FINAL ENVIRONMENTAL MANAGEMENT PROGRAMME

To facilitate compliance and sustainability during the development of a 400 MW solar photovoltaic (PV) facility (Phase 3)

Soventix South Africa (Pty) Ltd

FINAL ENVIRONMENTAL MANAGEMENT PROGRAMME

File Reference Number:

14/12/16/3/3/2/2167

Project Title:

The development of a 400 MW solar photovoltaic (PV) facility and associated infrastructure (Phase 3) on the Remainder of Farm Goede Hoop 26C, Portion 3 of Farm Goede Hoop 26C and other properties, between De Aar & Hanover, Emthanjeni Local Municipality, Pixley Ka Seme District Municipality, Northern Cape Province, South Africa.

Prepared for:

Mr Jean Paul de Villiers
Managing Director
Soventix South Africa (Pty) Ltd

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December 14, 2022

(Final)

MEMBERS: J.A. Bowers (M Tech, Pr.Sci.Nat.) & S.D. MacGregor (M.Sc., Pr.Sci.Nat.)
Reg: 2006/023163/23

DECLARATION

I the undersigned in my capacity as designated below, do hereby undertake to ensure that the conditions and recommendations in terms of the Environmental Management Programme (EMPr) relating to *the development of a 400 MW solar photovoltaic (PV) facility and associated infrastructure (Phase 3) on the Remainder of Farm Goede Hoop 26C, Portion 3 of Farm Goede Hoop 26C and other properties, between De Aar & Hanover, Emthanjeni Local Municipality, Pixley Ka Seme District Municipality, Northern Cape Province* are implemented in so far as they apply to my responsibilities. I assume accountability and responsibility in this respect.

Proponent:		
Name:		
Date:		**Signature**

Landowner:		
Name:		
Date:		**Signature**

Engineer:		
Name:		
Date:		**Signature**

*Contractor:		
Name:		
Date:		**Signature**

SEO:		
Name:		
Date:		**Signature**

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ECO:		
Name:		
Date:		**Signature**

IEA:		
Name:		
Date:		**Signature**

***** This declaration of the Main Contractor is binding on any sub-contractors / agents that may be employed by the Main Contractor in execution of his contract. It is the responsibility of the Main Contractor to ensure any sub-contractors are aware of this declaration and abide by it.

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DOCUMENT CONTROL

Table 1. Document Control.

Compiled by	Status	Revision	Signature	Date
Shannon Farnsworth	Draft	00		08 November 2022
Shannon Farnsworth	Final	00		14 December 2022

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EXECUTIVE SUMMARY

The National Department of Environmental Affairs granted an environmental authorisation with DEA Reference: 14/12/16/3/3/2/998 on 16th April 2018 (including two amendments in 2020 and 2021) for a 300 MW solar photovoltaic (PV) facility known as Phase 1. The applicant intends to develop two more solar PV facilities, specifically Phase 2 (300 MW) and Phase 3 (400 MW). Both facilities will feed into the authorised sub-station on Phase 1.

ECOLEGES Environmental Consultants was appointed by Soventix South Africa (Pty) Ltd as the Environmental Assessment Practitioner to undertake the Scoping and Environmental Impact Assessment (S&EIA) for Phase 3, involving the development of a 400 MW solar photovoltaic (PV) facility and associated infrastructure between De Aar & Hanover in the Northern Cape.

The scope of this EMPr relates to the solar PV facility only as the generic Environmental Management Programmes published in Government Gazette No. 42323 dated 22 March 2019 will be used for the development of the 'associated infrastructure', specifically the on-site substation and a 132 kV overhead distribution line, connecting the facility to Eskom's electrical grid.

This EMPr was developed using the impact and risk assessment, which formed part of the application for an Environmental Authorisation (EA) and Water Use License (WUL), in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) and the National Water Act, 1998 (Act No. 36 of 1998), respectively.

The size of the proposed development footprint for Phase 3 (a 400 MW solar PV facility) is approximately 650 ha. The facility is located 35 km Southeast of the town of De Aar within the Emthanjeni Local Municipality, and the Pixley Ka Seme District Municipality of the Northern Cape. The property details are the Remainder of Farm Goede Hoop 26C and Portion 3 of Farm Goede Hoop 26C.

The solar PV facility will be managed as an 'Agrivoltaic' system by combining current land use practices, specifically extensive livestock (sheep) production with green energy generation, simultaneously supporting the agricultural and energy industries.

Phase 3 will be built sequentially in 4 x 100 MW blocks. That way it is possible to limit the amount of people on site, as well as mitigate the need for excessive amounts of equipment, storage etc. There will also be some overlap between construction and operation. Once the first 100 MW block is complete, it will start feeding electricity into the national grid while the second and subsequent 100 MW blocks are being built. Consequently, construction items from fencing and roads to the on-site substation and operational offices must be completed first under the civil construction phase, generally 4 to 6 months. Subsequent construction of each 100 MW block typically takes 12 to 15 months from start to finish (pers. comm. JP De Villiers, Managing Director, Soventix).

None of the listed and/or specified activities that were triggered, and which required environmental authorisation, specifically included the term '*and related operation*'. Consequently, the scope of the activities pertaining to this project does not include an operational (or decommissioning) component. All activities that are to be undertaken during the development of the 400 MW solar PV facility have been

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described for the planning and design, pre-construction, construction, and post-construction phases only. Pre-construction follows on from the final project planning and tender phase and leads up to the establishment of the appointed contractor on site.

The EMPr is an extension of the EA and WUL, and as such is a legally binding document that should form part of any tender documentation and appointment contract to ensure its consideration and implementation throughout the life cycle of the project, that is from planning and design to post-construction rehabilitation and monitoring.

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APPENDIX

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CHECKLIST

An environmental management programme (EMPr) must comply with section 24N of the NEMA, 1998, as amended and contain those requirements prescribed in the EIA Regulations, 2014, as amended, including regulation 23 and Appendix 4. The full suite of requirements (listed in **Table 2**) has dictated the layout and content of this EMPr.

Table 2. Environmental Management Programme Checklist.

Content of Environmental Management Programme	Checked
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;	✓
(b) a detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description;	✓
(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;	✓
(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;	✓
(f) a description of proposed impact management actions, identifying the manner in which the impact management outcomes contemplated in paragraph (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;	✓

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(ii) comply with any prescribed environmental management standards or practices;	✓
(iii) comply with any applicable provisions of the Act regarding closure, where applicable; and	N/A
(iv) comply with any provisions of the Act regarding financial provisions for rehabilitation, where applicable;	N/A
(g) the method of monitoring the implementation of the impact management actions contemplated in paragraph (f);	✓
(h) the frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f);	✓
(i) an indication of the persons who will be responsible for the implementation of the impact management actions;	✓
(j) the time periods within which the impact management actions contemplated in paragraph (f) must be implemented;	✓
(k) the mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f);	✓
(l) a program for reporting on compliance, taking into account the requirements as prescribed by the Regulations;	✓
(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	✓
(n) any specific information that may be required by the competent authority.	✓
(2) Where a government notice gazetted by the Minister provides for a generic EMPr, such generic EMPr as indicated in such notice will apply.	✓
There are separate generic Environmental Management Programmes for the substation and the distribution line as per Government Notice No.42323 dated March 2019 (See **Appendix F: Annexure A** of EIA report)	

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ABBREVIATIONS / ACRONYMS AND DEFINITIONS

Table 3. List of terms for abbreviations used in this document.

Abbreviation / Acronym	Term
CA	Competent Authority
CAR	Corrective Action Report
CLO	Community Liaison Officer
CRE	Chief Resident Engineer
DFFE	Department of Forestry, Fisheries and Environment
DMRE	Department of Mineral Resources & Energy
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EAPASA	Environmental Assessment Practitioners Association of South Africa
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment as provided for in NEMA (Act 107 of 1998) and EIA Regulations (2014), as amended.
EIR	Environmental Impact Assessment Report
EMPr	Environmental Management Programme
ELU	Existing Lawful Use as per Part 3 of the National Water Act (Act 36 of 1998)
EM	Environmental Manager
IEA	Independent Environmental Auditor
GA	General Authorisation as per Section 39 of the National Water Act (Act 36 of 1998)
HSO	Health and Safety Officer
I&APs	Interested and Affected Parties
IDP	Integrated Development Plan
LA	Listed Activity (EIA Regulations, 2014)
LN1	Listing Notice 1: GN. No. R. 983, 4 December 2014, as amended in GN. No. R. 327, 7 April 2017.
LN2	Listing Notice 2: GN R. 984, 4 December 2014, as amended in GN. No. R. 325, 7 April 2017.
LN3	Listing Notice 3: GN R. 985, 4 December 2014, as amended in GN. No. R. 324, 7 April 2017.

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MPRDA	Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002)
MS	Method Statement
NEMA	National Environmental Management Act, 1998 (Act No. 107 of 1998)
NHRA	National Heritage Resources Act, 1999 (Act No. 25 of 1999)
NWA	National Water Act, 1998 (Act No. 36 of 1998)
SACNASP	South African Council for Natural Scientific Professions
SAHRA	South African Heritage Resources Agency
SDF	Spatial Development Framework
SEO	Site Environmental Officer
SO	Social Officer
SOP	Standard Operating Procedure
WUL	Water Use License

Table 4. Definitions of some terms used in this document.

Term	Source	Definition
Aspect (environmental)	ISO 14001: 2015	Element of an organisation's activities or products or services that interacts or can interact with the environment. An environmental aspect can cause (an) environmental impact(s). A significant environmental aspect is one that has or can have one or more significant environmental impact(s).
Corrective Action	ISO 14001: 2015	Action to eliminate the cause of a non-conformity (or non-compliance in the case of an EMPr) and prevent recurrence.
Development	EIA Regulations (2014)	Means the building, erection, construction or establishment of a facility, structure or infrastructure, including associated earthworks or borrow pits, that is necessary for the undertaking of a listed or specified activity, but excludes any modification, alteration or expansion of such a facility, structure or infrastructure, including associated earthworks or borrow pits, and excluding the redevelopment of the same facility in the same location, with the same capacity and footprint.

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Environmental Impact	ISO 14001: 2015	Change to the environment, whether adverse or beneficial, wholly or partially resulting an organisation's environmental aspects.
Maintenance	EIA Regulations (2014)	Means actions performed to keep a structure or system functioning or in service on the same location, capacity and footprint.
Performance	ISO 14001: 2015	Measurable unit. Performance can relate either to quantitative or qualitative findings.
Regulated Area of a watercourse	National Water Act (Act 36 of 1998)	(a) The outer edge of the 1:100-year flood line and /or delineated riparian habitat, whichever is the greatest distance, measured from the middle of the watercourse of a river, spring, natural channel, lake or dam; (b) In the absence of a determined 1 in 100-year flood line or riparian area the area within 100m from the edge of a watercourse where the edge of the watercourse is the first identifiable annual bank fill flood bench; or (c) A 500 m radius from the delineated boundary (extent) of any wetland or pan.
Significant impact	EIA Regulations (2014)	Means an impact that may have a notable effect on one or more aspects of the environment or may result in non-compliance with accepted environmental quality standards, thresholds or targets and is determined through rating the positive and negative effects of an impact on the environment based on criteria such as duration, magnitude, intensity and probability of occurrence.
Watercourse	EIA Regulations (2014)	(a)A river or spring; (b)A natural channel in which water flows regularly or intermittently; (c)A wetland, pan, lake or dam into which, or from which, water flows; and any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse as defined in the National Water Act, 1998 (Act No. 36 of 1998); and A reference to a watercourse includes, where relevant, its beds and banks.

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Section 1: DETAILS AND EXPERTISE OF EAP AND APPLICANT

Details of –

(i) The EAP who prepared the report;

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E-mail	shannon@ecoleges.co.za

Details of the Applicant;

Project Applicant	Soventix (Pty) Ltd
Trading Name (if any)	Same as above
Contact Person	Jean-Paul de Villiers
Physical Address	Unit E2 and E3, 8 Quantum Road Firgrove Business Park (Off main Road M9) Somerset West South Africa
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Cell	+27 (0)82 550 6672
Fax	+27 (0)21 852 5089
Email	Jp.devillers@soventix.com

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(ii) The expertise of the EAP to prepare the EMPr, including a curriculum vitae.

Abbreviated Curriculum Vitae of **Shannon Farnsworth**	
Specialisations	Key Fields: environmental/ecological management plans, environmental auditing, Environmental Impact & Basic Assessment, PA Management
Qualifications & Courses Attended	**2009 – 2011** BSc: Environmental Management & Geography, University of Kwa-Zulu Natal. **2012 – 2019** • Firearm training in the handle and use of handgun, shotgun, manual and self-loading operated rifle and carbine. • Environmental Management Inspector [EMI] basic training course for government officials conducted by the national Department of Environmental Affairs [DEA]. designated by the hon. MEC in KwaZulu-Natal for Economic Development, Tourism and Environmental Affairs, Mr. Sihle Zikalala, as a grade 2 environmental management inspector • Wetland wet-heath and Wet-ecoservices training provided by WESSA and UKZN • Certificate of successful completion of: basic Geographic Information Systems [GIS] arc 10 training course • Mini-SASS [stream assessment scoring system] by Duzi Umgeni Conservation Trust [DUCT] and the then Department of Agriculture and Environmental Affairs [DAEA] • Certificate of attendance issued by Maccaferri Africa for hydraulics: introduction to river protection and for hydraulics: introduction to coastal protection • Ecological infrastructure training workshop by WESSA
Memberships & Registrations	**2013 - Present** Registered member of the South African Council for Natural Scientific Professions [SACNASP] as a Certified Natural Scientist in the field of Environmental Science. Registration Number: 200215/13 **2020 - Present** Registered as a professional Environmental Assessment Practitioner [EAP] with the Environmental Assessment Practitioners Association of South Africa [EAPASA]. Registration Number: 2020/176
Career Summary	**September 2021 – Current** Environmental Assessment Practitioner – Ecoleges Environmental Consultants **December 2020 – Current** Member of the Mopani District Municipal Planning Tribunal – Env Portfolio **February 2020 – November 2020** Operational Management - African Dawn Safaris **April 2019 – December 2019** Manager: Env Mgt Unit at Msunduzi Municipality **January 2012 – March 2019** Environmental Scientist: Env Mgt Unit at Msunduzi Municipality

Full Curriculum Vitae available if required.

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Section 2: DESCRIPTION OF THE ACTIVITY

(b) a detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description.

Project Title

The development of a 400 MW Solar Photovoltaic (PV) facility and associated infrastructure (Phase 3) on the Remainder of Farm Goede Hoop 26C, Portion 3 of Farm Goede Hoop 26C and other properties, between De Aar & Hanover, Emthanjeni Local Municipality, Pixley Ka Seme District Municipality, Northern Cape Province, South Africa.

Detailed Project Description

Size

The size of the development footprint for the 400 MW solar PV facility, comprising four separate but interconnected PV Blocks is approximately 650 ha.

Agrivoltaic System

The solar PV facility will be managed as an 'Agrivoltaic' system by combining current land use practices, specifically extensive livestock (sheep) production with green energy generation.

PV Modules

A single PV device is known as a cell. To boost the power output of PV cells, they are connected in chains to form larger units known as modules or panels. The applicant, Soventix (Pty) Ltd will use Bifacial Mono Perc modules. Each module is approximately 2.2 by 1.1 m (or 2,42 m^2) in size. Modules are connected to form arrays. Several arrays are then connected to an inverter. Inverters convert the voltage from direct current (DC) to alternating current (AC). The inverters are cabled to field transformers. The field transformers then transfer and increase (step up) the voltage of the alternating-current circuit to Eskom's electrical grid via an onsite substation.

Arrays (or racks)

Two rows of approximately twenty-three to twenty-six modules each will be mounted onto a single-axis tracker and supported by steel or aluminium racks. Consequently, each rack would accommodate approximately 125.84 m^2 of panel (or a total area of 270 m^2 including gaps between the panels). The racks are arranged in parallel, approximately 9,5 m apart (between piles). The results of a geotechnical assessment will determine whether the racks are held in place by either a ballast or piled foundation. Solar arrays will be orientated in a northern direction and track the sun from east to west. As far as possible, arrays will be arranged in four or five blocks of approximately 150 ha each. Each block can produce up to 140 MW, but under current legislation will be capped at 100 MW.

Inverters

There will be three to four inverters per MW (300 to 400 inverters per 100 MW block, or 1200 to 1600 inverters for 400 MW).

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Field Transformers

Depending on the inverter technology available and transformer size chosen, approximately 27 inverters are connected to a field transformer, and there will be approximately twelve field transformers per 100 MW. Fewer field transformers will be required if larger units are installed.

Height of the Modules (or panels)

The arrays will be placed over the vegetation. The solar panels sit in two in portrait (not landscape – they are rectangular shaped), so from the centre pivot point, 2.274 m each way (as each panel is 2.274 m long). They stow overnight horizontally, that is at zero tilt to reduce wind loading (See cross-section drawing of horizontal panel on right of **Figure 1** below). The height of the array above the ground in the

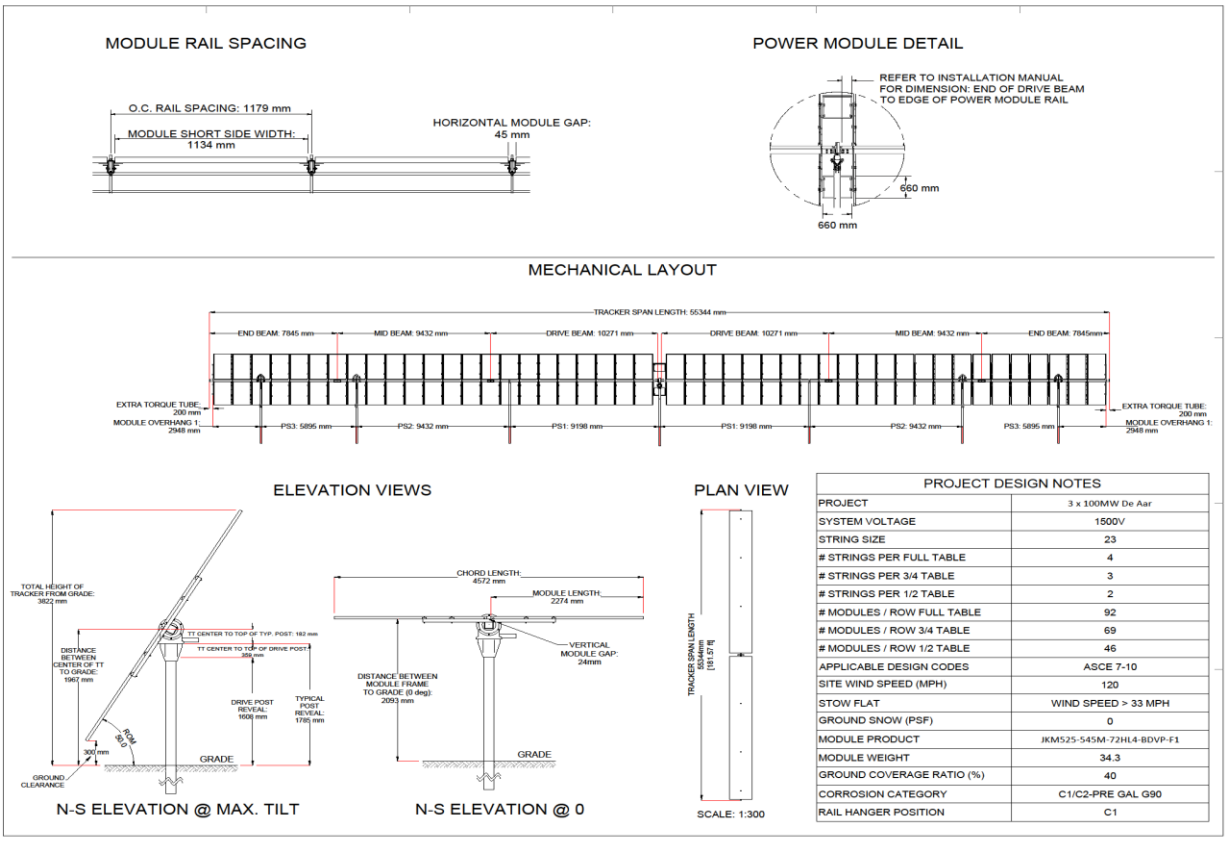

Figure 1: Elevation views of solar modules on a single-axis tracker at maximum tilt (left) and zero tilt (right).

stow position is ± 2 m. The solar panels cannot move to a vertical (90º) position. The maximum tilt at sunrise (east-facing) and sunset (west-facing) is 45º to 55º, so the ground clearance and maximum height during these brief periods will be 0.3 m and 3,822 m, respectively (See cross-section drawing of angles – panel on left of **Figure 1**). The maximum and minimum height in the design below is the starting position and ending position at sunrise and after sunset, respectively. Soventix South Africa (Pty) Ltd is working with the mounting structure supplier to increase the minimum height, however the maximum height will not exceed 4 m.

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On-site Substation and Distribution Line

Separate generic Environmental Management Programmes have been published for the on-site substation and the distribution line as per Government Notice No.42323 dated March 2019 (**Appendix F: Annexure A** of EIA report)

For background information, all four 100 MW blocks will feed into an on-site substation. A 10 to 15 m lightning mast will be erected within proximity to the on-site substation. The on-site substation will be linked to the Main Transmission Substation (MTS) on Phase 1 via a 132 kV distribution line. The distribution lines are approximately 20 m high, and the servitude width is approximately 22 m (11 m from the centre line).

The planned 132 kV distribution line, including an access/service road within the 22 m-wide servitude, will intersect three watercourses with a total of five (5) watercourse crossings. The first watercourse crossing is 151 m wide, whereas the second watercourse south of the railway line is a braided channel, comprising 3 crossings (811 m, 574 m and 499m wide) and the third watercourse associated with a borehole, pan and dam (76 m wide).

Timing and Employment

The three phases will be built sequentially. There may be some overlap. Once civil works on Phase 1 are complete the civils' team would move onto Phase 2. Furthermore, each phase would be built sequentially, e.g., Phase 3 will be built in 4 x 100 MW blocks. That way it is possible to limit the amount of people on site, as well as mitigate the need for excessive amounts of equipment, storage etc.

There will also be some overlap between construction and operation. In other words, once the first 100 MW block is complete, it will start feeding electricity into the national grid while the second and subsequent 100 MW blocks are being built. Consequently, construction items from fencing and roads to the on-site substation and operational offices must be completed first under the civil construction phase, generally 4 to 6 months. Subsequent construction of each 100 MW block typically takes 12 to 15 months from start to finish (pers. comm. JP De Villiers, Managing Director, Soventix).

We have assumed 650 construction staff during peak construction, and 55 staff during operation (pers. comm JP De Villiers, Managing Director, Soventix). Whilst the construction phase numbers provided are within the expected range, they are based on the requirement for a very tight completion deadline as communicated by the IPP. The phased construction of all individual 100 MW projects will therefore have a large overlap period, thereby creating the expected peak (pers. comm. Bruce Conné, General Manager, Soventix). Should the individual project implementation program stagger out for any reason then the number of expected person-hours of employment created will still be the same, but the peak would be lower because of the extended timeline (pers. comm. Bruce Conné, General Manager, Soventix).

Vegetation Clearance

Vegetation will be cleared from the physical footprint of the construction camp (including laydown area), inverters, field transformers, on-site substation, rack foundations, pylon footings, underground cables and

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water pipes, roads (including the fire-break road) and fencing posts, operational area, borrow pit, water storage tanks and deionization plant(s). A total of 155 ha will be cleared.

Roads

Two-track roads

Approximately two (2) m-wide two-track access roads totalling an estimated 553 km will be placed between the parallel arrays during the construction phase. It is assumed that the total length of two-track access roads will be equal to the total length of solar arrays, that is 553 km.

Cleared/Graded Roads

Approximately 5 km of existing two-track roads (including the servitude road under the existing Eskom 132 kV powerline) will be upgraded, that is graded 5 to 6 m wide, imported material, shaped for runoff, and compacted.

An estimated ± 35,6 km of new access roads (including the proposed 132 kV distribution line between the on-site substation (Dx) and the Main Transmission Substation (MTS) - 3 km from Dx to road (11 m wide allowing 8 m for the roadbed preparation, and up to 3 m for the side/cut-off drain) and then 5,1 km to the MTS) will be constructed (graded 5 – 6 m wide, imported material, shaped for runoff, and compacted) to access the construction camp, operational area, components of the PV system, such as the field transformers, on-site substation, and distribution line.

Road Crossings

Six (6) road crossings will be required to access the four different PV Blocks of the Solar PV facility, which is fragmented by the watercourse. Two of the crossings are existing and will therefore be expanded, whereas four of the road crossings will be new developments. All 6 road crossings will be combined with underground cables and/or water pipelines. Pre-cast box culverts or pipes will be required for the road crossings.

The 132 kV distribution line, including an access/service road within the 22 m-wide servitude, will intersect three watercourses with a total of five (5) watercourse crossings. The first watercourse crossing is 151 m wide, whereas the second watercourse south of the railway line is a braided channel, comprising 3 crossings (811 m, 574 m and 499 m wide) and the third watercourse in proximity to the MTS is associated with a borehole, pan and dam (76 m wide).

Passing Lanes

Passing lanes which will widen the total road width up to 8 m wide and ± 30 m long will be placed at strategic areas on existing or new roads. No passing lanes are permitted within the 50 m ecological buffer of any watercourse.

Borrow Pit(s)

Any fill material required for road construction will be obtained from existing borrow pits (no mining permit is required as per the exemption afforded in section 106 of the MRPDA) and/or a new borrow pit (not

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more than 2 ha in surface area) will be mined. The borrow pit may only be used to source suitable material for improvements to the property that it is located on.

Operational Area

The operational area comprises a controlled access (security gate and guard house (± 11 m^2)), single-storey buildings (OM building (± 262 m^2), main warehouse (± 302 m^2) and secondary warehouse (± 143 m^2)), unpaved parking, and a sewerage treatment plant(s). The buildings shall be constructed from brick with metal sheet roofing and include space for an office, showers (incl. change rooms), toilets, medical room, control room, kitchen, storeroom, and workshop.

Fencing

Considering a razor-wire mesh security fence is potentially harmful to wildlife, an eco-friendly alternative is preferred. However, the IPP shall determine the final fence design by undertaking a due diligence that provides an acceptable balance (best point of intersection) between (a) harm to wildlife or domestic stock, (b) cost, and (c) the IPP's security standards (to ensure protection of the high-valued asset from theft). Where the sand is soft enough to tunnel under, the fence will be embedded into the ground.

Access will be controlled using a security gate. It is planned to maintain continuity throughout the ephemeral drainage line by installing the perimeter fence around each PV block approximately 1 m outside the demarcated 50 m ecological buffer. A 10 m-wide fire break, comprising a constructed road with mowed vegetation will be created inside the perimeter fence. The road will be located within 2 m of the perimeter fence (as per the recommendation by the Avian specialist). The fire break will be extended by mowing 1 m of vegetation beyond the perimeter fence, that is until the 50 m ecological buffer.

Visual screening

The visual recommendations from the Visual Impact Assessment were all incorporated into the layout design, including a 250 m 'visual sensitivity buffer' from sensitive receptor boundaries, specifically the Remainder of Farm No. 149 and Portion 2 of Taaibosch Fountain 41, and a 70 m 'visual sensitivity buffer' along the boundary with the Remainder of farm Leuwe Fountain 27.

Lighting

The facility will not be lit up at night. The fence line will be secured using multiple FLIR PTZ cameras which have a 2 km range in absolute darkness (pers. comm. JP De Villiers, Managing Director, Soventix). The obvious areas that would have lights is the control and security office, as well as the on-site substation, which is a legal requirement (pers. comm. JP De Villiers, Managing Director, Soventix).

Electricity

Electricity during construction of at least the first PV block will be sourced from a 20 kVA mobile generator with an integrated diesel tank (fuel capacity ± 55 litres) but used in conjunction with a solar system. The generator will be located at the construction camp. Once the first PV block is complete and operational (capable of generating electricity), then it will be able to supply electricity for the remainder of construction.

Access

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The main access is off the N10 between De Aar & Hanover, specifically at the 'Burgerville' District Road (2448) turn-off. Access continues along the District Road and takes a right turn after crossing over the railway line, travelling in a south-easterly direction along Transnet's service road, and finally takes a left turn into a farm gate (for the Remainder of Farm Riet Fontein No. 39), marking the entrance to the Phase 2 Solar PV Facility. These roads are existing.

The existing access road from the farm gate continues in a north-easterly direction through Phase 2 and towards Phase 3, until it reaches a four-way intersection. At this point, there will be two access roads into Phase 3; the one will involve upgrading the farm track that continues in a north-easterly direction towards the entrance of PV Block No. 3, and the second will involve upgrading the existing Eskom service road under their 132 kV distribution line than runs in a south-easterly direction until its intersection with a new access/service road (described below) that leads to the entrance of PV Block No. 4 (including the operational area), and the Switching station (Dx).

An approximately 3 km long and 11 m wide (allowing 8 m for the roadbed preparation, and up to 3 m for the side/cut-off drain) access road will be constructed for unrestricted Eskom access to the Switching station (Dx) without traversing the fenced solar PV facility development footprint. This road will simultaneously function as a service road and will be constructed alongside and/or within the 22 m-wide servitude of the 132 kV distribution line between Transnet's service road and the Dx in PV Block No. 4.

Water Abstraction

Estimated Yields

There are two existing boreholes in the study area; Borehole No. 4 or BH4 (30°49'43.62"S and 24°20'55.07"E) is located on the Remainder of Farm Goede Hoop 26C. and Borehole No. 5 or BH5 (30°49'30.17"S and 24°22'5.58"E) is located on Portion 3 of Farm Goede Hoop 26C. The sustainable abstraction yields, based on the recommended abstraction rate of 8 hrs pumping per day, are 6,58 l/s (or **189,5 m³/day**) and 5,11 l/s (or **147,17 m³/day**) for BH4 and BH5, respectively (Geohydrological Assessment Report (Final Rev 3), prepared by GCS Water and Environmental Consultants, dated 10th August 2022, GCS Project Number: 22-0401). Consequently, the combined sustainable abstraction yields for both properties is **336,67 m³/day**.

A third borehole is proposed within proximity to the construction camp/operational area (PV Block 4). Two potential sites have been identified on the Remainder of Farm Goede Hoop 26C; T1 (30°51'3.60"S and 24°21'26.89"E) and T2 (30°51'5.04"S and 24°21'28.30"E).

Estimated Water Demand

The water use license application pertaining to the abstraction of groundwater from both properties combined, including all boreholes contained thereon, shall be for **216 m³/ day** during the construction period (including when it overlaps with operation), and **150 m³/day** during operation.

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However, abstraction may not exceed the sustainable abstraction yield at the recommended pumping rate of 8 hrs per day for each borehole, that is 6,58 l/s @ 8hrs (or **189,5 m³/8hr day**) for BH4 and 5,11 l/s @ 8 hrs (or **147,17 m³/8hr day**) for BH5.

Rainwater Harvesting (during operation)

Harvesting rainfall run-off from a roof (Schedule 1 Permissible Use of Water (1) (c) "store and use run-off water from a roof") is only worth it if the water can supplement non-potable usage. In this case the only non-potable usage options during operation are toilet-flushing and dust suppression. Furthermore, the principal source of water that can already be used to supplement toilet flushing and dust suppression is the treated effluent from the Multirock 60 treatment system. The treatment system could generate sufficient treated effluent for toilet flushing with some excess for dust suppression. Consequently, the benefit of harvesting rainfall runoff from the roof would be limited to dust suppression and only during the wet months of the year when dust suppression is likely to be in least demand. Another potential benefit of rainwater collection is to help disinfect the treated effluent from the Multirock 60 treatment system.

Consequently, and only if the project engineers determine rainwater harvesting to be a feasible water-saving strategy, rainwater will be stored in the same tank system as the treated effluent from the Multirock 60 treatment system. The three (3) 10 m3 water storage tanks making up the tank system may be increased by two additional tanks to accommodate the rainwater run-off (up to five (5) tanks or **50 m³** in total).

Water Storage

Groundwater during construction and operation

Twenty (20) tanks or **200 m³** will be used for potable water from Boreholes No. 4 and No. 5 (in PV Block 2), and Ten (10) tanks or **100 m³** will be used for potable water at the operational area (in PV Block 4), for washing solar panels and domestic use.

During construction only four (4) tanks or up to **40 m³** will be used for storing potable groundwater on top the toilet containers connected to the NEWGen100 wastewater treatment system.

The construction and operational phases will overlap. Consequently, the combined storage of groundwater on Portion 3 of Farm Goede Hoop 26C during construction and operation shall not exceed **340 m³**.

Treated Effluent during construction

Up to four (4) tanks or **40 m³** will be used for storing treated effluent that is the disinfected recycled water for flushing toilets, on top the toilet containers connected to the NEWGen100 wastewater treatment system.

Excess 'unrecycled' but treated effluent from the NEWGen100 flush toilet sewage treatment system will need to be stored in 4 additional 10 m³ tanks or **40 m³** and reused for dust control and/or be disposed of via a sub-surface soakaway.

Treated Effluent (and rainwater) during operation

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Up to five (5) tanks or **50 m³** will be used for storing treated wastewater (and rainwater) from the Multirock 60 on-site disposal facility for disposal and/or reuse (toilet flushing and/or dust suppression.

Untreated Effluent (concrete slurry from e.g., concrete mixer trucks) during construction

Up to ten (10) 10 m³ containers or **100 m³** will be used to store concrete slurry for reuse or disposal.

Contaminated Soil

Storing contaminated soil for reuse (bioremediation and rehabilitation) and/or disposal - a **10 m³** container will be made available for the storage and bioremediation of soil contaminated with hydrocarbon spills or storage and collection for disposal at the De Aar licensed landfill site.

In summary, the construction and operational phases will overlap. Consequently, the combined storage of groundwater on Portion 3 of the Farm Goede Hoop 26C during construction and operation shall not exceed **340 m³** (**S21(b)**), the combined storage of treated effluent shall not exceed **130 m³**, the combined storage of untreated effluent (concrete slurry from e.g., concrete mixer trucks) shall not exceed **100 m³**, and the storage of contaminated soil shall not exceed **10 m³**.

Domestic Wastewater

Construction

Assuming the estimated demand shall be **16,25 m³/day** during construction (650 staff and the provision of 25 litres of potable water per person per day), **13 m³** of "domestic wastewater" (wastewater arising from domestic and commercial activities and premises and may contain sewage) shall be generated each day.

The principal sanitation system during construction shall be a sewerage treatment package plant. Black water (flush toilet sewerage) and grey water (from hand wash basins) will be treated in a decentralised toilet block treatment system known as NEWGen100. NewGen100 is a compact containerised treatment unit that treats and recycles >99% of the flush toilet sewage from multiuser toilet blocks. The system is an autonomous, solar-powered, compact, and off-grid sewage treatment system which utilizes membrane biotechnology for the treatment of sewage from toilets for re-use in the toilets.

The NewGen100 sanitation system will be supplemented by portable chemical toilets for use by the work front further away from the construction camp. Collected by supplier for disposal at a licensed municipal Wastewater Treatment Works (WWTW).

The NewGen100 sanitation system shall comprise a 6 m shipping container that houses the NewGen100 Treatment unit, a NEWGen1000 Multiplier Treatment unit (for 1 000 users per day) and up to four (4) 12 m toilet containers (10 toilets per container). The modular design makes the plants capable of handling a phased variation in capacity.

Outputs of the system include,

(1) Screening and grit removal (Collected for disposal at a licensed hazardous waste landfill site),

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(2) Sludge (Sludge beneficiation is encouraged, otherwise the sludge from septic tanks will be disposed of in accordance with the "Guidelines for the Utilisation and Disposal of Wastewater Sludge: Volume 3: Requirements for the on-site and off-site disposal of sludge."),

(3) Biogas (CO_2 and Methane - Biogas to energy is encouraged; reused for cooking, boiling water in a hot water urn and/or to provide hot water to the basins in the containerised toilet blocks via a gas geyser), and

(4) Treated effluent (Discharge Limit: Toilet flushing standards).

A sub-surface soakaway will be required to dispose of the 'unrecycled' or excess treated effluent that cannot be reused for dust control/suppression.

Operation

Assuming the estimated demand shall be **5,5 m³/day** during operation (55 staff and the provision of 100 litres of potable water per person per day), **4,4 m³** of "domestic wastewater" (wastewater arising from domestic and commercial activities and premises and may contain sewage) shall be generated each day.

The principal sanitation system during operation shall be a sewerage treatment package plant. Black water (flush toilet sewerage) and grey water (hand wash basins in kitchen, change rooms, medical room, and/or workshop) shall be treated to general limits with a Biorock package plant. Biorock products are capable of recycling domestic sewerage to produce a high-quality final product fit for irrigation or to return safely to the local receiving environment.

The Multirock 60 treatment system shall accommodate the predicted 55 staff during operation, and still have capacity to accommodate for occasional increases in staff during, for example, stakeholder meetings and site inspections.

The system will be made up of four (4) 6 m³, 3-chambererd primary (septic) tanks, and two (2) 5 m³ ECOROCK-5010 treatment unit(s). The primary tank clarifies the sewage water of fats, oils, greases, and organic solids before the sewage then passes through an effluent filter and discharges into the ECOROCK-5010 units. The aerobic purification (secondary treatment) and the filtration (tertiary treatment) processes take place in the ECOROCK-5010 units.

The treated effluent will be discharged by submersible pump into three (3) 10 m³ water storage tanks. The tank system will provide about 4 to 5 days of storage of the treated effluent before it will overflow, but it may significantly deteriorate if stored for more than 24 hrs. Hence, the treated effluent will be disinfected and preserved in the water tank with a simple floating chlorine basket (contact chlorination). Alternative means of disinfection include germicidal UV-light radiation, and dilution, using rainwater when available.

Outputs of the system include,

(1) Sludge, and

(2) Treated effluent (Discharge Limit: Toilet flushing standards).

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A sub-surface soakaway will be required to dispose of the treated and disinfected effluent that cannot be reused for dust control/suppression.

The Biorock service includes a set of water samples professionally analysed by an accredited laboratory to determine the process performance of the sewerage treatment system (every 12 months). A sample set comprises two samples, one taken from the primary tank, and the second from the outlet of the ECOROCK-5010 unit(s) (before disinfection). The results are presented in a laboratory analyses report, as well as a summary analyses report by BIOROCK Africa. Sample analysis and reporting will take 7-14 days from submission to the laboratory.

Waste Management

Construction

It is anticipated that both general and hazardous waste types will be generated during construction (**Table 5.**). Except for domestic wastewater (**13 m³/day**), volumes cannot be known.

The principal sanitation system during construction shall be a sewerage treatment package plant as mentioned above.

Table 5. Identification of construction waste types and proposed management methods.

Source	Waste type	Proposed Control Method(s)
Concrete mixing	Rubble (Inert)	Solid concrete rubble will be re-used as fill material and/or disposed at the De Aar licensed landfill site.
	wet Slurry (Hazardous) dry Slurry (General waste)	Slurry from the concrete mixing will be recycled in concrete production or once hardened, reused as fill material and/or disposed at the De Aar licensed landfill site.
	Residual wastewater (Hazardous)	Reuse residual wastewater by replacing borehole water for making new mortar or concrete, and/or allowed to evaporate.
Construction plant	Used motor oil (Hazardous)	Collected by a registered collector or mechanic (during emergency repairs) for recycling.
	Contaminated soil (Hazardous)	Bioremediation and/or collected for disposal at the De Aar licensed landfill site.
Containerised toilet blocks, staff welfare area/ kitchens connected to the	Domestic wastewater	NEWGen100 treats and recycles >99% of the flush toilet sewage for re-use in the toilets.

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NewGen100		Excess 'unrecycled' grey water from the NEWGen100 flush toilet sewage treatment system will be reused for dust control and/or be disposed of via a sub-surface soakaway.
	Screening and Grit (Hazardous)	Collected for disposal at a licensed hazardous waste landfill site.
	Sludge	Sludge beneficiation is encouraged, otherwise the sludge from septic tanks will be disposed of in accordance with the "Guidelines for the Utilisation and Disposal of Wastewater Sludge: Volume 3: Requirements for the on-site and off-site disposal of sludge."
	Biogas (CO_2 and Methane)	Biogas to energy is encouraged; reused for cooking, boiling water in a hot water urn and/or to provide hot water to the basins in the containerised toilet blocks via a gas geyser.
Chemical toilets	Domestic wastewater	Collected by supplier for disposal at a licensed municipal Wastewater Treatment Works (WWTW).
Office	Paper (General waste)	Collected for recycling.
	Stationary (General waste)	Separated for re-use and/or recycling, and/or collected for disposal at the De Aar licensed landfill site.
	Ink cartridges (Hazardous)	Transferred to or collected by supplier for recycling.
Staff Welfare area	Organic (food) waste (General waste)	Collected for disposal at the De Aar licensed landfill site
	Food/drink packaging (General waste)	Separated for re-use and/or recycling, and/or collected for disposal at the De Aar licensed landfill site
Packaging	Cardboard, plastic, wood, cement bags (Inert)	Collected for re-use and/or recycling.
Solar PV components	Modules, wiring/cabling, etc. (e-waste)	Recycled and/or disposed of at a licensed hazardous waste landfill site.

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Operation

It is anticipated that both general and hazardous waste types will be generated during operation (**Table 6.**). Except for domestic wastewater (**4,4 m^3/day**), volumes cannot be known.

The principal sanitation system during operation shall be a sewerage treatment package plant as mentioned above.

Table 6. Identification of operation waste types and proposed management methods.

Source	Waste type	Proposed Control Method(s)
Parking area	Contaminated soil (Hazardous)	Bioremediation and/or collected for disposal at the De Aar licensed landfill site.
Ablutions (toilets and showers) and Kitchen connected to the **Multirock 60**	Domestic wastewater	Treated effluent from the BioRock sewage treatment system reused for toilet flushing, dust control and/or disposed of via a sub-surface soakaway
	Sludge	Sludge beneficiation is encouraged, otherwise the sludge from septic tanks will be disposed of in accordance with the "Guidelines for the Utilisation and Disposal of Wastewater Sludge: Volume 3: Requirements for the on-site and off-site disposal of sludge."
Office	Paper (General waste)	Separated and collected for recycling.
	Stationary (General waste)	Separated for re-use and/or recycling, and/or collected for disposal at the De Aar licensed landfill site.
	Ink cartridges (Hazardous)	Transferred to or collected by supplier for recycling.
Kitchen	Organic (food) waste (General waste)	Collected for disposal at the De Aar licensed landfill site
	Grease trap (General waste)	Collected for disposal at the De Aar licensed landfill site
	Food/drink packaging (General waste)	Separated for re-use and/or recycling, and/or collected for disposal at the De Aar licensed landfill site
Packaging	Cardboard, plastic, wood (Inert)	Collected for re-use and/or recycling.

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Solar PV components	Modules, wiring/cabling, etc. (e-waste)	Recycled and/or disposed of at a licensed hazardous waste landfill

Construction Staff and Equipment

Phase 3 will be built in 4 x 100 MW blocks. That way it is possible to limit the amount of people on site, as well as mitigate the need for excessive amounts of equipment, storage etc.

There will also be some overlap between construction and operation - once the first 100 MW block is complete, it will start feeding electricity into the national grid while the second and subsequent 100 MW blocks are being built. Consequently, construction items from fencing and roads to the on-site substation and operational offices must be completed first under the civil construction phase, generally 4 to 6 months. Subsequent construction of each 100 MW block typically takes 12 to 15 months from start to finish (pers. comm. JP De Villiers, Managing Director, Soventix).

During this period there will be approximately 650 employment opportunities (mainly unskilled and semi-skilled). Many the workforce would be sourced from the surrounding areas. Specific training would also be provided for more technical tasks. The appointed contractor would be required to establish a construction camp and laydown area.

Heavy delivery vehicles will use the same staging area as for Phase 1 and 2. Materials, machinery and equipment will then be transferred onto lighter vehicles so that they can pass underneath Transnet's railway line unhindered and transported to the laydown area in the construction camp.

It is anticipated that the construction equipment will include at least:

- Water tankers,
- Graders,
- Tipper trucks,
- Drilling rigs
- Mobile pile ramming machines
- Rock crushing plant,
- Excavators,
- TLBs,
- Concrete mixers,
- Compaction equipment,
- Light delivery vehicles, and
- Heavy delivery vehicles (for the transformers).

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Listed and Specified Activities

An application for an EA has been submitted to the National Department of Forestry, Fisheries and the Environment (DFFE) in terms of the EIA Regulations, 2014 as amended to undertake listed activities 11, 12, 19, 24, 28, and 48 of **Listing Notice 1** (GG No. 40772, GN No. 327, 07th April 2017), listed activities 14 and 18 of **Listing Notice 3** (GG No. 40772, GN No. 324, 07 April 2017), and listed activities 1 and 15 of **Listing Notice 2** (GG No. 40772, GN No. 325, 07 April 2017) (**Table 7**).

Table 7. All listed and specified activities triggered and being applied for.

Activity No(s):	Provide the relevant **Basic Assessment Activity(ies)** as set out in **Listing Notice 1** of the EIA Regulations, 2014 as amended	Describe the portion of the proposed project to which the applicable listed activity relates.
LN 1, Listed Activity 11	The development of facilities or infrastructure for the transmission and distribution of electricity - (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts;	The placement of factory-manufactured 800V/33kV in-field transformer stations that collectively feed into an on-site substation which steps the voltage up to a 132 kV Distribution Line for the transmission and distribution of electricity on land zoned as Agriculture (a rural area).
LN 1, Listed Activity 12	The development of— (ii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs— (a) within a watercourse; (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse;	Five new linear infrastructure crossings including road crossings, underground cables and/or underground water pipelines between the four solar PV Blocks will have a combined physical footprint of approximately 25 258 square metres within 32 m of the ephemeral drainage line. The 132kv distribution line and associated access/service road will have a combined physical footprint of approximately 53 482 square metres within 32 m of the affected watercourses.
LN 1, Listed Activity 19	The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation,	Seven linear infrastructure crossings including roads, underground cables and underground water pipelines between the four solar PV blocks will result in the

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	removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse;	combined excavation and infilling of approximately 56 179 m^3 of soil from the ephemeral drainage line. The 132 kV distribution line and associated access/service road will result in the excavation and infilling of approximately 92 884 m^3 of soil from five watercourse crossings.
LN 1, Listed Activity 24	The development of a road – (i) for which an environmental authorisation was obtained for the route determination in terms of activity 5 in Government Notice 387 of 2006 or activity 18 in Government Notice 545 of 2010; or (ii) with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres; but excluding a road – (a) which is identified and included in activity 27 in Listing Notice 2 of 2014; (b) where the entire road falls within an urban area; or (c) which is 1 kilometre or shorter.	An approximately 3 km long and 11 m wide (allowing 8 m for the roadbed preparation, and up to 3 m for the side/cut-off drain) access road will be constructed for unrestricted Eskom access to the Switching substation (Dx) without traversing the fenced solar PV facility development footprint. This road will simultaneously function as a service road and will be constructed alongside and/or within the 22 m-wide servitude of the 132 kV distribution line between Transnet's service road and the Dx in PV Block No. 4.
LN 1, Listed Activity 28	Residential, mixed, retail, commercial, industrial, or institutional developments where such land was used for agriculture, game farming, equestrian purposes or afforestation on or after 01 April 1998 and where such development:	The development of a 400 MW Solar PV facility on approximately 650 ha of land zoned as Agriculture (in a rural area).

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	(ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare;	
LN1, Listed Activity 48	The expansion of – (i) infrastructure or structures where the physical footprint is expanded by 100 square metres or more; where such expansion [or expansion and related operation] occurs - (a) within a watercourse; (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse;	Two existing two-track dirt road crossings (PV3 to PV2 and PV3 to PV1) will be upgraded (graded, imported material, shaped for runoff, and compacted) and expanded to accommodate underground cables and/or water pipelines by approximately 5 647 m^2 within 32 m of the ephemeral drainage line.
Activity No(s):	Provide the relevant **Basic Assessment Activity(ies)** as set out in **Listing Notice 3** of the EIA Regulations, 2014 as amended.	Describe the portion of the proposed project to which the applicable listed activity relates.
LN3, Listed Activity 14 (replaces LA12 of LN1)	The development of – (ii) infrastructure or structures with a physical footprint of 10 square metres or more; where such development occurs - (a) within a watercourse; (c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse; g. Northern Cape ii. Outside urban areas: (ff) Critical biodiversity areas or ecosystem service areas	Five new linear infrastructure crossings including road crossings, underground cables and/or underground water pipelines between the four solar PV Blocks will have a combined physical footprint of approximately 25 258 square metres within 32 m of the ephemeral drainage line. The 132kv distribution line and associated access/service road will have a combined physical footprint of approximately 53 482 square metres within 32 m of the affected watercourses.

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	as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; yes - Study area is in an ESA in the Northern Cape CBA Map 2016.	
LN3, Listed Activity 18	The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre. g. Northern Cape ii. Outside urban areas: (ii) Areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland; yes	Existing two - track dirt roads will be widened by more than 4 m to a total road width up to 6m within 100 m of two existing road crossings (PV3 to PV2 and PV3 to PV1) over the ephemeral drainage line. Sections of existing two-track dirt roads within 100 m of two existing road crossings (PV3 to PV2 and PV3 to PV1) over the ephemeral drainage line will be widened by more than 4 m to create passing lanes (up to 8 m wide and ± 30 m long) for delivery vehicles during construction.
Activity No(s):	Provide the relevant **Scoping and EIR Activity(ies)** as set out in **Listing Notice 2** of the EIA Regulations, 2014 as amended.	Describe the portion of the proposed project to which the applicable listed activity relates.
LN 2, Listed Activity 1	The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more.	The development of a 400 MW Solar Photovoltaic (PV) facility on land zoned as agriculture (in a rural area).
LN 2, Listed Activity 15	The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for – (i) the undertaking of a linear activity; or (ii) maintenance purposes undertaken in accordance	Approximately 150 ha of indigenous vegetation will be cleared from the physical footprint of the construction camp (including laydown areas), inverters, field transformers, on-site substation, rack foundations/piles, pylon footings, underground cables and water pipes, roads, a fire-break road and fencing posts, operational area, borrow pit, water storage tanks and deionization plants.

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	with a maintenance management plan.	

Section 24E of NEMA requires that every EA must ensure that adequate provision is made for the ongoing management and monitoring of impacts of the activity on the environment throughout the life cycle of the activity. The life cycle of the activity is determined by the scope of the activity. If the activity requires EA for development only, the development phase is the scope of the activity. If the activity requires EA for development and operation, the development and operational phases make up the scope of the activity (Environmental Authorisation Validity Period Explanatory Document, 2018). Only when the activity includes such an operational component, the relevant Scoping and Environmental Impact Assessment, the Environmental Authorisation (including any conditions thereto) and the EMPr can include aspects regarding the operation scope of the activity e.g., mitigation actions for the operational phase (Environmental Authorisation Validity Period Explanatory Document, 2018).

None of the listed and/or specified activities that are triggered, and which require environmental authorisation, specifically include the term '*and related operation*' (**Table 7**). Consequently, the scope of the activities pertaining to this project does not have an operational (or decommissioning) component.

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Table 8. Detailed Description of the Phases, Activities and Environmental Aspects of the Development (and that will be managed by this EMPr).

PHASES, ACTIVITIES, SERVICES & PRODUCTS ON PREFFERED FOOTPRINT	SUB-ACTIVITY	ENVIRONMENTAL ASPECT
Planning & Design		
LEGAL COMPLIANCE - Acquiring authorisations, permits and/or licenses for activities/uses undertaken during construction and operation	Protected Species	NPNCA, 2009/NFA, 1998/NEMBA 2004
	Invasive Species	NEMBA, 2004
	Water Use S21(c) and (i)	NWA, 1998
	Water Use S21 (a)	NWA, 1998
	Water Use S21 (b)	NWA, 1998
	Water Use S21 (g)	NWA, 1998
	Mining (Borrow pit)	MPRDA, 2002
	Eskom 132kV servitude	Servitude Agreement and Letter of Consent
	Construction of the 20 m high 132 kV distribution line & 10-15m lightning mast	Civil Aviation Act (Act No. 13 of 2009)
	Development of substation infrastructure and distribution infrastructure	GN No. 435 of 22 March 2019 in terms of Section 24(5) of NEMA, 1998
	Development of a 400 MW Solar PV Facility	Astronomy Geographic Advantage (AGA) Act (Act No. 21 of 2007)
	Compliance Monitoring (ECO Appointment)	Environmental Authorisation
CONSIDERATION OF ALTERNATIVES - including Location, Layout and Design, Magnitude, etc.	Alternative Sites	NA
	Alternative Technologies	NA
CLIMATE CHANGE	Solar PV Facility	
HEAT ISLAND EFFECT	Solar PV Facility	Atmospheric warming

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CHANGE LAND USE	Rezoning Land use application for a "Renewable Energy Plants Zone" submitted through the Emthanjeni LM for a decision by the District Municipal Planning Tribunal	SPLUMA and the ELM Land Use Scheme 2022
		Conflict with surrounding land uses.
	Uncertainty (SIA)	Property values
		Fires
	Increased traffic on District Gravel Road during construction	Development of potholes, corrugations and puddles
	Land Acquisition and Access to Site	Physical and economic displacement of individuals and households.
PLANNING	Commencement	
	Agreements	Eskom
	Labour	Job Creation
	Dust suppression	Water Usage
	Haulage Routes	
	Space	Magnitude of physical disturbance
LAYOUT & DESIGN	Overall	
	Lighting	
	Installing Perimeter Fence and Access Control	Security
		Terrestrial barrier
	Installing panel arrays and associated infrastructure (from racks to field transformers) including within 100 m of a watercourse or 500 m of a wetland/pan	Physical Structures
		Atmospheric warming
		Shading

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		Surface water hydrology (run-off)
		Heritage
		Interfering with ecological processes and biodiversity pattern
	Distribution Lines	Obstruction
	Effluent Infrastructure (Sanitation)	Effluent disposal
	Water infrastructure (Supply)	Groundwater abstraction, purification and storage
	Culverts/Stormwater outlets	
	Quarry (new)	
	Services (pipes and cables)	Dispersive Soils
	Roads	
	Buffers	Specialist Assessment Reports
	Flood lines	
	Building Plans	Municipal Bylaws
	Building Lines	Agriculture Zone 1
		Eskom servitude
Pre-construction		
Planning	Social Impact Management Plan	Social Impact Management Plan
	Stakeholder Engagement Plan	Communication
		Grievance Mechanism
		Compensation and Claims
	Corporate Social Responsibility	

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	Recruitment	Recruitment
	Procurement	Procurement
	Traffic Management Plan	Traffic
		Safety and Security
	Waste Management Plan	
Monitoring		
Contractor Readiness	Awarding of preferred bidder	
	Acquiring permits, licenses, Letters of consent and permissions	**Permission:** No mechanical equipment shall be used in the vicinity of Eskom's apparatus and/or services without prior written permission having been granted by Eskom (Eskom letter dated 14 March 2017 ref: Invest14/03/2017)
		Fire Management Plan
		EMPr
		Other approvals
	Cultural Heritage Resource rescue and relocation	Stone Age open-air surface scatters
		old Wagon Road
	Employment of labour	Influx of job-seekers and construction workers into the area.
		Training
	Development of Method Statements	
	Commencement	
Site Establishment (Layout)	Site Selection	

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	Site Area (size)	
	Access Restricted Areas	
	Perimeter/boundary fence	
	Site Offices	
	Lighting	
	Flammable and other hazardous substance stores	
	Quarry & Crushing Plant	
	Laydown areas	
	Machinery Parking Area	
	Maintenance and workshop areas	
	Fuel storage and refuelling area	
	Vehicle wash bays	
	Sanitation/Ablutions	
	Pollution control	
	Eating/Rest Areas	
	Accommodation	
	Kitchen	
	Temporary access roads	
	Batching plant/Cement-mixing area	
Construction		
Employee management (including appointment, conduct and movement)	Supervision	Avoid harm to the environment and persons
	Communicating	Noise generation

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	Eating (lunch breaks)	Organic and inorganic waste arisings
	Abluting	Land contamination
	Keeping warm or cooking	Starting fires
	Harvesting muthi plants, collecting firewood and/or poaching	Removal of medicinal plants, dead wood and/or wildlife
Construction Plant Management including Deliveries	Driving/Transport	Generating dust
		Generating noise
		Speed (en route to & from site)
		Generating emissions
		Congestion for other road users/Disruption to landowners
		Damage to the environment
	Operating equipment	Generating noise
	Operating equipment	Causing spills
	Parking	Causing spills
	Parking	Damage to the environment
	Maintenance	Land contamination
	Maintenance	Watercourse contamination
	Washing plant	Land contamination
	Washing plant	Watercourse contamination
Water management (abstraction, storage and use)	Monitoring	
	Pumping from a borehole	Use of natural resources
	Installing a deionizing plant	

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	Storage in tanks	Overflow and surface water run-off
	Sanitation and drinking	
	Dust suppression	Use of natural resources
		Surface water run-off
	Mixing concrete on site	Addressed under 'Handling Hazardous Substances'
General and Hazardous Waste Management	Handling and Collection (incl. chemical toilets)	Effluent discharges
		Land contamination
		Watercourse contamination
	Reuse	Health and safety
	Storage	Land contamination
		Watercourse contamination
		Unpleasant odours
	Transport	Land contamination
	Transport	Watercourse contamination
	Disposal	Land contamination
	Disposal	Watercourse contamination
Handling Hazardous Substances	Fuel Storage	Land contamination
		Watercourse contamination
	Refuelling	Use of resources
		Causing spills
	Cement Storage	Land contamination
		Watercourse contamination

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	Mixing concrete on site	Effluent (cement slurry) discharges and land contamination
		Effluent (cement slurry) discharges and watercourse contamination
		Waste arisings (cement bags)
	Importing Ready mix/Cleaning the cement trucks	Generating dust
		Generating noise
		Speed (en route to & from site)
		Generating emissions
		Damage to the environment
		Land contamination
		Watercourse contamination
		Waste arisings (cement slurry)
	Transporting concrete	Land contamination
	Placing concrete	Watercourse contamination
	Waste Slurry and Concrete Storage and Disposal	Land contamination
		Watercourse contamination
	Disposal of Domestic Wastewater	Land contamination
		Watercourse contamination
		Unpleasant odours
	Explosives Storage	Land contamination
	Paint Storage and Disposal	Land contamination
		Watercourse contamination
	Lubricating, Oil Storage and Disposal	Land contamination

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		Watercourse contamination
	Oil-contaminated water Storage and Disposal	Land contamination
		Watercourse contamination
	Contaminated Soil Storage and Disposal	Land contamination
		Watercourse contamination
	Damaged Solar panel and other e-waste Disposal	Land contamination
Alien Plant Management	Disturbance to natural areas	Favourable conditions for alien plant/animal recruitment.
Fire Management	Wildfires	
STORMWATER MANAGEMENT AND EROSION CONTROL		
Chance Find Protocol		
Security		Influx of contractors and workers into the area.
Health and Safety		
QUARRY (Sourcing materials (aggregate) for roads and concrete)	Importing aggregate	
	New Quarry & Crushing Plant Operation (and maintenance)	Dust generation
		Noise generation
		Soil contamination (hydrocarbon spills)
LINEAR INFRASTRUCTURE CROSSINGS	Distribution Line Pylons	Clearing & Grubbing/Removal of Vegetation/ Sedimentation
		Importing material/ Excavating/Diversion Works/Sedimentation /Erosion

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		Clearing/ Excavating/ Importing material/Dust generation
		Installing pylons/Watercourse contamination
		Compacting/Noise generation
	Roads	Grading existing & new roads/Removal of Vegetation /Sedimentation
		Importing material/ Shaping/Diversion Works/Sedimentation /Erosion
		Clearing/ Excavating/ Importing material/Dust generation
		Installing culverts/Watercourse contamination
		Compacting/Noise generation
	Underground Pipelines and Cables	Clearing & Grubbing/Removal of Vegetation/Sedimentation
		Importing material/ Trenching/Diversion Works/Sedimentation /Erosion
		Clearing/ Excavating/ Importing material/Dust generation
		Installing cables & pipes/Watercourse contamination
		Compacting/Noise generation
	Driving new two-track roads	Removal of vegetation and habitat

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ROAD MANAGEMENT Construction of permanent and temporary access roads (including upgrading existing roads and establishing new roads), As WELL AS maintenance of District gravel road		Creating bare surfaces susceptible to erosion
	Grading existing and new roads	Removal of vegetation and habitat
		Creating bare surfaces susceptible to erosion
	Importing material	Dust generation
		Sedimentation of watercourse
	Compacting	Noise generation
	Use including gravel District Road, Transnet Service Road and internal roads	Dust generation
		Development of corrugations, potholes and puddles
Clearing/Grubbing and Grading	Construction camp (incl. operational area), borrow pit, upgrading existing and new roads, trenches for underground cables and water pipes, holes for racks, fence posts and pylons, foundations for inverters, field transformers and on-site substation, water storage tanks and deionization plant.	Removal of vegetation
		Noise generation
		Dust generation
		Creating bare surfaces susceptible to erosion
		Interfering with biodiversity patterns (fauna and flora)
		Destruction of artefacts
		Creating bare surfaces susceptible to alien invasive plant recruitment
Drilling and/or Ram Piling (for rack foundations and fence poles)	Drilling Rig on land and in a watercourse (perimeter fence)	Noise generation
		Dust generation
		Mixing soil horizons

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		Waste arisings (spoil)
		Traps
		Sedimentation of watercourse
		Vibration
		Soil contamination (hydrocarbon spills)
Installing panel arrays and associated infrastructure (from racks to field transformers) including within 100 m of a watercourse or 500 m of a wetland/pan	Field transformers	
	Electrical circuits	
	Panels	Dripline
Earthworks - holes for racks and fence posts, inverters, field transformers, on-site substation, pylons and operational area (building, on-site disposal facility) and trenches for underground cables and pipes, and water storage tanks and deionization plant.	Excavating and Trenching	Disturb animals
		Dust generation
		Mixing soil horizons
		Destruction of artefacts
		Sedimentation of watercourse
		Traps
		Increased porosity of repacked dispersive soils
		Alter surface water hydrology
		Alter visual landscape
		Waste arisings (spoil)
	Backfilling	Dust generation
		Subsidence (if not adequately compacted)
		Tunnel erosion (when using unsuitable bedding in sodic sites)
Blasting		Noise generation

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		Dust generation
		Fly Rock
Stockpiling and Storing (Laydown)	Mulch, topsoil, aggregate, spoil and infrastructure	Cover fauna/nests/burrows
		Smother and damage flora
		Wind erosion & entrainment
		Impede river flow or surface water run-off
		Sedimentation of watercourse
		Removal by runoff
	Topsoil	Viability of stockpiled material
Erecting the 33kV powerline underneath Eskom's 133kV powerline	Relocation of existing services	Disruption in the provision of services
	Consultation with affected parties	Insufficient consultation
	Working near or under powerlines	Unsafe environment (damage to property and loss of life)
Post-construction (incl. Construction)		
Rehabilitation	Temporary structures and infrastructure	
	Pollution and Waste	Soil contamination (hydrocarbon spills)
	Borrow Pit	Surface water hydrology (run-off)
		Compaction
		Compromised topsoil
		Overgrazing
	Roads	
	Disturbed areas - terrestrial	Surface water hydrology (run-off)
		Bare ground
		Compaction

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		Compromised topsoil
		Overgrazing
	Disturbed areas - aquatic	Reshaped bed and banks
		Bare ground
		Compromised topsoil
		Overgrazing
Facility Management		
Grazing Management		Veld condition
Maintenance and Monitoring		Erosion
		Water Quality/Quantity
		Compromised topsoil
		Revegetation
		Veld condition
		Bat monitoring
		Avian Study monitoring
		Alien plant recruitment

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Section 3: LAYOUT MAP OF PROPOSED ACTIVITY

(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 any areas that should be avoided, including buffers.

"The Environmental Management Programme (EMPr) to be submitted as part of the EIAr must include the following:
ii. The final site layout map.
iv. An environmental sensitivity map indicating environmental sensitive areas and features identified during the EIA process.
v. A map combining the final layout map superimposed (overlain) on the environmental sensitivity map."

The preferred site of the Solar PV Facility was determined through an iterative process, to ensure that it remains outside of all the assessed sensitive receptors, including the riparian area, rocky ridge habitats and cultural heritage sites (**Figure 2**). All construction related activities (except for linear structures such as the distribution line, road crossings, pipeline, and cable routes) must remain outside the 50 m ecological (and avian) buffer from the delineated edge of the watercourse that runs through the centre of the development site (**Figure 3**).

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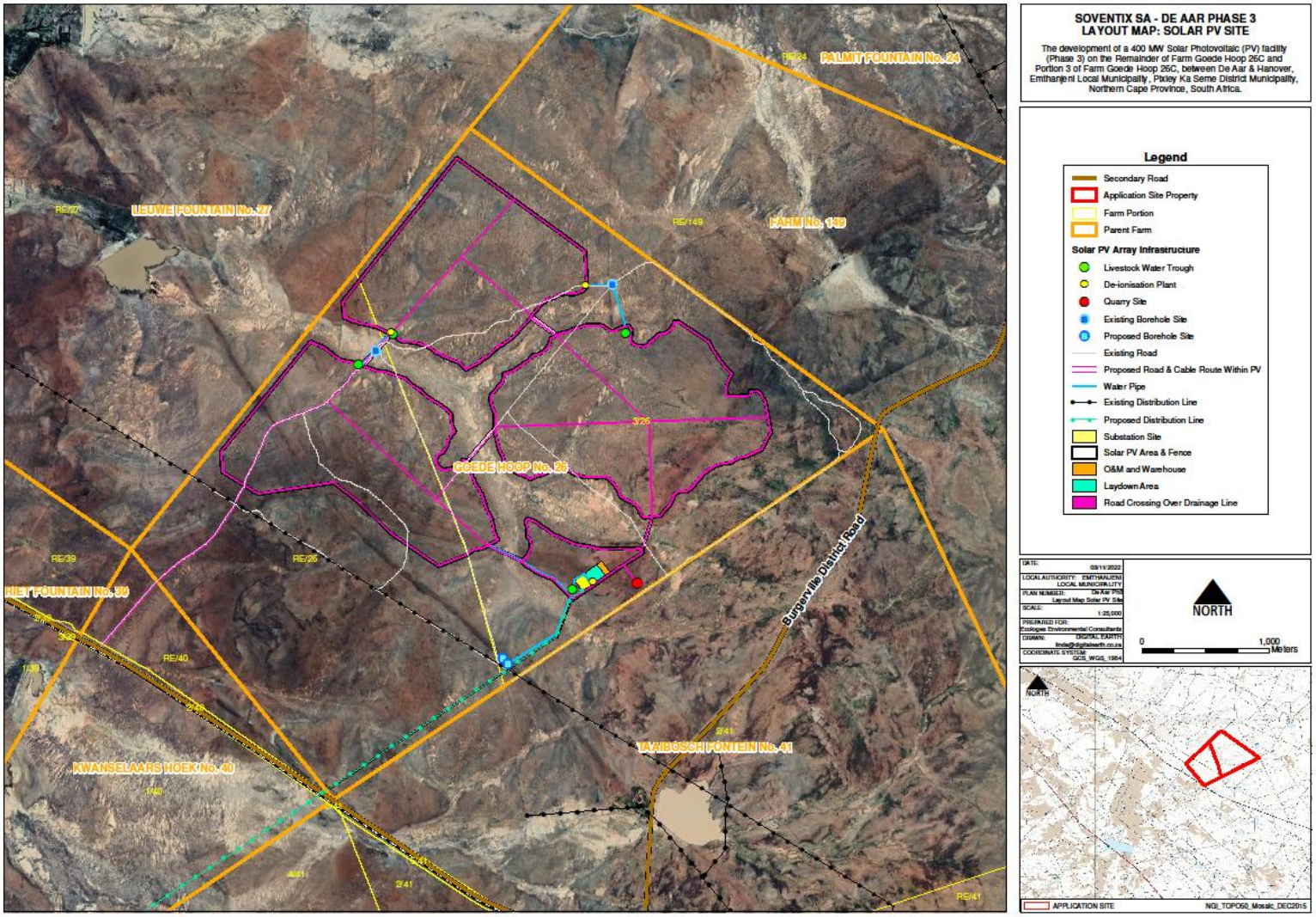

Figure 2: Layout map of the Solar PV facility.

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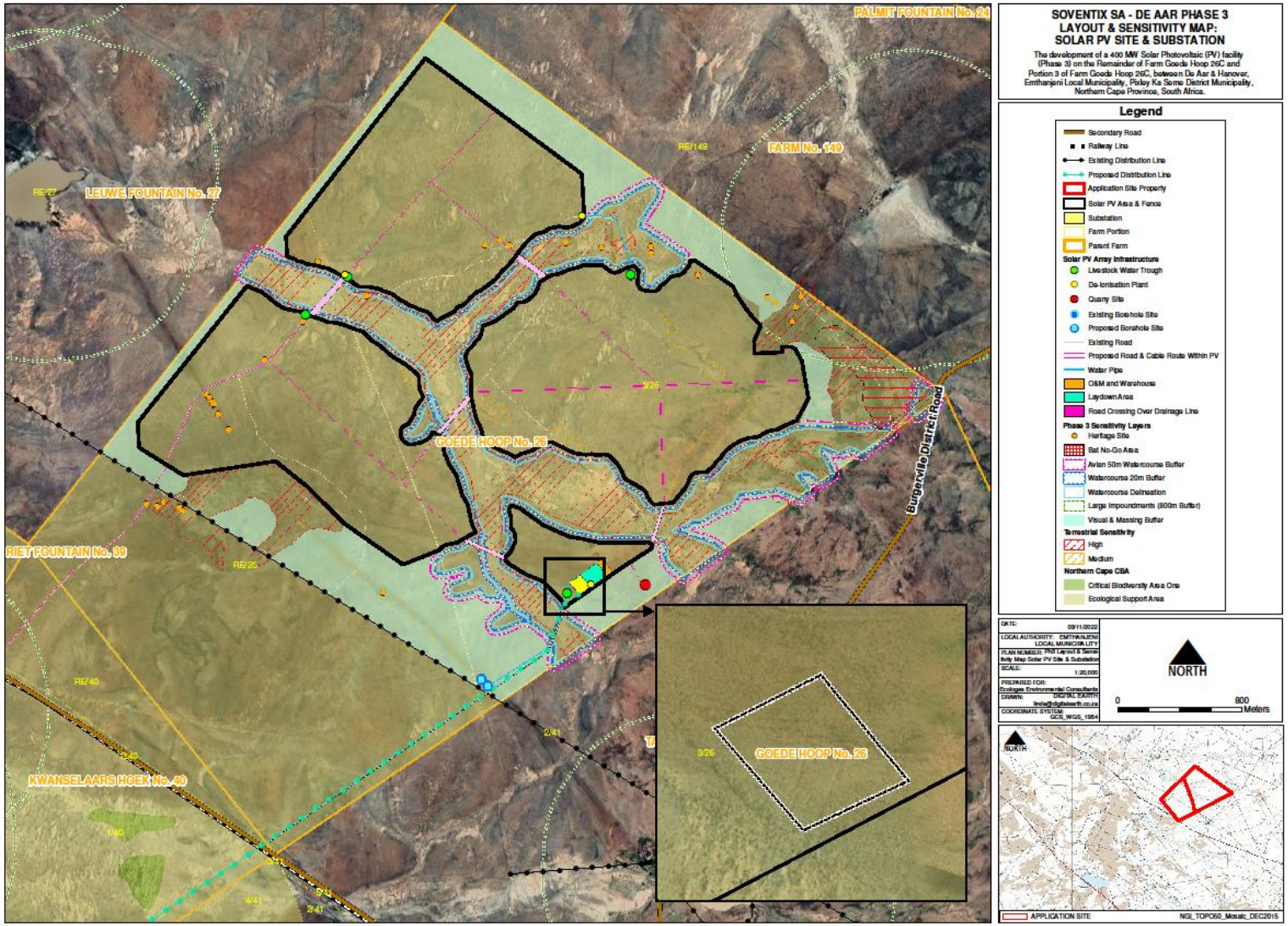

Figure 3: Layout and sensitivity map for the Solar PV facility.

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Section 4: ROLE PLAYERS AND RESPONSIBILITIES

The approved EMPr shall be printed, completed, and kept in an on-site file designated for all matters pertaining to environmental management. Co-operation is required between the applicant, engineer, contractor, and ECO to ensure that activities are managed in an amicable and responsible manner and in accordance with the philosophies of environmental legislation and principles of the EMPr.

This EMPr is predominantly compiled for the management of construction activities associated with the development of the solar PV facility, once the Planning and Authorisation phases are complete. The tabulated management protocols assign responsibilities to one or more role players. Those responsibilities and accountabilities are described in more detail below to avoid any uncertainty.

Applicant

The applicant remains ultimately accountable for ensuring that the development is implemented according to the requirements of the EMPr. Although the applicant delegates specific responsibilities to role players to perform functions on his / her behalf, the ultimate accountability cannot be delegated. The applicant is responsible for ensuring that sufficient resources (time, financial, manpower, equipment, etc.) are available to ensure the effective and efficient implementation of any management actions that fall under his/her responsibility. The responsibility of restoring the environment in the event of any negligence, which leads to damage of the environment, also falls on the applicant.

The applicant must ensure that the EMPr (and EA) are included in tender documents and the contracts of appointment so that the appointed engineer and contractor are legally bound to the conditions of the EMPr (and EA).

The applicant must appoint an Environmental Control Officer (ECO) prior to commencement of construction, to help identify conditions that need to be fulfilled prior to commencement and avoid any unnecessary delays.

The applicant must, for the period during which the EMPr (and EA) remain valid, (a) ensure that compliance with the conditions of the EMPr (and EA) is audited by an independent person with the relevant environmental auditing expertise (IEA); and (b) submit an environmental audit report to the DFFE at intervals stipulated in the EA, alternatively in accordance with Regulation 54A(3) of the EIA Regulations (2014), as amended.

The applicant must notify all potential and registered I&APs of the submission of an environmental audit report within 7 days of the date of submission to the DFFE and make such report immediately available (a) to anyone on request; and (b) on a publicly accessible website, if the applicant has such a website.

If the findings of the environmental audit report indicate (a) insufficient mitigation of environmental impacts associated with the undertaking of the activity; or (b) insufficient levels of compliance

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with the EMPr (and EA), the applicant must, when submitting the environmental audit report to the DFFE, submit recommendations to amend the EMPr to rectify the shortcomings identified in the environmental audit report.

Such recommendations must have been subjected to a public participation process, which process has been agreed to by the DFFE and was appropriate to bring the proposed amendment of the EMPr to the attention of potential and registered I&APs, including organs of state which have jurisdiction in respect of any aspect of the relevant activity and the competent authority, for approval by the DFFE.

Engineer

The engineer, as the applicant's agent on site, is bound to the conditions of the EMPr through his/her contract with the applicant and is responsible for ensuring their effective and efficient implementation. The Engineer is responsible for ensuring that sufficient resources (time, financial, manpower, equipment, etc.) are available to ensure the effective and efficient implementation of any management actions that fall under his/her responsibility.

Contractor

The contractor, as the applicant's agent on site, is bound to the conditions of the EMPr through his/her contract with the applicant and is responsible for ensuring their effective and efficient implementation. The contractor shall be responsible for the actions undertaken by all their employees including sub-contractors. The contractor must thoroughly familiarise him/herself with the EMPr requirements before coming onto site and must request clarification on any aspect of these documents, should they be unclear. The contractor is responsible for ensuring that sufficient resources (time, financial, manpower, equipment, etc.) are available to ensure the effective and efficient implementation of any management actions that fall under his/her responsibility. The contractor must comply with all instruction (whether verbal or written) given by the environmental manager, project manager or site engineer in terms of the EMPr.

Site Environmental Officer (SEO)

The Site Environmental Officer (SEO) shall be appointed by the contractor to implement and monitor implementation of the EMPr daily. Findings relating to any impacts resulting from current construction activities will be recorded in a site diary.

The SEO shall also ensure that all construction activities are implemented according to the relevant conditions of the EMPr by establishing Standard Operating Procedures (SOPs)/Method Statements for each construction activity.

The SEOs development of SOPs has been facilitated by assigning management categories to each of the management actions identified in the management protocols (**Section 7**).

The management categories include:

1. Planning

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2. Monitoring
3. Contractor Readiness
4. Site Establishment (Layout)
5. Employee management (including appointment, conduct and movement)
6. Construction Plant Management including Deliveries
7. Water management (abstraction, storage and use)
8. General and Hazardous Waste Management
9. Handling Hazardous Substances
10. Alien Plant Management
11. Fire Management
12. Stormwater Management and Erosion Control
13. Chance Find Protocol
14. Security
15. Health and Safety
16. Quarry (sourcing materials (aggregate) for roads and concrete)
17. Linear infrastructure crossings
18. Road management - Construction of permanent and temporary access roads (including upgrading existing roads and establishing new roads), As WELL AS maintenance of District gravel road
19. Clearing/Grubbing and Grading
20. Drilling and/or Ram Piling (for rack foundations and fence poles)
21. Installing panel arrays and associated infrastructure (from racks to field transformers) including within 100 m of a watercourse or 500 m of a wetland/pan
22. Earthworks - holes for racks and fence posts, inverters, field transformers, on-site substation, pylons and operational area (building, on-site disposal facility) and trenches for underground cables and pipes, and water storage tanks and deionization plant.
23. Blasting
24. Stockpiling and Storing (Laydown)
25. Erecting the 33kV powerline underneath Eskom's 133kV powerline
26. Rehabilitation
27. Facility Management

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28. Grazing Management
29. Maintenance and Monitoring

The SEO shall also be responsible for training the workforce on how to carry out their tasks according to the applicable SOPs.

Environmental Control Officer (ECO)

The Environmental Control Officer (ECO) is appointed by the applicant as a compliance monitor of the implementation of the EMPr. He/she must form part of the project management team and be involved in all aspects of decision-making that can influence environmental compliance on the site.

The ECO shall also be responsible for preparing and presenting environmental inductions.

The ECO must conduct site inspections to assess compliance with the EMPr, attend relevant project management meetings, and provide feedback on any findings associated with the development. In addition, the ECO is responsible for:

- Liaising with relevant authorities;
- Liaising with contractors regarding environmental management; and
- Appointing a competent person / institution to be responsible for any specialist monitoring (if required).

Monitoring must track past findings and, on a sampled basis, confirm compliance using verifiable evidence, such as existing documentation, conducting interviews with managers and personnel, and observing activities on site.

The ECO has the right to enter the site and undertake monitoring at any time, subject to compliance with health and safety requirements applicable to the site (wearing safety boots, head gear, mouth mask etc.).

Independent Environmental Auditor (IEA)

The IEA is appointed by the applicant to conduct audits and submit environmental audit reports to the DFFE at intervals as indicated in the EA.

The environmental audit report must –

(a) provide verifiable findings, in a structured and systematic manner, on (i) the level of compliance with and performance against the provisions of the EMPr (and EA); and (ii) the ability of the measures contained in the EMPr to sufficiently provide for the avoidance, management and mitigation of environmental impacts associated with the undertaking of the activity on an ongoing basis; and

(b) contain all information set out in Appendix 7 of the EIA Regulations (2014), as amended.

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If the findings of the environmental audit report indicate (a) insufficient mitigation of environmental impacts associated with the undertaking of the activity; or (b) insufficient levels of compliance with the EMPr (and EA), the IEA should propose recommendations to amend the EMPr to rectify the shortcomings identified in the environmental audit report.

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Section 5: COMPLIANCE MONITORING

(k) the mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f);

(l) a program for reporting on compliance, considering the requirements as prescribed by the Regulations;

Mechanism for Monitoring Compliance

The SEO shall maintain a site diary to record any environmental impacts, that is any change to the environment, whether adverse or beneficial, wholly, or partially resulting from construction activities.

The ECO and IEA will be responsible for monitoring and reporting on compliance for the life cycle of the activity.

Site inspections shall be a systematic and documented process of gathering verifiable evidence to objectively determine the extent to which the audit criteria are complied with. The audit criteria (or reference conditions) against which compliance is assessed, includes the management actions contained in this EMPr and the conditions of the EA.

The Environmental Compliance or Audit Reports shall identify the actual and potential transgressions, describe the impacts, provide verifiable evidence (photographs, records, or statements) and recommend corrective and preventive actions (including completion dates). Environmental Compliance Reports prepared by the ECO shall measure the applicant/contractor's level of compliance with the aforesaid criteria, whereas Environmental Audit Reports prepared by the IEA shall measure the level of compliance with and performance against the provisions of the EMPr (and EA).

The project management team should engage in bi-weekly or monthly site meetings so that the ECO can give regular feedback, and any identified concerns can be addressed timeously.

A Programme for Reporting on Compliance

A Site Environmental Officer (SEO) is appointed by the contractor to *inter alia* monitor implementation of the EMP daily, and record findings relating to any impacts resulting from construction activities in a site diary.

An Environmental Control Officer (ECO) is appointed by the applicant to monitor compliance with the EMPr (and EA). The ECO shall undertake bi-weekly site inspections, and submit Environmental Compliance Reports to the DFFE within 14 days of the site inspection, unless otherwise specified in the EA.

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An Independent Environmental Auditor (IEA) is appointed by the applicant to conduct audits and submit Environmental Audit Reports to the DFFE at intervals as indicated in the EA. The applicant must notify all potential and registered I&APs of the submission of an environmental audit report within 7 days of the date of submission to the DFFE. If the applicant submits recommendations to amend the EMPr to rectify any shortcomings identified in the environmental audit report, then such recommendations must have been subjected to a public participation process.

Mechanism for Resolving Non-compliance

The EMPr is a legally binding document and should form part of the contract. Should the contractor fail to comply with the EMPr (or EA) the following steps are suggested:

Step 1. The ECO or IEA meets with the contractor and points out the deviation from the EMPr either during the site inspection or closure meeting. The ECO or IEA and Contractor verbally agree on a solution and deadline, depending on the nature and severity of the finding.

Step 2. The non-compliance is recorded by the ECO or IEA in the Environmental Compliance/Audit Report, as well as the proposed corrective action and the time within which it needs to be implemented. In the absence of a prescribed deadline or completion date, findings shall, as far as is practical, be corrected or prevented immediately upon being found to occur.

Step 3. Should the non-compliance not be corrected within the required timeframe the Chief Resident Engineer (CRE) or Project Manager (PM) shall order the contractor to suspend construction in that specific area or the project until the activity at variance with the EMPr is corrected and or remedial actions taken. Any cost incurred by such action shall be for the account of the contractor.

Step 4. Where there is non-compliance with the EMPr and no evidence of the contractor intending to comply, the applicant may terminate the contract due to non-compliance (breach of contract). Such termination does not negate any legal proceedings that may result from the non-compliance.

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Section 6: ENVIRONMENTAL AWARENESS PLAN

The EMPr needs to include, *inter alia*:

(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 to avoid pollution or the degradation of the environment; and

(n) any specific information that may be required by the competent authority.

This section of the report is included to comply with Section 24N(3)(c) of the NEMA and the EIA Regulations (2014), as amended.

Ongoing environmental awareness training should be provided to all employees to promote the effective implementation of the EMPr's management actions throughout the life cycle of the activity/project. The applicant shall ensure that the project team, including the engineer, contractor, and any sub-contractors are adequately trained on the implementation of the EMPr, (and EA) prior to commencing with construction through environmental inductions, as well as during construction through toolbox talks. Refresher environmental awareness training should be made available as and when required.

Environmental Inductions

The ECO shall be responsible for preparing and presenting environmental inductions. A slideshow can be developed using visual aids to explain the potential impacts and their management. Inductions shall be undertaken prior to the commencement of construction. If any new personnel will be contracted or arrive on site during the construction period, they should attend an environmental induction beforehand. Inductions shall be targeted at two distinct levels of employment: management (applicant, architect, engineer, contractor / site agent) and labourers (including the site foreman). Where possible the presentation will be conducted in the language of the employees.

The Environmental induction for management shall include mitigations that are relevant to or require management's involvement prior to implementation including, but not limited to, measures required during the planning and design phase and pre-construction phase, e.g., site establishment.

The Environmental induction for the contractor's labourers and foreman shall include a synopsis of key management actions including the environmental impacts they are meant to avoid and the desired management outcomes, such as:

- Staff conduct including, noise, poaching and movement;

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- The steps to be taken should any archaeological artefacts be located or unearthed;
- Procedures to be followed when working near or within sensitive areas;
- No-go areas, including the 50 m ecological buffer;
- Wastewater management procedures;
- Water usage and conservation;
- Solid waste management procedures;
- Sanitation procedures;
- Fire prevention;
- Disease prevention; and
- (generic) Emergency procedures.

Training

The SEO is responsible for making staff aware of their individual roles and responsibilities in achieving compliance with the EMPr (and EA) by preparing and presenting training to the workforce on standard operating procedures (SOPs)/Method Statements linked to their construction activities (e.g., waste management, mixing concrete, operating equipment, etc.). The training shall include:

- A description of significant environmental impacts, actual or potential, related to their work activities and mitigation measures to be implemented when carrying out those activities; and
- Any adopted Emergency Response Plans (see **Appendix L**).

The SEO must allow for sufficient sessions to train all personnel with no more than 20 personnel attending each course.

Toolbox Talks

The SEO and ECO shall undertake an informal training needs analysis throughout construction to identify appropriate environmental topics and the appropriate labourers to target. The analysis shall be informed by the findings contained in the site diary and compliance reports. Applicable toolbox talks shall be prepared and given by the SEO.

The ECO and SEO shall keep records (e.g., signed attendance registers) of environmental inductions, training and toolbox talks in an on-site file designated for all matters pertaining to environmental management.

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Posters

It is recommended that posters are developed and placed in highly visible areas at the construction or contractor's camps to provide a constant awareness of key environmental issues, any required information, such as emergency numbers, and remind employees of their duties regarding environmental protection.

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Section 7: IMPACT MANAGEMENT

(d) a description of the impact management objectives, 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;

(e) a description and identification of impact management outcomes required for the aspects contemplated in paragraph (d),

(f) a description of proposed impact management actions, identifying the way the impact management objectives and outcomes contemplated in paragraph (d) and (e) 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;

(g) the method of monitoring the implementation of the impact management actions contemplated in paragraph (f);

(h) the frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f);

(i) an indication of the persons who will be responsible for the implementation of the impact management actions;

(j) the time periods within which the impact management actions contemplated in paragraph (f) must be implemented;

Ecoleges set out to identify, predict and evaluate impacts and risks firstly by identifying the activities that are to be undertaken during the development of the listed or specified activity(ies). The activities were used to identify environmental aspects, which are defined as elements of an organisation's activities, products or services that interact or can interact with the environment (ISO 14001). The environmental aspects were used to identify environmental impacts, which are

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defined as any change to the environment, whether adverse or beneficial, wholly, or partially resulting from an organisation's environmental aspects (ISO 14001). Finally, management actions were sought and tailored to achieve measurable targets (quantitative and qualitative) and ensure desired environmental outcomes that are dictated by legal requirements, scientific standards, social acceptability and/or environmental best practice.

Management protocols have been prepared for each attribute of the receiving environment, including (1) Legal System, (2) Terrestrial fauna, (3) Terrestrial flora, (4) Aquatic fauna, (5) Aquatic flora, (6) Soil and Rock, (7) Ground and Surface Water, (8) Atmosphere, (9) Terrestrial and Avian ecosystem, (10) Aquatic ecosystem, (11) Economical, (12) Social, (13) Land use, (14) Property, (15) Health and Safety, (16) Security, (17) Public services, (18) Visual aesthetics and (19) Heritage and Culture. Each management protocol provides management actions to avoid, mitigate or remedy various construction-related impacts and achieve stated targets that will ensure desired outcomes for an attribute of the receiving environment. Indicators are used to measure the level of compliance, whereas targets (and outcomes) are used to measure the level of performance.

However, if this EMPr is to be effectively and efficiently implemented by the applicant and contractor, they must develop Standard Operating Procedures (SOPs)/Method Statements for the different activities.

The SEOs development of SOPs on behalf of the contractor has been facilitated by assigning management categories to each of the management actions identified in the management protocols (**Section 7**).

Although impacts and management actions have been addressed under the various project development phases, they are not intended to be mutually exclusive, and impacts from one phase may occur in subsequent phases.

Any appendices to this EMPr form part of the EMPr and must be implemented accordingly.

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PLANNING AND DESIGN PHASE

Table 9. Management Protocol for Legal System

Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
01	Legal Compliance	Unlawful activities involving any threatened or protected flora.	Lawful activities involving any threatened or protected flora.	A license under the NFA, 1998, a permit under NCNCA, 2009 and/or a permit under NEMBA, 2004.	Construction may not commence without the applicable permit(s) and/or license to carry out a restricted activity involving, or picking, or cutting, disturbing, damaging or destroying any threatened or protected flora.	SEO or ECO	Prior to commencement of clearing and grubbing.	Compliance to be verified by ECO and IEA.
01	Legal Compliance	Unlawful activities involving any threatened or protected flora.	Lawful activities involving any threatened or protected flora.	A license under the NFA, 1998, a permit under NCNCA, 2009 and/or a permit under NEMBA, 2004.	Only apply for permit(s) and/or a license to “pick” a threatened or protected plant if it is not possible to relocate the footprint.	SEO or ECO	Prior to commencement of clearing and grubbing.	Compliance to be verified by ECO and IEA.
01	Legal Compliance	Failure to comply with Duty of Care relating to Listed Invasive Species	Duty of Care relating to Listed Invasive Species	Written Notification	The landowner or person in control of the land must notify the Minister (DFFE) and/or MEC (DENC), in writing, of any listed invasive species occurring in the project area.	Landowner or Holder	Continuous	Compliance to be verified by ECO and IEA.
01	Legal Compliance	Unlawful commencement of section 21 (c) and (i) water uses in terms of the NWA, 1998.	Lawful commencement of section 21 (c) and (i) water uses in terms of the NWA, 1998.	A water use license for Section 21(c) and (i) water uses.	Construction may not commence without a water use license for Section 21(c) and (i) water uses.	Holder	Prior to commencement of those construction activities relating to S21	Compliance to be verified by ECO and IEA.

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							(c) and (i) water uses.	
01	Legal Compliance	Unlawful abstraction of water for use during construction, e.g., mixing concrete, dust suppression and potable usage.	Lawful commencement of Section 21 (a) water uses in terms of the NWA, 1998.	A water use license for Section 21(a) water uses.	Construction may not commence without a water use license for Section 21(a) water use.	Holder	Prior to commencement of those construction activities relating to a S21(a) water use, e.g., taking water for mixing concrete, dust suppression and potable water usage.	Compliance to be verified by ECO and IEA.
01	Legal Compliance	Unlawful storage of water.	Lawful commencement of Section 21 (b) water uses in terms of the NWA, 1998.	A water use license for Section 21(b) water uses.	Construction may not commence without a water use license for Section 21(b) water use	Holder	Prior to commencement of those construction activities relating to S21(b) water uses, e.g., installing storage tanks.	Compliance to be verified by ECO and IEA.
01	Legal Compliance	Unlawful disposal of wastewater (and storage of treated effluent for reuse).	Lawful commencement of Section 21 (g) water uses in terms of the NWA, 1998.	A water use license for Section 21(g) water uses.	Construction may not commence without a water use license for Section 21(g) water use.	Holder	Prior to commencement of those construction activities relating to S21(g) water uses, e.g., installing an on-	Compliance to be verified by ECO and IEA.

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							site disposal facility and storage tanks for treated effluent.	
01	Legal Compliance	Unlawful activities relating to heritage resources	Lawful commencement of Section 35 of the NHRA	NHRA Permit	Permits in terms of section 35 of the National Heritage Resource Act (NHRA) must be applied for from SAHRA for the collection of archaeological material prior to construction. No construction may commence without a permit in this regard.	Holder	Prior to commencement	Compliance to be verified by ECO and IEA.
01	Legal Compliance	The construction of the 132 kV powerline and upgrading the servitude access road will impact Eskom's 132 kV powerline servitude	Lawful commencement of construction activities affecting Eskom's 132 kV powerline servitude.	A Letter of Consent from Eskom	(1) The applicant must apply for co-use of Eskom's 132 kV powerline servitude by submitting a formal application entitled "Annex A Application for the co-use of an Eskom right or restriction area", as well as all required supporting documents that are indicated in the form. The application should be submitted to Nomzamo Mdunyelwa ST(SA)0991, Land & Rights Officer, Land Development, Northern Cape Operating Unit, Eskom (Tel: 053 830 5947, Mobile: 081 046 5341,	Holder	At least 30 days before the intended date of commencing with constriction within Eskom's servitude.	Compliance to be verified by ECO and IEA.

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					Email: MdunyeNC@eskom.co.za) at least 30 days before the intended date of commencement to prevent any unnecessary delays. (2) Separate applications will need to be submitted for (1) upgrading the existing two-track service road to a 5m to 6m-wide road by grading it, importing material, reshaping it, and compacting it, and (2) constructing the 132 kV powerline from the on-site substation on Phase 3 across/underneath Eskom's 132 kV powerline. (3) The application for upgrading Eskom's service road beneath the 132 KV powerline should also include the following: (a) Location of upgraded, including which line and towers will be affected. (b) Final designs for road, showing the final elevation and road surface level.			

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
					(c) Construction methodology for road. (d) Details on how surface will be made, graders, blasting etc. (e) Timelines for road construction. (f) Conduct survey to gather current conductor positions of line being crossed and current surface levels of servitude.			
01	Legal Compliance	Construction of the 20 m high 132 kV distribution line and 10 to 15 m lightning mast represents a potential obstacle to aviation.	Lawful erection of potential obstacles to aviation.	Glint and Glare Assessment Report. Written approval from SA CAA and SAAF.	(1) Undertake a Glint and Glare Assessment before submitting a Solar Obstacle Application for assessment as the report is required before Air Traffic and Navigation Services (ATNS) can proceed with their assessment. (2) Lodge a Solar Obstacle Application for assessment with ATNS to obstacles@atns.co.za at least 120 days before the commencement of construction, preferably during the Planning and design phase once the engineers have determined the specifications of the structures (e.g.,	Holder	Planning and design phase. At least 120 days prior to commencing with construction.	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
					dimensions, co-ordinates, etc.) and completed the final layout plan. Refer queries to Yanga Nofuma, Obstacle Administrator | COO - Air Traffic Services, Bruma, T: 011 607 1474 E: obstacles@atns.co.za (3) The assessment will only proceed one ATNS' Business Development department has received an accepted and signed proposal back from the client as well as additional information, using their "Template for Solar PV information", including • Elevation above mean sea level. • Coordinate list for each structure - WGS84 (degrees, min and sec – S302515.32 E0180102.52). • A KMZ file with the positions of the proposed structures. • The dimensions/specs of the structures • Height to the top of structure.			

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					• A Glint and Glare assessment report. • If there will be power lines erected, and/or a substation the position and heights for each structure (Pole/substation) must be provided. (4) ATNS will liaise with the SACAA and will provide the client (Soventix SA (Pty) Ltd) with the conditional/final approval from the SACAA. (5) The client (Soventix SA (Pty) will have to liaise with SACAA to finalise the "As build" and for any queries with the lighting.			
01	Legal Compliance	A person is guilty of an offence if that person fails to comply with or contravenes a condition of an approved environmental management programme.	Compliance with the applicable generic EMPrs	The generic EMPr completed by the contractor and accepted (signed) by the Holder.	Adopt the generic "EMPr for the development and expansion of **substation infrastructure for the transmission and distribution of electricity**" during development of the on-site substation.	Holder and Contractor	Prior to the commencement of construction of the on-site substation and 132 kV powerline.	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
01	Legal Compliance	A person is guilty of an offence if that person fails to comply with or contravenes a condition of an approved environmental management programme.	Compliance with the applicable generic EMPrs	The generic EMPr completed by the contractor and accepted (signed) by the Holder.	Adopt the generic "EMPr for the development and expansion for **overhead electricity transmission and distribution infrastructure**" during development of the 132 kV distribution line to the on-site substation on Phase 2.	Holder and Contractor	Prior to the commencement of construction of the on-site substation and 132 kV powerline.	Compliance to be verified by ECO and IEA.
01	Legal Compliance	A person is guilty of an offence if that person fails to comply with or contravenes a condition of an environmental authorisation.	Compliance with the conditions of an environmental authorisation.	ECO Appointment	Appoint an ECO as prescribed in the Environmental Authorisation.	Holder	Prior to the pre-construction (and contractor readiness) phase.	Compliance to be verified by IEA.
01	Change in Land Use	Proposed land use is incompatible with current zoning.	Compliance with the Municipal Scheme Regulations.	A decision by the District Municipal Planning Tribunal	The applicant shall submit a Rezoning Land use application for rezoning from Agricultural Zone 1 to "Renewable Energy Plants Zone" through the Emthanjeni LM for a decision by the District Municipal Planning Tribunal (contact person: Ms Lucy Billy Email: lbilly@emthanjeni.co.za)	Holder	Prior to the pre-construction (and contractor readiness) phase.	Compliance to be verified by ECO & IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
01	Change in Land Use	Proposed land use is incompatible with current zoning.	Combine solar photovoltaic power generation and Agriculture.	Recognition of the Agrivoltaic system as a legitimate land use.	The Rezoning Land use application shall involve an Agrivoltaic system, which combines solar photovoltaic power generation and Agriculture.	Holder	Prior to the pre-construction (and contractor readiness) phase.	Compliance to be verified by ECO & IEA.
01	Change in Land Use	Unplanned movement of vehicles could damage households/Eskom infrastructure	Minimize disturbance to local individuals.	Access Agreement	An access agreement must be formalised and signed by the Contractor and landowner before commencing with the activities (DEA Generic EMPr)	Holder	Planning & Design Phase	Compliance to be verified by ECO & IEA.
01	Planning	Solar photovoltaic structures within a 2 km radius of the closest point of a transmission or distribution substation (66kV to 765kV) may impede Eskom's future planning.	Eskom's existing infrastructure and future planning is not impeded.	Eskom Agreement	Where solar photovoltaic structures fall within a 2 km radius of the closest point of a transmission or distribution substation (66kV to 765kV), a written agreement with Eskom is recommended during the planning phase of such plant or structures to ensure Eskom's future planning is not impeded (Renewable Energy Generation Plant Setbacks to Eskom Infrastructure Revision 02 compiled on 15/09/2020 - Unique Identifier 240-65559775).	Holder	Planning & Design Phase.	Compliance to be verified by ECO & IEA.
01	Planning	Solar photovoltaic structures	Eskom's existing infrastructure	Eskom requirements for work at or near	Adhere to Eskom requirements for work at or near Eskom infrastructure	Holder	Planning & Design Phase.	Compliance to be verified by ECO & IEA.

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		within a 2 km radius of the closest point of a transmission or distribution substation (66kV to 765kV) may impede Eskom's future planning.	and future planning is not impeded.	Eskom infrastructure and servitudes are met.	and servitudes (Annexure N).			
01	Layout & Design	Unlawful development or widening of roads.	Compliance with listed activities relating to development and widening of roads.	Road Designs with specifications overlaid on sensitive areas identified by specialists.	Incorporate the following elements into the design of the roads: (a) Minimise the extent of new and upgraded roads as far as is practical, (b) Only two-track roads shall be used between solar arrays and for the fire-break road inside the perimeter fence, (c) New roads may be wider than 4m, but they should not be wider than 5-6 m, (d) Upgrading existing two-track roads should not be wider than 5-6 m, (e) Sections of new road with a passing lane should not be wider than 8 m or if wider than 8 m then the cumulative length of passing lanes shall not	Holder	Planning & Design Phase.	Compliance to be verified by ECO & IEA.

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					exceed 1 km, (f) Sections of existing road with a passing lane may be wider than 8 m if justified by the Engineer, and (g) Passing lanes shall not be constructed within the 50 m ecological buffer of a watercourse.			
01	Layout & Design	Degradation of sensitive environments identified by specialists	Protect sensitive areas by avoidance.	Layout of the Solar PV facility overlaid on map of the sensitive areas identified by specialists.	No development, other than linear activities authorised in terms of the environmental authorisation such as road crossings, the distribution line, electrical cables, and water pipes, may take place within demarcated ecological buffers.	Holder, Engineer	Planning & Design Phase.	Compliance to be verified by ECO & IEA.
01	Layout & Design	Degradation of sensitive environments identified by specialists	Protect sensitive areas by avoidance.	Layout of the Solar PV facility overlaid on map of the sensitive areas identified by specialists.	Buffers must be demarcated by the ECO.	Holder, Engineer	Planning & Design Phase.	Compliance to be verified by ECO & IEA.
01	Layout & Design	Ignorance of flood lines can cause significant damage to the environment and infrastructure.	Lawful planning of development with respect to flood lines.	Layout of the Solar PV facility overlaid on predicted "ponded flood occurrence zones"	Care should be taken in areas where development does take place within the likely flooding zones. The Engineers should during the design of the development identify the predicted "ponded flood occurrence zones"	Holder, Engineer	Planning & Design Phase.	Compliance to be verified by ECO & IEA.

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					(Hydrology Assessment Report) and prescribe, where applicable, proper flooding protocols (e.g., ensure drainage and stormwater systems are put in place to minimize flooding potential) and erosion prevention measures.			
01	Layout & Design	Ignorance of flood lines can cause significant damage to the environment and infrastructure.	Lawful planning of development with respect to flood lines.	Layout of the Solar PV facility overlaid on predicted "ponded flood occurrence zones"	If PV panels and array assemblages are proposed in areas of high flood risk, the depth of flooding should be predicted for those areas, e.g., depth of surface water flooding predicted during the 1:100 year flood event (refer to Hydrology Assessment Report).	Holder, Engineer	Planning & Design Phase.	Compliance to be verified by ECO & IEA.
01	Layout & Design	Ignorance of flood lines can cause significant damage to the environment and infrastructure.	Lawful planning of development with respect to flood lines.	Layout of the Solar PV facility overlaid on predicted "ponded flood occurrence zones"	All electrical connectors and other items vulnerable to flood water should be located at a minimal level of the maximum flood depth plus a 0,3 m free board above ground level to ensure that they are protected from the design flood event (1:100yr).	Holder, Engineer	Planning & Design Phase.	Compliance to be verified by ECO & IEA.
01	Layout & Design	Unlawful planning and development	Lawful planning and	Building plans approved by the Emthanjeni	Building plans for the solar PV facility must be submitted to the	Holder, Engineer	Planning & Design Phase.	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
		of land, that is without approved building plans.	development of land.	Local Municipality.	Emthanjeni Local Municipality for approval in terms of Section 4(1) of National Building Regulations and Building Standards, 1977 (Act No. 103 of 1977) as amended.			
01	Layout & Design	Unlawful planning and development of land, that is without regard of prescribed building lines.	Lawful planning and development of land.	Building Plan indicating approved building lines from the property boundary.	The applicant can stipulate in the Rezoning Land use application, what they need in terms of building lines and motivate as to why. The applicant will apply the building line restrictions from the boundary of the premise they need to for the land use they are applying for.	Holder	Planning & Design Phase.	Compliance to be verified by ECO and IEA.
01	Layout & Design	Poor planning and development of land, that is without regard of Eskom's Infrastructure.	Eskom's existing infrastructure and future planning is not impeded.	Proof of correspondence with Eskom Grid Access Unit.	No construction or excavation work shall be executed within Eskom's servitude without their consent.	Holder, Contractor	Planning & Design Phase.	Compliance to be verified by ECO and IEA.
01	Layout & Design	Poor planning and development of land, that is without regard of Eskom's Infrastructure.	Eskom's existing infrastructure and future planning is not impeded.	Proof of correspondence with Eskom Grid Access Unit.	Solar photovoltaic plant setbacks away from substations are required to prevent substations from being boxed in by these renewable generation plants limiting line route access to the substations and possible future	Holder	Planning & Design Phase.	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
					substation expansion (Renewable Energy Generation Plant Setbacks to Eskom Infrastructure Revision 02 compiled on 15/09/2020; Unique Identifier 240-65559775).			
01	Layout & Design	Poor planning and development of land, that is without regard of Eskom's Infrastructure.	Eskom's existing infrastructure and future planning is not impeded.	Proof of correspondence with Eskom Grid Access Unit.	A written request should be sent to Eskom via the Grid Access Unit regarding any proposed solar photovoltaic activity within a 5 km radius of a substation for Eskom to comment on (Renewable Energy Generation Plant Setbacks to Eskom Infrastructure Revision 02 compiled on 15/09/2020; Unique Identifier 240-65559775).	Holder	Planning & Design Phase.	Compliance to be verified by ECO and IEA.
01	Layout & Design	Poor planning and development of land, that is without regard of Eskom's Infrastructure.	Eskom's existing infrastructure and future planning is not impeded.	Proof of correspondence with Eskom Grid Access Unit.	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 (DEA generic EMPr).	Holder	Planning & Design Phase.	Compliance to be verified by ECO and IEA.

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Table 10. Management Protocol for Terrestrial Fauna

Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
02	Heat Island Effect	Possible PVHI effect on wild game.	Ensure least impact on animal behaviour.	Avoid or reduce possible PVHI effect on neighbouring game farm (Farm No. 149) – 200 m 'visual sensitivity' buffer along north-eastern property boundary.	A risk averse approach to the unknown lateral and vertical extent of the PVHI effect on wild game is to establish a 250 m corridor along the concerned neighbours' game farm boundary.	Engineer	Planning and Design Phase	Compliance to be verified by ECO and IEA.
02	Layout and Design	Decrease in species composition, activity and abundance.	The conservation of the natural vegetation, seasonal resources (such as the aquatic system), rocky outcrops and ecosystem functionality to enhance the conservation of all bat species that occur in the area.	Important bat areas are protected.	Areas of significance for bats such as foraging and socialising areas, landscape features used for commuting/navigation and roosting sites must be considered during the planning, layout and design of the solar arrays.	Holder, Engineer	Planning and Design Phase	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
02	Layout and Design	Disturbance to roosting sites and commuting routes during construction activities	Ensure least impact on animal behaviour.	No impacts on bat roosting sites due to disturbance	Avoid development of the ridge near the eastern border of the farm and extend a 100 m buffer zone from the crest of the rocky outcrop to limit any potential impact on possible roosting sites and commuting routes.	Holder, Engineer	Planning and Design Phase	Compliance to be verified by ECO and IEA.
02	Layout and Design	Removal of vegetation and disruption to the ephemeral watercourse	The conservation of the natural vegetation, seasonal resources (such as the aquatic system), rocky outcrops and ecosystem functionality to enhance the conservation of all bat species that occur in the area.	Important bat areas are protected.	Except for the approved linear activities, the ephemeral drainage line running centrally through the proposed footprint must not be altered/developed as this feature would be an important seasonal resource for bats.	Holder, Engineer	Planning and Design Phase	Compliance to be verified by ECO and IEA.
02	Layout and Design	Light Pollution can negatively affect bat species	Ensure least impact on animal behaviour.	No impacts on bat species due to lighting.	(1) The number and position of lights required must be limited and installed in areas where it is absolutely necessary. (2) A light shield/lamp shade should be used to	Holder, Engineer	Planning and Design Phase	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
					focus the beam downwards onto the ground to prevent sky glow as well as to prevent light from trespassing beyond the development area into the surrounding naturally dark areas. (3) The intensity of the lighting is lowered (dim the lights). Alternatively, in conjunction with substantially dimming the lights, motion sensors could be installed. (4) The spectrum of light chosen has longer wavelengths to reduce the attractiveness of light to insects. (5) If possible, the duration of the lighting period should be limited, and lights switched on shortly after the peak night-time emergence of clutter-edge forager bats ~60min after sunset.			
02	Layout and Design	Bird mortalities during the operational phase due to	Ensure the protection of Aves	Reduce Risk of avian mortality below unsustainable	In all areas where service roads intersect semi natural or natural habitat, all fences must be set	Holder, Engineer	Planning and Design Phase	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
		vehicle collisions, collisions with infrastructure and/or combustion.		thresholds that threaten regional populations of sensitive and priority avian species	back at least (strictly) 75 m from the edge of every service road in order to allow for vulnerable species such as cranes and korhaans to obtain adequate height after being flushed by vehicle traffic. Alternative to and where a 75 m buffer is not possible, new fences must be set back no more than 2 m (directly adjacent) from the edge of service roads. Through the essential elimination of habitat, this will limit any chance of vulnerable species foraging on verge side vegetation and causing subsequent fence collisions.			
02	Layout and Design	The destruction or disturbance of bird roosts/nests during the construction phase.	Ensure the protection of Aves	Reduce Risk of avian mortality below unsustainable thresholds that threaten regional populations of sensitive and priority avian species	Timing construction to May, June, July and August in order to avoid breeding periods of species within the sensitive drainage lines, wetlands and the general region.	Holder, Engineer	Planning and Design Phase	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
02	Layout and Design	Collisions of avifauna with fencing	Ensure the protection of Aves	Reduce Risk of avian mortality below unsustainable thresholds that threaten regional populations of sensitive and priority avian species	Utilize systematic fence marking to reduce avian collisions with fences. Markings should be at an appropriate height to be visible to birds flying at or above the height of the solar panels.	Holder, Engineer	Planning and Design Phase	Compliance to be verified by ECO and IEA.
02	Layout and Design	The attraction of some novel bird species due to the development of a solar farm with associated infrastructure such as lake effect perches, nest and shade opportunities.	Ensure the protection of Aves	Bird diverting devices around/across PV panels	Bird diverters, perch deterrents and the application of non-polarising white tape can be used around and/or across panels to minimise reflection.	Holder, Engineer	Planning and Design Phase	Compliance to be verified by ECO and IEA.
02	Layout and Design	Collision of traffic with fauna crossing roads etc.	Minimize the loss/injury to fauna caused by roads.	Animal friendly road design	Appropriate design of roads and other infrastructure to minimise faunal impacts and allow fauna to pass over, through or underneath these features as appropriate.	Holder, Engineer	Planning and Design Phase	Compliance to be verified by ECO and IEA.

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Table 11. Management Protocol for Terrestrial Flora

Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
03	Change in Land Use	Risk of veld fires caused by workers during the construction of the facility decreases grazing capacity	Fire management plan	No run-away (uncontrolled) fires - no open fires	Undertake a risk analysis to determine *inter alia* the probability and frequency of a wildfire during construction and operation and prepare a fire management plan accordingly.	Holder	Planning and Design	Compliance to be verified by ECO and IEA.

Table 12. Management Protocol for Soil and Rock

Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
04	Layout and Design	Run-off from solar PV arrays in dispersive soils can cause erosion.	Minimise the risk of erosion on dispersive soils.	No signs of soil erosion	Sheep will help control the height of the underlying vegetation. However, given that they are highly selective grazers and the unlikelihood of all karoo 'bossies' immediately to the east and west of each solar module being browsed below 300 mm, indigenous	Engineer	Planning and Design Phase	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
					vegetation may where required be cropped/cut by staff to a height of 100 mm below the solar module at maximum tilt, but not cleared.			
04	Layout and Design	Run-off from solar PV arrays in dispersive soils can cause erosion.	Minimise the risk of erosion on dispersive soils.	No signs of soil erosion	Cut vegetation shall be left on the ground beneath and around the trimmed plants to protect the soil and provide shelter for seedlings.	Engineer	Planning and Design Phase	Compliance to be verified by ECO and IEA.
04	Layout and Design	Run-off from solar PV arrays in dispersive soils can cause erosion.	Minimise the risk of erosion on dispersive soils.	No signs of soil erosion	If solar arrays are to be installed on potentially dispersive soils (e.g., bare patches) then implement the 'Solar Arrays on Dispersive Soils Protocol' (Appendix B3).	Engineer	Planning and Design Phase	Compliance to be verified by ECO and IEA.
04	Layout and Design	Supplying services via trenches in dispersive soils can cause tunnel erosion.	Minimise the risk of tunnel erosion in dispersive soils.	No signs of tunnel erosion.	If trenching is to be undertaken in potentially dispersive soils (e.g., bare patches) then implement the 'Trenching in Dispersive Soils Protocol' (Appendix B1)	Engineer	Planning and Design Phase	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
04	Layout and Design	Constructing roads and culverts in dispersive soils can cause erosion.	Minimise the risk of erosion on dispersive soils.	No signs of soil erosion.	If roads and culverts are to be constructed in potentially dispersive soils (e.g., bare patches) then implement the 'Roads & Culverts in Dispersive Soils Protocol' (Appendix B2)	Engineer	Planning and Design Phase	Compliance to be verified by ECO and IEA.
04	Layout and Design	The clayey soils and most noticeably the Swartland and Valsrivier soils may restrict vehicle movement during the wet season.	Minimise the risk of erosion on dispersive soils.	No signs of soil erosion.	Access roads to the project area, especially those crossing large flood plains, should be well planned.	Engineer	Planning and Design Phase	Compliance to be verified by ECO and IEA.
04	Layout and Design	The clayey soils and most noticeably the Swartland and Valsrivier soils may restrict vehicle movement during the wet season.	Minimise the risk of erosion on dispersive soils.	No signs of soil erosion.	The design of access roads must include the adequate management of surface water run-off	Engineer	Planning and Design Phase	Compliance to be verified by ECO and IEA.
05	Layout and Design	Spills from damaged and leaking oil-filled field	Conserve topsoil/prevent contamination.	No signs of oil spills from field transformers.	Field transformers shall be located in/on a transformer contaminant bund	Engineer	Planning and Design Phase	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
		transformers will contaminate the topsoil (Risk).			designed with an oil/water separation system, such as but not limited to a valve with an oil/water capture filter that allows water to pass through but trap oil.			

Table 13. Management Protocol for Ground and Surface Water

Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
06	Climate Change	Water availability for irrigation and drinking in an arid District dependent on ground water (with a high salt content).	Reduce Impact on aquifer reserve.	Preserve the underground aquifer, that is abstracting without depleting.	Do not overproduce from boreholes used as part of the project. 8 hours of pumping per day is recommended.	Holder, Engineer	All phases	Compliance to be verified by ECO and IEA.
06	Climate Change	Water availability for irrigation and drinking in an arid District dependent on ground water (with a high salt content).	Reduce Impact on aquifer reserve.	Preserve the underground aquifer, that is abstracting without depleting.	The abstraction of groundwater from both properties combined (but limited to sub-catchment HRU2 of Quaternary Catchment D62D), including all boreholes contained thereon, shall not exceed 216 m3/ day (or 78 840,43 m3/ yr) during the	Holder, Engineer	All phases	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
					construction period (including when it overlaps with operation), and 150 m3/day (or 54 750,3 m3/ yr) during operation.			
06	Climate Change	Water availability for irrigation and drinking in an arid District dependent on ground water (with a high salt content).	Reduce Impact on aquifer reserve.	Preserve the underground aquifer, that is abstracting without depleting.	Abstraction may not exceed the sustainable abstraction yield at the recommended pumping rate of 8 hrs per day for each borehole, that is 6,58 l/s @ 8hrs (or 189,5 m3/8hr day) for BH4 and 5,11 l/s @ 8 hrs (or 147,17 m3/8hr day) for BH5.	Holder, Engineer	All phases	Compliance to be verified by ECO and IEA.
06	Climate Change	Water availability for irrigation and drinking in an arid District dependent on ground water (with a high salt content).	Reduce Impact on aquifer reserve.	Preserve the underground aquifer, that is abstracting without depleting.	Undertake water level monitoring of boreholes within a 1.5 km radius of the pumping borehole. If a decline in water levels is noted in all boreholes, because of pumping, the abstraction rate should be lowered to prevent aquifer depletion.	Holder, Engineer	All phases How often?	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
06	Climate Change	Water availability for irrigation and drinking in an arid District dependent on ground water (with a high salt content).	Reduce Impact on aquifer reserve.	Preserve the underground aquifer, that is abstracting without depleting.	All new boreholes drilled in the project area (such as T1 or T2) must be pump tested, and interference (if any) with other existing boreholes (closer than 500 m) be evaluated by long-duration pump tests.	Holder, Engineer	All phases	Compliance to be verified by ECO and IEA.
06	Climate Change	Water availability for irrigation and drinking in an arid District dependent on ground water (with a high salt content).	Reduce Impact on aquifer reserve.	Preserve the underground aquifer, that is abstracting without depleting.	Conduct multi borehole water level logging, to ensure that no cumulative dewatering impacts are taking place for boreholes which may be in the same contact zones.	Holder, Engineer	All phases	Compliance to be verified by ECO and IEA.
06	Climate Change	Water availability for irrigation and drinking in an arid District dependent on ground water (with a high salt content).	Reduce Impact on aquifer reserve.	Preserve the underground aquifer, that is abstracting without depleting.	Implement the Surface and Groundwater Monitoring Protocol during construction and operation (Appendix D).	Holder, Engineer	All phases	Compliance to be verified by ECO and IEA.
06	Climate Change	Water availability for irrigation and drinking in an arid District dependent on ground water	Reduce Impact on aquifer reserve.	Preserve the underground aquifer, that is abstracting without depleting.	Continually investigate (or research) and implement (or adopt) water-saving strategies and	Holder, Engineer	All phases	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
		(with a high salt content).			technologies or alternatives, including designs throughout construction and operation, particularly relating to, but not limited to, washing solar panels.			
06	Change in Land use	Water demand for fighting wildfires may temporarily jeopradise available water reserves for development or operational requirements.	Reduce Impact on aquifer reserve.	Alternative firefighting technologies in place.	Consider alternative firefighting technologies such as CAFS (Compressed Air Foam Systems), which can multiply water use efficiency by as much as 11 times (pers. comm. Stefan Schlimmer 072 474 3155).	Holder, Engineer	Planning and Design	Compliance to be verified by ECO and IEA.
06	Planning	Uncontrolled abstraction of groundwater from an underground aquifer could deplete the ecological reserve and affect other water users' rights to domestic use and livestock watering.	Protection and restoration of a Strategic Water Source Area.	Preserve the underground aquifer, that is abstracting without depleting: Save water through wise water use – evidence of water saving behaviour, methods, and technologies.	Reduce the need for dust suppression/control, particularly along the access road from the N10 to the main entrance of the construction camp (and operational area) during construction (and operation) by providing construction staff (and employees) with a prearranged bus charter service.	Holder, Contractor	Continuous	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
06	Planning	Uncontrolled abstraction of groundwater from an underground aquifer could deplete the ecological reserve and affect other water users' rights to domestic use and livestock watering.	Protection and restoration of a Strategic Water Source Area.	Preserve the underground aquifer, that is abstracting without depleting: Save water through wise water use – evidence of water saving behaviour, methods, and technologies.	Remove dust from the solar panels using compressed air to reduce the frequency of watering the panels from 4 times (every 3 months) to 2 times each year (every 6 months).	Holder, Contractor	Continuous	Compliance to be verified by ECO and IEA.
07	Climate Change	Decrease in the quality of water	Reduce deterioration in water quality due to increased salt concentrations in dams, wetlands and soil/plant systems from enhanced evaporation.	A functional deionization plant at each borehole. Total hardness for domestic use should be limited to between 50 - 100 mg/• as CaCO3, where possible.	Establish water treatment, e.g., deionization plants at water sources used for washing solar modules and domestic use (potable water).	Holder, Engineer	Planning and Design	Compliance to be verified by ECO and IEA.
07	Layout and Design	Installation of pylons for transmission lines may cause temporary sedimentation after storm events.	Preserve ecological functioning of watercourse	Watercourses show no signs of sedimentation.	All development footprint areas to remain as small as possible.	Holder, Contractor	Continuous	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
07	Layout and Design	Groundwater is vulnerable to pollution.	Safe drinking water.	Avoidance of groundwater pollution: Correct positioning of boreholes relative to on-site disposal facilities.	Boreholes for domestic use should be positioned at least 30 m to 50 m away from potential pollution sources, such as on-site toilets, and site-specific conditions should be considered to determine the appropriate distance. The direction of the aquifer flow is also an important consideration.	Holder	Planning and Design Phase Continuous	Compliance to be verified by ECO and IEA.
07	Layout and Design	Groundwater is vulnerable to pollution.	Safe drinking water.	Avoidance of groundwater pollution: Employee appointed and trained	An employee should be trained to maintain the borehole and borehole pump and to alert management when major breakdowns occur.	Contractor	Planning and Design Phase Continuous	Compliance to be verified by ECO and IEA.
07	Layout and Design	Groundwater is vulnerable to pollution.	Safe drinking water.	Avoidance of groundwater pollution: A sanitary seal is present on each borehole.	To prevent aquifer pollution, the installation of a sanitary seal on the borehole is required.	Holder, Engineer	Planning and Design Phase Continuous	Compliance to be verified by ECO and IEA.
07	Layout and Design	Groundwater is vulnerable to pollution.	Safe drinking water.	Avoidance of groundwater pollution: Design	Ensure the design and development of the NewGen100 treatment plant	Holder, Engineer	Planning and Design Phase	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
				includes points of reuse and subsurface discharge.	includes *inter alia* a discharge pump and piping from the chlorine contact tank to a storage tank(s) and a sub-surface soakaway at the points of reuse (e.g., dust control) and discharge, respectively.			
07	Layout and Design	Groundwater is vulnerable to pollution.	Safe drinking water.	Avoidance of groundwater pollution: Biogas is converted into energy.	Ensure the design and development of the NewGen100 treatment plant allows for the safe capture and reuse of biogas as a source of energy for cooking, boiling water in a hot water urn and/or to provide hot water to the basins in the containerised toilet blocks via a gas geyser.	Holder, Engineer	Planning and Design Phase	Compliance to be verified by ECO and IEA.
07	Layout and Design	Groundwater is vulnerable to pollution.	Safe drinking water.	Avoidance of groundwater pollution: Design includes a subsurface discharge point.	Ensure the design and development of the Multirock 60 treatment plant includes *inter alia* discharge piping from the storage tanks at the point of reuse	Holder, Engineer	Planning and Design Phase Continuous	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
					(e.g., dust control) to a sub-surface soakaway at the point of discharge.			
07	Layout and Design	Groundwater is vulnerable to pollution.	Safe drinking water.	Avoidance of groundwater pollution: A floating chlorine basket is visible in the tanks or germicidal UV-light radiation.	Disinfect the treated effluent from the Multirock 60 plant in storage tanks by means of chlorine dosing or germicidal UV-light radiation. Consider diluting the treated effluent with rainwater (when available). The same storage tanks can be used for rainwater harvesting.	Holder, Engineer	Planning and Design Phase Continuous	Compliance to be verified by ECO and IEA.
07	Layout and Design	Groundwater is vulnerable to pollution from effluent disposal	Safe drinking water.	Avoidance of groundwater pollution: Show compliance with Annexure A of SANS 10252-2.	Comply with the National Standards on septic tank systems provided in SANS 10252-2 Water Supply and Drainage for Buildings: Part 2 Drainage installations for buildings (relevant information is included in Annexure A of SANS 10252-2).	Holder, Engineer	Planning and Design Phase Continuous	Compliance to be verified by ECO and IEA.
07	Layout and Design	Groundwater is vulnerable to pollution from effluent disposal	Safe drinking water.	Avoidance of groundwater pollution: Show	Sludge from septic tanks should be disposed of in accordance with the	Holder	Planning and Design Phase Continuous	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
				compliance with Guidelines for the Utilisation and Disposal of Wastewater Sludge.	"Guidelines for the Utilisation and Disposal of Wastewater Sludge: Volume 3: Requirements for the on-site and off-site disposal of sludge."			
07	Layout and Design	Groundwater is vulnerable to pollution from effluent disposal	Safe drinking water.	Avoidance of groundwater pollution: Show compliance with National Building Regulations SANS 10400	The design of a soakaway must comply with the guidelines given in the National Building Regulations SANS 10400.	Holder, Engineer	Planning and Design Phase Continuous	Compliance to be verified by ECO and IEA.
07	Layout and Design	Groundwater is vulnerable to pollution from effluent disposal	Safe drinking water.	Avoidance of groundwater pollution: Sampling records	Treated effluent must be sampled and monitored at the points of ingress to the effluent plants and at the points of reuse or discharge.	Holder	Continuous	Compliance to be monitored by SEO and verified by ECO and IEA.
07	Layout and Design	Groundwater is vulnerable to pollution from effluent disposal	Safe drinking water.	Avoidance of groundwater pollution: A suitably qualified operator.	The success of the NewGen100 and/or Multirock 60 treatment plants is dependent on correct operation and maintenance. Therefore, a suitably qualified operator should be appointed prior to commissioning.	Holder	Continuous	Compliance to be monitored by SEO and verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
07	Layout and Design	Groundwater is vulnerable to pollution from effluent disposal	Safe drinking water.	Avoidance of groundwater pollution: Grease traps are present in kitchens. FOG's no more than 10 mg/L	Fats, oils and greases (FOG's) should be treated at the source with grease/fat traps in the kitchens (during construction and operation) and shall be no more than 10 mg/L before entering the effluent plant.	Holder, Engineer	Planning and Design Phase Continuous	Compliance to be verified by ECO and IEA.
06	Layout and Design	Increased demand for groundwater during operation to water livestock as well as clean solar panels, control dust and provide staff with potable/drinking water, may stress groundwater reserves (exceed the rate at which reserves are naturally replenished).	Protection and restoration of a Strategic Water Source Area.	Preserve the underground aquifer, that is abstracting without depleting: Save water through wise water use – evidence of water saving behaviour, methods, and technologies.	Supplement non-potable water at the operational area by harvesting rainwater runoff from the roof of the main building at the operational area, unless non-potable usage doesn't warrant it.	Holder	Continuous	Compliance to be monitored by SEO and verified by ECO and IEA.
06	Layout and Design	Increased demand for groundwater during operation to water livestock as well as clean solar panels,	Protection and restoration of a Strategic Water Source Area.	Preserve the underground aquifer, that is abstracting without depleting: Save water	Reuse treated wastewater generated by a waterwork (e.g., a wastewater treatment package plant) for non-potable usage, e,g., dust	Holder	Continuous	Compliance to be monitored by SEO and verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
		control dust and provide staff with potable/drinking water, may stress groundwater reserves (exceed the rate at which reserves are naturally replenished).		through wise water use – evidence of water saving behaviour, methods, and technologies.	suppression, during operation.			
06	Layout and Design	Increased demand for groundwater during operation to water livestock as well as clean solar panels, control dust and provide staff with potable/drinking water, may stress groundwater reserves (exceed the rate at which reserves are naturally replenished).	Protection and restoration of a Strategic Water Source Area.	Preserve the underground aquifer, that is abstracting without depleting: Save water through wise water use – evidence of water saving behaviour, methods, and technologies.	Remove dust from the solar panels using compressed air to reduce the frequency of watering the panels from 4 times (every 3 months) to 2 times each year (every 6 months).	Holder	Continuous	Compliance to be monitored by SEO and verified by ECO and IEA.
06	Layout and Design	Increased demand for groundwater during operation to water livestock as well as clean solar panels,	Protection and restoration of a Strategic Water Source Area.	Preserve the underground aquifer, that is abstracting without depleting: Save water	Reduce the quantity of groundwater and frequency of applications required for dust suppression on gravel access roads by adding	Holder	Continuous	Compliance to be monitored by SEO and verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
		control dust and provide staff with potable/drinking water, may stress groundwater reserves (exceed the rate at which reserves are naturally replenished).		through wise water use – evidence of water saving behaviour, methods, and technologies.	environmentally friendly soil binding agents. This would require the necessary storage tanks complete with Programmable Logic Controller (PLC) and pump systems required for dosage purposes.			
06	Layout and Design	Increased demand for groundwater during operation to water livestock as well as clean solar panels, control dust and provide staff with potable/drinking water, may stress groundwater reserves (exceed the rate at which reserves are naturally replenished).	Protection and restoration of a Strategic Water Source Area.	Preserve the underground aquifer, that is abstracting without depleting: Save water through wise water use – evidence of water saving behaviour, methods, and technologies.	Install suitable water meters to ensure that the abstracted volumes are measured daily (DEA Generic EMPr).	Holder	Continuous	Compliance to be monitored by SEO and verified by ECO and IEA.
06	Layout and Design	The yield from a new borehole may not be viable.	Protection and restoration of a Strategic Water Source Area.	Preserve the underground aquifer, that is abstracting without depleting:	Tests should be conducted to estimate the likely yield before drilling a borehole to ensure viability.	Holder	Planning and Design	Compliance to be monitored by SEO and verified by

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
				Save water through wise water use – evidence of water saving behaviour, methods, and technologies.				ECO and IEA.
06	Layout and Design	The yield from a new borehole may not be viable.	Protection and restoration of a Strategic Water Source Area.	Preserve the underground aquifer, that is abstracting without depleting: Save water through wise water use – evidence of water saving behaviour, methods, and technologies.	The drilling should be executed in accordance with the South African National Standard, development, maintenance, and management of groundwater resources - Part 4 Test Pumping of water boreholes.	Holder	Planning and Design	Compliance to be monitored by SEO and verified by ECO and IEA.
06	Layout and Design	The yield from a new borehole may not be viable.	Protection and restoration of a Strategic Water Source Area.	Preserve the underground aquifer, that is abstracting without depleting: Save water through wise water use – evidence of water saving behaviour,	A reputable driller registered with the Borehole Water Association of South Africa (BWASA) should be used to drill the borehole.	Holder	Planning and Design	Compliance to be monitored by SEO and verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
				methods, and technologies.				
06	Layout and Design	The yield from a new borehole may not be viable.	Protection and restoration of a Strategic Water Source Area.	Preserve the underground aquifer, that is abstracting without depleting: Save water through wise water use – evidence of water saving behaviour, methods, and technologies.	Install flow metres at all abstraction points (boreholes). Water meters should not only be used to measure water consumption of end users but also measure water losses (through leakage), improve maintenance of infrastructure, and manage the water levels of storage facilities.	Holder	Planning and Design	Compliance to be monitored by SEO and verified by ECO and IEA.
06	Layout and Design	The yield from a new borehole may not be viable.	Protection and restoration of a Strategic Water Source Area.	Preserve the underground aquifer, that is abstracting without depleting: Save water through wise water use – evidence of water saving behaviour, methods, and technologies.	An employee should be trained to maintain the borehole and borehole pump and to alert management when major breakdowns occur.	Holder	Planning and Design	Compliance to be monitored by SEO and verified by ECO and IEA.
06	Layout and Design	The yield from a new borehole	Protection and restoration of a	Preserve the underground	Borehole water level measurements should be taken regularly and	Holder	Planning and Design	Compliance to be monitored by

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
		may not be viable.	Strategic Water Source Area. Saving water through its wise use.	aquifer, that is abstracting without depleting: Save water through wise water use – evidence of water saving behaviour, methods, and technologies.	recorded to ensure the pump is submerged at all times and to provide early warning of source depletion.			SEO and verified by ECO and IEA.
06	Layout and Design	Impact on the aquifer reserve and borehole pump lifespan.	Protection and restoration of a Strategic Water Source Area.	Preserve the underground aquifer, that is abstracting without depleting: Save water through wise water use – evidence of water saving behaviour, methods, and technologies.	Groundwater should be pumped from the boreholes to dedicated water storage tanks to build up a reserve, whereafter the boreholes are only used to top up the storage tanks.	Holder, Engineer	Planning and Design	Compliance to be monitored by SEO and verified by ECO and IEA.
07	Layout and Design	Harvested rainwater is susceptible to pollution.	Safe water for non-potable usage.	Avoidance of surface water pollution: Design of rainwater harvesting system includes a first-flush	If rainwater harvesting is a feasible option to supplement non-potable usage during operation, then some mechanism (e.g., a first-flush diverter) should be installed to discard the first flush	Holder, Engineer	Planning and Design Phase Continuous	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
				diverter or similar mechanism.	of rainwater from a roof.			
07	Layout and Design	Harvested rainwater is susceptible to pollution.	Safe water for non-potable usage.	Avoidance of surface water pollution: Design of rainwater harvesting system includes a gauze screen at the inlet.	If rainwater harvesting is a feasible option to supplement non-potable usage during operation, then the inlet to the storage tank should be protected by a gauze screen to keep out debri, as well as insects and rodents.	Holder, Engineer	Planning and Design Phase Continuous	Compliance to be verified by ECO and IEA.
07	Layout and Design	Leaking chemical toilets can contaminate soil and surface water.	Safe drinking water.	Avoidance of surface water pollution: no leaks. The holdings tanks are contained.	Portable chemical toilets shall be in good working order and the holding tank shall be contained within a drip tray or other impermeable containment structure.	Holder, Engineer	Planning and Design Phase Continuous	Compliance to be verified by ECO and IEA.
07	Layout and Design	Overflowing chemical toilets can contaminate soil and surface water.	Safe drinking water.	Avoidance of surface water pollution: The holding tanks are not overfilled. Municipal disposal bills.	The sewerage shall be removed regularly (dependant on usage) from the holding tank of portable chemical toilets and conveyed to a municipal treatment or disposal facility.	Contractor, SEO	Continuous	Compliance to be monitored by the SEO and verified by ECO and IEA.
08	Layout and Design	Culverts or stormwater outlets tend to concentrate and	Protection and restoration of a Strategic Water Source Area	No pipe culvert road crossings.	Pipe culvert road crossings are prohibited.	Engineer	Planning and Design Phase	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
		increase the velocity of surface water flow, changing the surface water hydrology or flow patterns.						
08	Layout and Design	Culverts or stormwater outlets tend to concentrate and increase the velocity of surface water flow, changing the surface water hydrology or flow patterns.	Protection and restoration of a Strategic Water Source Area	Preserve river channel hydrological pattern	Ensure that any dedicated stream crossings use road crossing designs, such as box culverts or concrete drifts with rock fill, which spread the surface water into a broadly distributed sheet whilst maintaining unrestricted subterranean flow	Engineer	Planning and Design Phase	Compliance to be verified by ECO and IEA.
08	Layout and Design	Culverts or stormwater outlets tend to concentrate and increase the velocity of surface water flow, changing the surface water hydrology or flow patterns.	Protection and restoration of a Strategic Water Source Area	Preserve river channel hydrological pattern	Road crossing designs, such as box culverts or concrete drifts with rock fill, which spread the surface water into a broadly distributed sheet whilst maintaining unrestricted subterranean flow should be sized to	Engineer	Planning and Design Phase	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
					accommodate at least 1:100 yr flood events			
08	Layout and Design	Altered stormwater run-off patterns, e.g., from sheet flow to channelled flow, can cause erosion.	Protection and restoration of a Strategic Water Source Area	Fill roads of gravel/crushed rock	Limit or restrict the construction of fill roads. All fill roads must use a permeable fill material (such as gravel or crushed rock) for at least the first layer of fill in order to maintain the natural flow regimes of subsurface water.	Engineer	Planning and Design Phase	Compliance to be verified by ECO and IEA.
08	Layout and Design	Altered stormwater run-off patterns, e.g., from sheet flow to channelled flow, can cause erosion.	Protection and restoration of a Strategic Water Source Area	Preserve stormwater run-off hydrological pattern: Minimal erosion of disturbed areas during construction.	The levelling of disturbed areas must be done concurrent with construction activities.	Contractor, SEO	Continuous	Compliance to be monitored by SEO and verified by ECO and IEA.
08	Layout and Design	Altered stormwater run-off patterns, e.g., from sheet flow to channelled flow, can cause erosion.	Protection and restoration of a Strategic Water Source Area	Preserve stormwater run-off hydrological pattern: No linear depressions or mounds of earth.	The levelling of disturbed areas should not significantly alter the flow characteristics of stormwater run-off, e.g., shaped to natural pre-existing forms that retain sheet flow.	Contractor.	Continuous	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
08	Layout and Design	Altered stormwater run-off patterns, e.g., from sheet flow to channelled flow, can cause erosion.	Protection and restoration of a Strategic Water Source Area	Preserve stormwater run-off hydrological pattern: Shaped to natural forms.	Ensure the re-instatement of original terrestrial landscape levels.	Engineer, Contractor.	Upon completion of a construction activity	Compliance to be verified by ECO and IEA.

Table 14. Management Protocol for Atmosphere

Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
09	Heat Island Effect	The PV "heat island" (PVHI) effect.	Increased ecosystem resilience to atmospheric warming.	Reduce the potential PVHI: Restored bare patches.	Minimise vegetation clearance.	Holder	Continuous	Compliance to be verified by ECO and IEA.
09	Heat Island Effect	The PV "heat island" (PVHI) effect.	Increased ecosystem resilience to atmospheric warming.	Reduce the potential PVHI: Restored bare patches.	Halt and reverse existing degradation primarily from extensive livestock production to counter increased climatic uncertainty - restore all bare patches of soil with vegetation using the Bare Patch Restoration Protocol (Appendix C).	Holder, Landowner	Continuous	Compliance to be verified by ECO and IEA.
09	Heat Island Effect	The PV "heat island" (PVHI) effect.	Increased ecosystem resilience to	Reduce the potential PVHI: No signs of overgrazing.	Ensure responsible natural resource management that maintains the integrity of	Holder, Landowner	Continuous	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
			atmospheric warming.		ecosystems and the continued provision of ecosystem services to current and future generations.			
09	Heat Island Effect	The PV "heat island" (PVHI) effect.	Increased ecosystem resilience to atmospheric warming.	Reduce the potential PVHI: Natural vegetation retained underneath solar PV modules.	Once construction has been completed in an area, immediately reinstate and maintain the vegetation underneath the solar PV modules to retain its cooling effect through transpiration.	Holder, Contractor	Continuous	Compliance to be verified by ECO and IEA.
09	Heat Island Effect	The PV "heat island" (PVHI) effect.	Increased ecosystem resilience to atmospheric warming.	Reduce the potential PVHI: A fragmented development.	Fragment the expansive covering of the solar PV development into two or more clusters segregated by ecological or other buffers.	Holder, Engineer	Planning and Design Phase	Compliance to be verified by ECO and IEA.
09	Heat Island Effect	The PV "heat island" (PVHI) effect.	Increased ecosystem resilience to atmospheric warming.	Reduce the potential PVHI: Adequate spacing between solar arrays.	Solar panel arrays shall be spaced approximately 9.5 m apart (from pile to pile). If each module is 2.2 m long, this will allow a 5 m gap between the modules of parallel arrays.	Holder, Engineer	Planning and Design Phase	Compliance to be verified by ECO and IEA.
10	Layout and Design	Air pollution or reduced air quality from gravel roads	Minimise dust generation	Dust generation is controlled.	Reduce speed to 30 km/hr	Holder, Contractor	Continuous	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
10	Layout and Design	Air pollution or reduced air quality from gravel roads	Minimise dust generation	Dust generation is controlled.	Restrict the width of new or upgraded gravel roads to preferably 5 m, but not wider than 6 m except for passing lanes (not more than 8 m wide).	Holder, Engineer	Continuous	Compliance to be verified by ECO and IEA.

Table 15. Management Protocol for Terrestrial and Avian Ecosystems

Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
14	Climate Change	Diversification by changing the current land-use (Agriculture) to an Agrivoltaic system is potentially a powerful climate resilient land-use	Maintenance of near natural landscapes with minimal loss in ecosystem integrity and functioning.	Maintain ecosystem integrity and resilience to climate change: An Agrivoltaic system	The solar PV facility shall adopt a symbiotic Agrivoltaic system that combines agriculture, specifically good ecological management (grazing) practices, with green energy generation.	Holder, Engineer, Landowner	Planning and Design Phase Continuous	Compliance to be verified by ECO and IEA.
14	Change in land Use	Diversification by changing the current land-use (Agriculture) to an Agrivoltaic system is potentially a powerful climate	Maintenance of near natural landscapes with minimal loss in ecosystem integrity and functioning.	Maintain of ecosystem integrity and resilience to climate change: soil maps and veld condition assessments	Undertake detailed soil mapping and veld condition assessments to determine the grazing capacity of the project area so that the landowner does not exceed recommended stocking densities and ensure adequate vegetation cover necessary for the	Holder, Landowner	Planning and Design Phase Continuous	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
		resilient land-use			maintenance of ecosystem services.			
14	Change in Land Use	Diversification by changing the current land-use (Agriculture) to an Agrivoltaic system is potentially a powerful climate resilient land-use	Maintenance of near natural landscapes with minimal loss in ecosystem integrity and functioning/Protection and restoration of a Strategic Water Source Area	Maintain ecosystem integrity and resilience to climate change: Revegetated bare patches.	Halt and reverse existing degradation from extensive livestock production or other drivers to counter increased climatic uncertainty - restore all bare patches of soil with vegetation using the Bare Patch Restoration Protocol (Appendix C).	Holder, Landowner	Continuous	Compliance to be verified by ECO and IEA.
14	Change in Land Use	Diversification by changing the current land-use (Agriculture) to an Agrivoltaic system is potentially a powerful climate resilient land-use	Maintenance of near natural landscapes with minimal loss in ecosystem integrity and functioning	Maintain ecosystem integrity and resilience to climate change: No signs of overgrazing.	Ensure responsible natural resource management that maintains the integrity of ecosystems and the continued provision of ecosystem services to current and future generations.	Holder, Landowner	Continuous	Compliance to be verified by ECO and IEA.
14	Change in Land Use	Impacts on Ecological Support Areas (ESAs) and general ecological processes within the site	Good environmental management of the facility in accordance with management plans.	Open space management plan	Develop an open space management plan which makes provision for the favourable management of the facility and the surrounding area for fauna. The open space management plan must be undertaken by a qualified terrestrial and aquatic specialist.	Holder	Planning and Design Phase and construction phase	Compliance to be verified by ECO and IEA.
11	Layout and Design	Habitat loss and fragmentation of watercourse areas due to	Minimize habitat loss.	Roads do not impede surface or	All roads and crossings must be engineered not to impede surface or subsurface flow in any way.	Holder, Engineer	Planning and Design Phase	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
		displacement as a result of infrastructure installation (panels, powerlines, roads, fences and sub surface cables).		subsurface flows				
11	Layout and Design	Habitat loss and fragmentation of watercourse areas due to displacement as a result of infrastructure installation (panels, powerlines, roads, fences and sub surface cables).	Minimize habitat loss.	Pipeline corridors are no wider than 10m through ephemeral drainage line	All Pipelines corridors (affected areas) should be implemented to a maximum 10 metres wide through wetlands during construction.	Holder, Engineer	Planning and Design Phase	Compliance to be verified by ECO and IEA.
11	Layout and Design	Habitat loss and fragmentation of watercourse areas due to displacement as a result of infrastructure installation (panels, powerlines, roads, fences	Minimize habitat loss.	Aerial or overhead equipment used where possible	Avoid the construction of a crossing or staging area by either choosing an alternative route or by using aerial or overhead equipment.	Holder, Engineer	Planning and Design Phase	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
		and sub surface cables).						
11	Layout and Design	Habitat loss and fragmentation of watercourse areas due to displacement as a result of infrastructure installation (panels, powerlines, roads, fences and sub surface cables).	Minimize habitat loss.	No unnecessary ephemeral drainage line crossings	Limit the number of crossings.	Holder, Engineer	Planning and Design Phase	Compliance to be verified by ECO and IEA.
11	Layout and Design	Habitat loss and fragmentation of watercourse areas due to displacement as a result of infrastructure installation (panels, powerlines, roads, fences and sub surface cables).	Minimize habitat loss.	Best possible crossing sites utilized	Consider criteria when locating crossing sites to minimize disturbance, such as shortest crossing point, avoiding unstable or steep banks, avoiding highly erodible soils, avoid unstable portions of stream channels.	Holder, Engineer	Planning and Design Phase	Compliance to be verified by ECO and IEA.
11	Layout and Design	The physical footprint of the quarry will result in a loss of local terrestrial	Minimize habitat loss.	Natural vegetation is retained.	The quarry shall not exceed 2 ha in size.	Holder, Engineer	Planning and Design Phase	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
11	Layout and Design	The physical footprint of the quarry will result in a loss of local terrestrial	Minimize habitat loss.	Natural vegetation is retained.	As far as is practical, feasible and permissible within the law, mine material for concrete aggregate and/or road layers from existing quarries before resorting to establishing a new quarry in the project area (on Portion 3 of Farm Goede Hoop 26C). None of the following existing quarries utilize good quality sandstone or dolerite rock but can be recommended as construction material source: • 30,821773° S; 24,403240° E • 30,87254° S; 24,36635° E • 30,84143° S; 24,31322° E • 30,8333° S; 24,30296° E • 30,85369° S; 24,26418° E • 30,87197° S; 24,32169° E Better quality material (sandstone) which appears to be intermittently used in road layers occurs at a large dormant quarry near the N10 national road: • 30,87990° S; 24,23715° E	Holder, Engineer	Planning and Design Phase	Compliance to be verified by ECO and IEA.
11	Layout and Design	The physical footprint of the quarry will result in a loss of local terrestrial	Minimize habitat loss.	Natural vegetation is retained.	The borrow pit/quarry may only be used to source suitable material for improvements to the property that it is located on.	Holder, Engineer	Planning and Design Phase	Compliance to be verified by ECO and IEA.
11	Layout and Design	Habitat loss and fragmentation due to displacement as a result of	Maintenance of ecological processes (e.g., predation, reproduction, etc.)	No development (excluding linear development)	Adherence to the terrestrial biodiversity ecological sensitivity mapping and no-go areas ('High' sensitivity) provided within the Terrestrial Biodiversity Assessment	Holder, Engineer	Planning and Design Phase	Compliance to be verified by ECO and IEA.

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		infrastructure installation (panels, powerlines, roads, fences and sub surface cables).	and biodiversity pattern.	within highly sensitive areas	(refer to Appendix M) when determining the final layout of the PV Arrays. Linear infrastructure may traverse the ephemeral drainage lines and other areas mapped as 'High' sensitivity.			
11	Layout and Design	Fragmenting the local landscape.	Maintenance of connectivity, particularly terrestrial and aquatic ecological process pathways within the local landscape/Protection and restoration of a Strategic Water Source Area	Limit fragmentation: A perimeter fence does not intersect the ephemeral drainage line running through the project area (an unnamed tributary to the D62D – 05610 tributary).	Fragmentation of the terrestrial ecosystem will be reduced by fencing each PV Block separately.	Holder, Engineer	Planning and Design Phase	Compliance to be verified by ECO and IEA.
11	Layout and Design	Fragmenting the local landscape.	Maintenance of connectivity, particularly terrestrial and aquatic ecological process pathways within the local landscape.	Limit fragmentation: A perimeter fence does not intersect an ecological buffer.	Fencing shall remain outside the delineated edge of visual and ecological buffers inclusive of the riparian or other 'High' ecologically sensitive habitats.	Holder, Engineer	Planning and Design Phase	Compliance to be verified by ECO and IEA.
11	Layout and Design	Fragmenting the local landscape.	Maintenance of connectivity, particularly terrestrial and aquatic ecological process	Limit fragmentation: A perimeter fence does not intersect a	Fragmentation must be limited by the exclusion of 'High' ecologically sensitive habitats from fenced in areas and the preservation of	Holder, Engineer	Planning and Design Phase	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
			pathways within the local landscape.	'High' sensitive habitat.	ecological corridors connecting these 'High' sensitive habitats.			
11	Layout and Design	Birds may be attracted to the area for nesting/landing	Maintenance of ecological processes (e.g., predation, reproduction, etc.) and biodiversity pattern.	Minimise areas that attract birds	Numerous devices have been developed to deter birds from an area. Deterrents could include habitat management, control of prey populations, anti-perching devices, nest-proofing, netting or other enclosures, scaring or chasing (e.g., with trained dogs or raptors), bio-acoustic or visual deterrence.	Engineer, Landowner	Planning and Design Phase Continuous	Compliance to be verified by ECO and IEA.
11	Layout and Design	Habitat loss and fragmentation due to displacement as a result of infrastructure installation (panels, powerlines, roads, fences and sub surface cables).	Maintenance of ecological processes (e.g., predation, reproduction, etc.) and biodiversity pattern.	Sensitive avifauna habitats are protected and maintained.	Avoid avifaunal specific highly sensitive areas and their associated buffers, such as the local drainage lines, impoundments, smaller watercourses, pans and rocky kopjes.	Holder, Engineer	Planning and Design Phase	Compliance to be verified by ECO and IEA.
11	Layout and Design	Habitat loss and fragmentation due to displacement as a result of infrastructure installation (panels, powerlines, roads, fences	Maintenance of ecological processes (e.g., predation, reproduction, etc.) and biodiversity pattern.	Sensitive avifauna habitats are protected and maintained.	The linear Drainage line habitats must be buffered by a minimum of 50 metres from the edge of the demarcated ephemeral drainage line (or wetland).	Holder, Engineer	Planning and Design Phase	Compliance to be verified by ECO and IEA.

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		and sub surface cables).						
11	Layout and Design	Habitat loss and fragmentation due to displacement as a result of infrastructure installation (panels, powerlines, roads, fences and sub surface cables).	Maintenance of ecological processes (e.g., predation, reproduction, etc.) and biodiversity pattern.	Sensitive avifauna habitats are protected and maintained.	A green buffer should be maintained around all habitats with a SEI designated as High or above. This includes a 50 m no-go buffer proposed around small artificial water points (borehole pans and livestock watering troughs).	Holder, Engineer	Planning and Design Phase	Compliance to be verified by ECO and IEA.
11	Layout and Design	Habitat loss and fragmentation due to displacement as a result of infrastructure installation (panels, powerlines, roads, fences and sub surface cables).	Maintenance of ecological processes (e.g., predation, reproduction, etc.) and biodiversity pattern.	Sensitive avifauna habitats are protected and maintained.	All large impoundments (dams) require a 1 km buffer from any infrastructure activity although this may be reduced to 800 m if no new powerline infrastructure impacts the 1 km threshold. The 1 km buffer will not apply to roads and fences.	Holder, Engineer	Planning and Design Phase	Compliance to be verified by ECO and IEA.
12	Layout and Design	Erosion and sediment transport may be exacerbated by the concentrated rainfall volumes	Maintenance of near natural landscapes with minimal loss in ecosystem integrity and functioning	Minimise erosion	Sheep will help control the height of the underlying vegetation. However, given that they are highly selective grazers and the unlikelihood of all karoo 'bossies' immediately to the east and west of each solar module being browsed below 300 mm, indigenous vegetation may where	Holder, Engineer, Contractor	Planning and Design Phase Pre-construction	Compliance to be verified by ECO and IEA.

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		off the solar PV panels.			required be cropped/cut by staff to a height of 100 mm below the solar module at maximum tilt, but not cleared.			
12	Layout and Design	Erosion and sediment transport may be exacerbated by the concentrated rainfall volumes off the solar PV panels.	Maintenance of near natural landscapes with minimal loss in ecosystem integrity and functioning	Minimise erosion.	Cut vegetation shall be left on the ground beneath and around the trimmed plants to protect the soil and provide shelter for seedlings.	Holder, Engineer, Contractor	Planning and Design Phase Pre-construction	Compliance to be verified by ECO and IEA.
12	Layout and Design	Erosion and sediment transport may be exacerbated by the concentrated rainfall volumes off the solar PV panels.	Maintenance of near natural landscapes with minimal loss in ecosystem integrity and functioning	Minimise erosion	If solar arrays are to be installed on potentially dispersive soils (e.g., bare patches) then implement the 'Solar Arrays on Dispersive Soils Protocol' (Appendix B3).	Holder, Engineer, Contractor	Planning and Design Phase Pre-construction	Compliance to be verified by ECO and IEA.
14	Change in Land Use	The physical footprint of solar PV facility will result in a loss of local terrestrial habitat.	Minimize habitat loss.	Natural vegetation is retained.	The development footprint of the Solar PV facility and associated infrastructure shall not be cleared in its entirety. The clearance of indigenous vegetation shall be restricted to the physical footprint of the facility and associated infrastructure (with the exception of temporary clearance and/or disturbance associated with 'normal' construction-related activities).	Engineer, Landowner	Planning and Design Phase Continuous	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
14	Change in Land Use	The physical footprint of solar PV facility will result in a loss of local terrestrial habitat.	Minimize habitat loss.	Natural vegetation is retained.	Limit the number of equipment staging areas and spoil storage areas.	Engineer, Landowner	Planning and Design Phase Continuous	Compliance to be verified by ECO and IEA.
14	Change in Land Use	The physical footprint of solar PV facility will result in a loss of local terrestrial habitat.	Minimize habitat loss.	Natural vegetation is retained.	A rehabilitation plan must be commissioned before construction commences.	Engineer, Landowner	Planning and Design Phase Continuous	Compliance to be verified by ECO and IEA.
14	Change in Land Use	The physical footprint of solar PV facility will result in a loss of local terrestrial habitat.	Minimize habitat loss.	Natural vegetation is retained.	The clearance or disturbance of indigenous vegetation resulting from 'normal' construction-related activities shall be rehabilitated immediately upon the completion of those activities on a site, in accordance with a rehabilitation plan and/or the Bare Patch Restoration Protocol (Appendix C).	Engineer, Landowner	Planning and Design Phase Continuous	Compliance to be verified by ECO and IEA.
11	Planning	Loss of terrestrial habitat cleared for the development footprint and construction camp.	Ensure the protection of undisturbed or sensitive vegetation units.	The facility is built in sequential phases.	Reduce the area needed for parking, storage, etc. by building the facility in sequential phases (e.g., 100 MW blocks) as opposed to trying to build the 400 MW facility in one go.	Holder, Engineer	Planning and Design Phase	Compliance to be verified by ECO and IEA.
12	Layout and Design	Bare areas created by vegetation	Maintenance of near natural landscapes with minimal loss in	Minimise erosion	Maintain vegetation cover beneath the solar arrays.	Holder, Landowner	Planning and Design Phase	Compliance to be verified

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		removal will increase surface water run-off, causing erosion and sedimentation of watercourses.	ecosystem integrity and functioning				Continuous	by ECO and IEA.
12	Planning	Potential run-off and stormwater discharge from the site can cause erosion.	Maintenance of near natural landscapes with minimal loss in ecosystem integrity and functioning	Minimise erosion	The civil construction phase should take place during the winter months (e.g., June to September) with a decreased probability of storm events.	Holder, Engineer, Contractor	Planning and Design Phase Pre-construction	Compliance to be verified by ECO and IEA.
12	Layout and Design	Access roads, including the two-track service roads between the solar panel arrays, will increase surface water run-off, causing erosion and sedimentation of watercourses.	Maintenance of near natural landscapes with minimal loss in ecosystem integrity and functioning	Minimise erosion	If necessary, the Engineers responsible for designing the roads shall include berms & mitre drains at strategic points along the two-track service roads between the solar panel arrays (and other roads) as a mechanism to dissipate runoff.	Holder, Engineer	Planning and Design Phase	Compliance to be verified by ECO and IEA.
13	Layout and Design	Artificial lighting threatens biodiversity.	Maintenance of ecological processes (e.g., predation, reproduction, etc.) and biodiversity pattern.	Minimise the effects of artificial light on wildlife (and humans): LEDs and smart control technologies.	Adopt LEDs and smart control technologies (such as motion sensors and timers) to control and manage the effects of artificial light on wildlife and 'sense of place'.	Holder, Engineer	Planning and Design Phase	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
13	Layout and Design	Artificial lighting threatens biodiversity.	Maintenance of ecological processes (e.g., predation, reproduction, etc.) and biodiversity pattern.	Minimise the effects of artificial light on wildlife (and humans): best practice lighting design principles have been incorporated into the design of lighting.	Incorporate the following best practice lighting design principles into the design of lighting: (a) Start with natural darkness and only add light for specific purposes, (b) Use adaptive light controls to manage light timing, intensity and colour, (c) Light only the object or area intended – keep lights close to the ground/mounting fixtures as low as possible, directed and shielded to avoid light spill, (d) Use the lowest intensity lighting appropriate for the task, (e) Use non-reflective, dark-coloured surfaces, and (f) Use lights with reduced or filtered blue, violet and ultra-violet wavelengths/Use lights with longer wavelengths, e.g., a white 2 700 K LED light (as opposed to a 5 000 K LED light) (National Light Pollution Guidelines for Wildlife Including Marine Turtles, Seabirds and Migratory Shorebirds, Commonwealth of Australia 2020)	Holder, Engineer	Planning and Design Phase	Compliance to be verified by ECO and IEA.

Table 16. Management Protocol for Aquatic Ecosystems

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
15	Layout and Design	Habitat loss and fragmentation due to displacement as a result of infrastructure installation (panels, powerlines, roads, fences and sub surface cables).	Maintenance of ecological processes (e.g., predation, reproduction, etc.) and biodiversity pattern.	No development (excluding linear development) within highly sensitive areas	Adherence to the terrestrial biodiversity ecological sensitivity mapping and no-go areas ('High' sensitivity) provided within the Terrestrial Biodiversity Assessment (refer to Appendix M) when determining the final layout of the PV Arrays. Linear infrastructure may traverse the ephemeral drainage lines and other areas mapped as 'High' sensitivity.	Holder, Engineer	Planning and Design Phase	Compliance to be verified by ECO and IEA.
15	Layout and Design	Habitat loss and fragmentation due to displacement as a result of infrastructure installation (panels, powerlines, roads, fences and sub surface cables).	Maintenance of ecological processes (e.g., predation, reproduction, etc.) and biodiversity pattern.	Underground cables are below subsurface flows and rehabilitated once complete	All underground cables bisecting sensitive habitats must be placed below the subsurface flow of the ephemeral wetlands with the linear construction pits subjected to full rehabilitation in order to maintain normal subsurface flow.	Engineer	Planning and Design	Compliance to be verified by ECO and IEA.
15	Layout and Design	Habitat loss and fragmentation due to displacement as a result of infrastructure installation	Maintenance of ecological processes (e.g., predation, reproduction, etc.) and biodiversity pattern.	Zero interruption to flow.	Horizontal directional drilling is preferred for the crossing of wetlands. A hole is dug below the stream crossing and pulling a prefabricated section of pipe through the hole.	Engineer	Planning and Design	Compliance to be verified by ECO and IEA.

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		(panels, powerlines, roads, fences and sub surface cables).						
15	Layout and Design	Habitat loss and fragmentation due to displacement as a result of infrastructure installation (panels, powerlines, roads, fences and sub surface cables).	Maintenance of ecological processes (e.g., predation, reproduction, etc.) and biodiversity pattern.	Zero interruption to flow.	Avoid or minimise any restriction to subsurface water flow by constructing road crossings at or above (not below) natural ground level (NGL) and, where applicable, retaining the in-situ topsoil with vegetation root mass (or mat). In the case of building road crossings above NGL, and if the natural vegetation is cleared, then ensure that the grader does not penetrate the abovementioned root mat and maintains a flat surface. Topsoil removed from other infrastructure placement sites can be added below the road surface to protect the vegetative binding below.	Engineer	Planning and Design	Compliance to be verified by ECO and IEA.
15	Layout and Design	Habitat loss and fragmentation due to displacement as a result of infrastructure installation (panels, powerlines, roads, fences	Maintenance of ecological processes (e.g., predation, reproduction, etc.) and biodiversity pattern.	Zero interruption to flow.	Should horizontal directional drilling not be possible, open-cut crossings can be used. This involves cutting a trench across the waterbody while water flows through the trenching area. Where the water is shallow enough, it may be diverted by flumes and pumps. A flume pipe may be placed to divert the water around the trenching area. Pumps in	Engineer	Planning and Design	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
		and sub surface cables).			combination with dams may also be used to divert the water during open-cut trenching.			
15	Layout and Design	Habitat loss and fragmentation due to displacement as a result of infrastructure installation (panels, powerlines, roads, fences and sub surface cables).	Maintenance of ecological processes (e.g., predation, reproduction, etc.) and biodiversity pattern.	Zero interruption to flow.	Where possible, pipelines can be installed using the push-pull technique-- stringing and welding the pipeline outside of the wetland and excavating and backfilling the trench using a backhoe supported by equipment mats or timber riprap. The prefabricated pipeline is installed in the wetland by pushing or pulling it across the trench. After the pipeline is floated into place, the floats are removed and the pipeline sinks into place.	Engineer	Planning and Design	Compliance to be verified by ECO and IEA.
15	Layout and Design	Habitat loss and fragmentation due to displacement as a result of infrastructure installation (panels, powerlines, roads, fences and sub surface cables).	Maintenance of ecological processes (e.g., predation, reproduction, etc.) and biodiversity pattern.	Limit transformation of aquatic ecosystem	The trench is backfilled to the proper grade to maintain wetland hydrology and grades are restored to the original elevation. If topsoil is segregated from subsoil, then subsoil is backfilled first.	Engineer	Planning and Design	Compliance to be verified by ECO and IEA.
15	Layout and Design	Habitat loss and fragmentation due to displacement	Maintenance of ecological processes (e.g., predation, reproduction,	Roads do not impede surface or subsurface flows	All roads and crossings must be engineered not to impede surface or subsurface flow in any way.	Engineer	Planning and Design	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
		as a result of infrastructure installation (panels, powerlines, roads, fences and sub surface cables).	etc.) and biodiversity pattern.					
15	Climate Change and Layout and Design	Fragmenting the local landscape.	Maintenance of connectivity, particularly terrestrial and aquatic ecological process pathways within the local landscape.	Limit fragmentation: A perimeter fence does not intersect the ephemeral drainage line running through the project area (an unnamed tributary to the D62D – 05610 tributary).	Fragmentation of the aquatic ecosystem will be avoided by fencing each PV Block separately.	Holder, Engineer	Planning and Design Phase	Compliance to be verified by ECO and IEA.
15	Climate Change and Layout and Design	Fragmenting the local landscape.	Maintenance of connectivity, particularly terrestrial and aquatic ecological process pathways within the local landscape.	Limit fragmentation: A perimeter fence does not intersect an ecological buffer.	Fencing shall remain outside the delineated edge of ecological buffers inclusive of the riparian or other 'High' ecologically sensitive habitats.	Holder, Engineer	Planning and Design Phase	Compliance to be verified by ECO and IEA.
15	Climate Change	Increased risks to inter alia Biodiversity and	Preserve wetlands and the ecosystem	Limit transformation of	Road crossing designs, such as box culverts or concrete drifts with rock fill, shall ensure year-round	Holder, Engineer	Planning and Design Phase	Compliance to be verified

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
		environment, including increased impacts due to loss of priority wetlands and river ecosystems	services they provide to increase their resilience to changes in rainfall patterns and temperature.	aquatic ecosystem	access to all parts of the veld (for livestock management) and facility (for operational management) and avoid vehicles getting stuck and damaging the watercourse.			by ECO and IEA.
15	Climate Change	Increased risks to inter alia Biodiversity and environment, including increased impacts due to loss of priority wetlands and river ecosystems	Preserve wetlands and the ecosystem services they provide to increase their resilience to changes in rainfall patterns and temperature.	Limit transformation of aquatic ecosystem	Access roads to the project area, especially those crossing large flood plains, should be well planned.	Holder, Engineer	Planning and Design Phase	Compliance to be verified by ECO and IEA.
15	Climate Change	Increased risks to inter alia Biodiversity and environment, including increased impacts due to loss of priority wetlands and river ecosystems	Preserve wetlands and the ecosystem services they provide to increase their resilience to changes in rainfall patterns and temperature.	Limit transformation of aquatic ecosystem	The design of access roads must include the adequate management of surface water run-off.	Holder, Engineer	Planning and Design Phase	Compliance to be verified by ECO and IEA.
15	Climate Change	Increased risks to inter alia Biodiversity and environment,	Preserve wetlands and the ecosystem services they	Limit transformation of aquatic ecosystem	Laydown areas must be located in uplands a minimum of 35 metres from the wetland edge.	Holder, Engineer	Planning and Design Phase	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
		including increased impacts due to loss of priority wetlands and river ecosystems	provide to increase their resilience to changes in rainfall patterns and temperature.					
15	Climate Change	Increased risks to inter alia Biodiversity and environment, including increased impacts due to loss of priority wetlands and river ecosystems	Preserve wetlands and the ecosystem services they provide to increase their resilience to changes in rainfall patterns and temperature.	Limit transformation of aquatic ecosystem	Avoid discharges of untreated wastewater into natural watercourses (or wetlands).	Holder, Engineer, Contractor	Planning and Design Phase Continuous	Compliance to be verified by ECO and IEA.
15	Climate Change	Increased risks to inter alia Biodiversity and environment, including increased impacts due to loss of priority wetlands and river ecosystems	Preserve wetlands and the ecosystem services they provide to increase their resilience to changes in rainfall patterns and temperature.	Limit transformation of aquatic ecosystem	Avoid or restrict point source discharges of storm water into natural watercourses (or wetlands) by relying on free drainage.	Holder, Engineer	Planning and Design Phase	Compliance to be verified by ECO and IEA.
15	Planning	The generation of excessive wind-blown dust could 'choke' the	Minimise dust generation	Construction of Linear infrastructure during dry months	The construction of linear infrastructure across parts of the ephemeral drainage system, should be restricted to the dry winter months (e.g., May to	Holder, Contractor	Planning and Design Phase	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
		ecologically sensitive ephemeral drainage line system.			September), that is commence with such activities as clearing or grading, excavating, and importing material at the end of the wet season/beginning of the dry season whilst the soil is still moist and as far as is practical, be completed in, the dry winter months.			
15	Planning	The generation of excessive wind-blown dust could 'choke' the ecologically sensitive ephemeral drainage line system.	Minimise dust generation	Construction during dry months	The civil construction phase should be restricted to the dry winter months (e.g., April/May to September), that is commence with such activities as clearing or grading, excavating and importing material at the end of the wet season/beginning of the dry season whilst the soil is still moist to reduce dust and as far as is practical, be completed in, the dry winter months with a decreased probability of storm events.	Holder, Contractor	Planning and Design Phase	Compliance to be verified by ECO and IEA.
15	Planning	The generation of excessive wind-blown dust could 'choke' the ecologically sensitive ephemeral drainage line system.	Minimise dust generation	Mining from quarry during wet summer season.	Mining of suitable material from a quarry for road construction and associated rock crushing should as far as is practical take place during the wet summer season prior to the commencement of the civil construction phase.	Holder, Contractor	Planning and Design Phase	Compliance to be verified by ECO and IEA.
15	Layout and Design	Overflow from water storage	Protection and Restoration of a	Avoid erosion from water	Place water tanks on solid foundations, platforms or stands	Holder, Engineer	Planning and Design Phase	Compliance to be verified

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
		tanks can cause erosion of receiving environment.	Strategic Water Source Area/ Preservation of aquatic ecosystem, composition, structure, and function.	storage tanks: no muds, Water storage tanks are on a solid foundation, platform or stand.	to ensure that they are level, will not fall over and are above the ground in order to build up the necessary water pressure for the outlet.			by ECO and IEA.
15	Layout and Design	Overflow from water storage tanks can cause erosion of receiving environment.	Protection and Restoration of a Strategic Water Source Area/ Preservation of aquatic ecosystem, composition, structure, and function.	Avoid erosion from water storage tanks: Water storage tanks are fastened to the platform or stand.	The platform or stand for water storage tanks must be level and must have hooks onto which the tank can be anchored or fastened.	Holder, Engineer	Planning and Design Phase	Compliance to be verified by ECO and IEA.
15	Layout and Design	Overflow from water storage tanks can cause erosion of receiving environment.	Protection and Restoration of a Strategic Water Source Area/ Preservation of aquatic ecosystem, composition, structure, and function.	Avoid erosion from water storage tanks: Water pipes are visibly secured.	The pipes leading to and from the water storage tanks should also be anchored to prevent them from breaking, cracking and leaking.	Holder, Engineer	Planning and Design Phase	Compliance to be verified by ECO and IEA.
15	Layout and Design	Overflow from water storage tanks can cause erosion of receiving environment.	Protection and Restoration of a Strategic Water Source Area/ Preservation of aquatic	Avoid erosion from water storage tanks: no muds, Design includes an	Each water storage tank or series of water storage tanks should have an overflow pipe to prevent water being forced out of the inlet when the tank is full. The overflow	Holder, Engineer	Planning and Design Phase	Compliance to be verified by ECO and IEA.

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			ecosystem, composition, structure, and function.	overflow pipe to a soakaway.	pipe should be diverted to a soakaway.			
15	Layout and Design	Overflow from water storage tanks can cause erosion of receiving environment.	Protection and Restoration of a Strategic Water Source Area/ Preservation of aquatic ecosystem, composition, structure, and function.	Avoid erosion from water storage tanks: no muds, puddles or signs of erosion around water storage tanks.	If water storage tanks are placed on a raised platform or stand, then a layer of gravel should be placed around and/or under the platform or stand to ensure good drainage and to prevent forming mud and puddles.	Holder, Engineer	Planning and Design Phase	Compliance to be verified by ECO and IEA.
15	Layout and Design	Quarries in or near to fragile terrestrial and/or aquatic ecosystems could transform those systems.	Persistence of aquatic ecosystems in good ecological condition.	Limit transformation of aquatic ecosystem	Any new quarry site shall be located outside all ecological buffers	Holder, Engineer	Planning and Design Phase	Compliance to be verified by ECO and IEA.
15	Layout and Design	Pipe culvert crossings channel and increase the velocity of surface water flows.	Persistence of Wetland FEPAs in good ecological condition.	Limit transformation of Wetland FEPAs	Road crossing designs, such as box culverts or concrete drifts with rock fill, which spread the surface water into a broadly distributed sheet whilst maintaining unrestricted subterranean flow should be sized to accommodate at least 1:100 yr flood events	Holder, Engineer	Planning and Design Phase	Compliance to be verified by ECO and IEA.
15	Layout and Design	Pipe culvert crossings channel and increase the velocity of	Persistence of Wetland FEPAs in good ecological condition.	Limit transformation of Wetland FEPAs	Road crossing designs, such as box culverts or concrete drifts with rock fill, shall spread the surface water into a broadly distributed sheet whilst maintaining	Holder, Engineer	Planning and Design Phase	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
		surface water flows.			unrestricted subterranean flow, across the width of the active channel(s).			
15	Layout and Design	Pipe culvert crossings channel and increase the velocity of surface water flows.	Persistence of Wetland FEPAs in good ecological condition.	Limit transformation of Wetland FEPAs: Raised bridges and culverts	It is preferable to eliminate fill roads and utilise raised bridges and box culverts or concrete drifts with rock fill with adequate sizing and spacing of water crossing structures, proper choice of the type of crossing structure, and installation of drainage structures at a depth adequate to pass subsurface flow.	Holder, Engineer	Planning and Design Phase	Compliance to be verified by ECO and IEA.
15	Layout and Design	Access roads crossing a drainage channel will be subject to submerged conditions from time to time (Geotechnical Assessment)	Persistence of Wetland FEPAs in good ecological condition.	Limit transformation of Wetland FEPAs	Road crossings require placement of compacted gravel layers to lift their elevation and increase traction.	Holder, Engineer	Planning and Design Phase	Compliance to be verified by ECO and IEA.
16	Layout and Design	Artificial lighting threatens biodiversity.	Persistence of Wetland FEPAs in good ecological condition.	Limit transformation of Wetland FEPAs: No light spillage into adjacent watercourses.	Watercourses shall not be lit up or affected by light spillage.	Holder, Engineer	Planning and Design Phase	Compliance to be verified by ECO and IEA.
16	Layout and Design	Artificial lighting threatens biodiversity.	Persistence of Wetland FEPAs in good ecological condition.	Limit transformation of Wetland FEPAs: No light spillage	Incorporate the following best practice lighting design principles into the design of lighting:	Holder, Engineer	Planning and Design Phase	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
				into adjacent watercourses.	(a) Start with natural darkness and only add light for specific purposes, (b) Use adaptive light controls to manage light timing, intensity and colour, (c) Light only the object or area intended – keep lights close to the ground/mounting fixtures as low as possible, directed and shielded to avoid light spill, (d) Use the lowest intensity lighting appropriate for the task, (e) Use non-reflective, dark-coloured surfaces, and (f) Use lights with reduced or filtered blue, violet and ultra-violet wavelengths/Use lights with longer wavelengths, e.g., a white 2 700 K LED light (as apposed to a 5 000 K LED light).			
16	Layout and Design	Artificial lighting threatens biodiversity.	Persistence of Wetland FEPAs in good ecological condition.	Limit transformation of Wetland FEPAs: No light spillage into adjacent watercourses.	Adopt LEDs and smart control technologies (such as motion sensors and timers) to control and manage the effects of artificial light on wildlife and 'sense of place'.	Holder, Engineer	Planning and Design Phase	Compliance to be verified by ECO and IEA.

MEMBERS: J.A. Bowers (M Tech, Pr.Sci.Nat.) & S.D. MacGregor (M.Sc., Pr.Sci.Nat.)
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Table 17. Management Protocol for Economical

Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
17	Climate Change	According to the District Municipality's Climate Change Response Plan there are increased risks to inter alia Agriculture, including livestock and game, relating to drought, less grazing and increased livestock mortality, affecting commercial exports	Minimise negative health impacts (and mortality) on livestock due to decreases in rainfall and reduction in herbage yields. Offset productivity losses during drought periods with an additional income stream.	Offset productivity losses during drought periods with an additional income stream: An Agrivoltaic system.	The solar PV facility shall adopt a symbiotic Agrivoltaic system that combines agriculture, specifically good ecological management (grazing) practices, with green energy generation.	Holder, Engineer, Landowner	Planning and Design Phase Continuous	Compliance to be verified by ECO and IEA.
17	Climate Change	According to the District Municipality's Climate Change Response Plan there are increased risks to inter alia	Minimise negative health impacts (and mortality) on livestock due to decreases in rainfall and reduction in herbage yields.	Good ecological (grazing) management: Soil Maps. Recommended stocking densities. Good vegetation cover.	Develop a long-term grazing strategy using the findings (land capability classes/grazing units and carrying capacities) as well as Grazing Management Principles (Appendix F) identified in the Soil Mapping and Grazing Potential Assessments.	Holder, Landowner	Planning and Design Phase Continuous	Compliance to be verified by ECO and IEA.

MEMBERS: J.A. Bowers (M Tech, Pr.Sci.Nat.) & S.D. MacGregor (M.Sc., Pr.Sci.Nat.)
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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
		Agriculture, including livestock and game, relating to drought, less grazing and increased livestock mortality, affecting commercial exports	Offset productivity losses during drought periods with an additional income stream.					
17	Climate Change	According to the District Municipality's Climate Change Response Plan there are increased risks to inter alia Agriculture, including livestock and game, relating to drought, less grazing and increased livestock mortality, affecting commercial exports	Minimise negative health impacts (and mortality) on livestock due to decreases in rainfall and reduction in herbage yields. Offset productivity losses during drought periods with an additional income stream.	Good ecological (grazing) management	Implement good rangeland management practices defined by an adopted long-term grazing strategy with small stock for the areas underneath the solar panels to maintain optimal vegetation cover and to reduce soil erosion and runoff.	Holder, Landowner	Planning and Design Phase Continuous	Compliance to be verified by ECO and IEA.

MEMBERS: J.A. Bowers (M Tech, Pr.Sci.Nat.) & S.D. MacGregor (M.Sc., Pr.Sci.Nat.)
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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
17	Climate Change	According to the District Municipality's Climate Change Response Plan there are increased risks to inter alia Agriculture, including livestock and game, relating to drought, less grazing and increased livestock mortality, affecting commercial exports	Minimise negative health impacts (and mortality) on livestock due to decreases in rainfall and reduction in herbage yields. Offset productivity losses during drought periods with an additional income stream.	Good ecological (grazing) management: Restoration work on bare patches.	Halt and reverse existing degradation primarily from extensive livestock production to counter increased climatic uncertainty - restore all bare patches of soil by implementing the Bare Patch Restoration Protocol (Appendix C).	Holder, Landowner	Continuous	Compliance to be verified by ECO and IEA.
17	Climate Change	According to the District Municipality's Climate Change Response Plan there are increased risks to inter alia Agriculture, including	Minimise negative health impacts (and mortality) on livestock due to decreases in rainfall and reduction in herbage yields. Offset productivity losses during	Good ecological (grazing) management: Soil maps. Recommended stocking densities. Good vegetation cover. Restoration work on bare patches.	Ensure responsible natural resource management that maintains the integrity of ecosystems and the continued provision of ecosystem services to current and future generations.	Holder, Landowner	Continuous	Compliance to be verified by ECO and IEA.

MEMBERS: J.A. Bowers (M Tech, Pr.Sci.Nat.) & S.D. MacGregor (M.Sc., Pr.Sci.Nat.)
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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
		livestock and game, relating to drought, less grazing and increased livestock mortality, affecting commercial exports	drought periods with an additional income stream.					
17	Layout and Design	Wasted energy from inefficient lighting.	The Solar PV facility is energy efficient and financially feasible.	Minimise maintenance costs and energy consumption: Energy efficient fixtures are used in the buildings.	If colour discrimination is not important, choose energy-efficient fixtures utilising yellowish high-pressure sodium (HPS) bulbs. If “white” light is needed, fixtures using LEDs, compact fluorescent, or metal-halide (MH) bulbs are more energy-efficient than those using incandescent, halogen, or mercury-vapour bulbs.	Holder, Engineer	Planning and Design Phase Continuous	Compliance to be verified by ECO and IEA.
17	Layout and Design	Wasted energy from inefficient lighting.	The Solar PV facility is energy efficient and financially feasible.	Minimise maintenance costs and energy consumption: Wattage is lower than traditional candescent bulbs.	When purchasing energy efficient alternatives to traditional energy consumptive lighting, remember that they use less watts to produce the same amount of light (measured in lumens). So, never replace candescent bulbs with alternatives that use the same or more watts.	Holder, Engineer	Planning and Design Phase Continuous	Compliance to be verified by ECO and IEA.
18	Change in Land Use	Periodic hunting or culling of game on neighbouring	The Solar PV facility is financially feasible and energy efficient.	Minimise maintenance costs and energy consumption: Zero damage to	Improve the safety of the Solar PV facility including its staff and property during the hunting season, such as identifying no shooting zones, notifying	Neighbouring Landowners	Continuous	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
		farms may result in damages to property.		property from hunting on adjacent farms.	neighbouring properties of imminent hunts, hunters taking out the appropriate insurances, etc.			
18	Change in Land Use	Damage to vehicles driving on bad gravel roads.	Limited risk of financial losses to neighbouring farmers.	Avoid damage to vehicles: Roads are in good condition.	The holder shall maintain any deterioration to the district gravel roads resulting from increased traffic during construction.	Holder, Contractor	Continuous	Compliance to be monitored by SEO and verified by ECO and IEA.
18	Change in Land Use	Damage to vehicles driving on bad gravel roads.	Limited risk of financial losses to neighbouring farmers.	Avoid damage to vehicles: Roads are in good condition. Minimal corrugations.	Corrugations shall be removed as soon as is reasonably practical (e.g., within 5 working days of being reported).	Holder, Contractor	Continuous	Compliance to be monitored by SEO and verified by ECO and IEA.
18	Change in Land Use	Damage to vehicles driving on bad gravel roads.	Limited risk of financial losses to neighbouring farmers.	Avoid damage to vehicles: Roads are in good condition. Minimal potholes and puddles.	Potholes and puddles will be filled in and compacted as soon as is reasonably practical (e.g., within 5 working days of being reported).	Holder, Contractor	Continuous	Compliance to be monitored by SEO and verified by ECO and IEA.
18	Layout and Design	The usage of mudstone from the Karoo Supergroup for use as concrete aggregate or road layers	Limited risk of financial losses due to poor road materials.	Roads are in good condition.	When sourcing material from a local quarry, preference should be given to the use of dolerite rock as construction material. Sedimentary rock may be used for the lower road layers but with caution — especially the sandstones and mudstone/shale which have been baked by	Engineer, Contractor	Planning and Design Phase Construction	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
		may reduce the quality of concrete and/or roads due to its instability.			dolerite intrusions (e.g., in close proximity to dolerite rock).			
19	Change in Land Use	Risk of reduced property values.	Limited risk of financial losses to neighbouring farmers.	Minimise risk of reduced property values; Massing and visual sensitivity buffers are indicated on Layout Plan.	Reduce massing effects particularly as seen from neighbouring landowners by implementing appropriate massing and visual sensitivity buffers.	Holder, Engineer	Planning and Design Phase	Compliance to be verified by ECO and IEA.
19	Change in Land Use	Risk of reduced property values.	Limited risk of financial losses to neighbouring farmers.	Minimise risk of reduced property values; Massing and visual sensitivity buffers are indicated on Layout Plan.	Screening the solar facility from the neighbouring properties in a way acceptable to the landowners must be investigated and agreed to.	Holder, Engineer	Planning and Design Phase	Compliance to be verified by ECO and IEA.
19	Change in Land Use	Risk of reduced property values.	Limited risk of financial losses to neighbouring farmers.	Minimise risk of reduced property values; Massing and visual sensitivity buffers are indicated on Layout Plan.	Where the proposed solar field is directly adjacent to a neighbour's fence line there should be a buffer zone between the panels and the fence as agreed in writing between Soventix and the directly affected neighbours during the EIA process, to ensure that it is included in the EIA authorisation. Recommendations made in the Visual Impact Assessment should be considered in the discussion about and development of the buffer zone.	Holder, Engineer	Planning and Design Phase	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
18	Change in Land Use	Risk of veld fires caused by workers during the construction of the facility.	Limited risk of financial losses to neighbouring farmers.	Minimise risk of and control runaway fires: no evidence of open fires are observed on site.	Undertake a risk analysis to determine *inter alia* the probability and frequency of a wildfire during construction and operation, and prepare a fire management plan accordingly.	Holder, Engineer	Planning and Design Phase	Compliance to be verified by ECO and IEA.
18	Layout and Design	Poor water quality can adversely affect plumbing and appliances.	The Solar PV facility is energy efficient and financially feasible.	Minimise maintenance costs and energy consumption: Results of water analysis. Results informed the treatment process.	Determine the alkalinity and hardness of the water sources as these aspects have an effect on the treatability of the water, as well as on infrastructure. Typical concerns relate to pH stability and whether the water will lead to excessive scaling in or aggressive attack of pipework.	Holder, Engineer	Planning and Design Phase	Compliance to be verified by ECO and IEA.
18	Layout and Design	Poor water quality can adversely affect plumbing and appliances.	Prolong the lifespan of pipes, appliances, etc. Maintain optimum generation capacity of solar modules	Minimise maintenance costs and energy consumption: Results of water analysis. Results informed the treatment process.	Groundwater from BH4 and BH5 should be treated with water softeners or establish deionization plants at these water sources.	Holder, Engineer	Planning and Design Phase	Compliance to be verified by ECO and IEA.
20	Layout and Design	Poor foundation conditions or ineffective support will cause the solar panel structures to overturn.	Maintain project feasibility.	Proper excavation depth for solar panels	Excavation to a depth of 1,0 m below natural ground level will probably be required to ensure overturning stability of solar panel structures.	Engineer, Contractor	Planning and Design Phase	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
20	Layout and Design	Poor foundation conditions or ineffective support will cause the solar panel structures to overturn.	Maintain project feasibility.	Proper excavation depth for solar panels	Rammed piles are considered the most effective support option for solar panels but if driving to at least 1 m depth proves difficult over most of the site then ground beam concrete footings (which make use of concrete strip footings at very shallow depth below ground level to act as support and counterweight for solar panels) may be an alternative option.	Engineer, Contractor	Planning and Design Phase	Compliance to be verified by ECO and IEA.
20	Layout and Design	The shallow soils may present a challenge for some construction items like poles that need to be planted. The Swartland and Valsrivier soils may also have an influence on any foundations.	Maintain project feasibility.	Proper design of solar PV facility.	The engineers should be aware of and take into consideration the soil forms and properties as described in the Soil Mapping Report 2022 when planning the design and layout of the solar PV facility including associated infrastructure.	Engineer	Planning and Design Phase	Compliance to be verified by ECO and IEA.
21	Planning	Haulage of imported materials incur a cost relating to distance	Maintain financial feasibility of the project.	Minimise travel distances of materials	The engineers should consider the feasibility of the preferred alternative route for the haulage of imported materials from the Port of Ngqura to the proposed PV	Holder, Engineer	Planning and Design Phase	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
		travelled and time.			facility as recommended in the Traffic Impact Assessment Report.			
21	Planning	Transport of abnormal roads could be delayed.	Safe (unobstructed) delivery of abnormal loads to site.	Abnormal loads are delivered to site timeously.	The appointed engineers should investigate the route to the site to ensure that the abnormal loads are not obstructed at any point by geometric, height and width limitations along the route.	Holder, Engineer	Planning and Design Phase	Compliance to be verified by ECO and IEA.
21	Layout and Design	Commercially available sources of concrete aggregate may prove to be too distant.	Maintain financial feasibility of the project.	Minimise travel distances of materials	Dolerite rock or baked sediments from the Phase 3 terrain can be considered for sources of concrete aggregate or road layers but materials will need to be tested for quality purposes (hardness, strength, durability, mineral composition, and degree of weathering).	Holder, Engineer, Contractor	Planning and Design Phase	Compliance to be verified by ECO and IEA.
21	Layout and Design	Commercially available sources of concrete aggregate may prove to be too distant.	Maintain financial feasibility of the project.	Minimise travel distances of materials	Material intended for use in road surfacing needs to be tested for grading distribution, Atterberg limits, compaction-moisture density values and durability.	Holder, Contractor	Planning and Design Phase	Compliance to be verified by ECO and IEA.

Table 18. Management Protocol for Social

Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
23	Layout and Design	Increased traffic can result in corrugations	Good road conditions	Internal roads are well maintained	Upgrade the internal farm access road (e.g., internal private roads leading off the Burgerville Road) to	Holder, Engineer, Contractor	Planning and Design Phase	Compliance to be verified

MEMBERS: J.A. Bowers (M Tech, Pr.Sci.Nat.) & S.D. MacGregor (M.Sc., Pr.Sci.Nat.)
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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
		and potholes on roads.			suitable standards as specified by the civil engineer.		Construction	by ECO and IEA.

Table 19. Management Protocol for Property

Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
25	Layout and Design	Risk of veld fires caused by lightning strikes to infrastructure within the solar PV facility.	Limited risk of financial losses to facility (from lightning strikes).	Reduce risk of lightning strikes to infrastructure: A lightning mast is included in the substation design.	Maintain a 10m firebreak around the perimeter of each of the four solar PV Blocks making up the solar PV facility.	Holder	Continuous	Compliance to be verified by ECO and IEA.
25	Layout and Design	Risk of veld fires caused by lightning strikes to infrastructure within the solar PV facility.	Limited risk of financial losses to facility (from lightning strikes).	Reduce risk of lightning strikes to infrastructure: A lightning mast is included in the substation design.	Adequate firefighting equipment shall be regularly maintained and readily available during construction (and operation).	Holder, Contractor	Continuous	Compliance to be verified by ECO and IEA.
25	Layout and Design	Risk of veld fires caused by lightning strikes to infrastructure within the solar PV facility.	Limited risk of financial losses to facility (from lightning strikes).	Reduce risk of lightning strikes to infrastructure: A lightning mast is included in the substation design.	A team of designated firefighting personal shall be trained and ready to immediately deal with any runaway veld fires.	Holder, Contractor	Continuous	Compliance to be verified by ECO and IEA.
25	Layout and Design	Risk of veld fires caused by lightning strikes to infrastructure	Limited risk of financial losses to facility (from	Reduce risk of lightning strikes to infrastructure: A lightning mast	Immediately notify neighbouring landowners upon confirming a runaway fire.	Holder, Contractor	Continuous	Compliance to be verified by ECO and IEA.

MEMBERS: J.A. Bowers (M Tech, Pr.Sci.Nat.) & S.D. MacGregor (M.Sc., Pr.Sci.Nat.)
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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
		within the solar PV facility.	lightning strikes).	is included in the substation design.				

Table 20. Management Protocol for Land Use

Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
26	Change in Land Use	Change of land use is a threat to agricultural potential and productivity.	Preserve the agricultural potential and maintain or improve the agricultural productivity of the land.	Minimise loss of agricultural potential: Agrivoltaic system.	The virgin land shall be used for both solar photovoltaic power generation and agriculture (Agrivoltaic). The current land use being sheep farming will continue within the solar PV facility to ensure minimal reduction (if any) on agricultural potential of the land as well as a management tool to control vegetation growth.	Holder, Engineer, Landowner	Planning and Design Phase Continuous	Compliance to be verified by ECO and IEA.
26	Change in Land Use	Change of land use is a threat to agricultural potential and productivity.	Preserve the agricultural potential and maintain or improve the agricultural productivity of the land.	Minimise loss of agricultural potential: An Agricultural Agro-Ecosystem Specialist Assessment Report.	Generate sound site-specific grazing management recommendations based on the findings of an Agricultural Agro-Ecosystem Specialist Assessment that models and maps the terrain units, soil patterns and land capability values, as well as determines the veld condition and carrying capacity.	Holder	Planning and Design Phase	Compliance to be verified by ECO and IEA.

Table 21. Management Protocol for Health and Safety

MEMBERS: J.A. Bowers (M Tech, Pr.Sci.Nat.) & S.D. MacGregor (M.Sc., Pr.Sci.Nat.)
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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
27	Layout and Design	Groundwater may be infit for human consumption.	Safe drinking water.	Potable water is treated to standard: Total hardness preferably 50 - 100 mg/• as $CaCO_3$	Test the quality of any water source that is to be used for potable water.	Holder, Engineer	Planning and Design Phase.	Compliance to be verified by ECO and IEA.
27	Layout and Design	Groundwater may be infit for human consumption.	Safe drinking water.	Potable water is treated to standard: Water quality results compare favourably with standard.	Potable water must comply with SANS 241-1 (water used in sanitation systems does not have to), which prescribes health-based water quality requirements.	Holder, Engineer	Planning and Design Phase.	Compliance to be verified by ECO and IEA.
27	Layout and Design	Groundwater may be infit for human consumption.	Safe drinking water.	Potable water is treated to standard: Water quality results compared with standard.	The raw water quality data should be compared against the potable water quality standards to determine the overall treatment requirements.	Holder, Engineer	Planning and Design Phase.	Compliance to be verified by ECO and IEA.
27	Layout and Design	Groundwater may be infit for human consumption.	Safe drinking water.	Potable water is treated to standard: Appropriate treatment technology is adopted.	The treatment technologies selected should focus on those specific parameters in the raw water that do not meet the potable water quality standards (SANS 241-1).	Holder, Engineer	Planning and Design Phase.	Compliance to be verified by ECO and IEA.

MEMBERS: J.A. Bowers (M Tech, Pr.Sci.Nat.) & S.D. MacGregor (M.Sc., Pr.Sci.Nat.)
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Table 22. Management Protocol for Security

Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
28	Planning	An influx of job seekers and construction workers into the area could increase the potential for criminal activity.	A safe local farming community	Reduce risk of criminal activity: Facility is planned to be constructed in blocks/phases.	As far as is practical, limit the number of construction workers required on site at any one time by building the facility in sequential phases of circa 100 MW blocks as opposed to trying to build the 400 MW facility in one go.	Holder, Engineer	Planning and Design Phase Continuous	Compliance to be verified by ECO and IEA.
28	Planning	An influx of job seekers and construction workers into the area could increase the potential for criminal activity.	A safe local farming community	Reduce risk of criminal activity: no accommodation is provided on site.	No accommodation shall be provided for contractors, sub-contractors, and their workers on the construction site.	Holder, Engineer, Contractor	Planning and Design Phase Continuous	Compliance to be verified by ECO and IEA.
28	Layout and Design	Increased potential for criminal activity, including theft of and damage to infrastructure, such as solar panels.	A secure solar PV facility	Reduce risk of criminal activity: A security company is appointed.	Security should be appointed throughout construction and operation to discourage criminal elements.	Holder	Continuous	Compliance to be verified by ECO and IEA.
28	Layout and Design	Increased potential for criminal activity, including theft of and damage	A secure solar PV facility	Reduce risk of criminal activity: facility is fenced with security access control.	The facility should be fenced off and have controlled access using a security gate. Whilst an eco-friendly alternative is preferred to razor-wire mesh, the final design shall be	Holder, Engineer	Planning and Design Phase Continuous	Compliance to be verified by ECO and IEA.

MEMBERS: J.A. Bowers (M Tech, Pr.Sci.Nat.) & S.D. MacGregor (M.Sc., Pr.Sci.Nat.)
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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
		to infrastructure, such as solar panels.			determined by a due diligence that provides an acceptable balance (best point of intersection) between (a) harm to wildlife or domestic stock, (b) cost, and (c) the IPP's security standards (to ensure protection of the high-valued asset from theft).			
28	Layout and Design	Increased potential for criminal activity, including theft of and damage to infrastructure, such as solar panels.	A secure solar PV facility	Reduce risk of criminal activity: security cameras are present.	The perimeter fence line should be secured using multiple FLIR PTZ security cameras.	Holder, Engineer	Planning and Design Phase Continuous	Compliance to be verified by ECO and IEA.
28	Layout and Design	Increased potential for criminal activity, including theft of and damage to infrastructure, such as solar panels.	A secure solar PV facility	Reduce risk of criminal activity: access	Use existing gates provided to gain access to all parts of the area authorised for development, where possible.	Holder, Engineer	Planning and Design Phase Continuous	Compliance to be verified by ECO and IEA.
28	Layout and Design	Increased potential for criminal activity, including theft of and damage to infrastructure, such as solar panels.	A secure solar PV facility	Reduce risk of criminal activity: access photographs	Existing and new gates to be recorded and documented in a photographic record.	Holder	Planning and Design Phase Continuous	Compliance to be verified by ECO and IEA.

MEMBERS: J.A. Bowers (M Tech, Pr.Sci.Nat.) & S.D. MacGregor (M.Sc., Pr.Sci.Nat.)
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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
28	Layout and Design	Increased potential for criminal activity, including theft of and damage to infrastructure, such as solar panels.	A secure solar PV facility	Reduce risk of criminal activity: Locked gates	All gates must be fitted with locks and be kept locked at all times during the development phase, unless otherwise agreed with the landowner.	Holder	Continuous	Compliance to be verified by ECO and IEA.
28	Layout and Design	Increased potential for criminal activity, including theft of and damage to infrastructure, such as solar panels.	A secure solar PV facility	Reduce risk of criminal activity: gate design	Care must be taken when erecting gates so that there is a gap of no more than 100 mm between the bottom of the gate and the ground.	Holder, Engineer	Planning and Design Phase Continuous	Compliance to be verified by ECO and IEA.
28	Layout and Design	Increased potential for criminal activity, including theft of and damage to infrastructure, such as solar panels.	A secure solar PV facility	Reduce risk of criminal activity: Demarcated fences	All demarcation fencing and barriers must be maintained in good working order for the duration of the development activities.	Holder	Planning and Design Phase Continuous	Compliance to be verified by ECO and IEA.
28	Layout and Design	Increased potential for criminal activity, including theft of and damage to infrastructure,	A secure solar PV facility	Reduce risk of criminal activity: fencing	Fencing must be erected around the camp, batching plants, hazardous storage areas, and all designated access restricted areas, where applicable.	Holder, Engineer, Contractor	Planning and Design Phase Continuous	Compliance to be verified by ECO and IEA.

MEMBERS: J.A. Bowers (M Tech, Pr.Sci.Nat.) & S.D. MacGregor (M.Sc., Pr.Sci.Nat.)
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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
		such as solar panels.						
28	Layout and Design	Increased potential for criminal activity, including theft of and damage to infrastructure, such as solar panels.	A secure solar PV facility	Reduce risk of criminal activity: fencing	All fencing must be developed of high-quality material bearing the SABS mark.	Holder, Engineer	Planning and Design Phase	Compliance to be verified by ECO and IEA.
28	Layout and Design	Increased potential for criminal activity, including theft of and damage to infrastructure, such as solar panels.	A secure solar PV facility	Reduce risk of criminal activity: locked gates	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.	Holder, Engineer, Contractor	Planning and Design Phase Continuous	Compliance to be verified by ECO and IEA.

Table 23. Management Protocol for Visual Aesthetics

Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
29	Layout and Design	(1) Light directed uselessly above the horizon creates murky skyglow. (2) Light trespass or	Retain the existing rural dark sky night landscape.	Effective light management: No murky sky glow. No light spillage onto neighbours' properties. No glare from light bulbs.	Effective light management needs to be incorporated into the design of the lighting to ensure that the visual influence is limited to the solar PV facility, without jeopardising project operational safety and security (See Annexure D of VIA Scoping Report, as well as lighting mitigations by The	Holder, Engineer	Planning and Design Phase	Compliance to be verified by ECO and IEA.

MEMBERS: J.A. Bowers (M Tech, Pr.Sci.Nat.) & S.D. MacGregor (M.Sc., Pr.Sci.Nat.)
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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
		spillage from poor outdoor lighting shines onto neighbours' properties. (3) Glare from exposed light bulbs can be distracting.			New England Light Pollution Advisory Group (NELPAG) and Sky Publishing Corp in 14.2).			
29	Layout and Design	(1) Light directed uselessly above the horizon creates murky skyglow. (2) Light trespass or spillage from poor outdoor lighting shines onto neighbours' properties. (3) Glare from exposed light bulbs can be distracting.	Retain the existing rural dark sky night landscape.	Effective light management: No murky sky glow. No light spillage onto neighbours' properties. No glare from light bulbs.	No security lighting should be placed on the perimeter fencing.	Holder, Engineer	Planning and Design Phase	Compliance to be verified by ECO and IEA.
29	Layout and Design	Light directed uselessly above the horizon creates murky skyglow.	Retain the existing rural dark sky night landscape.	Effective light management: No murky sky glow.	No overhead security lighting. Rather locate the light source closer to the operation, use directed technology, and aim fixtures either down or to maximise their impact on	Holder, Engineer	Planning and Design Phase	Compliance to be verified by ECO and IEA.

MEMBERS: J.A. Bowers (M Tech, Pr.Sci.Nat.) & S.D. MacGregor (M.Sc., Pr.Sci.Nat.)
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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
					the targeted area whilst minimizing their impact elsewhere.			
29	Layout and Design	Light trespass or spillage from poor outdoor lighting shines onto neighbours' properties.	Retain the existing rural dark sky night landscape.	Effective light management: No light spillage onto neighbours' properties.	Provide only enough light for the task at hand; don't over-light, and don't spill light off your property.	Holder, Engineer	Planning and Design Phase	Compliance to be verified by ECO and IEA.
29	Layout and Design	Glare from exposed light bulbs can be distracting.	Retain the existing rural dark sky night landscape.	Effective light management: No glare from light bulbs.	Choose "full-cut-off shielded" fixtures that keep light from going uselessly up or sideways. Full-cut-off fixtures produce minimum glare.	Holder, Engineer	Planning and Design Phase	Compliance to be verified by ECO and IEA.
30	Layout and Design	A large, obtrusive perimeter fence creating long lines that wrap over prominent landforms can be visually obtrusive.	A less dominant landscape change to local or neighbouring receptors.	Avoid obtrusive fence lines: Fencing is transparent. Fencing is not installed along the perimeter of the property boundaries but rather around two or more blocks of PV.	Fencing around the solar PV panels needs to appear transparent (preferably electrified) and should not go around the total property or project area, with the exception of existing farm fences being retained along the outside farm boundaries.	Holder, Engineer	Planning and Design Phase	Compliance to be verified by ECO and IEA.
31	Layout and Design	**(1)** Proximity to ridgeline features and areas of prominence that add to the medium to high levels of local Scenic Quality.	A less dominant landscape change to local or neighbouring receptors.	Minimise the Zone of Visual Influence (visual extent or viewshed).	Establish a setback that excludes the eastern area adjacent to the locally prominent ridgeline feature.	Holder, Engineer	Planning and Design Phase	Compliance to be verified by ECO and IEA.

MEMBERS: J.A. Bowers (M Tech, Pr.Sci.Nat.) & S.D. MacGregor (M.Sc., Pr.Sci.Nat.)
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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
31	Layout and Design	**(2)** Neighbours who are sensitive to landscape change; receptor sensitivity to the landscape changes to the existing rural agricultural landscape character, particularly by neighbouring landowners located to the north- and south-east of the development site.	A less dominant landscape change to local or neighbouring receptors.	A less dominant landscape change/maintain visual quality by visually buffering adjacent land uses/farms along north- and south-eastern property boundary (as these owners have indicated concern regarding the semi-industrial type of development in a deep rural setting).	A 250 m 'visual sensitivity buffer' should be maintained along the boundary with the north- and south-eastern receptors that have indicated higher levels of sensitivity to landscape change (Location of the buildings / substation should be away from prominent landscape features and outside of eastern receptor view area. However, the alignment of the 132 kV distribution line and the upgrading of the existing road crossing across the watercourse where it enters the south-eastern property boundary is permissible within this buffer)	Holder, Engineer	Planning and Design Phase	Compliance to be verified by ECO and IEA.
31	Layout and Design	**(2)** Neighbours who are sensitive to landscape change; receptor sensitivity to the landscape changes to the existing rural agricultural landscape	A less dominant landscape change to local or neighbouring receptors.	A less dominant landscape change/maintain visual quality by visually buffering adjacent land uses/farms along north- and south-eastern property boundary (as these owners have indicated	The buildings should be painted a grey-brown colour and not be located in prominent areas.	Holder, Engineer	Planning and Design Phase	Compliance to be verified by ECO and IEA.

MEMBERS: J.A. Bowers (M Tech, Pr.Sci.Nat.) & S.D. MacGregor (M.Sc., Pr.Sci.Nat.)
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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
		character, particularly by neighbouring landowners located to the north- and south-east of the development site.		concern regarding the semi-industrial type development in a deep rural setting).				
31	Layout and Design	**(3)** Massing effects created by large scale coverage or expanses of solar PV panels in a rural agricultural landscape setting (with medium to high levels of Scenic Quality).	A less dominant landscape change to local or neighbouring receptors.	Breaking of massing effects created by large scale coverage or expanses of solar PV panels such that the development parcels are more reflective of the landscape carrying capacity and less dominating to sensitive receptors located in the northern areas.	The solar PV facility should be developed in lower lying valley areas or grasslands that reflect pockets of development that are better aligned with the lay of the land and the hydrology drainage of the site (VIA Scoping Report page 34 and 42).	Holder, Engineer	Planning and Design Phase	Compliance to be verified by ECO and IEA.
31	Layout and Design	**(3)** Massing effects created by large scale coverage or expanses of solar PV panels	A less dominant landscape change to local or neighbouring receptors.	Breaking of massing effects created by large scale coverage or expanses of solar PV panels such	Reduce the massing effects by establishing a 'massing buffer' at the head of an apparent tributary north of the main watercourse, effectively segregating the northern-most PV	Holder, Engineer	Planning and Design Phase	Compliance to be verified by ECO and IEA.

MEMBERS: J.A. Bowers (M Tech, Pr.Sci.Nat.) & S.D. MacGregor (M.Sc., Pr.Sci.Nat.)
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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
		in a rural agricultural landscape setting (with medium to high levels of Scenic Quality).		that the development parcels are more reflective of the landscape carrying capacity and less dominating to sensitive receptors located in the northern areas.	development area into two separate clusters.			
31	Layout and Design	**(3)** Massing effects created by large scale coverage or expanses of solar PV panels in a rural agricultural landscape setting (with medium to high levels of Scenic Quality).	A less dominant landscape change to local or neighbouring receptors.	Breaking of massing effects created by large scale coverage or expanses of solar PV panels such that the development parcels are more reflective of the landscape carrying capacity and less dominating to sensitive receptors located in the northern areas.	Reduce the massing effects created by the location of the adjacent Phase 2 development by establishing a 'massing buffer' along the low ridgeline between the two projects thereby limiting visual interface between the two developments through topographic screening.	Holder, Engineer	Planning and Design Phase	Compliance to be verified by ECO and IEA.
31	Layout and Design	Loss of landscape character from the current rural	A less dominant landscape change.	Height of PV panels not above 4m above ground	Limit the height of the PV panels to a maximum of 4 m above ground level.	Holder, Engineer	Planning and Design Phase	Compliance to be verified by ECO and IEA.

MEMBERS: J.A. Bowers (M Tech, Pr.Sci.Nat.) & S.D. MacGregor (M.Sc., Pr.Sci.Nat.)
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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
		agricultural sense of place to the semi-industrial RE landscape						
31	Layout and Design	Loss of landscape character from the current rural agricultural sense of place to the semi-industrial RE landscape	A less dominant landscape change.	Internal power line cable is buried	All internal power line cables need to be buried to reduce visual intrusion to the local landscape.	Holder, Engineer, Contractor	Planning and Design Phase Construction	Compliance to be verified by ECO and IEA.
31	Layout and Design	Rock from the irregularly shaped dolerite sill traversing Phase 3 (represented by localities P20, P24, P26, P27, P28, P29, P35, P36, P38) as well as the adjacent baked sediments may be utilized as construction materials.	A less dominant landscape change.	Quarry visual screening: is outside of any buffers.	In the event that the engineers decide to create a new quarry in the project area (as opposed to lawfully mining from any of the other existing quarries in the area), then rock from the locality P24 (in Figure 2 of the Geotechnical Assessment Report) including the adjacent baked sediments may be utilized as construction materials as long as it remains further then 100 m from the ecological buffer.	Holder, Engineer	Planning and Design Phase	Compliance to be verified by ECO and IEA.
31	Layout and Design	Rock from the irregularly shaped dolerite sill traversing	A less dominant landscape change.	Quarry visual screening: buffer	Given the location of the Quarry P24 in a “visual” sensitivity buffer its exact siting relative to/distance from the farm boundary must be agreed	Holder	Planning and Design Phase	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
		Phase 3 (represented by localities P20, P24, P26, P27, P28, P29, P35, P36, P38) as well as the adjacent baked sediments may be utilized as construction materials.			to with the south-eastern receptor (neighbouring farmer).			
31	Layout and Design	Rock from the irregularly shaped dolerite sill traversing Phase 3 (represented by localities P20, P24, P26, P27, P28, P29, P35, P36, P38) as well as the adjacent baked sediments may be utilized as construction materials.	A less dominant landscape change.	Quarry visual screening: cut into north facing slopes and screening	The responsible engineer(s) should as far as is practical ensure that the quarry is visually sheltered by cutting into the northern facing slopes, screening the cutting from southern receptors.	Holder, Engineer, Contractor	Planning and Design Phase Construction	Compliance to be verified by ECO and IEA.
31	Layout and Design	The dolerite dyke running sub-parallel to the southwestern boundary	A less dominant landscape change.	Site P34 is not used for a quarry	Given the potential archaeological and visual sensitivity of the proposed quarry site represented by locality P34, use of this site is forbidden.	Holder, Engineer	Planning and Design Phase	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
		(represented by localities P11, P30, P31 and P34) has a width of between 20 and 50 m and a quarry for utilization of dolerite from this dyke can be located anywhere along the strike of the dyke.						
31	Layout and Design	Decrease in the "sense of place" as it relates to noise, visual and light pollution.	A less dominant landscape change.	Screening of facility	Screening the solar facility from the neighbouring properties in a way acceptable to the landowners must be investigated and agreed to.	Holder, Engineer, Contractor	Planning and Design Phase Continuous	Compliance to be verified by ECO and IEA.
31	Layout and Design	Decrease in the "sense of place" as it relates to noise, visual and light pollution.	A less dominant landscape change.	Buffer zone and written agreement	Where the proposed solar field is directly adjacent to a neighbour's fence line there should be a buffer zone between the panels and the fence as agreed in writing between Soventix and the directly affected neighbours during the EIA process, to ensure that it is included in the EIA authorisation. Recommendations made in the Visual Impact Assessment should be considered in the discussion about and development of the buffer zone.	Holder, Engineer	Planning and Design Phase	Compliance to be verified by ECO and IEA.

MEMBERS: J.A. Bowers (M Tech, Pr.Sci.Nat.) & S.D. MacGregor (M.Sc., Pr.Sci.Nat.)
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Table 24. Management Protocol for Heritage and Culture

Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
32	Layout and Design	Disturbance to or destruction of Stone Cairns indicating an old Wagon Road (Sites: 19-25) by construction activities, e.g., clearing and grubbing activities.	Preservation of heritage resources and expansion of knowledge of the archaeology of the area.	Section of the old wagon road section is preserved.	Preserve the section of road demarcated by the Heritage Specialist in a kmz file and including stone cairns at sites 19 to 23 (see **Appendix A**).	Holder, Engineer	Planning and Design Phase	Compliance to be verified by ECO and IEA.
32	Layout and Design	Disturbance to or destruction of Stone Cairns indicating an old Wagon Road (Sites: 19-25) by construction activities, e.g., clearing and grubbing activities.	Preservation of heritage resources and expansion of knowledge of the archaeology of the area.	Mapping data of heritage sites provided to SAHRA	All mapping data of sites must be provided to SAHRA prior to construction;	Holder, Engineer	Planning and Design Phase	Compliance to be verified by ECO and IEA.

MEMBERS: J.A. Bowers (M Tech, Pr.Sci.Nat.) & S.D. MacGregor (M.Sc., Pr.Sci.Nat.)
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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
32	Layout and Design	Disturbance to or destruction of Stone Cairns indicating an old Wagon Road (Sites: 19-25) by construction activities, e.g., clearing and grubbing activities.	Preservation of heritage resources and expansion of knowledge of the archaeology of the area.	30 m buffer around section of the wagon road	A buffer of 30 m must be adhered to around the wagon road (points 19 - 25).	Holder, Engineer	Planning and Design Phase	Compliance to be verified by ECO and IEA.
32	Layout and Design	Disturbance to or destruction of Stone Cairns indicating an old Wagon Road (Sites: 19-25) by construction activities, e.g., clearing and grubbing activities.	Preservation of heritage resources and expansion of knowledge of the archaeology of the area.	Report on the Section of the old wagon road.	A report containing the research, recording, mapping and further recommendations for the road must be submitted to SAHRA for comment prior to construction;	Holder, Heritage specialist	Planning and Design Phase	Compliance to be verified by ECO and IEA.
32	Layout and Design	Disturbance to or destruction of Stone Cairns indicating an old Wagon Road (Sites: 19-25) by	Preservation of heritage resources and expansion of knowledge of the archaeology of the area.	Stone cairns preserved.	As far as possible avoid destruction or demolition of other stone cairns, including but not limited to sites 24, 25 and 29. These cairns may only be destroyed if they can't be avoided (see **Appendix A**).	Holder, Engineer, Contractor	Planning and Design Phase Construction	Compliance to be verified by ECO and IEA.

MEMBERS: J.A. Bowers (M Tech, Pr.Sci.Nat.) & S.D. MacGregor (M.Sc., Pr.Sci.Nat.)
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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
		construction activities, e.g., clearing and grubbing activities.						

MEMBERS: J.A. Bowers (M Tech, Pr.Sci.Nat.) & S.D. MacGregor (M.Sc., Pr.Sci.Nat.)
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PRE-CONSTRUCTION PHASE

Table 25. Management Protocol for Legal System

Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
01	Contractor Readiness	Contractor is unaware of EA and EA and EMP.	Compliance with the EA and EMPr	Contractor has an environmental file on site including the EA and EMPr	Contractor must be provided with a copy of the EA and EMPr.	Holder, Contractor	Pre-construction	Compliance to be verified by ECO and IEA.
01	Contractor Readiness	The construction of the 132 kV powerline will impact Eskom's power lines servitude. Construction without permission will constitute an offence in terms of the relevant legislation	Lawful commencement of construction activities within Eskom's 132 kV powerlines servitude.	A Letter of Consent from Eskom.	The Holder of the EA must apply for co-use of Eskom's 132 kV powerline servitude by submitting a formal application entitled "Annex A Application for the co-use of an Eskom right or restriction area", as well as all required supporting documents that are indicated in the form. The application should be submitted to Nomzamo Mdunyelwa ST(SA)0991, Land & Rights Officer, Land Development, Northern Cape Operating Unit, Eskom (Tel: 053 830 5947, Mobile: 081 046 5341, Email: MdunyeNC@eskom.co.za) at least 30 days before the intended date of commencement to prevent any unnecessary delays. A separate application will need to be submitted for:	Holder	Pre-construction	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
					(1) upgrading the existing two-track service road to a 5m to 6m-wide road by grading it, importing material, reshaping it, and compacting it, and (2) constructing the 132 kV powerline from the on-site substation on Phase 3 across/underneath Eskom's 132 kV powerline.			
01	Contractor Readiness	Solar photovoltaic structures within a 2 km radius of the closest point of a transmission or distribution substation (66kV to 765kV) may impede Eskom's future planning.	Eskom's existing infrastructure and future planning is not impeded.	Eskom requirements for work at or near Eskom infrastructure and servitudes are met.	Adhere to Eskom requirements for work at or near Eskom infrastructure and servitudes (Annexure N).	Holder, Contractor	Pre-construction	Compliance to be verified by ECO and IEA.
01	Contractor Readiness	Unlawful activities relating to heritage resources	Lawful commencement of Section 35 of the NHRA	NHRA Permit	Permits in terms of section 35 of the National Heritage Resource Act (NHRA) must be applied for from SAHRA for the collection of archaeological material prior to construction. No construction may commence without a permit in this regard.	Holder, Contractor	Prior to commencement	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
01	Contractor Readiness	Once the Minister has identified, through a government notice that a generic EMPr is relevant to an application for EA, that generic EMPr must be applied by all parties involved in the EA process, including but not limited to the applicant and the competent authority (CA)	Compliance with the Generic EMPr	Two generic EMPrs completed by the contractor and accepted (signed) by the Holder.	Part B Section 1 of (a) the generic EMPr for the development and expansion of **substation infrastructure** for the transmission and distribution of electricity, and (b) the generic EMPr for the development and expansion for **overhead electricity transmission and distribution infrastructure**, must be completed by the contractor, and each completed page must be signed and dated by the holder of the EA prior to the commencement of the activity.	Holder, Contractor	Pre-construction	Compliance to be verified by ECO and IEA.
01	Contractor Readiness	Once the Minister has identified, through a government notice that a generic EMPr is relevant to an application for EA, that generic EMPr must be	Compliance with the Generic EMPr	Generic EMPr method statements prepared by contractor (signed by Holder)	Appendix 1 of (a) the generic EMPr for the development and expansion of **substation infrastructure** for the transmission and distribution of electricity, and (b) the generic EMPr for the development and expansion for **overhead electricity transmission and distribution infrastructure**, contains method statements that must be prepared by the contractor and agreed to by	Holder, Contractor	Pre-construction	Compliance to be verified by ECO and IEA.

MEMBERS: J.A. Bowers (M Tech, Pr.Sci.Nat.) & S.D. MacGregor (M.Sc., Pr.Sci.Nat.)
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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
		applied by all parties involved in the EA process, including but not limited to the applicant and the competent authority (CA)			the holder of the EA prior to the commencement of the activity. Each method statement must be signed and dated on each page by the holder of the EA.			
01	Contractor Readiness	Conditions of EA and EMP are not enforced or penalised through employment contracts: Significant Impacts on different aspects of the environment.	Reduced occurrence of labour being non-compliant with EA and EMPr	Clause within labour employment contracts relating to a penalty system for incidences of non-compliance with the EA and EMPr	Contractor should include in labour employment contracts a penalty system regarding incidences of non-compliance with the EA and EMPr.	Contractor	Pre-construction	Compliance to be verified by ECO and IEA.
01	Contractor Readiness	Lack of environmental awareness: Significant environmental impacts	Environmentally sensitive and responsible conduct by employees	Signed attendance register of Environmental Awareness training	All contractors, sub-contractors and their workers shall participate in an Environmental Awareness Training before being allowed to enter site. Refresher environmental awareness training should be undertaken as and when required.	Contractor, ECO	Pre-construction	Compliance to be verified by ECO and IEA.
01	Contractor Readiness	Lack of environmental	Environmentally sensitive and	Signed attendance	The Contractor must allow for sufficient sessions to train all	Contractor, ECO	Pre-construction	Compliance to be verified

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
		awareness: Significant environmental impacts	responsible conduct by employees	register of Environmental Awareness training	personnel with no more than 20 personnel attending each course.			by ECO and IEA.
01	Contractor Readiness	Lack of environmental awareness: Significant environmental impacts	Environmentally sensitive and responsible conduct by employees	Course outline of Environmental Awareness training	All staff must be made aware of their individual roles and responsibilities in achieving compliance with the EMPr (and EA) by participating in training on standard operating procedures (SOPs)/Method Statements linked to their construction activities.	Contractor, SEO	Pre-construction	Compliance to be verified by ECO and IEA.
01	Contractor Readiness	Lack of environmental awareness: Significant environmental impacts	Environmentally sensitive and responsible conduct by employees	Course outline of Environmental Awareness training	Environmental awareness training must include as a minimum the following: • Staff conduct including, noise, poaching and movement; • The steps to be taken should any archaeological artefacts be located or unearthed; • Procedures to be followed when working near or within sensitive areas; • No-go areas, including the 50 m ecological buffer; • Wastewater management procedures; • Water usage and conservation; • Solid waste management procedures; • Sanitation procedures; • Fire prevention;	Contractor, ECO	Pre-construction	Compliance to be verified by ECO and IEA.

MEMBERS: J.A. Bowers (M Tech, Pr.Sci.Nat.) & S.D. MacGregor (M.Sc., Pr.Sci.Nat.)
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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
					• Disease prevention; and • (generic) Emergency procedures.			
01	Contractor Readiness	Lack of environmental awareness: Significant environmental impacts	Environmentally sensitive and responsible conduct by employees	Signed attendance register of Environmental Awareness training	A record of all environmental awareness training courses undertaken as part of the EMPr and staff attendance registers must be readily available.	Contractor, ECO	Pre-construction	Compliance to be verified by ECO and IEA.
01	Contractor Readiness	Lack of environmental awareness: Significant environmental impacts	Environmentally sensitive and responsible conduct by employees	Course outline of Environmental Awareness training	Course material must be available and presented in appropriate languages that all staff can understand.	Contractor, ECO	Pre-construction	Compliance to be verified by ECO and IEA.
01	Site establishment	Non-compliance with regards to dangerous goods (fuel) storage	Lawful dangerous goods storage	Fuel storage is below 30 cubic meters	Combined fuel storage capacity must remain below 30 cubic meters.	Contractor, ECO	Pre-construction	Compliance to be verified by ECO and IEA.

Table 26. Management Protocol for Terrestrial Fauna

Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
02	Planning	The construction of a solar electricity generating facility and its associated	Minimize disturbance to local famers	Construction programme received by farmers	The farmers must be given a construction programme with sufficient leeway to ensure that they can move their livestock before construction activities commence.	Contractor	Pre-construction	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
		infrastructure will lead to a change of land use and livelihoods						
02	Planning	Farm gates being left open, or not being closed properly by construction teams.	Minimize disturbance to local famers	Grievance mechanism	Develop a grievance mechanism using the Grievance Mechanism Protocol (Appendix I).	Holder, Contractor	Pre-construction	Compliance to be verified by ECO and IEA.
02	Planning	Farm gates being left open, or not being closed properly by construction teams.	Minimize disturbance to local famers	Grievance mechanism	The grievance mechanism must be in place and shared with all the stakeholders before the construction commences.	Holder, Contractor	Pre-construction	Compliance to be verified by ECO and IEA.
02	Planning	Farm gates being left open, or not being closed properly by construction teams.	Minimize disturbance to local famers	Grievance complaints register	The grievance mechanism must include a complaints procedure that allows the landowners to log their grievance and submit a claim for damages.	Holder, Contractor	Pre-construction and On-going	Compliance to be verified by ECO and IEA.
02	Contractor Readiness	Farm gates being left open, or not being closed properly by construction teams.	Minimize disturbance to local famers	Signed attendance register of Environmental Awareness training	The construction teams must be educated about the closing/locking farm gates, through toolbox talks.	Contractor, ECO	Pre-construction	Compliance to be verified by ECO and IEA.
03	Monitoring	Possible bat fatalities incurred from collisions with infrastructure associated with	Ensure least impact on bat species and behaviour.	Bat monitoring results	Perform continuous bat monitoring using passive bioacoustic recording systems in line with the South African Good Practice Guidelines for Surveying Bats at WEF's (Sowler and Stoffberg, 2014) and	Holder, ECO, Specialist	One year pre-construction, during construction and two years post-	Compliance to be verified by ECO and IEA.

MEMBERS: J.A. Bowers (M Tech, Pr.Sci.Nat.) & S.D. MacGregor (M.Sc., Pr.Sci.Nat.)
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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
		the solar PV facility including solar arrays, security fencing, transmission lines, and buildings.			SAGPG for Operational Monitoring (Aronson et al. 2014) for one year pre-construction, during construction and two years post-construction (operation). During the first two years of operation, it is expected that any changes in bat activity and perceived impacts will be most evident.		construction (operation)	
03	Monitoring	Possible bat fatalities incurred from collisions with infrastructure associated with the solar PV facility including solar arrays, security fencing, transmission lines, and buildings.	Ensure least impact on bat species and behaviour.	Bat monitoring results	A specialist should maintain these bat monitoring systems and determine the impacts of the solar PV facility and associated infrastructure on bat populations in relation to landscape changes in both the physical changes with the installation of the solar PV panels, the resulting change in vegetation structure underneath the solar PV panels and the management strategy of the operational facility.	Holder, Specialist	One year pre-construction, during construction and two years post-construction (operation)	Compliance to be verified by ECO and IEA.
03	Monitoring	Possible bat fatalities incurred from collisions with infrastructure associated with the solar PV facility including solar arrays, security fencing, transmission	Ensure least impact on bat species and behaviour.	Bat carcasses	Mortality searches near infrastructure and along the security fence line must be conducted to determine if the security fences pose a threat to bats.	Contractor, ECO, Specialist	On-going	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
		lines, and buildings.						
03	Contractor Readiness	Loss of fauna/ livestock through poaching	Ensure the protection of fauna and livestock	No poaching (snares etc.)	Soventix must have a zero-tolerance policy regarding poaching, and make it clear what the punishment and consequences would be.	Contractor, ECO	Pre-construction	Compliance to be verified by ECO and IEA.
03	Site Establishment	Active mammals or nesting birds could be injured or increase in mortalities	Ensure the protection of fauna, and aves.	Photographic evidence of relocation operation.	If any sedentary animals or ground nesting birds are found, then these are to be relocated to a suitable distance and habitat by the ECO.	Contractor, ECO.	Ongoing	Compliance to be verified by ECO and IEA.
03	Site Establishment	Tortoises and other animals become stuck against fences and are electrocuted to death.	Faunal mortalities as a result of fencing are reduced	Electric fence wire is at least 30 cm above ground. No fauna/aves carcasses	The design should ensure that there is no electrical fencing within 30 cm of the ground as tortoises become stuck against such fences and are electrocuted to death. Alternatively, a guard wire set at 20 cm can be used to keep larger tortoises away from the fence.	Engineer, Contractor.	Pre-construction	Compliance to be verified by ECO and IEA.
03	Site Establishment	Tortoises and other animals become stuck against fences and are electrocuted to death.	Faunal mortalities as a result of fencing are reduced	Concrete sill beneath gates in jackal proof fencing.	Where gates are installed in jackal proof fencing, a suitable reinforced concrete sill must be provided beneath the gate.	Engineer, Contractor.	Pre-construction	Compliance to be verified by ECO and IEA.
03	Site Establishment	Tortoises and other animals become stuck against fences and are electrocuted to death.	Faunal mortalities as a result of fencing are reduced	Tension of fence wires	Original tension must be maintained in the fence wires.	Holder, Contractor	Ongoing	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
03	Site Establishment	Tortoises and other animals become stuck against fences and are electrocuted to death.	Faunal mortalities as a result of fencing are reduced	Consent from landowner	Any temporary fencing to restrict the movement of livestock must only be erected with the permission of the landowner.	Holder, Landowner, Contractor.	Ongoing	Compliance to be verified by ECO and IEA.
03	Site Establishment	Animals may enter the construction camp and have access to waste, hazardous substances, equipment, etc.	Ensure the protection of fauna	No incidents of animals entering the construction camp	Erect and maintain a barrier (e.g., shade cloth fence) around the perimeter of the construction camp.	Contractor	Ongoing	Compliance to be verified by ECO and IEA.
03	Site Establishment	Light pollution	Ensure least impact on animal behaviour.	No impacts on bat species due to lighting.	The number and position of lights required must be limited and installed in areas where it is absolutely necessary.	Contractor	Ongoing	Compliance to be verified by ECO and IEA.
03	Site Establishment	Light pollution	Ensure least impact on animal behaviour.	No impacts on bat species due to lighting.	A light shield/lamp shade should be used to focus the beam downwards onto the ground to prevent sky glow as well as to prevent light from trespassing beyond the development area into the surrounding naturally dark areas.	Contractor	Ongoing	Compliance to be verified by ECO and IEA.
03	Site Establishment	Light pollution	Ensure least impact on animal behaviour.	No impacts on bat species due to lighting.	The intensity of the lighting is lowered (dim the lights). Alternatively, in conjunction with substantially dimming the lights, motion sensors could be installed.	Holder, Contractor.	Ongoing	Compliance to be verified by ECO and IEA.
03	Site Establishment	Light pollution	Ensure least impact on	No impacts on bat species due to lighting.	The spectrum of light chosen has longer wavelengths to reduce the attractiveness of light to insects.	Holder, Contractor.	Ongoing	Compliance to be verified

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
			animal behaviour.					by ECO and IEA.
03	Site Establishment	Light pollution	Ensure least impact on animal behaviour.	No impacts on bat species due to lighting.	If possible, the duration of the lighting period should be limited, and lights switched on shortly after the peak night-time emergence of clutter-edge forager bats ~60min after sunset.	Holder, Contractor.	Ongoing	Compliance to be verified by ECO and IEA.

Table 27. Management Protocol for Terrestrial Flora

Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
04	Contractor Readiness	Risk of veld fires caused by workers during the construction of the facility.	Fire management plan	No run-away (uncontrolled) fires - no open fires	Undertake a risk analysis to determine *inter alia* the probability and frequency of a wildfire during construction and operation and prepare a fire management plan accordingly.	Holder, Contractor	On-going	Compliance to be verified by ECO and IEA.
04	Contractor Readiness	Risk of veld fires caused by workers during the construction of the facility.	Firefighting personal	No run-away (uncontrolled) fires - no open fires	Appoint a responsible person (or agent) who will extinguish a fire or assist in doing so. If no agent is appointed, a team of designated firefighting personal shall be trained and readily available to immediately deal with any runaway veld fires.	Holder, Contractor	On-going	Compliance to be verified by ECO and IEA.
05	Contractor Readiness	Direct loss of terrestrial plants from construction	Preserve protected plant species that may not have been identified	Signed register of attendance, and content of induction.	The contractor's staff must be made aware of the prohibition on harvesting any plant or plant part.	Contractor, SEO	Prior to site establishment.	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
		activities on land.	during the EIA Phase					
05	Site establishment (Layout)	Direct loss of terrestrial plants from construction camp footprint.	Preserve protected plant species that may not have been identified during the EIA Phase	No disturbance to protected or threatened plants, unless necessary.	Undertake a pre-construction walk through of the development footprint to locate protected plant species that should be relocated outside of the development footprint.	SEO, ECO	Prior to commencement of clearing and grubbing.	Compliance to be verified by ECO and IEA.
05	Site establishment (Layout)	Direct loss of terrestrial plants from construction camp footprint.	Preserve protected plant species that may not have been identified during the EIA Phase	No disturbance to protected or threatened plants, unless necessary.	Only apply for permit(s) and/or a license to "pick" a threatened or protected plant if it is not possible to relocate the footprint.	Engineer, Holder, Contractor, ECO, SEO	Prior to commencement of clearing and grubbing.	Compliance to be verified by ECO and IEA.
05	Site establishment (Layout)	Direct loss of terrestrial plants from construction camp footprint.	Preserve protected plant species that may not have been identified during the EIA Phase		High visibility flags must be placed near protected plants to avoid any damage or destruction of these species.	Contractor, SEO	Ongoing	Compliance to be verified by ECO and IEA.

Table 28. Management Protocol for Soil and Rock

Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
06	Site establishment (Layout)	Parking of vehicles will compact the ground	Minimise erosion	No formation of soil erosion rills	Identify and avoid no-go areas or areas sensitive to compaction on the site plan. Parking areas should as far as practical be located on flat ground.	Contractor	Pre-construction	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
06	Site establishment (Layout)	Parking of vehicles will compact the ground	Minimise erosion	No formation of soil erosion rills	All activities remain strictly within demarcated routes and areas.	Contractor	On-going	Compliance to be verified by ECO and IEA.
06	Site establishment (Layout)	Parking of vehicles will compact the ground	Minimise erosion	No formation of soil erosion rills	Once the intervention has been completed, break the crust on bare compacted areas to enhance vegetation establishment.	Contractor	On-going	Compliance to be verified by ECO and IEA.
06	Site establishment (Layout)	Spills or other waste from the maintenance of construction vehicles and other machinery can contaminate the topsoil.	Avoid contamination of soil from leaking machinery	No services/workshop on site	No planned maintenance and workshop area is permitted within the construction site and construction camp.	Contractor	Ongoing	Compliance to be monitored by SEO and verified by ECO and IEA.
06	Site establishment (Layout)	Hydrocarbon and other hazardous material spills (concrete slurry) can contaminate the soil	Control or contain soil pollution	Bunded area located within construction camp.	Fuel storage tanks must be placed on an impermeable bund that can hold 110% volume of the tank.	Contractor	Ongoing	Compliance to be verified by ECO and IEA
06	Site establishment (Layout)	Hydrocarbon and other hazardous material spills (concrete slurry) can contaminate the soil	Control or contain soil pollution	Spill response equipment.	Provide accidental spill response equipment at the construction camp.	Contractor	Ongoing	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
06	Site establishment (Layout)	Hydrocarbon and other hazardous material spills (concrete slurry) can contaminate the soil	To reduce the amount of soil pollution	Adequate number of drip trays available.	Enough drip trays must be available for all construction plant.	Contractor	Ongoing	Compliance to be verified by ECO and IEA.
06	Site establishment (Layout)	Hydrocarbon and other hazardous material spills/leaching can contaminate the soil	To reduce the amount of soil pollution	A designated waste storage area is contained – waste is not in direct contact with the ground.	Designate and contain a temporary waste storage area within the construction camp (e.g., covered skips, scavenger proof bins, etc.)	Contractor	Ongoing	Compliance to be verified by Compliance to be verified by ECO and IEA

Table 29. Management Protocol for Ground and Surface Water

Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
07	Monitoring	It is anticipated that soils downstream of the proposed development, and the non-perennial streams (feeding into temporary livestock watering dams)	To reduce sedimentation	Preserve aquatic ecosystem structure and function.	Implement the Surface and Groundwater Monitoring Protocol during construction and operation (Appendix D).	Holder, Contractor	Construction and operation	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
		are the receivers of any sediment runoff or poor-quality runoff from the site. Suspended sediment (or turbidity) during construction in the watercourse can influence water quality.						
07	Site establishment (Layout)	Concrete slurry from the batching plant can contaminate surface water flows	To reduce the amount of soil/water pollution	A designated batching plant is contained – deflects surface water runoff.	Designate and contain a concrete batching plant within the construction camp by deflecting surface water runoff on the up- and down-slope side using, for example, sandbags.	Contractor	Ongoing	Compliance to be verified by ECO and IEA
08	Contractor readiness	Construction of linear infrastructure across the ephemeral drainage system will involve temporary diversion works, changing the surface water hydrology or flow patterns.	Altered aquatic ecosystem structure and function.	Construction during dry months and clearing/grubbing end of wet season	The civil construction phase should be restricted to the dry winter months (e.g., April/May to September), that is commence with such activities as clearing or grading, excavating and importing material at the end of the wet season/beginning of the dry season whilst the soil is still moist to reduce dust and as far as is practical, be completed in, the dry winter months with a decreased probability of storm events	Holder, Contractor	Pre-construction	Compliance to be verified by ECO and IEA.

Table 30. Management Protocol for Terrestrial and Avian Ecosystem

MEMBERS: J.A. Bowers (M Tech, Pr.Sci.Nat.) & S.D. MacGregor (M.Sc., Pr.Sci.Nat.)
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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
09	Contractor readiness	Construction of linear infrastructure across the ephemeral drainage system will involve temporary diversion works, changing the surface water hydrology or flow patterns.	Altered aquatic ecosystem structure and function.	Construction during dry months and clearing/grubbing end of wet season	The civil construction phase should be restricted to the dry winter months (e.g., April/May to September), that is commence with such activities as clearing or grading, excavating and importing material at the end of the wet season/beginning of the dry season whilst the soil is still moist to reduce dust and as far as is practical, be completed in, the dry winter months with a decreased probability of storm events	Holder, Contractor	Pre-construction	Compliance to be verified by ECO and IEA.
10	Site establishment (Layout)	Transformation of ecosystems and construction camp creep	Minimize habitat loss	No construction creep beyond demarcated boundaries.	The construction camp, including planned operational area, shall not exceed 4 ha in size.	Holder, Contractor	Pre-construction	Compliance to be verified by ECO and IEA.
10	Site establishment (Layout)	Transformation of ecosystems and construction camp creep	Minimize habitat loss	Method statement (camp layout plan)	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, 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, cooking and ablution	Contractor	Pre-construction	Compliance to be verified by ECO and IEA.

MEMBERS: J.A. Bowers (M Tech, Pr.Sci.Nat.) & S.D. MacGregor (M.Sc., Pr.Sci.Nat.)
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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
					facilities, waste and wastewater management.			
10	Site establishment (Layout)	Transformation of ecosystems and construction camp creep	Minimize habitat loss	Fenced camp	The camp must be fenced.	Contractor	Pre-construction	Compliance to be verified by ECO and IEA.
10	Site establishment (Layout)	Transformation of ecosystems and construction camp creep	Minimize habitat loss	No disturbance of undisturbed or sensitive vegetation units.	Minimise the development footprint as far as possible, which includes locating temporary-use areas such as construction camps and lay-down areas in low sensitivity or previously disturbed areas.	Contractor, ECO	Pre-construction	Compliance to be verified by ECO and IEA.
10	Site establishment (Layout)	Transformation of ecosystems and construction camp creep	Minimize habitat loss	No disturbance of undisturbed or sensitive vegetation units.	Minimise the development footprint near watercourses and other ecologically significant features.	Contractor, ECO	On-going	Compliance to be verified by ECO and IEA.
10	Site establishment (Layout)	Transformation of ecosystems and construction camp creep	Minimize habitat loss	Aerial or overhead equipment used where possible	Avoid the construction of a crossing or staging area by either choosing an alternative route or by using aerial or overhead equipment.	Contractor, ECO	On-going	Compliance to be verified by ECO and IEA.
10	Site establishment (Layout)	Environmentally sensitive areas are disturbed due to uncontrolled access.	Minimize habitat loss	No disturbance of undisturbed or sensitive vegetation units.	Identification of access restricted areas is to be informed by the environmental assessment, site walk through, and any additional areas identified during development.	Contractor, ECO, SEO	Pre-construction	Compliance to be verified by ECO and IEA.

MEMBERS: J.A. Bowers (M Tech, Pr.Sci.Nat.) & S.D. MacGregor (M.Sc., Pr.Sci.Nat.)
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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
10	Site establishment (Layout)	Environmentally sensitive areas are disturbed due to uncontrolled access.	Minimize habitat loss	Barrier around restricted areas	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.	Contractor, SEO	Pre-construction	Compliance to be verified by ECO and IEA.
10	Site establishment (Layout)	Environmentally sensitive areas are disturbed due to uncontrolled access.	Minimize habitat loss	Barrier around restricted areas	Demarcate ecological sensitive habitats such as riparian areas as no-go areas (ecological sensitivity 'High' refer to Appendix M) during construction with construction tape or similar markers and signage.	Contractor, SEO	Pre-construction	Compliance to be verified by ECO and IEA.
10	Site establishment (Layout)	Environmentally sensitive areas are disturbed due to uncontrolled access.	Minimize habitat loss	No disturbance of undisturbed or sensitive vegetation units.	Unauthorised access and development related activity inside access restricted areas is prohibited except for the road crossings and laying of underground cables/pipelines.	Contractor, SEO	Laying underground cables/pipelines	Compliance to be verified by ECO and IEA.
10	Site establishment (Layout)	The physical footprint of the quarry will result in a loss of local terrestrial	Minimize habitat loss.	Natural vegetation is retained.	The quarry shall not exceed 2 ha in size.	Contractor	On-going	Compliance to be verified by ECO and IEA.
10	Site establishment (Layout)	The physical footprint of the quarry will result in a loss of local terrestrial	Minimize habitat loss.	Natural vegetation is retained.	The borrow pit may only be used to source suitable material for improvements to the property that it is located on.	Contractor	On-going	Compliance to be verified by ECO and IEA.
10	Site establishment (Layout)	Damage to the environment due to unplanned movement of vehicles.	Minimize habitat loss.	Contractor has an environmental file on site	All contractors must be made aware of all these access routes.	Contractor, SEO	On-going	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
10	Site establishment (Layout)	Damage to the environment due to unplanned movement of vehicles.	Minimize habitat loss.	No disturbance of undisturbed or sensitive vegetation units.	Maximum use of both existing servitudes and existing roads must be made to minimize further disturbance through the development of new roads.	Engineer, Contractor	On-going	Compliance to be verified by ECO and IEA.
10	Site establishment (Layout)	Damage to the environment due to unplanned movement of vehicles.	Minimize habitat loss.	Planned access roads	Access roads in flattish areas must follow fence lines and tree belts to avoid fragmentation of vegetated areas or croplands.	Engineer, Contractor	On-going	Compliance to be verified by ECO and IEA.
10	Site establishment (Layout)	Damage to the environment due to unplanned movement of vehicles.	Minimize habitat loss.	No unplanned access roads	Access roads must only be developed on pre-planned and approved roads.	Engineer, Contractor	On-going	Compliance to be verified by ECO and IEA.
11	Site establishment (Layout)	Disruption/alteration of ecological life cycles due to light pollution.	Ensure least impact on animal behaviour.	No impacts on animal species due to lighting.	Any outside lighting should be minimised, positioned at or below roof height and directed away from highly sensitive areas, e.g., downwards.	Contractor	On-going	Compliance to be verified by ECO and IEA.
11	Site establishment (Layout)	Disruption/alteration of ecological life cycles due to light pollution.	Ensure least impact on animal behaviour.	No impacts on animal species due to lighting.	Fluorescent and mercury vapor lighting should be avoided, and sodium vapor (green/red) lights should be used wherever possible."	Contractor	On-going	Compliance to be verified by ECO and IEA.

Table 31. Management Protocol for Aquatic Ecosystem

MEMBERS: J.A. Bowers (M Tech, Pr.Sci.Nat.) & S.D. MacGregor (M.Sc., Pr.Sci.Nat.)
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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
12	Planning	Pollution due to accidental releases of contaminated liquids.	Ensure legal compliance with the prevailing and pertinent legislation. Avoid pollution. Reduce the amount of waste disposed to landfill.	Integrated waste management plan	Develop and implement an integrated waste management plan that (a) adopts the cradle-to-grave approach extending from waste prevention and minimization to generation, storage, collection, transportation, treatment, and final disposal of waste, (b) incorporates all aspects of the waste management hierarchy, and (c) is aligned with the Waste Classification and Management Regulations (GN No. 634 of 23rd August 2013).	Holder, Contractor	Ongoing	Compliance to be verified by ECO and IEA
12	Site establishment (Layout)	Chemical pollution of the soil and water resources.	No incidents of chemical pollution of land/watercourses	Refuelling points are located outside of sensitive areas	Sites of oiling and refuelling points must be located more than 100 m away from surface water sewers or edge of a watercourse.	Contractor	Ongoing	Compliance to be verified by ECO and IEA
12	Contractor readiness	Loss of riparian systems and disturbance of the alluvial water courses.	Riparian systems and alluvial water courses are maintained as far as possible.	Barrier around restricted areas	Demarcate ecological sensitive habitats such as riparian areas as no-go areas (ecological sensitivity 'High' refer to Appendix M) during construction with construction tape or similar markers and signage.	Contractor, SEO	Pre-construction	Compliance to be verified by ECO and IEA.
12	Contractor readiness	Loss of riparian systems and disturbance of the alluvial water courses.	Riparian systems and alluvial water courses are maintained as far as possible.	Method statement for the ephemeral	A construction method statement should be compiled and approved prior to the commencement of construction activities in the	Contractor, SEO	Pre-construction	Compliance to be verified by ECO and IEA

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
				drainage line and buffer.	ephemeral drainage line and its buffer. The method statement should take cognisance of: (a) the mitigation measures identified in the Aquatic Biodiversity Impact Assessment Report, as well as mitigation measures specified by each of the environmental specialists, (b) the conditions of the Environmental Authorisation and Integrated Water Use License, and (c) the Environmental Management Programs (EMPr's).			
12	Contractor readiness	Loss of riparian systems and disturbance of the alluvial water courses.	Riparian systems and alluvial water courses are maintained as far as possible.	Compliance with the method statement for the ephemeral drainage line and buffer.	The Environmental Control Officer (ECO) must ensure that the contractor adheres to the method statement.	ECO	Pre-construction and Construction	Compliance to be verified by ECO and IEA
12	Contractor readiness	The generation of excessive wind-blown dust could 'choke' the ecologically sensitive ephemeral	Minimise dust generation	Construction of Linear infrastructure during dry months	The construction of linear infrastructure across parts of the ephemeral drainage system, should be restricted to the dry winter months (e.g., May to September), that is commence with such activities as clearing or grading,	Contractor	Pre-construction and construction	Compliance to be verified by ECO and IEA.

MEMBERS: J.A. Bowers (M Tech, Pr.Sci.Nat.) & S.D. MacGregor (M.Sc., Pr.Sci.Nat.)
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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
		drainage line system.			excavating and importing material at the end of the wet season/beginning of the dry season whilst the soil is still moist and as far as is practical, be completed in, the dry winter months.			
12	Contractor readiness	The generation of excessive wind-blown dust could 'choke' the ecologically sensitive ephemeral drainage line system.	Minimise dust generation	Construction during dry months	The civil construction phase should be restricted to the dry winter months (e.g., April/May to September), that is commence with such activities as clearing or grading, excavating and importing material at the end of the wet season/beginning of the dry season whilst the soil is still moist to reduce dust and as far as is practical, be completed in, the dry winter months with a decreased probability of storm events.	Contractor	Pre-construction and construction	Compliance to be verified by ECO and IEA.
12	Contractor readiness	The generation of excessive wind-blown dust could 'choke' the ecologically sensitive ephemeral drainage line system.	Minimise dust generation	Mining from quarry during wet summer season.	Mining of suitable material from a quarry for road construction and associated rock crushing should as far as is practical take place during the wet summer season prior to the commencement of the civil construction phase.	Contractor	Pre-construction and construction	Compliance to be verified by ECO and IEA.
13	Site establishment (Layout)	Surface water run-off laden with sediment from	Preserve aquatic ecosystem	Construction camp outside of buffers	The construction camp shall be located within PV Block 4 at least 100 m from the	Engineer, Contractor	Pre-construction	Compliance to be verified by ECO and IEA.

MEMBERS: J.A. Bowers (M Tech, Pr.Sci.Nat.) & S.D. MacGregor (M.Sc., Pr.Sci.Nat.)
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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
		the construction camp area/hydrocarbon spills can enter the watercourse, increasing turbidity.	structure and function.		delineated edge of the ecological buffer surrounding the ephemeral drainage system.			
13	Site establishment (Layout)	Surface water run-off laden with sediment from the construction camp area/hydrocarbon spills can enter the watercourse, increasing turbidity.	Preserve aquatic ecosystem structure and function.	Sources of pollution are contained – deflects surface water runoff.	Designate and contain potential sources of pollution, e.g., concrete batching area, within the construction camp by deflecting surface water runoff on the up-and down-slope side using, for example, sandbags.	Contractor	Ongoing	Compliance to be verified by ECO and IEA.

Table 32. Management Protocol for Economic

Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
15	Planning	Haulage of imported materials incur a cost relating to distance travelled and time.	Maintain financial feasibility of the project.	Minimise travel distances of materials	The engineers should consider the feasibility of the preferred alternative route for the haulage of imported materials from the Port of Ngqura to the proposed PV facility as recommended in the Traffic Impact Assessment Report.	Holder, Engineer	Pre-construction	Compliance to be verified by ECO and IEA.
15	Planning	Transport of abnormal	Safe (unobstructed) delivery of	Abnormal loads are delivered to site timeously.	The appointed engineers should investigate the route to the site to ensure that the	Holder, Engineer	Pre-construction	Compliance to be verified by

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		roads could be delayed.	abnormal loads to site.		abnormal loads are not obstructed at any point by geometric, height and width limitations along the route.			ECO and IEA.
15	Contractor readiness	Failure to obtain approvals, licenses or permits	Legal compliance	Approvals/licences/permits	Obtain at least all the approvals identified in the Planning and Design Phase (under ""Legal Compliance"") prior to commencing construction.	Holder, Contractor, SEO	Pre-construction	Compliance to be verified by ECO and IEA.
15	Site establishment (Layout)	Commercially available sources of concrete aggregate may prove to be too distant.	Good quality material for aggregate/roads	Material tests (aggregate)	Dolerite rock or baked sediments from the Phase 3 terrain can be considered for sources of concrete aggregate or road surfacing but materials will need to be tested for grading distribution, Atterberg limits, compaction-moisture density values and durability.	Engineer, Contractor	Pre-construction	Compliance to be verified by ECO and IEA.

Table 33. Management Protocol for Social

Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
16	Planning	Cumulative social impacts as it relates to social ills such as increases in crimes, theft, HIV rates, unemployment levels etc.	Social responsibility	Cumulative impact management	The management of cumulative impacts must be a joint effort between Soventix, other players in the renewable energy field and the local and district municipality.	Holder	On-going	Compliance to be verified by ECO and IEA
16	Planning	Cumulative social impacts as it relates to	Social responsibility	Social Impact Management Plan	Implement the Social Impact Management Plan during all phases of the project (Appendix J).	Holder, Contractor	On-going	Compliance to be verified by

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
		social ills such as increases in crimes, theft, HIV rates, unemployment levels etc.						ECO and IEA
16	Planning	Cumulative social impacts as it relates to social ills such as increases in crimes, theft, HIV rates, unemployment levels etc.	Social responsibility	Small business development	It is recommended to invest in the development of SMME's or create a business incubator.	Holder, Contractor	On-going	Compliance to be verified by ECO and IEA
16	Planning	Cumulative social impacts as it relates to social ills such as increases in crimes, theft, HIV rates, unemployment levels etc.	Social responsibility	Skills development	It is recommended to assist with the development of skills required in the construction and management of renewable energy facilities.	Holder, Contractor	Construction and Operational	Compliance to be verified by ECO and IEA
16	Planning	Cumulative social impacts as it relates to social ills such as increases in crimes, theft, HIV rates, unemployment levels etc.	Social responsibility	Skills development	It is recommended to provide in-service training for candidates with potential.	Holder, Contractor	Construction and Operational	Compliance to be verified by ECO and IEA

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
16	Planning	Cumulative social impacts as it relates to social ills such as increases in crimes, theft, HIV rates, unemployment levels etc.	Social responsibility	Green energy investment	It is recommended to invest in solar energy in the town, e.g., for water pumps and other municipal infrastructure.	Holder	On-going	Compliance to be verified by ECO and IEA
16	Planning	Cumulative social impacts as it relates to social ills such as increases in crimes, theft, HIV rates, unemployment levels etc.	Social responsibility	Local goods and services used	It is recommended to encourage local manufacturing and maintenance service providers.	Holder, Contractor	Construction and Operational	Compliance to be verified by ECO and IEA
16	Planning	Cumulative social impacts as it relates to social ills such as increases in crimes, theft, HIV rates, unemployment levels etc.	Social responsibility	Member of local police forum	It is recommended to become part of the community police forum and invest in security measures such as cameras and lights.	Holder, Contractor	Construction and Operational	Compliance to be verified by ECO and IEA
16	Planning	Cumulative social impacts as it relates to social ills such as increases in crimes, theft, HIV rates,	Social responsibility	Renewable energy forum established	It is recommended to create a renewable energy forum that meets on a quarterly basis. Discuss potential projects and alignment between different parties in this forum.	Holder	Construction and Operational	Compliance to be verified by ECO and IEA

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
		unemployment levels etc.						
16	Planning	Cumulative social impacts as it relates to social ills such as increases in crimes, theft, HIV rates, unemployment levels etc.	Social responsibility	Consultation with municipality regarding social plans	It is recommended to discuss and develop social plans in conjunction with the municipality.	Holder	Pre-construction	Compliance to be verified by ECO and IEA
16	Planning	Cumulative social impacts as it relates to social ills such as increases in crimes, theft, HIV rates, unemployment levels etc.	Social responsibility	Consultation with municipality regarding siting of construction camp	It is recommended to discuss siting of construction camps with the town planning teams of the municipality and pool resources to ensure sustainability.	Holder	Pre-construction	Compliance to be verified by ECO and IEA
16	Planning	There is an expectation from the affected communities and municipalities that the Soventix project will result in similar benefits and opportunities as other existing renewable	Build and maintain trusting relationships with affected stakeholders.	Stakeholder Engagement Plan	Develop a Stakeholder Engagement Plan during the pre-construction phase of the project using the Stakeholder Engagement Plan Protocol (Appendix H).	Holder	Pre-construction	Compliance to be verified by ECO and IEA

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
		projects in the area.						
16	Planning	There is an expectation from the affected communities and municipalities that the Soventix project will result in similar benefits and opportunities as other existing renewable projects in the area.	Build and maintain trusting relationships with affected stakeholders.	Stakeholder Engagement Plan	The Stakeholder Engagement Plan must be implemented for the life of the project and adapted as required.	Holder	On-going	Compliance to be verified by ECO and IEA
16	Planning	There is an expectation from the affected communities and municipalities that the Soventix project will result in similar benefits and opportunities as other existing renewable projects in the area.	Build and maintain trusting relationships with affected stakeholders.	Communication protocol	A protocol on communication must be agreed upon and be in place before construction commences.	Holder	Pre-construction	Compliance to be verified by ECO and IEA
16	Planning	There is an expectation from	Build and maintain	Communication protocol	The plan (or strategy) must communicate in an open and	Holder	Pre-construction	Compliance to be

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
		the affected communities and municipalities that the Soventix project will result in similar benefits and opportunities as other existing renewable projects in the area.	trusting relationships with affected stakeholders.		honest way what kind of jobs will be created, who will qualify and how the recruitment process will work.			verified by ECO and IEA
16	Planning	There is an expectation from the affected communities and municipalities that the Soventix project will result in similar benefits and opportunities as other existing renewable projects in the area.	Build and maintain trusting relationships with affected stakeholders.	Communication protocol	The plan (or strategy) should employ different media, including social media, printed media, meetings, and a community liaison officer.	Holder	Pre-construction	Compliance to be verified by ECO and IEA
16	Planning	There is an expectation from the affected communities and municipalities	Build and maintain trusting relationships with affected stakeholders.	Communication protocol	The plan (or strategy) must include liaison with the local municipality about project opportunities, as the municipality is often the first port of call for the community - the municipality can be an important	Holder	Pre-construction	Compliance to be verified by ECO and IEA

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
		that the Soventix project will result in similar benefits and opportunities as other existing renewable projects in the area.			ally for Soventix if the relationship is based on mutual trust and respect.			
16	Planning	There is a level of uncertainty amongst the directly affected landowners with regards to timelines for the project.	Build and maintain trusting relationships with affected stakeholders.	Meeting register with landowner and neighbours	Hold a direct meeting between the affected landowners (directly affected landowner and owners of neighbouring properties) and Soventix during the planning and design and/or pre-construction phases. The meeting should provide greater clarity about when the construction will start, how long it will be, what the layout and design of the solar facility will be, as well as answer any technical questions about practicalities and the implementation of the project.	Holder, Contractor	Pre-construction	Compliance to be verified by ECO and IEA
16	Planning	There is a level of uncertainty amongst the directly affected landowners with regards to timelines for the project.	Build and maintain trusting relationships with affected stakeholders.	Community Liaison Officer appointed	A community liaison officer that is trusted by the community and has the necessary skills must be appointed before construction commences to interface and build trust between Soventix and the landowners.	Holder, Contractor, CLO	Pre-construction	Compliance to be verified by ECO and IEA
16	Planning	There is a level of uncertainty amongst the	Build and maintain trusting	Community Liaison Officer appointed	The community liaison officer must be bilingual with a solid knowledge of Afrikaans, as it is the language	Holder, Contractor, CLO	Pre-construction	Compliance to be verified by

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
		directly affected landowners with regards to timelines for the project.	relationships with affected stakeholders.		that most stakeholders are comfortable with (excluding the local government, where English would be sufficient).			ECO and IEA
16	Planning	Vulnerable group's susceptible to negative influences in society such as prostitution, relationships with minors, alcohol and drug abuse, gambling and fighting due to the presence of people from outside the area.	Build and maintain trusting relationships with affected stakeholders.	Grievance mechanism	Establish a grievance mechanism. The grievance mechanism must be communicated to the affected communities.	Holder, Contractor	Pre-construction	Compliance to be verified by ECO and IEA
16	Planning	Economic benefits may not be achieved by local residents/service providers.	Build and maintain trusting relationships with affected stakeholders.	Community Trust	It is recommended that Soventix establish a community trust.	Holder	On-going	Compliance to be verified by ECO and IEA
16	Planning	Economic benefits may not be achieved by local residents/service providers.	Build and maintain trusting relationships with affected stakeholders.	Community Trust	The final percentage contribution to the trust could only be calculated upon finalisation of the feed-in tariff as part of the Power Purchase Agreement, which is assumed not to be calculated at the time of writing of this report.	Holder	On-going	Compliance to be verified by ECO and IEA

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
16	Planning	Economic benefits may not be achieved by local residents/service providers.	Build and maintain trusting relationships with affected stakeholders.	Community Trust	The trust should be administered by a board comprising a range of representatives including representatives from the local community.	Holder	On-going	Compliance to be verified by ECO and IEA
16	Planning	Economic benefits may not be achieved by local residents/service providers.	Build and maintain trusting relationships with affected stakeholders.	Community Trust	The structure and operational objectives of the Community Trust should be determined at the time. It is envisaged that the development objectives/ projects identified and supported by the trust will be identified in collaboration with the local municipality, community representatives and NPOs in the area.	Holder	On-going	Compliance to be verified by ECO and IEA
16	Planning	Economic benefits may not be achieved by local residents/service providers.	Build and maintain trusting relationships with affected stakeholders.	Identification of projects aligned with IDP	Projects should be aligned with key needs as identified in the municipal Integrated Development Plan (IDP) and with input from local NPOs to ensure benefits are locally relevant.	Holder	On-going	Compliance to be verified by ECO and IEA
16	Planning	Economic benefits may not be achieved by local residents/service providers.	Build and maintain trusting relationships with affected stakeholders.	Consultation with other renewable facilities in the area	The renewable facilities in the area should combine their efforts and contributions to socio-economic and enterprise development to make a bigger positive impact instead of diluting the impact with small, unrelated projects.	Holder	On-going	Compliance to be verified by ECO and IEA
16	Planning	Economic benefits may not be achieved by local	Build and maintain trusting relationships	Corporate Social Responsibility projects	Soventix must consider the recommendations regarding Corporate Social Responsibility (CSR) projects (Appendix G)	Holder	On-going	Compliance to be verified by

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
		residents/service providers.	with affected stakeholders.					ECO and IEA
16	Planning	The proposed project will create positive economic impacts in the area. The most direct impact on a community level is job creation.	Community Upliftment	Locals employed	As far as possible local labour must be used for the project. Local labour must be prioritised. The definition of "local" must be clarified with the affected stakeholders.	Holder, Contractor	Pre-construction	Compliance to be verified by ECO and IEA
16	Planning	The proposed project will create positive economic impacts in the area. The most direct impact on a community level is job creation.	Community Upliftment	Recruitment Policy	Soventix must develop a recruitment policy and liaise with the Local Economic Development section of the municipality, local leaders, and NGOs during its development to ensure it is in line with the local practices and taps into existing knowledge.	Holder, Contractor	Construction	Compliance to be verified by ECO and IEA
16	Planning	The proposed project will create positive economic impacts in the area. The most direct impact on a community level is job creation.	Community Upliftment	Recruitment Policy	The recruitment policy must set reasonable targets for the employment of local people and women. Soventix and the municipality should identify these targets before recruitment commences.	Holder	Construction	Compliance to be verified by ECO and IEA
16	Planning	The proposed project will	Skills development	On the job training	If there is a need for transferable skills, Soventix must ensure that	Holder, Contractor	On-going	Compliance to be

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
		create positive economic impacts in the area. The most direct impact on a community level is job creation.			people get on the job training as far as possible.			verified by ECO and IEA
16	Planning	The proposed project will create positive economic impacts in the area. The most direct impact on a community level is job creation.	Skills development	Skills development project	A skills development project where skills required for renewable energy and the Fourth Industrial Revolution are taught locally must be considered.	Holder	On-going	Compliance to be verified by ECO and IEA
16	Planning	The proposed project will create positive economic impacts in the area. The most direct impact on a community level is job creation.	Community Upliftment	List of skills required	Soventix must provide the local municipality with a list of skills required before the construction period commences, and the municipality must distribute the list to all stakeholders to allow them to prepare for the opportunities.	Holder, Contractor	Pre-construction	Compliance to be verified by ECO and IEA
16	Planning	The proposed project will create positive economic impacts in the area. The most	Community Upliftment	No recruitment on site	All labour opportunities must be accessed through a labour desk in town, and no recruitment must be allowed on site.	Holder, Contractor	On-going	Compliance to be verified by ECO and IEA

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
		direct impact on a community level is job creation.						
16	Planning	Economic benefits may not be achieved by local residents/service providers.	Community Upliftment	Local Procurement Policy	Soventix must develop a local procurement policy.	Holder, Contractor	Pre-construction	Compliance to be verified by ECO and IEA
16	Planning	Economic benefits may not be achieved by local residents/service providers.	Community Upliftment	Local procurement prioritised.	The specialised equipment needed for the project will not be available locally, but as far as possible everything else must be procured locally. Local procurement must be prioritised.	Holder, Contractor	On-going	Compliance to be verified by ECO and IEA
16	Planning	Economic benefits may not be achieved by local residents/service providers.	Community Upliftment	List of local service providers	Workers from outside the area must be provided with a list of local service providers for their accommodation and other social needs.	Holder, Contractor	On-going	Compliance to be verified by ECO and IEA
16	Planning	Economic benefits may not be achieved by local residents/service providers.	Community Upliftment	List of local service providers	People that provided services to other solar farms in the area should be offered an opportunity to put their names on a list at the municipality to ensure that Soventix is aware of the available resources.	Holder, Contractor	On-going	Compliance to be verified by ECO and IEA
16	Contractor readiness	Vulnerable group's	Community protection	Signed code of conduct	Any person that does any work on site must sign the Code of	Holder, Contractor	On-going	Compliance to be

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		susceptible to negative influences in society such as prostitution, relationships with minors, alcohol and drug abuse, gambling and fighting due to the presence of people from outside the area.			Conduct and presented with a copy.			verified by ECO and IEA
16	Contractor readiness	Vulnerable group's susceptible to negative influences in society such as prostitution, relationships with minors, alcohol and drug abuse, gambling and fighting due to the presence of people from outside the area.	Community protection	Code of conduct	The Code of Conduct must include the following aspects: (a) Respect for local residents, their customs and property, (b) Respect for farm infrastructure and agricultural activities, (c) No hunting or un-authorised taking of products or livestock, (d) Zero tolerance of illegal activities by construction personnel including: prostitution; illegal sale or purchase of alcohol; sale, purchase or consumption of drugs; illegal gambling or fighting, (e) Compliance with the Traffic Management Plan and all road regulations, and	Holder, Contractor	Pre-construction	Compliance to be verified by ECO and IEA

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
					(f) Description of disciplinary measures for violation of the Code of Conduct and company rules.			
16	Contractor readiness	Vulnerable group's susceptible to negative influences in society such as prostitution, relationships with minors, alcohol and drug abuse, gambling and fighting due to the presence of people from outside the area.	Community protection	Disciplinary Hearings	If workers are found to be in contravention of the Code of Conduct, which they will be required to sign at the beginning of their contract, they will face disciplinary procedures that could result in dismissal. Stock theft should be noted as a dismissible offence.	Holder, Contractor, SEO, ECO	On-going	Compliance to be verified by ECO and IEA
16	Contractor readiness	Vulnerable group's susceptible to negative influences in society such as prostitution, relationships with minors, alcohol and drug abuse, gambling and fighting due to the presence of people from outside the area.	Community protection	Induction Programme	Develop an induction programme that includes a Code of Conduct for all workers (including sub-contractors). The induction programme must include HIV/AIDS awareness, substance abuse programmes and education about alcohol abuse and gender-based violence.	Holder, Contractor, SEO, ECO	Pre-construction	Compliance to be verified by ECO and IEA

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
17	Planning	Noise pollution due to traffic.	Minimise noise caused by traffic	No signs of speeding	Enforce speed control through speed limit road signage and fines.	Holder, Contractor, SEO	On-going	Compliance to be verified by ECO and IEA
17	Planning	Potential congestion and delays on the surrounding road network.	Minimise risk of congestion and delays to local farmers	Planned deliveries	Stagger delivery trips and schedule deliveries outside of the peak traffic periods.	Holder, Contractor	On-going	Compliance to be verified by ECO and IEA
17	Planning	Potential congestion and delays on the surrounding road network.	Minimise risk of congestion and delays to local farmers	Planned staff trips	Staff trips should also occur outside of the peak hours where possible.	Holder, Contractor	On-going	Compliance to be verified by ECO and IEA

Table 34. Management Protocol for Land Use

Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
18	Planning	The construction of a solar electricity generating facility and its associated infrastructure will lead to a change of land use and livelihoods	Build and maintain trusting relationships with affected stakeholders.	Compensation	The contractor must compensate the farmer for any losses of livestock due to irresponsible behaviour by the construction teams.	Contractor	On-going	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
18	Planning	The construction of a solar electricity generating facility and its associated infrastructure will lead to a change of land use and livelihoods	Build and maintain trusting relationships with affected stakeholders.	Compensation Protocol	A protocol on compensation must be agreed upon and be in place before construction commences.	Holder, Contractor	Pre-construction	Compliance to be verified by ECO and IEA.
18	Planning	The construction of a solar electricity generating facility and its associated infrastructure will lead to a change of land use and livelihoods	Build and maintain trusting relationships with affected stakeholders.	Claims Procedure	A claims procedure must be in place and shared with all the stakeholders before the construction commences.	Holder, Contractor	Pre-construction	Compliance to be verified by ECO and IEA.

Table 35. Management Protocol for Health and Safety

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19	Planning	Workers on site may be at risk to stray bullets or hunting accidents.	Build and maintain trusting relationships with affected stakeholders.	Monthly check-ins with direct neighbours	Soventix should check in with the direct neighbours once a month to ensure all grievances are dealt with and that the different parties remain informed about any planned activities.	Holder, Contractor, CLO	On-going	Compliance to be verified by ECO and IEA.
19	Planning	Potential impact on traffic safety and increase in accidents with other vehicles or animals.	Road and traffic safety	Road signage	The necessary road signage must be erected on the affected roads to warn road users about the construction activities and traffic	Contractor, SEO	On-going	Compliance to be verified by ECO and IEA.
19	Planning	Potential impact on traffic safety and increase in accidents with other vehicles or animals.	Road and traffic safety	No signs of speeding	Consider speed control by means of stop and go systems.	Contractor	On-going	Compliance to be verified by ECO and IEA.
19	Planning	Potential impact on traffic safety and increase in accidents with other vehicles or animals.	Road and traffic safety	No signs of speeding	Enforce speed control through speed limit road signage and fines.	Contractor, SEO	On-going	Compliance to be verified by ECO and IEA.
19	Contractor readiness	Snake encounters during the clearing of the site may pose a risk to the workers and	Avoid injury or fatality amongst staff.	An attendance register signed by all applicable staff.	Workers and contractors must be educated about safety aspects in areas where there are wild animals. This could be done through toolbox talks.	Contractor, SEO	Construction and Operation	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
		during the operation						
19	Contractor readiness	During the clearing of the site this may pose a risk to the workers and during the operation there may also be snake encounters.	Avoid injury or fatality amongst staff.	Trained staff to deal with snake relocation	At least one person on site needs to be trained to relocate venomous snakes.	Holder, Contractor	Construction and Operation	Compliance to be verified by ECO and IEA.
19	Contractor readiness	During the clearing of the site this may pose a risk to the workers and during the operation there may also be snake encounters.	Avoid injury or fatality amongst staff.	First Aid Certificates	The person responsible for first aid must be trained in dealing with snake bites.	Holder, Contractor	Construction and Operation	Compliance to be verified by ECO and IEA.
19	Site establishment (Layout)	Lack on environmental and OHS awareness	To ensure effective Health and Safety implementation	CV of appointed HSO	Appoint a suitably qualified HSO to implement OHSA (Act 85 of 1993)	Contractor	Construction	Compliance to be verified by HSO
19	Site establishment (Layout)	Lack on environmental and OHS awareness	To ensure effective Health and Safety implementation	Information posters	The Contractor must erect and maintain information posters at key locations on site, and the posters must include the following information as a minimum: a) Safety notifications,	Contractor	Construction	Compliance to be verified by HSO

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
					b) No littering.			

Table 36. Management Protocol for Security

Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
20	Planning	Increases in stock theft and other crimes	A secure solar PV facility	Roster given to landowners	A roster stating dates and approximate times that contractors will be on the farms must be given directly to affected landowners. All access arrangements should be made at least 24 hours before farm access is required.	Holder, Contractor, SEO, CLO	Construction	Compliance to be verified by ECO and IEA.
20	Planning	Increases in stock theft and other crimes	A secure solar PV facility	Security company schedule	If a security company is used, their schedules should be communicated to the landowners.	Holder, Contractor, SEO, CLO	On-going	Compliance to be verified by ECO and IEA.
20	Planning	Increases in stock theft and other crimes	A secure solar PV facility	Member of farm watch group	Soventix should become a member of existing farmers' security groups and farmers' associations.	Holder, Contractor	Pre-construction	Compliance to be verified by ECO and IEA.
20	Planning	Increases in stock theft and other crimes	A secure solar PV facility	Farm access protocol and security plan	Soventix should work with landowners, existing farmers' security groups and farmers' associations to create (a) a farm access protocol for everybody that need to access the properties, and (b) a security/safety plan.	Holder, Contractor, SEO, CLO	Pre-construction	Compliance to be verified by ECO and IEA.

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20	Planning	Increases in stock theft and other crimes	A secure solar PV facility	Signed farm access protocol	The protocol on farm access must be agreed upon and be in place before construction commences.	Holder, Contractor, SEO, CLO	Pre-construction	Compliance to be verified by ECO and IEA.
20	Planning	Increases in stock theft and other crimes	A secure solar PV facility	Existing security systems utilized	Soventix should use existing security systems, which include the use of cameras, to avoid any duplication.	Holder	On-going	Compliance to be verified by ECO and IEA.
20	Planning	Increases in stock theft and other crimes	A secure solar PV facility	Meeting register	Soventix must meet with the landowners before the construction phase commences to formalise security arrangements.	Holder, Contractor, SEO, CLO	Pre-construction	Compliance to be verified by ECO and IEA.
20	Site establishment (Layout)	Increased potential for criminal activity, including stock theft, game poaching, property theft, emotional and/or physical harm to victims, etc.	A secure solar PV facility	Perimeter fence	Security during construction will be mitigated by erecting the permitter fence at the onset of construction to prevent any movement out of the development footprint.	Holder, Contractor	Pre-construction	Compliance to be verified by ECO and IEA.
20	Site establishment (Layout)	Increased potential for criminal activity, including stock theft, game poaching, property theft, emotional and/or physical harm to victims, etc.	A secure solar PV facility	No staff residing on site	No accommodation shall be provided for contractors, sub-contractors and their workers on the construction site.	Contractor	Pre-construction	Compliance to be verified by ECO and IEA.

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20	Contractor readiness	Increases in stock theft and other crimes.	A secure solar PV facility	Signed code of conduct	Any person that does any work on site must sign the Code of Conduct and presented with a copy.	Contractor, SEO	On-going	Compliance to be verified by ECO and IEA.
20	Contractor readiness	Increases in stock theft and other crimes.	A secure solar PV facility	Code of conduct	The Code of Conduct must include the following aspects: (a) Respect for local residents, their customs and property, (b) Respect for farm infrastructure and agricultural activities, (c) No hunting or un-authorised taking of products or livestock, (d) Zero tolerance of illegal activities by construction personnel including: prostitution; illegal sale or purchase of alcohol; sale, purchase or consumption of drugs; illegal gambling or fighting, (e) Compliance with the Traffic Management Plan and all road regulations, and (f) Description of disciplinary measures for violation of the Code of Conduct and company rules.	Contractor, SEO	Pre-construction	Compliance to be verified by ECO and IEA.
20	Contractor readiness	Increases in stock theft and other crimes.	A secure solar PV facility	Disciplinary hearings	If workers are found to be in contravention of the Code of Conduct, which they will be required to sign at the beginning of their contract, they will face disciplinary procedures that could result in dismissal. Stock theft should be noted as a dismissible offence.	Contractor, SEO, ECO	On-going	Compliance to be verified by ECO and IEA.

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20	Planning	Stakeholders are concerned about the quality of the roads, increases in traffic and traffic safety.	A secure solar PV facility	Marked vehicles	Vehicles must be clearly marked.	Contractor	On-going	Compliance to be verified by ECO and IEA.

Table 37. Management Protocol for Public Services

Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
21	Planning and Contractor readiness	Stakeholders are concerned about the quality of the roads, increases in traffic and traffic safety.	Good quality road network	Roads are maintained in good condition	Soventix must contribute to the maintenance of the roads for the life of the project.	Holder, Contractor	On-going	Compliance to be verified by ECO and IEA.
21	Planning and Contractor readiness	Stakeholders are concerned about the quality of the roads, increases in traffic and traffic safety.	Good quality road network	Road maintenance agreement	An agreement must be formalised between Soventix and the parties currently responsible for road maintenance.	Holder	Pre-construction	Compliance to be verified by ECO and IEA.
21	Planning and Contractor readiness	Stakeholders are concerned about the quality of the roads, increases in	Good quality road network	Traffic Management Plan	Soventix must have a Traffic Management Plan to address the flow of traffic, including such aspects as speeding, driving while tired, transport of passengers,	Holder	On-going	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
		traffic and traffic safety.			driving on un-tarred roads and general road safety.			
21	Planning and Contractor readiness	Stakeholders are concerned about the quality of the roads, increases in traffic and traffic safety.	Good quality road network	Road maintenance protocol	A protocol on road maintenance must be agreed upon and be in place before construction commences.	Holder, Contractor	Pre-construction	Compliance to be verified by ECO and IEA.
21	Planning and Contractor readiness	Stakeholders are concerned about the quality of the roads, increases in traffic and traffic safety.	Good quality road network	Course outline of Environmental Awareness training	Aspects of the Traffic Management Plan must be included in the induction of workers.	Holder, Contractor, SEO, ECO	On-going	Compliance to be verified by ECO and IEA.
21	Contractor readiness	Transport of abnormal roads could be delayed.	Safe (unobstructed) delivery of abnormal loads to site.	Abnormal load permits	The applicable permits to transport abnormal loads should be obtained.	Holder, Contractor	Pre-construction	Compliance to be verified by ECO and IEA.
22	Monitoring	It is anticipated that soils downstream of the proposed development, and the non-perennial streams (feeding into temporary livestock	To reduce sedimentation	Preserve aquatic ecosystem structure and function.	Implement the Surface and Groundwater Monitoring Protocol during construction and operation (Appendix D).	Holder, Contractor	Construction and Operational	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
		watering dams) are the receivers of any sediment runoff or poor-quality runoff from the site. Sedimentation (or turbidity) caused by working in the watercourse can increase the cost of treating drinking water.						

Table 38. Management Protocol for Visual Aesthetics

Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
23	Planning	Decrease in the "sense of place" as it relates to noise, visual and light pollution.	A less dominant landscape change to local or neighbouring receptors.	Notification to neighbours	Residents near the development site should be notified 24 hours prior to any planned activities that will be visible.	Contractor, SEO, CLO	Construction	Compliance to be verified by ECO and IEA.
23	Site establishment (Layout)	Excessive signage on the District gravel road can be visually	A less dominant landscape change to local	Moderate signage	Signage on the main access and local farm roads should be moderated.	Holder, Contractor	On-going	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
		obtrusive to local receptors (farmers).	or neighbouring receptors.					
23	Site establishment (Layout)	Fencing can obstruct views	A less dominant landscape change to local or neighbouring receptors.	No signs of litter against construction camp/laydown area fencing	Fencing around the construction camp and/or laydown areas should be simple, diamond shaped (to catch wind-blown litter) and appear transparent from a distance. The fences should be checked monthly for the collection of litter caught on the fence.	Contractor, SEO	Pre-construction and Construction	Compliance to be verified by ECO and IEA.
23	Site establishment (Layout)	Short-term landscape change from the current rural agricultural sense of place to the semi-industrial RE landscape - Loss of site landscape character due to the removal of vegetation and the construction of the PV structures and associated infrastructure.	A less dominant landscape change to local or neighbouring receptors.	Buildings are natural colours	The buildings should be painted a mid-grey or grey-brown colour.	Holder, Contractor	Construction and post-construction	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
23	Site establishment (Layout)	Short-term landscape change from the current rural agricultural sense of place to the semi-industrial RE landscape - Loss of site landscape character due to the removal of vegetation and the construction of the PV structures and associated infrastructure.	A less dominant landscape change to local or neighbouring receptors.	Laydown areas and buildings are away from neighbours.	The laydown and building structures should be located away from neighbouring property farmsteads and banked into the ground to the eastern areas as much as possible.	Engineer, Contractor	Pre-construction	Compliance to be verified by ECO and IEA.
24	Site establishment (Layout)	Short-term landscape change from the current rural agricultural sense of place to the semi-industrial RE landscape - Loss of site landscape character due	Retain the existing rural dark sky night landscape.	Effective light management: No murky sky glow.	No overhead security lighting. Rather locate the light source closer to the operation, use directed technology, and aim fixtures either down or to maximise their impact on the targeted area whilst minimizing their impact elsewhere.	Holder, Engineer, Contractor	On-going	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
		to the operation of the PV structures and associated infrastructure - Lights at night have the potential to significantly increase the visual exposure of the proposed project.						
24	Site establishment (Layout)	Short-term landscape change from the current rural agricultural sense of place to the semi-industrial RE landscape - Loss of site landscape character due to the operation of the PV structures and associated infrastructure -	Retain the existing rural dark sky night landscape.	Light reduction methods are used.	Implement measures to reduce light spillage (e.g., choose “full-cut-off shielded” fixtures that keep light from going up or sideways, locate the light source closer to the operation, use directed LED technology, and aim fixtures either down or to maximise their impact on the targeted area whilst minimizing their impact elsewhere).	Holder, Engineer, Contractor	On-going	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
		Lights at night have the potential to significantly increase the visual exposure of the proposed project.						
24	Site establishment (Layout)	Decrease in the "sense of place" as it relates to noise, visual and light pollution.	Retain the existing rural dark sky night landscape.	Minimal night lighting	Night lighting of the construction sites should be minimised within requirements of safety and efficiency.	Holder, Engineer, Contractor	On-going	Compliance to be verified by ECO and IEA.

Table 39. Management Protocol for Heritage and Culture

Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
26	Contractor readiness	Disturbance to or destruction of Stone Age open-air surface scatters (Sites: 1; 3-15; 17-18; 27-28) by construction activities, e.g., clearing and	Preservation of heritage resources and expansion of knowledge of the archaeology of the area.	Appointed qualified heritage specialist and mapping	Prior to commencing development, appoint a heritage specialist/archaeologist registered with ASAPA to undertake detailed mapping and determine the extents of the Stone Age open-air surface scatters (sites: 1; 3-15; 17-18; 27-28) if the sites can't be avoided by development activities. (see **Appendix A**).	Holder, Engineer	Pre-construction	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
		grubbing activities						
26	Contractor readiness	Disturbance to or destruction of Stone Cairns indicating an old Wagon Road (Sites: 19-25) by construction activities, e.g., clearing and grubbing activities.	Preservation of heritage resources and expansion of knowledge of the archaeology of the area.	Mapping data of heritage sites provided to SAHRA	All mapping data of sites must be provided to SAHRA prior to construction.	Holder, Engineer	Pre-construction	Compliance to be verified by ECO and IEA.
26	Contractor readiness	Disturbance to or destruction of Stone Cairns indicating an old Wagon Road (Sites: 19-25) by construction activities, e.g., clearing and grubbing activities.	Preservation of heritage resources and expansion of knowledge of the archaeology of the area.	30m buffer around section of the wagon road	A buffer of 30 m must be adhered to around the wagon road (points 19 -25).	Contractor	Pre-construction	Compliance to be verified by ECO and IEA.
26	Contractor readiness	Disturbance to or destruction of Stone Age open-air surface scatters (Sites:	Preservation of heritage resources and expansion of knowledge of	Landowners' permission letter	Landowner's permission to undertake the required mitigation work must be provided.	Holder, Heritage Specialist	Pre-construction	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
		1; 3-15; 17-18) by construction activities, e.g., clearing and grubbing activities	the archaeology of the area.					
26	Contractor readiness	Disturbance to or destruction of Stone Age open-air surface scatters (Sites: 1; 3-15; 17-18) by construction activities, e.g., clearing and grubbing activities	Preservation of heritage resources and expansion of knowledge of the archaeology of the area.	Sample collection	Obtain a representative sample of Stone Age material and types to determine the age of the material and sites through the surface collection of material. (see **Appendix A**).	Heritage specialist	Pre-construction	Compliance to be verified by ECO and IEA.
26	Contractor readiness	Disturbance to or destruction of Stone Age open-air surface scatters (Sites: 1; 3-15; 17-18) by construction activities, e.g., clearing and grubbing activities	Preservation of heritage resources and expansion of knowledge of the archaeology of the area.	Archaeological permit	For the surface sampling an Archaeological Mitigation Permit must be applied for and issued by SAHRA. A permit will only be issued by SAHRA once Environmental Authorization for the development have been given, Final Comments from SAHRA on the Phase 3 HIA has been provided and an accredited Archaeologist has been appointed to undertake the work.	Holder, Heritage Specialist	Pre-construction	Compliance to be verified by ECO and IEA.
26	Contractor readiness	Disturbance to or destruction of Stone Cairns	Preservation of heritage resources and expansion of	Appointed qualified heritage	Prior to commencing development, appoint a heritage specialist/archaeologist registered with ASAPA to undertake (a)	Holder, Heritage Specialist	Pre-construction	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
		indicating an old Wagon Road (Sites: 19-25) by construction activities, e.g., clearing and grubbing activities.	knowledge of the archaeology of the area.	specialist and mapping	desktop research on the age, origin and function, as well as (b) detailed mapping and photographic recording of the section of old Wagon Road in the development footprint and demarcated by stone cairns at sites 19 to 25 and 29.			
26	Contractor readiness	Disturbance to or destruction of Stone Cairns indicating an old Wagon Road (Sites: 19-25) by construction activities, e.g., clearing and grubbing activities	Preservation of heritage resources and expansion of knowledge of the archaeology of the area.	Landowners' permission letter	Landowner's permission to undertake the required mitigation work must be provided.	Holder	Pre-construction	Compliance to be verified by ECO and IEA.
26	Contractor readiness	Disturbance to or destruction of Stone Cairns indicating an old Wagon Road (Sites: 19-25) by construction activities, e.g., clearing and	Preservation of heritage resources and expansion of knowledge of the archaeology of the area.	Heritage sites have been preserved	Preserve the section of road demarcated by the Heritage Specialist in a kmz file and including stone cairns at sites 19 to 23 (see **Appendix A**).	Engineer, Contractor, SEO	Pre-construction	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
		grubbing activities						
26	Contractor readiness	Disturbance to or destruction of Stone Cairns indicating an old Wagon Road (Sites: 19-25) by construction activities, e.g., clearing and grubbing activities	Preservation of heritage resources and expansion of knowledge of the archaeology of the area.	Old wagon road is fenced off.	The preserved section of old Wagon Road should be cordoned-off during construction (see **Appendix A**).	Contractor, SEO	Pre-construction	Compliance to be verified by ECO and IEA.
26	Contractor readiness	Disturbance to or destruction of Stone Cairns indicating an old Wagon Road (Sites: 19-25) by construction activities, e.g., clearing and grubbing activities	Preservation of heritage resources and expansion of knowledge of the archaeology of the area.	Information signage	Erect information signage on the history of the old Wagon Road	Holder, Heritage Specialist	Pre-construction	Compliance to be verified by ECO and IEA.
26	Contractor readiness	Disturbance to or destruction of Stone Cairns indicating an old Wagon	Preservation of heritage resources and expansion of knowledge of	Stone cairns protected.	As far as possible avoid destruction or demolition of other stone cairns, including but not limited to sites 24, 25 and 29. These cairns may only be	Engineer, Contractor, SEO	Pre-construction and Construction	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
		Road (Sites: 19-25) by construction activities, e.g., clearing and grubbing activities	the archaeology of the area.		destroyed if they can't be avoided (see **Appendix A**).			

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CONSTRUCTION PHASE

Table 40. Management Protocol for Legal System

Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
01	Quarry (Sourcing materials (aggregate) for roads and concrete)	Unlawful mining activities	Compliance with Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002)	Quarry material used on Portion 3 of the Farm Goede Hoop 26C.	The borrow pit/quarry may only be used to source suitable material for improvements to the property that it is located on.	Contractor	Construction	Compliance to be verified by ECO and IEA
01	General and Hazardous Waste	Risk of non-compliance	Compliance with waste handling and storage	Integrated waste management plan.	Waste shall be managed in accordance with the integrated waste management plan.	Holder, Contractor	Construction	Compliance to be verified by ECO and IEA
01	General and Hazardous Waste	Risk of non-compliance	Compliance with waste handling and storage	Registration with SAWIS, if required.	The contractor(s) must determine whether he/she needs to register a waste management activity on the South African Waste Information System (SAWIS) using the South African Waste Information Centre's website, e.g., generators of hazardous waste in excess of 20kg per day must register.	Contractor	Construction	Compliance to be verified by ECO and IEA
01	General and Hazardous Waste	Risk of non-compliance	Compliance with waste handling and storage	Records of waste management.	The waste generator must keep accurate and up to date records of the management of the waste they generate including records that reflect:	Contractor	Construction	Compliance to be verified by ECO and IEA

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
					(a) The classification of the wastes (General waste, including domestic, business, building and demolition waste not containing hazardous waste/chemicals is listed in Annexure 1 of the Waste Classification and Management Regulations, 2013 and therefore do not require formal classification and assessment in terms of the same Regulations); (b) The quantity of each waste generated, expressed in tons or cubic metres per month; (c) The quantities of each waste that has either been reused, recycled, recovered, treated, or disposed of; and (d) By whom the waste was managed.			
01	General and Hazardous Waste	Risk of non-compliance	Compliance with waste handling and storage	Waste is separated	Separate waste into recyclable (glass, metals, paper, plastic) and non-recyclable waste.	Contractor	On-going	Compliance to be verified by ECO and IEA
01	General and Hazardous Waste	Risk of non-compliance	Compliance with waste handling and storage	Waste disposed/recycled within 18 months of generation	Waste generators must ensure that their waste is reused, recycled, recovered, treated and/or disposed of within 18 months of generation.	Contractor	On-going	Compliance to be verified by ECO and IEA

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
01	General and Hazardous Waste	Risk of non-compliance	Compliance with waste handling and storage	Labelled waste storage	Any container or storage impoundment holding waste must be labelled. If labelling is not possible, then records must be kept.	Contractor	On-going	Compliance to be verified by ECO and IEA
01	General and Hazardous Waste	Risk of non-compliance	Compliance with waste handling and storage	Records of waste storage	Labels and records need to reflect: (a) The date on which the waste was first placed into the container; (b) The date on which the last bit of waste was placed into the container before it was filled, closed, sealed or covered; (c) The dates when, and quantities of, waste added, and waste removed from containers or storage impoundments (if relevant); (d) The specific category or categories of waste in the container or storage impoundment as identified in terms of the National Waste Information Regulations (2012); and (e) The classification of the waste once it has been completed.	Contractor	On-going	Compliance to be verified by ECO and IEA

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
01	General and Hazardous Waste	Risk of non-compliance	Compliance with waste handling and storage	Licensed service provider used	Given the overwhelming legal requirements governing the transport of Hazardous Chemical Substances (HCS) or dangerous goods, and therefore hazardous waste, it is recommended that the services of a licensed service provider be employed to undertake this activity. None the less, the consignor or person who dispatches the hazardous waste remains responsible to ensure that hazardous waste is packaged, transported, treated and disposed of in terms of the legal requirements and that there is an auditable record of the steps involved in storing, collecting and transporting the waste.	Contractor	On-going	Compliance to be verified by ECO and IEA
01	General and Hazardous Waste	Risk of non-compliance	Compliance with waste handling and storage	Safety Data Sheets	A Safety Data Sheet (SDS) and Waste Manifest must accompany a load of hazardous waste transported from the point of generation to the waste management facility.	Contractor	On-going	Compliance to be verified by ECO and IEA
01	General and Hazardous Waste	Risk of non-compliance	Compliance with waste handling and storage	Waste classification	Waste transporters may not accept waste that has not been classified in terms of SANS10234, unless it is listed in Annexure 1 of the Waste Classification and Management Regulations, 2013.	Contractor	On-going	Compliance to be verified by ECO and IEA

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
01	Erecting 132kV powerline	Risk of non-compliance	Compliance with OHS	Safe working distance from Eskom's live electrical equipment	The clearances between Eskom's live electrical equipment and the proposed construction work shall be observed as stipulated by Regulation 15 of the Electrical Machinery Regulations of the Occupational Health and Safety Act, 1993 (Act No. 85 of 1993)	Contractor	On-going	Compliance to be verified by ECO and IEA

Table 41. Management Protocol for Terrestrial Fauna

Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
02	Drilling and/or Ram Piling (for rack foundations and fence poles)	Large antelope can get trapped inside the fenced area and smaller animals such as tortoises could get trapped along the fence line.	Ensure the protection of fauna aves and livestock	No trapped animals in PV blocks	Ensure large animals are not trapped inside the fenced PV blocks.	Holder, Contractor	On-going	Compliance to be verified by ECO and IEA.
02	Drilling and/or Ram Piling (for rack foundations and fence poles)	Large antelope can get trapped inside the fenced area and smaller animals such as tortoises could	Ensure the protection of fauna aves and livestock	No trapped animals in PV blocks	Inspections of boundary fences should be done daily.	Holder, Contractor, SEO	On-going	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
		get trapped along the fence line.						
02	Construction plant management (including deliveries)	Loss of sedentary or active fauna and aves when driving.	Ensure the protection of fauna aves and livestock	No signs of speeding	Drivers must adhere to the speed limit (30km/hr) and slow down when approaching animals. This is to be included in the induction.	Contractor, SEO, ECO	On-going	Compliance to be verified by ECO and IEA.
02	Construction plant management (including deliveries)	Loss of sedentary or active fauna and aves when driving.	Ensure the protection of fauna aves and livestock	No vehicle collisions with fauna.	Drivers must be vigilant and on the lookout for animals.	Contractor	On-going	Compliance to be verified by ECO and IEA.
02	Employee management (including appointment, conduct and movement)	Poaching	Ensure the protection of fauna aves and livestock	No poaching incidents	Soventix must have a zero-tolerance policy regarding poaching, and make it clear what the punishment and consequences would be.	Holder, Contractor, SEO, ECO	On-going	Compliance to be verified by ECO and IEA.
02	Employee management (including appointment, conduct and movement)	Poaching	Ensure the protection of fauna aves and livestock	Case number	All poaching incidences must be reported to the local police.	Holder, Contractor, SEO, ECO	On-going	Compliance to be verified by ECO and IEA.
02	Construction plant management (including deliveries)	Roadkill, electrocutions of fauna during construction and post-construction.	Ensure the protection of fauna aves and livestock	Logbook of fauna related incidents	A log should be kept detailing all fauna-related incidences or mortalities that occur on site, including roadkill, electrocutions etc. during construction and operation. These should be reviewed annually and used to inform operational management and mitigation measures.	Holder, Contractor, SEO	On-going	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
02	Clearing, grubbing and grading	Direct loss of local sedentary or burrowing fauna and Aves through construction activities on land.	Ensure the protection of fauna aves and livestock	No unnecessary physical harm to fauna	Search and rescue for reptiles and other vulnerable species during construction, before areas of intact vegetation are cleared. Such search and rescue should be conducted by relevant experts with experience in search and rescue of the faunal groups concerned.	Contractor, Specialist	Before clearing, grubbing or grading	Compliance to be verified by ECO and IEA.
02	Clearing, grubbing and grading	Direct loss of local sedentary or burrowing fauna and Aves through construction activities on land.	Ensure least impact on animal behaviour.	No unnecessary physical harm to fauna	If any sedentary animals or ground nesting birds are found, then these are to be relocated to a suitable distance and habitat by the ECO, and only if it is not possible to relocate the footprint.	Engineer, Contractor, SEO Specialist, ECO	On-going	Compliance to be verified by ECO and IEA.
02	Clearing, grubbing and grading	Removal of vegetation and disruption to the watercourse could alter bat behaviour	Ensure the protection of fauna aves and livestock	Natural vegetation preserved where possible	Conserve the natural vegetation around the physical footprints.	Contractor, SEO	Construction	Compliance to be verified by ECO and IEA.
02	Clearing, grubbing and grading	Removal of vegetation and disruption to the watercourse could alter bat behaviour	Ensure the protection of fauna aves and livestock	Bat monitoring results	Perform continuous bat monitoring using passive bioacoustic recording systems in line with the South African Good Practice Guidelines for Surveying Bats at WEF's (Sowler and Stoffberg, 2014) and SAGPG for Operational Monitoring (Aronson et al. 2014) for one year pre-construction, during construction and two years post-construction (operation).	Holder, Contractor, Bat specialist	Construction	Compliance to be verified by ECO and IEA.

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					During the first two years of operation, it is expected that any changes in bat activity and perceived impacts will be most evident.			
02	Clearing, grubbing and grading	Removal of vegetation and disruption to the watercourse could alter bat behaviour	Ensure the protection of fauna aves and livestock	Bat monitoring systems in working order.	A specialist should maintain these systems and determine the impacts of solar PV facility on bat populations in relation to landscape changes in both the physical changes with the installation of the solar PV panels, the resulting change in vegetation structure underneath the solar PV panels and the management strategy of the operational facility.	Holder, Bat specialist	Construction	Compliance to be verified by ECO and IEA.
02	Earthworks	Direct loss of fauna through earthworks during construction activities.	Ensure the protection of fauna aves and livestock	No trapped animals	Check excavations daily for trapped animals and release them.	Contractor, SEO	Construction	Compliance to be verified by ECO and IEA.
02	Earthworks	Direct loss of fauna through earthworks during construction activities.	Ensure the protection of fauna aves and livestock	Excavations are demarcated	Demarcate excavations with netting to prevent any persons or animals falling in the excavations.	Contractor, SEO	Construction	Compliance to be verified by ECO and IEA.
02	Earthworks	Direct loss of fauna through earthworks during construction activities.	Ensure the protection of fauna aves and livestock	No excavations left open	Fill open excavations as soon as possible after excavation.	Contractor, SEO	Construction	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
03	Construction plant management including deliveries	The construction of a solar electricity generating facility and its associated infrastructure will lead to a change of land use and livelihoods.	Ensure the protection of fauna aves and livestock	No vehicle collisions with livestock	Livestock must have right of way.	Contractor	On-going	Compliance to be verified by ECO and IEA.
03	Construction plant management including deliveries	The construction of a solar electricity generating facility and its associated infrastructure will lead to a change of land use and livelihoods.	Ensure the protection of fauna aves and livestock	No vehicle collisions with livestock	Construction vehicles must wait for the animals to cross before they continue with their journey.	Contractor	On-going	Compliance to be verified by ECO and IEA.
03	Security	Farm gates being left open, or not being closed properly by construction teams.	Ensure the protection of fauna aves and livestock	Boundary gates in good condition	Inspections of boundary gates should be done daily in areas where there are activities.	Contractor, SEO	On-going	Compliance to be verified by ECO and IEA.
03	Security	Farm gates being left open, or not being closed properly	Ensure the protection of fauna aves and livestock	Compensation	Affected landowners must be compensated for their losses if any livestock losses occur.	Holder, Contractor	On-going	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
		by construction teams.						
04	Employee management (including appointment, conduct and movement)	Animals could gain access to waste receptacles	Good waste storage and management	Lockable waste storage	All laydown areas, construction sites etc. with waste disposal bins, should be provided with lockable bins that are tamper proof by baboons, monkeys and other fauna.	Contractor	On-going	Compliance to be verified by ECO and IEA.
04	General and hazardous waste management	Loss of fauna if inorganic waste is ingested.	Good waste storage and management	No litter	General waste, such as food packaging and cement bags shall be immediately disposed of in the designated receptacles, e.g., scavenger proof bins, and removed from the construction site overnight.	Contractor	On-going	Compliance to be verified by ECO and IEA.
04	General and hazardous waste management	Burning of waste as a disposal method increases the risk of veld fires caused by workers during the construction of the facility decreasing grazing capacity and potentially harming wildlife	Good waste storage and management	No signs of burning waste	Burning of waste is prohibited.	Holder, Contractor	On-going	Compliance to be verified by ECO and IEA.
04	General and hazardous waste management	Cement bags disposed of around the site where fauna	Good waste storage and management	Waste storage area	Designate and contain a temporary waste storage area within the construction camp (e.g.,	Contractor	Construction	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
		could come into contact with the waste.			covered skips, scavenger proof bins, etc.)			
05	Construction plant management including deliveries	Disturbance during construction at both sites can cause active mammals to temporarily emigrate from the area.	Ensure least impact on animal behaviour.	Equipment in good condition	Construction plant, machinery and equipment must be regularly serviced and well maintained to reduce noise levels.	Contractor	On-going	Compliance to be verified by ECO and IEA.
05	Construction plant management including deliveries	Disturbance (including of nesting SCC) due to noise such as, machinery movements and maintenance operations during the construction phase the proposed PV solar farm.	Ensure least impact on animal behaviour.	Construction outside of breeding season	Timing construction to May, June, July and August in order to avoid breeding periods of species within the sensitive drainage lines, wetlands and the general region.	Holder, Contractor	Construction	Compliance to be verified by ECO and IEA.
05	Employee management (including appointment, conduct and movement)	Disturbance during construction can cause active mammals and birds to	Ensure least impact on animal behaviour.	No unnecessarily loud noise.	Keep noise levels as low as practically possible when working, e.g., no unnecessary shouting, loud music or revving of engines.	Contractor	On-going	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
		temporarily evade or emigrate from the area.						
05	QUARRY (Sourcing materials (aggregate) for roads and concrete)	Disturbance during operation of crushing plant can cause active mammals to temporarily emigrate from the area.	Ensure least impact on animal behaviour.	No unnecessarily loud noise.	Turn off all equipment when not in use.	Contractor	Construction	Compliance to be verified by ECO and IEA.
05	QUARRY (Sourcing materials (aggregate) for roads and concrete)	Disturbance during operation of crushing plant can cause active mammals to temporarily emigrate from the area.	Ensure least impact on animal behaviour.	Equipment in good condition	Ensure that all equipment is kept in good working order.	Contractor	Construction	Compliance to be verified by ECO and IEA.
05	QUARRY (Sourcing materials (aggregate) for roads and concrete)	Disturbance during operation of crushing plant can cause active mammals to temporarily emigrate from the area.	Ensure least impact on animal behaviour.	Equipment is operated correctly.	Operate all equipment within specifications and capacity.	Contractor	Construction	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
05	QUARRY (Sourcing materials (aggregate) for roads and concrete)	Disturbance during operation of crushing plant can cause active mammals to temporarily emigrate from the area.	Ensure least impact on animal behaviour.	Compliance with bylaws.	Adhere to any local bylaws and regulations regarding the generation of noise.	Holder, Contractor	On-going	Compliance to be verified by ECO and IEA.

Table 42. Management Protocol for Terrestrial Flora

Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
06	Fire management	Risk of veld fires caused by workers during the construction of the facility.	Fire management	Membership of the local Fire Protection Association	Join the local Fire Protection Association if there is one and abide by their minimum requirements, as well as any agreements entered into with the Minister or other FPAs to provide mutual assistance in fighting and extinguishing fires.	Holder, Contractor	On-going	Compliance to be verified by ECO and IEA.
06	Fire management	Risk of veld fires caused by workers during the construction of the facility.	Fire management	PPE	Obtain the necessary PPE for firefighting personnel.	Holder, Contractor	On-going	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
06	Fire management	Risk of veld fires caused by workers during the construction of the facility.	Fire management	Firefighting equipment	Obtain such firefighting equipment as would be reasonably required in the circumstances, that is proportional to the risk.	Holder, Contractor	On-going	Compliance to be verified by ECO and IEA.
06	Fire management	Risk of veld fires caused by workers during the construction of the facility.	Fire management	Maintained firefighting equipment	Firefighting equipment shall be maintained and readily available during construction (and operation) - regularly test and service equipment	Holder, Contractor	On-going	Compliance to be verified by ECO and IEA.
06	Fire management	Risk of veld fires caused by workers during the construction of the facility.	Fire management	Perimeter firebreak	Maintain a 10m firebreak around the perimeter of each solar PV Block. Be aware of burning firebreaks under powerlines as dense vertical columns of smoke can conduct electrical charge to the ground posing a danger to personnel and wildlife or livestock.	Holder, Contractor	On-going	Compliance to be verified by ECO and IEA.
07	QUARRY (Sourcing materials (aggregate) for roads and concrete)	Increase in sedimentation/dust covering flora species.	Minimize dust generation	No offloading during windy conditions	Offloading of dispersive materials should be avoided during windy conditions.	Contractor	Ongoing	Compliance to be verified by ECO and IEA
07	Road management	Direct loss of terrestrial plants from construction activities on land.	Avoid the unnecessary loss of or harm to terrestrial plants, particularly	No disturbance to protected or threatened plants, unless necessary.	Perform a search for any threatened or protected flora in those areas that will be disturbed.	Specialist, SEO, ECO	Prior to commencement of clearing and grubbing.	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
			protected or threatened plants.					
07	Road management	Direct loss of terrestrial plants from construction activities on land.	Avoid the unnecessary loss of or harm to terrestrial plants, particularly protected or threatened plants.	Permit, if required	Only apply for permit(s) and/or a license to "pick" a threatened or protected plant if it is not possible to relocate a road.	Holder, Contractor, SEO, ECO	Prior to commencement of clearing and grubbing.	Compliance to be verified by ECO and IEA.
07	Clearing and grubbing	Direct loss of terrestrial plants from construction activities on land.	Avoid the unnecessary loss of or harm to terrestrial plants, particularly protected or threatened plants.	Demarcated areas	Suitable demarcation must be erected around the construction area, including the servitude, areas where material is stored and the actual footprint of the development to prevent access to sensitive areas.	Contractor, SEO	Prior to commencement of clearing and grubbing.	Compliance to be verified by ECO and IEA.
07	Clearing and grubbing	Direct loss of terrestrial plants from construction activities on land.	Avoid the unnecessary loss of or harm to terrestrial plants, particularly protected or threatened plants.	Demarcations are maintained	Site demarcations should be maintained until the cessation of all construction activities.	Contractor	Construction	Compliance to be verified by ECO and IEA.
07	Clearing and grubbing	Direct loss of terrestrial plants from construction activities on land.	Avoid the unnecessary loss of or harm to terrestrial	No signs of vehicles in demarcated areas	Vehicular or pedestrian access is prohibited in natural areas beyond the	Contractor, SEO	Construction	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
			plants, particularly protected or threatened plants.		demarcated boundary of the construction site.			
07	Clearing and grubbing	Direct loss of terrestrial plants from construction activities on land.	Avoid the unnecessary loss of or harm to terrestrial plants, particularly protected or threatened plants.	Cleared vegetation stockpiles	Cleared vegetation from the construction camp, laydown area and other footprints shall be stockpiled separately within the construction camp for use during rehabilitation.	Contractor, SEO	Construction	Compliance to be verified by ECO and IEA.
07	Clearing and grubbing	Direct loss of terrestrial plants from construction activities on land.	Avoid the unnecessary loss of or harm to terrestrial plants, particularly protected or threatened plants.	Rehabilitation	Conduct active rehabilitation during the construction activities according to a rehabilitation plan and/or implement the Bare Patch Restoration Protocol (Appendix C) that will restore the natural vegetation to what it was prior to construction so that the long-term impact could be negligible.	Contractor, SEO	Construction	Compliance to be verified by ECO and IEA.
07	Clearing and grubbing	Direct loss of terrestrial plants from construction activities on land.	Avoid the unnecessary loss of or harm to terrestrial plants, particularly protected or	Rehabbed areas are cordoned off	Cordon off areas under rehabilitation as “no-go areas” to prevent vehicular, pedestrian and livestock access.	Contractor, SEO	Construction	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
			threatened plants.					
07	Employee management	Direct loss of terrestrial plants from construction activities on land	Avoid the unnecessary loss of or harm to terrestrial plants, particularly protected or threatened plants	No illegal harvesting of plants or plant parts, e.g., debarked trees or dug-up tubers, used for muthi.	Harvesting of any plant or plant part is prohibited.	Contractor	Ongoing	Compliance to be verified by ECO and IEA.
07	Construction plant management including deliveries	Increase in sedimentation/dust covering flora species.	Avoid the unnecessary loss of or harm to terrestrial plants, particularly protected or threatened plants	No uncovered vehicles transporting soil	Vehicles transporting dispersive materials shall be covered.	Contractor, ECO	Construction	Compliance to be verified by ECO and IEA.
08	Alien plant management	Alien invasive plants: Prevent the cleared areas from degrading, as invasive non-native plants will spread into degraded areas.	Reduce invasive alien plant recruitment	No adult or reproductively mature alien invasive plants observed on site.	Clearing of invasive alien plants must take place coupled with the sowing of seeds of indigenous species to stabilise disturbed habitats.	Holder, Contractor.	On-going	Compliance to be verified by ECO and IEA.
08	Alien plant management	Alien invasive plants: Prevent the cleared areas from degrading, as invasive non-native plants will	Reduce invasive alien plant recruitment	Re-vegetation	Re-vegetation with appropriate indigenous species (to prevent dust and erosion, as well as establishment of alien species).	Holder, Contractor.	On-going	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
		spread into degraded areas.						
08	Alien plant management	Alien invasive plants: Prevent the cleared areas from degrading, as invasive non-native plants will spread into degraded areas.	Reduce invasive alien plant recruitment	No open bare areas.	Compacted bare ground should be loosened and pitted and covered with branches or stones. This will improve the ability of the surfaces to trap seeds and to absorb rainwater, thereby hastening vegetation recovery.	Holder, Contractor.	On-going	Compliance to be verified by ECO and IEA.
09	Linear infrastructure crossings	Altered surface water flow patterns, e.g., changing sheet flow (natural open system) to concentrated flows leads to erosion.	Preserve topsoil, control soil erosion.	Linear infrastructure is planned.	Slight deviations of alignment are permitted, so as to avoid significant vegetation specimens and communities, natural features and sites of cultural and historical significance. These deviations must be approved by the ECO.	Engineer, Holder, Contractor, ECO	Construction	Compliance to be verified by ECO and IEA.
09	Linear infrastructure crossings	Altered surface water flow patterns, e.g., changing sheet flow (natural open system) to concentrated flows leads to erosion.	Preserve topsoil, control soil erosion.	Construction corridor is not too wide	The width of the construction corridor should be kept to a minimum.	Contractor, SEO	Construction	Compliance to be verified by ECO and IEA.
09	Linear infrastructure crossings	Altered surface water flow patterns, e.g., changing sheet flow (natural open	Preserve topsoil, control soil erosion.	Existing roads used where possible and unused roads rehabilitated	Where new roads need to be constructed, the existing road infrastructure should be rationalised, and any unnecessary roads	Engineer, Contractor, SEO	Construction	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
		system) to concentrated flows leads to erosion.			decommissioned and rehabilitated.			
10	Construction plant management	Removal of vegetation and disruption to the watercourse can impact bat behaviour.	Ensure the protection of fauna	No signs of off-road driving	Driving through natural vegetation must be discouraged where construction activities are not taking place.	Contractor, SEO	Construction	Compliance to be verified by ECO and IEA.

Table 43. Management Protocol for Aquatic Fauna

Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
11	Linear Infrastructure crossings	A direct loss of aquatic macro and microfauna by construction activities in a watercourse.	Ensure the protection of aquatic fauna	Construction during dry winter months	The construction of linear infrastructure across parts of the ephemeral drainage system, should be restricted to the dry winter months (e.g., May to September), that is commence with such activities as clearing or grading, excavating and importing material at the end of the wet season/beginning of the dry season whilst the soil is still moist and as far as is	Holder, Contractor	Construction	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
					practical, be completed in, the dry winter months.			
11	Linear Infrastructure crossings	A direct loss of aquatic macro and microfauna by construction activities in a watercourse.	Ensure the protection of aquatic fauna	No unnecessary physical harm to aquatic fauna	The ECO shall undertake a cursory inspection of the physical footprint prior to clearing and when grading or excavating in the ephemeral drainage system for signs of frogs, and if found, relocate them to a suitable habitat out of harms way.	ECO	Prior to clearing, grubbing or grading	Compliance to be verified by ECO and IEA.

Table 44. Management Protocol for Aquatic Flora

Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
12	Linear infrastructure crossings	Loss of local aquatic plants.	Avoid the unnecessary loss of or harm to aquatic plants, particularly protected or threatened plants.	No unnecessary loss of or harm to aquatic plants	Perform a search for any threatened or protected flora in those areas that will be disturbed by construction activities, including but not limited to the physical footprint of linear infrastructure across a watercourse.	Specialist, SEO, ECO	Prior to clearing, grubbing or grading	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
12	Linear infrastructure crossings	Loss of local aquatic plants.	Avoid the unnecessary loss of or harm to aquatic plants, particularly protected or threatened plants.	Grass sods stockpiled	Vegetation cover can be removed as sods (for rehabilitation) and stored within transformed vegetation (alien invasive vegetation must be removed prior to storing the grassland sods).	Contractor, SEO	Construction	Compliance to be verified by ECO and IEA.
12	Linear infrastructure crossings	Loss of local aquatic plants.	Avoid the unnecessary loss of or harm to aquatic plants, particularly protected or threatened plants.	Grass sods removed during winter and replanted in spring	The sods must preferably be removed during the winter months and be replanted by latest springtime. The sods should not be stacked on top of each other.	Contractor, SEO	Construction	Compliance to be verified by ECO and IEA.

Table 45. Management Protocol for Soil and Rock

Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
13	Construction plant management including deliveries	Spills from machinery can contaminate the topsoil.	Avoid contamination of soil from leaking machinery	No leaking machinery on site	Any construction plant, machinery, and equipment which leaks shall not be permitted on site. Undertake visual inspections for any leakages that may emanate	Contractor, SEO	Construction	Compliance to be verified by ECO and IEA

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
					from any vehicle accessing the site - all vehicles must be in good working order when entering the site.			
13	Construction plant management including deliveries	Spills from machinery can contaminate the topsoil.	Avoid contamination of soil from leaking machinery	Drip trays and no vehicles parked overnight except in the construction camp	All vehicles must be parked with drip trays in designated areas outside ecological buffer areas and if overnight, then preferably in the construction camp	Contractor, SEO	Construction	Compliance to be verified by ECO and IEA
13	Construction plant management including deliveries	Spills from machinery can contaminate the topsoil.	Avoid contamination of soil from leaking machinery	Drip trays	Enough drip trays must be available for all construction plant.	Contractor, SEO	Construction	Compliance to be verified by ECO and IEA
13	Construction plant management including deliveries	Spills from machinery can contaminate the topsoil.	Avoid contamination of soil from leaking machinery	Spill response kit	Provide accidental spill response equipment at the construction camp.	Contractor	Ongoing	Compliance to be verified by ECO and IEA
13	Construction plant management including deliveries	Spills from machinery can contaminate the topsoil.	Reduce contamination of soil through proper waste management	Low incidence of waste induced ground contamination with a trend indicating constant improvement over time. Waybills	In event of a spill, immediately remove the contaminated soil to the depth of penetration and temporarily store in a sealed container within the designated waste storage area for on-site bioremediation or disposal at a licensed hazardous waste landfill.	Contractor, SEO	Ongoing	Compliance to be verified by ECO and IEA
13	Construction plant management	Vehicles in poor condition are more prone to	Avoid contamination of	No signs of servicing on site.	Any planned maintenance or servicing of construction plant, machinery and	Contractor	Construction	Compliance to be verified by ECO and IEA

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
	including deliveries	breakdowns and/or leaks which could cause soil contamination	soil from leaking machinery		equipment is not permitted on site, including the construction camp.			
13	Construction plant management including deliveries	Vehicles in poor condition are more prone to breakdowns and/or leaks which could cause soil contamination	Avoid contamination of soil from leaking machinery	Drip trays	Any emergency repairs on site shall be undertaken with drip trays.	Contractor, SEO	Ongoing	Compliance to be verified by ECO and IEA
13	Construction plant management including deliveries	Washing cement slurry can contaminate the topsoil and create hard layer	Avoid contamination of soil from washing machinery	No signs of washing construction vehicles on site	Any washing of construction vehicles and other equipment is not permitted on site, including the construction camp.	Contractor, SEO	Construction	Compliance to be verified by ECO and IEA
13	General and Hazardous Waste Management	Spillage could result in microbiological pollutants to soil.	Avoid contamination of soil from ablutions	Use of chemical toilets	Chemical toilets (1 toilet for 20 or less staff) shall be provided on the construction site.	Contractor	Construction	Compliance to be verified by ECO and IEA
13	General and Hazardous Waste Management	Spillage could result in microbiological pollutants to soil.	Avoid contamination of soil from ablutions	No leaks or spills.	Chemical toilets are to be contained.	Contractor	Construction	Compliance to be verified by ECO and IEA

MEMBERS: J.A. Bowers (M Tech, Pr.Sci.Nat.) & S.D. MacGregor (M.Sc., Pr.Sci.Nat.)
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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
13	General and Hazardous Waste Management	Spillage could result in microbiological pollutants to soil.	Avoid contamination of soil from ablutions	Waybill(s) from service provider.	Chemical toilets shall be regularly emptied by the appointed service provider for appropriate disposal.	Contractor	Construction	Compliance to be verified by ECO and IEA
13	General and Hazardous Waste Management	Hydrocarbon spills can contaminate topsoil.	Avoid contamination of soil through proper waste management	Contaminated soil is treated on site	Soil contaminated with hydrocarbons should as far as is possible be treated on site by bioremediation so that it can be reused for rehabilitation.	Contractor, SEO	Construction	Compliance to be verified by ECO and IEA
13	General and Hazardous Waste Management	Hydrocarbon spills can contaminate topsoil.	Avoid contamination of soil through proper waste management	Waste storage of contaminated soil is intact and away from the watercourse	The storage and bioremediation of contaminated soil should take place in intact, impervious, not corroded receptacles within the designated waste storage area of the construction camp at least 100 m away from the outer edge of the ecological buffer.	Contractor, SEO	Construction	Compliance to be verified by ECO and IEA
13	Handling of hazardous substances	Contaminated rainwater may be released from the bund into the environment.	Avoid contamination of soil from fuel tanks	Fuel tanks are covered	Cover the fuel tank(s) and bund to prevent the ingress of rain.	Holder, Contractor	On-going	Compliance to be verified by ECO and IEA
13	Handling of hazardous substances	Spills from mobile fuel bowser can contaminate the topsoil.	Avoid contamination of soil when refuelling	Bunded area located within construction camp.	Any mobile fuel bowser shall be parked in a suitably bunded area within the construction camp.	Contractor	Construction	Compliance to be verified by ECO and IEA

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
13	Handling of hazardous substances	Spills from mobile fuel bowser can contaminate the topsoil.	Avoid contamination of soil when refuelling	Refuelling at construction camp only with drip trays	Always use a drip tray when refuelling with a mobile fuel bowser.	Contractor, SEO	Construction	Compliance to be verified by ECO and IEA
13	Handling of hazardous substances	Concrete slurry from the batching plant can contaminate the topsoil and form a hardpan layer	Avoid contamination of soil from concrete	No observed hard pan layers of concrete.	Mix concrete on a mixing tray and not on open ground.	Contractor, SEO	Construction	Compliance to be verified by ECO and IEA
13	Handling of hazardous substances	Cleaning residual ready-mixed concrete (RMC) from truck mixers can create hardpan layers.	Avoid contamination of soil from concrete	No residual RMC dumped on site	Mixer trucks should return any residual RMC to their batching plant after the delivery.	Contractor	Construction	Compliance to be verified by ECO and IEA
13	Handling of hazardous substances	Cleaning residual ready-mixed concrete (RMC) from truck mixers can create hardpan layers.	Avoid contamination of soil from concrete	Residual RMC stored in a temporary waste storage facility at the workshop area	If it is not possible for mixer trucks to return the residual RMC to their batching plant after the delivery, then the residual RMC within the truck mixers shall be disposed in a temporary waste storage facility designated for this purpose at the construction camp. Temporary storage means a once off storage of waste for a period not exceeding 90 days.	Contractor	Construction	Compliance to be verified by ECO and IEA

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
13	Handling of hazardous substances	Cleaning residual ready-mixed concrete (RMC) from truck mixers can create hardpan layers.	Avoid contamination of soil from concrete	A designated and contained, impervious waste storage area	Designated RMC waste storage facilities shall be covered and contained, that is impervious, and shall not detrimentally impact on a water resource (surface and groundwater).	Contractor	Construction	Compliance to be verified by ECO and IEA
13	Handling of hazardous substances	Cleaning residual ready-mixed concrete (RMC) from truck mixers can create hardpan layers.	Avoid contamination of soil from concrete	Compliance with conditions of the GA for S21(g) in GN 665 of 06 September 2013	The temporary storage of residual RMC for re-use (or disposal) must comply with the limits and conditions of the GA for S21(g) in GN 665 of 06 September 2013, particularly those provisions relating to the location of the wastewater storage facility and incidence reporting.	Contractor	Construction	Compliance to be verified by ECO and IEA
13	Handling of hazardous substances	Cleaning residual ready-mixed concrete (RMC) from truck mixers can create hardpan layers.	Avoid contamination of soil from concrete	Waste temporarily stored has been removed (by recycling/re-use)	Temporarily stored waste shall be re-used, recycled, and/or disposed of within a period not exceeding 90 days.	Contractor	Construction	Compliance to be verified by ECO and IEA
13	Handling of hazardous substances	Cleaning residual ready-mixed concrete (RMC) from truck mixers can create hardpan layers.	Avoid contamination of soil from concrete	Residual water is re-used	Any residual water in the RMC waste can be re-used by replacing domestic water for making new mortar or concrete. It is estimated that a replacement of up to 50% should be used to achieve the greatest gains in strength in relation to either 100%	Contractor	Construction	Compliance to be verified by ECO and IEA

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
					domestic water or 100% residual water.			
13	Handling of hazardous substances	Cleaning residual ready-mixed concrete (RMC) from truck mixers can create hardpan layers.	Avoid contamination of soil from concrete	Hardened cement has been removed (by recycling/re-use)	Once hardened, solid waste arising from the concrete mixer truck washing can also be recycled or reused as fill material and/or disposed at the De Aar licensed landfill site.	Contractor	Construction	Compliance to be verified by ECO and IEA
13	Handling Hazardous Substances	Contamination of soil with hydrocarbons.	Avoid contamination of soil from servicing	Waybill(s) from registered collector.	Any waste oil shall be collected by a registered collector for recycling and reuse or appropriate disposal.	Contractor	On-going	Compliance to be verified by ECO and IEA
13	Handling Hazardous Substances Stockpiling and Storing (Laydown)	Stockpiled topsoil left for extended period resulting in the seed bank becoming depleted and increased growth/dispersal of alien plants	Minimise the disturbance and contamination of topsoil	No alien plant growth on stockpiles	Immediately control any alien invasive plant in its entirety (including roots and propagating material) upon being identified on site, using preferably mechanical control methods as opposed to chemical spraying.	Contractor	Construction	Compliance to be verified by ECO and IEA
13	Installing panel arrays and associated infrastructure (from racks to field transformers) including within 100 m	Spills from damaged and leaking oil-filled field transformers will contaminate the topsoil	Avoid contamination of soil from transformers	Transformers are in a bund and have oil/water separation system	Field transformers shall be located in/on a transformer contaminant bund designed with an oil/water separation system, such as but not limited to a valve with an oil/water capture filter that allows water to pass through but trap oil.	Holder, Engineer	Construction	Compliance to be verified by ECO and IEA

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
	of a watercourse or 500 m of a wetland/pan							
13	Installing panel arrays and associated infrastructure (from racks to field transformers) including within 100 m of a watercourse or 500 m of a wetland/pan	Spills from damaged and leaking oil-filled field transformers will contaminate the topsoil	Avoid contamination of soil from transformers	Inspection sheets	Regular inspections (monthly) and maintenance of field transformers.	Holder, Contractor	On-going	Compliance to be verified by ECO and IEA
14	Construction plant management including deliveries	Parking of vehicles will compact the ground	Good quality soil for reinstatement.	Sensitive areas are avoided	Identify and avoid no-go areas or areas sensitive to compaction on the site plan.	Holder, Contractor	Construction	Compliance to be verified by ECO and IEA
14	Construction plant management including deliveries	Parking of vehicles will compact the ground	Good quality soil for reinstatement.	No signs of activity outside of demarcated areas	All activities remain strictly within demarcated routes and areas.	Contractor	Construction	Compliance to be verified by ECO and IEA
14	Construction plant management including deliveries	Parking of vehicles will compact the ground	Good quality soil for reinstatement.	Compacted surfaces on site have been ripped.	Once the intervention has been completed, break the crust on bare compacted areas to enhance vegetation establishment.	Contractor	Construction	Compliance to be verified by ECO and IEA

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
14	Stormwater management and erosion control	There is a potential for erosion and sedimentation of the surroundings or ephemeral drainage lines from, e.g., excavations associated with the borrow pits for road building material, if storm events take place and insufficient vegetation cover is present.	Minimize soil erosion	Soil erosion management plan	Develop a soil erosion management plan.	Holder, Contractor, SEO	Pre-Construction	Compliance to be verified by ECO and IEA
14	Stormwater management and erosion control	There is a potential for erosion and sedimentation of the surroundings or ephemeral drainage lines from, e.g., excavations associated with the borrow pits for road building material, if	Minimize soil erosion	No signs of stormwater runoff	It is recommended that sandbags and temporary berms be used, to manage stormwater runoff and control erosion.	Contractor, SEO	On-going	Compliance to be verified by ECO and IEA

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
		storm events take place and insufficient vegetation cover is present.						
14	Stormwater management and erosion control	There is a potential for erosion and sedimentation of the surroundings or ephemeral drainage lines from, e.g., excavations associated with the borrow pits for road building material, if storm events take place and insufficient vegetation cover is present.	Minimize soil erosion	No exposed soils	Exposed soils to be protected using a suitable covering, e.g., mulch.	Contractor, SEO	On-going	Compliance to be verified by ECO and IEA
14	Stormwater management and erosion control	There is a potential for erosion and sedimentation of the surroundings or ephemeral drainage lines	Minimize soil erosion	Cover stockpiles	Where required, cover soil stockpiles with a temporary liner to prevent erosion and contamination.	Contractor	Construction	Compliance to be verified by ECO and IEA

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
		from, e.g., excavations associated with the borrow pits for road building material, if storm events take place and insufficient vegetation cover is present.						
14	Stormwater management and erosion control	There is a potential for erosion and sedimentation of the surroundings or ephemeral drainage lines from, e.g., excavations associated with the borrow pits for road building material, if storm events take place and insufficient vegetation cover is present.	Minimize soil erosion	Revegetated areas	Re-vegetate areas where erosion is noted or where vegetation is required to reduce stormwater peak flows.	Holder, Contractor, SEO	On-going	Compliance to be verified by ECO and IEA

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
14	Stormwater management and erosion control	There is a potential for erosion and sedimentation of the surroundings or ephemeral drainage lines from, e.g., excavations associated with the borrow pits for road building material, if storm events take place and insufficient vegetation cover is present.	Minimize soil erosion	Swales installed	Install swales as per the CSWMP (Appendix E) if free drainage back to the environment shows evidence of accelerated erosion and sedimentation.	Holder, Engineer, Contractor	On-going	Compliance to be verified by ECO and IEA
14	Linear infrastructure crossings and Earthworks	Supplying services via trenches in dispersive soils can cause tunnel erosion.	Minimise the risk of erosion in dispersive soils.	No signs of tunnel erosion	If trenching is to be undertaken in potentially dispersive soils (e.g., bare patches) then implement the 'Trenching in Dispersive Soils Protocol' (Appendix B1)	Contractor	Construction	Compliance to be verified by ECO and IEA
14	Linear infrastructure crossings and Earthworks	Supplying services via trenches in dispersive soils can cause tunnel erosion.	Minimise the risk of erosion in dispersive soils.	Topsoil is preserved	The method of pipeline construction used in wetlands depends on the stability of the soils. Overall, topsoil is first removed and stored separately from the subsoil. Where wetland soils are	Contractor	Construction	Compliance to be verified by ECO and IEA

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
					saturated, segregating topsoil is not possible.			
14	Linear infrastructure crossings and Earthworks	Supplying services via trenches in dispersive soils can cause tunnel erosion.	Minimise the risk of erosion in dispersive soils.	Large timber mats used.	Large timber mats placed ahead of the construction equipment can provide a stable working platform and protect wetland soils by spreading the weight of the construction equipment over a broad area.	Contractor	Construction	Compliance to be verified by ECO and IEA
14	Linear infrastructure crossings and Road Management	Constructing roads and culverts in dispersive soils can cause erosion.	Minimise the risk of erosion on dispersive soils	No signs of soil erosion	If roads and culverts are to be constructed in potentially dispersive soils (e.g., bare patches) then implement the 'Roads & Culverts in Dispersive Soils Protocol' (Appendix B2)	Contractor	Construction	Compliance to be verified by ECO and IEA
14	Linear infrastructure crossings and Road Management	Constructing roads and culverts in dispersive soils can cause erosion.	Minimise the risk of erosion on dispersive soils	No signs of soil erosion	Implement appropriate stormwater management around the excavation areas to prevent the ingress of run-off into the excavation trenches.	Contractor	Construction	Compliance to be verified by ECO and IEA
14	Linear infrastructure crossings and Road Management	Constructing roads and culverts in dispersive soils can cause erosion.	Minimise the risk of erosion on dispersive soils	No signs of soil erosion	Implement source-directed erosion controls.	Contractor	Construction	Compliance to be verified by ECO and IEA
14	Linear infrastructure crossings and Road Management	Constructing roads and culverts in dispersive soils	Minimise the risk of erosion on dispersive soils	No signs of soil erosion	Maintain buffer zones to trap sediments.	Contractor	Construction	Compliance to be verified by ECO and IEA

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
		can cause erosion.						
14	Clearing, grubbing and grading	Areas cleared or disturbed around site might be affected by erosion of topsoil.	Minimize loss of topsoil	No unnecessary clearing of vegetation	Vegetation and soil should be retained in position for as long as possible and should only be removed immediately ahead of construction / earthworks in any specific area so that cleared areas are not unnecessarily exposed to erosion for extended periods prior to working in those areas.	Contractor, SEO	Construction	Compliance to be verified by ECO and IEA
14	Clearing, grubbing and grading	Areas cleared or disturbed around site might be affected by erosion of topsoil.	Minimize loss of topsoil	Rehabilitation/Re-vegetation	In areas where construction activities have been completed and no further disturbance is anticipated, rehabilitation and re-vegetation should commence as soon as possible.	Contractor, SEO	Construction	Compliance to be verified by ECO and IEA
14	Clearing, grubbing and grading	Areas cleared or disturbed around site might be affected by erosion of topsoil.	Minimize loss of topsoil	No signs of erosion channels developing	Any erosion channels developing during or after the construction period should be appropriately backfilled (and compacted where relevant) and the areas restored to a condition similar to the condition before the erosion occurred.	Contractor	Construction	Compliance to be verified by ECO and IEA
14	Clearing, grubbing and grading	Areas cleared or disturbed around site might be affected by	Minimize loss of topsoil	Topsoil removed and stockpiled	Topsoil must be removed from the construction camp footprint to a depth of 150 to 200mm and stockpiled within the construction camp.	Contractor, SEO	Construction	Compliance to be verified by ECO and IEA

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
		erosion of topsoil.						
14	Installing panel arrays and associated infrastructure (from racks to field transformers) including within 100 m of a watercourse or 500 m of a wetland/pan	Run-off from solar PV arrays in dispersive soils can cause erosion.	Minimise the risk of erosion on dispersive soils.	Vegetation under panels is cut short but not cleared	Sheep will help control the height of the underlying vegetation. However, given that they are highly selective grazers and the unlikelihood of all karoo 'bossies' immediately to the east and west of each solar module being browsed below 300 mm, indigenous vegetation may where required be cropped/cut by staff to a height of 100 mm below the solar module at maximum tilt, but not cleared.	Holder	On-going	Compliance to be verified by ECO and IEA
14	Installing panel arrays and associated infrastructure (from racks to field transformers) including within 100 m of a watercourse or 500 m of a wetland/pan	Run-off from solar PV arrays in dispersive soils can cause erosion.	Minimise the risk of erosion on dispersive soils.	Cut vegetation is left under the panels	Cut vegetation shall be left on the ground beneath and around the trimmed plants to protect the soil and provide shelter for seedlings.	Holder	On-going	Compliance to be verified by ECO and IEA
14	Installing panel arrays and	Run-off from solar PV arrays in dispersive	Minimise the risk of erosion	No signs of erosion under the panels	If solar arrays are to be installed on potentially dispersive soils (e.g., bare	Holder, Contractor	On-going	Compliance to be verified by ECO and IEA

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
	associated infrastructure (from racks to field transformers) including within 100 m of a watercourse or 500 m of a wetland/pan	soils can cause erosion.	on dispersive soils.		patches) then implement the 'Solar Arrays on Dispersive Soils Protocol' (Appendix B3).			
14	Stockpiling and Storing (Laydown)	Stockpiled topsoil left for extended period resulting in compaction	Minimize loss of topsoil	No signs of disturbance to topsoil stockpiles	No driving, parking, or storing of construction plant is permitted on topsoil stockpiles.	Contractor, SEO	Construction	Compliance to be verified by ECO and IEA

Table 46. Management Protocol for Ground and Surface Water

Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
15	Construction Plant Management including Deliveries	Hydrocarbon (fuel or oil) spills from construction vehicles or plant, and transformers will contaminate the soil, surface water run-off and possibly	Reduce deterioration in water quality	No signs of hydrocarbon spills	Implement the Surface and Groundwater Monitoring Protocol during construction and operation (Appendix D).	Holder, Contractor	Ongoing	Compliance to verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
		seepage, reducing the quality of the surface and groundwater resources.						
15	Water management (abstraction, storage and use)	Dust suppression with chemical additives or treated effluent may contaminate a watercourse.	Avoidance of water pollution	Compliance with general standards	Effluent shall be treated to General Standards.	Holder, Contractor	Ongoing	Compliance to verified by ECO and IEA.
15	Water management (abstraction, storage and use)	Dust suppression with chemical additives or treated effluent may contaminate a watercourse.	Avoidance of water pollution	Treated effluent sample data	Treated effluent must be sampled and monitored at the points of ingress to the effluent plants and at the points of reuse or discharge	Holder, Contractor, SEO	Ongoing	Compliance to verified by ECO and IEA.
15	Water management (abstraction, storage and use)	Dust suppression with chemical additives or treated effluent may contaminate a watercourse.	Avoidance of water pollution	Soil binders used are environmentally friendly	Soil binding agents used for dust suppression shall be biodegradable, environmentally friendly, non-phototoxic and must not harm flora or fauna (e.g., local wildlife and livestock).	Holder, Contractor	Ongoing	Compliance to verified by ECO and IEA.
16	Stormwater management and erosion control	Sedimentation in wetlands and watercourses.	Minimal sedimentation of watercourses	Watercourse has no sediment build up	Any sediment build-up should be removed immediately.	Holder, Contractor	Ongoing	Compliance to verified by ECO and IEA.

MEMBERS: J.A. Bowers (M Tech, Pr.Sci.Nat.) & S.D. MacGregor (M.Sc., Pr.Sci.Nat.)
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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
16	Stormwater management and erosion control	Sedimentation in wetlands and watercourses.	Minimal sedimentation of watercourses	Preserved hydrological pattern.	Disturbance of the natural topography and vegetation cover should be minimised. The natural contours should be preserved as far as is practical in order to preserve the existing site drainage patterns as far as possible.	Contractor	Construction	Compliance to verified by ECO and IEA.
16	Stormwater management and erosion control	Sedimentation in wetlands and watercourses.	Minimal sedimentation of watercourses	Preserved hydrological pattern.	Natural, dispersed, drainage should be encouraged, by maintaining the natural drainage characteristics of the land as far as possible, thereby minimising the concentration of flows and consequently the risk of erosion.	Contractor	Construction	Compliance to verified by ECO and IEA.
16	Stormwater management and erosion control	Altered surface water flow patterns, e.g., changing sheet flow (natural open system) to concentrated flows leads to erosion.	Preserve topsoil, control soil erosion.	No signs of soil erosion	Storm water runoff off all roads must be spread as much as possible, to avoid concentration of flows off compacted or hardened surfaces.	Holder, Engineer, Contractor	On-going	Compliance to verified by ECO and IEA.
16	Stormwater management and erosion control	Altered surface water flow patterns, e.g., changing sheet flow (natural open system) to concentrated	Preserve topsoil, control soil erosion.	No signs of soil erosion	Maintain all access routes and roads adequately to minimise erosion and undue surface damage. Repair rutting and potholing and maintain stormwater control mechanisms.	Holder, Contractor	On-going	Compliance to verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
		flows leads to erosion.						
16	Linear infrastructure crossings	Construction of linear infrastructure across the ephemeral drainage system may involve temporary diversion works, changing the surface water hydrology or flow patterns.	Preserve in-stream hydrological pattern	In-stream diversion.	Any river diversion works must remain inside the active channel, e.g., the works may not extend into the active channel bank. The location of the active channel bank must be verified by the ECO.	Contractor, ECO	Before clearing and grubbing operations	Compliance to be verified by ECO and IEA.
16	Linear infrastructure crossings	Construction of linear infrastructure across the ephemeral drainage system may involve temporary diversion works, changing the surface water hydrology or flow patterns.	Preserve in-stream hydrological pattern	No erosion of banks or bars.	Any river diversion works, and their outlets must be designed in such a way so as not to cause scouring of any bank or mid-channel bar. The works must be monitored regularly by the SEO for signs of scouring.	Engineer, Contractor, SEO	On-going	Compliance to be verified by ECO and IEA.
16	Linear infrastructure crossings	Construction of linear infrastructure across the ephemeral drainage system	Preserve in-stream hydrological pattern	No erosion of banks or bars.	Any signs of scouring caused by the river diversion works must be immediately rectified and remediated.	Engineer, Contractor, SEO	On-going	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
		may involve temporary diversion works, changing the surface water hydrology or flow patterns.						
16	Linear infrastructure crossings	Construction of linear infrastructure across the ephemeral drainage system will reshape the bed and banks of the watercourse.	Preserve in-stream hydrological pattern	No signs of sand mining	Sand mining in the ephemeral drainage system is prohibited.	Engineer, Contractor.	Ongoing	Compliance to be verified by ECO and IEA.
16	Linear infrastructure crossings	Construction of linear infrastructure across the ephemeral drainage system will reshape the bed and banks of the watercourse.	Preserve in-stream hydrological pattern	Fill roads of gravel/crushed rock	Limit or restrict the construction of fill roads. All fill roads must use a permeable fill material (such as gravel or crushed rock) for at least the first layer of fill in order to maintain the natural flow regimes of subsurface water.	Contractor.	Ongoing	Compliance to be verified by ECO and IEA.
16	Linear infrastructure crossings	Construction of linear infrastructure across the ephemeral drainage system will reshape the	Preserve in-stream hydrological pattern	Shaped to natural forms during operations.	Re-instatement of the original landscape levels must be done concurrent with construction activities.	Engineer, Contractor.	Ongoing	Compliance to be verified by ECO and IEA.

MEMBERS: J.A. Bowers (M Tech, Pr.Sci.Nat.) & S.D. MacGregor (M.Sc., Pr.Sci.Nat.)
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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
		bed and banks of the watercourse.						
16	Linear infrastructure crossings	Construction of linear infrastructure across the ephemeral drainage system will reshape the bed and banks of the watercourse.	Preserve in-stream hydrological pattern	Shaped to natural forms during operations.	The final grading of the crossing area should not significantly alter the flow characteristics of the ephemeral drainage system during periods of high flows, e.g., shaped to natural forms that blend in with pre-construction topography.	Engineer, Contractor.	Ongoing	Compliance to be verified by ECO and IEA.
16	Road Management Construction of permanent and temporary access roads (including upgrading existing roads and establishing new roads), As WELL AS maintenance of District gravel road	Altered surface water flow patterns, e.g., changing sheet flow (natural open system) to concentrated flows leads to erosion.	Preserve topsoil, control soil erosion.	Roads in good condition	Maintain all access routes and roads adequately in order to minimise erosion and undue surface damage. Repair rutting and potholing and maintain stormwater control mechanisms.	Holder, Contractor.	Ongoing	Compliance to be verified by ECO and IEA.
16	Road Management	Altered surface water flow patterns, e.g.,	Preserve topsoil, control soil erosion.	Roads in good condition	Ensure that all access roads utilised during construction (which are not earmarked for	Holder, Contractor.	Ongoing	Compliance to be verified by ECO and IEA.

MEMBERS: J.A. Bowers (M Tech, Pr.Sci.Nat.) & S.D. MacGregor (M.Sc., Pr.Sci.Nat.)
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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
	Construction of permanent and temporary access roads (including upgrading existing roads and establishing new roads), As WELL AS maintenance of District gravel road	changing sheet flow (natural open system) to concentrated flows leads to erosion.			closure and rehabilitation) are returned to a usable state and / or a state no worse than prior to construction.			
16	Road Management Construction of permanent and temporary access roads (including upgrading existing roads and establishing new roads), As WELL AS maintenance of District gravel road	Altered surface water flow patterns, e.g., changing sheet flow (natural open system) to concentrated flows leads to erosion.	Preserve topsoil, control soil erosion	No signs of soil erosion	Any erosion problems observed to be associated with the project infrastructure should be rectified as soon as possible and monitored thereafter to ensure that it does not re-occur.	Holder, Contractor.	Ongoing	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
16	Earthworks - holes for racks and fence posts, inverters, field transformers, on-site substation, pylons and operational area (building, on-site disposal facility) and trenches for underground cables and pipes, and water storage tanks and deionization plant. Stockpiling and Storing (Laydown) Road Management	Construction activities may alter the physical characteristics of the terrain.	Preserve topsoil, control soil erosion	No signs of rills/gullies	Monitor for signs of channelled surface water run-off, e.g., rills and gullies, caused by construction activities, and if observed, take actions necessary to immediately re-instate the original ground level and sheet flow across the affected site.	Holder, Contractor.	Ongoing	Compliance to be verified by ECO and IEA.

MEMBERS: J.A. Bowers (M Tech, Pr.Sci.Nat.) & S.D. MacGregor (M.Sc., Pr.Sci.Nat.)
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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
16	Stockpiling and storing (Laydown)	Stockpiles and overburden left in the river or floodplain can alter channel hydraulics during high flows, e.g., stockpiles left in the river channel can also deflect water to the other side of the riverbank.	Preserve hydrological patterns	Stockpiles are outside of the ephemeral drainage system buffer	Stockpiling and laydown areas must be outside the 50 m ecological buffer of the ephemeral drainage system.	Contractor	Construction	Compliance to be verified by ECO and IEA.
17	Water management (abstraction, storage and use)	Natural Resource depletion (groundwater reserve) - Construction will require the abstraction of water from boreholes for dust suppression, mixing concrete and potable usage. Declining groundwater abstraction yields as a result of no water quality and	Minimise water usage during construction (and operation) to avoid depleting the underground aquifer.	Abstraction records	The abstraction of groundwater from both properties combined (but limited to sub-catchment HRU2 of Quaternary Catchment D62D), including all boreholes contained thereon, shall not exceed 216 m3/ day (or 78 840,43 m3/ yr) during the construction period (including when it overlaps with operation), and 150 m3/day (or 54 750,3 m3/ yr) during operation.	Holder, Contractor.	Ongoing	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
		quantity monitoring plan.						
17	Water management (abstraction, storage and use)	Natural Resource depletion (groundwater reserve) - Construction will require the abstraction of water from boreholes for dust suppression, mixing concrete and potable usage. Declining groundwater abstraction yields as a result of no water quality and quantity monitoring plan.	Minimise water usage during construction (and operation) to avoid depleting the underground aquifer.	Abstraction records	Abstraction may not exceed the sustainable abstraction yield at the recommended pumping rate of 8 hrs per day for each borehole, that is 6,58 l/s @ 8hrs (or 189,5 m3/8hr day) for BH4 and 5,11 l/s @ 8 hrs (or 147,17 m3/8hr day) for BH5.	Holder, Contractor.	Ongoing	Compliance to be verified by ECO and IEA.
17	Water management (abstraction, storage and use)	Natural Resource depletion (groundwater reserve) - Construction will require the abstraction of water from boreholes for	Minimise water usage during construction (and operation) to avoid depleting the underground aquifer.	Water level monitoring results	Undertake water level monitoring of boreholes within a 1.5 km radius of the pumping borehole. If a decline in water levels is noted in all boreholes, because of pumping, the abstraction rate should be lowered to prevent aquifer depletion.	Holder, Contractor, SEO	Ongoing	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
		dust suppression, mixing concrete and potable usage. Declining groundwater abstraction yields as a result of no water quality and quantity monitoring plan.						
17	Water management (abstraction, storage and use)	Natural Resource depletion (groundwater reserve) - Construction will require the abstraction of water from boreholes for dust suppression, mixing concrete and potable usage. Declining groundwater abstraction yields as a result of no water quality and quantity monitoring plan.	Minimise water usage during construction (and operation) to avoid depleting the underground aquifer.	Pump tests	All new boreholes drilled in the project area (such as T1 or T2) must be pump tested, and interference (if any) with other existing boreholes (closer than 500 m) be evaluated by long-duration pump tests.	Holder, Engineer, Contractor.	When new boreholes are drilled.	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
17	Water management (abstraction, storage and use)	Natural Resource depletion (groundwater reserve) - Construction will require the abstraction of water from boreholes for dust suppression, mixing concrete and potable usage. Declining groundwater abstraction yields as a result of no water quality and quantity monitoring plan.	Minimise water usage during construction (and operation) to avoid depleting the underground aquifer.	Water level logbook	Conduct multi borehole water level logging, to ensure that no cumulative dewatering impacts are taking place for boreholes which may be in the same contact zones.	Holder, Contractor, SEO	Ongoing	Compliance to be verified by ECO and IEA.
17	Water management (abstraction, storage and use)	Natural Resource depletion (groundwater reserve) - Construction will require the abstraction of water from boreholes for dust suppression,	Minimise water usage during construction (and operation) to avoid depleting the underground aquifer.	Water wise technologies are installed	Continually investigate and implement water-saving strategies and technologies or alternatives, including designs.	Holder, Engineer, Contractor.	Ongoing	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
		mixing concrete and potable usage. Declining groundwater abstraction yields as a result of no water quality and quantity monitoring plan.						
17	Water management (abstraction, storage and use)	Natural Resource depletion - Construction will require the abstraction of water from boreholes for dust suppression, mixing concrete and potable usage.	Minimize the impact of borehole abstraction on the groundwater reserve.	Reduce the quantity of water used for each spray (e.g., 1 000 ml per sqm) and the frequency of spraying (e.g., less frequent than daily).	Reduce the quantity of groundwater and frequency of applications required for dust suppression on gravel access roads by adding environmentally safe/friendly soil binding agents.	Holder, Contractor.	Ongoing	Compliance to be verified by ECO and IEA.
17	Water management (abstraction, storage and use)	Natural Resource depletion - Construction will require the abstraction of water from boreholes for dust suppression, mixing concrete	Minimize the impact of borehole abstraction on the groundwater reserve.	Reduce the quantity of water used for each spray (e.g., 1 000 ml per sqm) and the frequency of spraying (e.g., less frequent than daily).	Monitor the amount of water used for suppressing dust on gravel roads.	Holder, Contractor, SEO	Ongoing	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
		and potable usage.						
17	Water management (abstraction, storage and use)	Natural Resource depletion - Construction will require the abstraction of water from boreholes for dust suppression, mixing concrete and potable usage.	Minimize the impact of borehole abstraction on the groundwater reserve.	Reduce the quantity of water used for each spray (e.g., 1 000 ml per sqm) and the frequency of spraying (e.g., less frequent than daily).	Regular, light watering of gravel roads is better than infrequent, heavy watering.	Holder, Contractor.	Ongoing	Compliance to be verified by ECO and IEA.

Table 47. Management Protocol for Atmosphere

Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
18	Clearing, grubbing and grading	The PV ""heat island"" (PVHI) effect would be the result of a detectable increase in sensible heat flux (atmospheric warming). This may be compounded by	Increased ecosystem resilience to atmospheric warming.	Reduce the potential PVHI: Restored bare patches.	Minimise vegetation clearance.	Contractor, SEO	Continuous	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
		the forecasted increase in temperatures linked to climate change.						
18	Clearing, grubbing and grading	The PV ""heat island"" (PVHI) effect would be the result of a detectable increase in sensible heat flux (atmospheric warming). This may be compounded by the forecasted increase in temperatures linked to climate change.	Increased ecosystem resilience to atmospheric warming.	Reduce the potential PVHI: Restored bare patches.	Once construction has been completed in an area, immediately reinstate, and maintain the vegetation underneath the solar PV modules to retain its cooling effect through transpiration.	Contractor	Continuous	Compliance to be verified by ECO and IEA.
18	Clearing, grubbing and grading	The PV ""heat island"" (PVHI) effect would be the result of a detectable increase in sensible heat flux (atmospheric warming). This may be compounded by	Increased ecosystem resilience to atmospheric warming.	Reduce the potential PVHI: Restored bare patches.	Restore all bare patches of soil with vegetation.	Holder, Contractor	Continuous	Compliance to be verified by ECO and IEA.

MEMBERS: J.A. Bowers (M Tech, Pr.Sci.Nat.) & S.D. MacGregor (M.Sc., Pr.Sci.Nat.)
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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
		the forecasted increase in temperatures linked to climate change.						
19	Quarry (Sourcing materials (aggregate) for roads and concrete)	Excessive dust from rock crushing plant	Minimise dust generation	Compliance with National Dust Control Regulations	Effective implementation of the National Dust Control Regulations.	Contractor	Construction	Compliance to be verified by ECO and IEA.
19	Quarry (Sourcing materials (aggregate) for roads and concrete)	Excessive dust from rock crushing plant	Minimise dust generation	Dust monitoring unit is installed	Dust Monitoring Unit is recommended to be installed.	Holder, Contractor	Construction	Compliance to be verified by ECO and IEA.
19	Quarry (Sourcing materials (aggregate) for roads and concrete)	Excessive dust from rock crushing plant	Minimise dust generation	No excessive dust at the rock crushing plant	Operating/offloading of the crusher plant shall be avoided during windy conditions, unless additional dust suppression methods will ensure that the dust fallout does not exceed the acceptable limits. We suggest that the contractor take into consideration predicted wind speeds from the local weather station when planning construction-related activities with a high risk of generating dust.	Contractor	Construction	Compliance to be verified by ECO and IEA.
19	Quarry (Sourcing materials	Excessive dust from rock crushing plant	Minimise dust generation	No excessive dust at the	Dust suppressant must be prioritised for the operation of the crusher plant.	Holder, Contractor	Construction	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
	(aggregate) for roads and concrete)			rock crushing plant				
19	Road Management Construction of permanent and temporary access roads (including upgrading existing roads and establishing new roads), As WELL AS maintenance of District gravel road	Reduced air quality due to dust from driving on dirt roads.	Minimise dust generation.	No signs of speeding	Reduce speed limit to 30 or 40 km/hr for deliveries and contractors.	Holder, Contractor	On-going	Compliance to be verified by ECO and IEA.
19	Road Management Construction of permanent and temporary access roads	Reduced air quality due to dust from driving on dirt roads.	Minimise dust generation.	No signs of speeding	Enforce speed control through speed limit road signage and fines.	Holder, Contractor	On-going	Compliance to be verified by ECO and IEA.

MEMBERS: J.A. Bowers (M Tech, Pr.Sci.Nat.) & S.D. MacGregor (M.Sc., Pr.Sci.Nat.)
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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
	(including upgrading existing roads and establishing new roads), As WELL AS maintenance of District gravel road							
19	Road Management Construction of permanent and temporary access roads (including upgrading existing roads and establishing new roads), As WELL AS maintenance of District gravel road	Reduced air quality due to dust from driving on dirt roads.	Minimise dust generation.	Good road drainage	Implement and maintain good drainage.	Holder, Contractor	On-going	Compliance to be verified by ECO and IEA.
19	Road Management	Reduced air quality due to dust from	Minimise dust generation.	No unnecessary staff trips	As far as possible, reduce the number of vehicle trips by transporting staff in busses instead of 15-seater taxis.	Holder, Contractor	Construction	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
	Construction of permanent and temporary access roads (including upgrading existing roads and establishing new roads), As WELL AS maintenance of District gravel road	driving on dirt roads.						
20	Blasting	Vibrations/noise from blasting.	Minimal noise generated by blasting	Use of minimum magnitude and amount of 'explosive' material.	The contractor carrying out the blasting work shall apply the absolute minimum magnitude and amount of 'explosive' material.	Contractor	Construction	Compliance to be verified by ECO and IEA.
20	Blasting	Vibrations/noise from blasting.	Minimal noise generated by blasting	Blast mat in use	The contractor carrying out the blasting work shall use a blast mat (not soil) to reduce noise/fly rock.	Contractor	Construction	Compliance to be verified by ECO and IEA.
20	Blasting	Vibrations/noise from blasting.	Minimal noise generated by blasting	No blasting after hours or on weekends	Blasting should be done during work hours and during weekdays only.	Contractor	Construction	Compliance to be verified by ECO and IEA.
20	Construction plant management including deliveries	Noise pollution due to traffic	Minimal noise generated by traffic.	No unnecessary delivery trips	Stagger delivery trips.	Contractor	Construction	Compliance to be verified by ECO and IEA.

MEMBERS: J.A. Bowers (M Tech, Pr.Sci.Nat.) & S.D. MacGregor (M.Sc., Pr.Sci.Nat.)
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Table 48. Management Protocol for Terrestrial and Avian Ecosystem

Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
21	Construction plant management including deliveries	Altered surface water flow patterns, e.g., changing sheet flow (natural open system) to concentrated flows leads to erosion.	Preserve topsoil, control soil erosion.	Limited construction activity after rainfall	There should be reduced activity at the site after rainfall events when the soils are wet. No driving off from hardened roads should occur immediately following large rainfall events until soils had dried out and the risk of bogging down has decreased.	Contractor	Construction	Compliance to be monitored by the SEO and verified by ECO and IEA.
21	Construction plant management including deliveries	Altered surface water flow patterns, e.g., changing sheet flow (natural open system) to concentrated flows leads to erosion.	Preserve topsoil, control soil erosion.	No signs of off-road driving in wet conditions	No off-road driving in wet conditions, and for two weeks afterwards. In particular, no driving in veld should take place on clay or fine-textured soils following rain.	Contractor	Construction	Compliance to be monitored by the SEO and verified by ECO and IEA.
21	Installing panel arrays and associated infrastructure (from racks to field transformers) including within 100 m of a watercourse	Erosion and sediment transport may be exacerbated by the concentrated rainfall volumes off the solar PV panels. Efforts should be	Minimise the risk of erosion on dispersive soils.	No bare soil beneath or between solar panels	With the exception of two-track roads, restore and maintain vegetation cover underneath and between the solar panel arrays.	Holder, Contractor	On-going	Compliance to be monitored by the SEO and verified by ECO and IEA.

MEMBERS: J.A. Bowers (M Tech, Pr.Sci.Nat.) & S.D. MacGregor (M.Sc., Pr.Sci.Nat.)
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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
	or 500 m of a wetland/pan	made in managing run-off from the PV panels and arrays onto the soils, and then managing the distribution of the accumulated water back to the environment						
21	Installing panel arrays and associated infrastructure (from racks to field transformers) including within 100 m of a watercourse or 500 m of a wetland/pan	Erosion and sediment transport may be exacerbated by the concentrated rainfall volumes off the solar PV panels. Efforts should be made in managing run-off from the PV panels and arrays onto the soils, and then managing the distribution of the	Minimise the risk of erosion on dispersive soils.	No bare soil beneath or between solar panels	Restore bare patches of soil using the Bare Patch Restoration Protocol (Appendix C) with native species of vegetation in the area.	Holder, Contractor	On-going	Compliance to be monitored by the SEO and verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
		accumulated water back to the environment						
21	Installing panel arrays and associated infrastructure (from racks to field transformers) including within 100 m of a watercourse or 500 m of a wetland/pan	Erosion and sediment transport may be exacerbated by the concentrated rainfall volumes off the solar PV panels. Efforts should be made in managing run-off from the PV panels and arrays onto the soils, and then managing the distribution of the accumulated water back to the environment	Minimise the risk of erosion on dispersive soils.	No bare soil in the ecological buffer.	Maintain vegetation cover within the designated ecological buffer zone alongside the delineated watercourses.	Holder, Contractor	On-going	Compliance to be monitored by the SEO and verified by ECO and IEA.
21	Installing panel arrays and associated infrastructure	Erosion and sediment transport may be exacerbated	Minimise the risk of erosion on dispersive soils.	No signs of rivulets	Conduct regular inspections and maintenance of the site to ensure that vegetation cover is adequate, and no rivulets are generated.	Holder, Contractor, SEO	On-going	Compliance to be monitored by the SEO and verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
	(from racks to field transformers) including within 100 m of a watercourse or 500 m of a wetland/pan	by the concentrated rainfall volumes off the solar PV panels. Efforts should be made in managing run-off from the PV panels and arrays onto the soils, and then managing the distribution of the accumulated water back to the environment						
21	Installing panel arrays and associated infrastructure (from racks to field transformers) including within 100 m of a watercourse or 500 m of a wetland/pan	Erosion and sediment transport may be exacerbated by the concentrated rainfall volumes off the solar PV panels. Efforts should be made in managing run-	Minimise the risk of erosion on dispersive soils.	No signs of sheet or rill erosion	Monitor for signs of sheet or rill erosion beneath the drip line of the solar panel arrays after rainfall events and remedy any signs of erosion using measures appropriate to the severity and scale of erosion, and that will prevent a recurrence.	Holder	On-going	Compliance to be monitored by the SEO and verified by ECO and IEA.

MEMBERS: J.A. Bowers (M Tech, Pr.Sci.Nat.) & S.D. MacGregor (M.Sc., Pr.Sci.Nat.)
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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
		off from the PV panels and arrays onto the soils, and then managing the distribution of the accumulated water back to the environment						
21	Installing panel arrays and associated infrastructure (from racks to field transformers) including within 100 m of a watercourse or 500 m of a wetland/pan	Erosion and sediment transport may be exacerbated by the concentrated rainfall volumes off the solar PV panels. Efforts should be made in managing run-off from the PV panels and arrays onto the soils, and then managing the distribution of the accumulated water back to	Minimise the risk of erosion on dispersive soils.	No signs of sheet or rill erosion	Sandbags shall be used to construct temporary berms and manage stormwater run-off across cleared or bare areas.	Contractor	On-going	Compliance to be monitored by the SEO and verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
		the environment						
21	Stormwater management and erosion control	Flooding in the predicted "ponded flood occurrence zones combined with solar PV panels and arrays and stormwater discharge from the site could alter surface water flow patterns in these areas, causing erosion.	Minimise the risk of erosion on dispersive soils.	No signs of flooding on site as a result of poor stormwater management	Implement where applicable, prescribed flooding protocols (e.g., drainage and stormwater systems to minimize flooding potential) and erosion prevention measures in the predicted "ponded flood occurrence zones".	Holder, Engineer, Contractor	On-going	Compliance to be monitored by the SEO and verified by ECO and IEA.
21	Stormwater management and erosion control	Flooding in the predicted "ponded flood occurrence zones combined with solar PV panels and arrays and stormwater discharge from the site could alter surface water flow	Minimise the risk of erosion on dispersive soils.	No signs of flooding on site as a result of poor stormwater management	Stormwater run-off and discharge from the site shall be managed according to the CSWMP (Appendix E) and the Surface and Groundwater Monitoring Protocol (Appendix D).	Holder, Contractor	On-going	Compliance to be monitored by the SEO and verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
		patterns in these areas, causing erosion.						
21	Road Management Construction of permanent and temporary access roads (including upgrading existing roads and establishing new roads), As WELL AS maintenance of District gravel road	Roads, including the two-track service roads between the solar panel arrays, will increase surface water run-off, causing erosion and sedimentation of watercourses.	Minimise the risk of erosion on dispersive soils.	No signs of erosion on the service roads	Install berms & mitre drains only where absolutely necessary at strategic points along the two-track service roads between the solar panel arrays (and other roads) as a mechanism to dissipate runoff.	Holder, Engineer, Contractor	On-going	Compliance to be monitored by the SEO and verified by ECO and IEA.
22	Road Management Construction of permanent and temporary access roads (including upgrading existing	Damage to environment when driving through veld to avoid potholes or puddles.	Ensure the protection of undisturbed or sensitive vegetation units.	Natural vegetation is retained between structures and infrastructure.	Driving offroad is prohibited.	Holder, Contractor	On-going	Compliance to be monitored by the SEO and verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
	roads and establishing new roads), As WELL AS maintenance of District gravel road							
23	General and hazardous waste management	Unsanitary conditions surrounding infrastructure promoting the establishment of alien plants and/or invasive rodents.	Sanitary conditions and good waste management.	No signs of unsanitary conditions or of increased rodent populations	Waste management must be a priority and all waste must be collected and stored adequately. It is recommended that all waste be removed from site on a weekly basis to prevent rodents and pests entering the site.	Holder, Contractor	On-going	Compliance to be monitored by the SEO and verified by ECO and IEA.
23	General and hazardous waste management	Windblown litter from transporting waste can contaminate the environment.	Sanitary conditions and good waste management.	Covered trucks	Trucks transporting waste must be covered.	Holder, Contractor	On-going	Compliance to be monitored by the SEO and verified by ECO and IEA.
23	General and hazardous waste management	Pollution of waste material	Good waste management	No signs of dumping	No illegal dumping of waste.	Holder, Contractor	On-going	Compliance to be monitored by the SEO and verified by ECO and IEA.
23	General and hazardous waste management	Pollution of waste material	Good waste management	No litter	No littering.	Holder, Contractor	On-going	Compliance to be monitored by the SEO and verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
23	General and hazardous waste management	Pollution of waste material	Good waste management	Waybills	General Waste shall be disposed of at a licensed municipal landfill, whereas hazardous waste will be disposed of at a licensed hazardous waste disposal facility.	Holder, Contractor	On-going	Compliance to be monitored by the SEO and verified by ECO and IEA.
23	Alien Plant Management	Herbicides can introduce toxic chemicals into the food chain.	Adopt an integrated pest management (IPM) approach to avoid the use of chemical pesticides and minimize risks to human health and the environment while maintaining economically viable management.	Integrated Weed Management (IWM) plan.	Develop an integrated approach to weed management, combining all appropriate weed control options into an integrated weed management (IWM) plan. Methods of control include herbicide application, mechanical removal, mulch or weed mat, shading, fire, flame guns, biological control agents, manual control, slashing, ring barking, and controlled grazing.	Holder, Contractor, SEO	Pre-construction and Construction	Compliance to be monitored by the SEO and verified by ECO and IEA.
23	Alien Plant Management	Herbicides can introduce toxic chemicals into the food chain.	Adopt an integrated pest management (IPM) approach to avoid the use of chemical pesticides and minimize risks to human health and the environment	FSC Pesticides Policy adopted	Adopt the FSC Pesticides Policy (FSC-POL-30-001 V3-0 EN) to regulate the use of chemical pesticides, if after having considered all available pest management strategies, the use of chemical pesticides may be identified as the most suitable control.	Holder, Contractor, SEO	On-going	Compliance to be monitored by the SEO and verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
			while maintaining economically viable management.					
23	Alien Plant Management	Herbicides can introduce toxic chemicals into the food chain.	Adopt an integrated pest management (IPM) approach to avoid the use of chemical pesticides and minimize risks to human health and the environment while maintaining economically viable management.	Best practise is used when undertaking alien plant control	Give preference, as a matter of principle, to: (a) non-chemical methods over chemical pesticides, (b) chemical pesticides not listed in the FSC lists of Highly Hazardous Pesticides (HHPs) over those listed in the FSC lists of HHPs, and (c) FSC restricted HHPs over FSC highly restricted HHPs.	Holder, Contractor, SEO	On-going	Compliance to be monitored by the SEO and verified by ECO and IEA.
23	Earthworks - holes for racks and fence posts, inverters, field transformers, on-site substation, pylons and operational area	Chemical pollution of the water resources.	No incidents of chemical pollution of watercourses.	No surplus spoil stockpiled on site	All surplus spoil material from the foundation excavations (e.g., not used as backfill) should be removed from the site as soon as is practically possible.	Contractor	Construction	Compliance to be monitored by the SEO and verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
	(building, on-site disposal facility) and trenches for underground cables and pipes, and water storage tanks and deionization plant.							
23	Earthworks - holes for racks and fence posts, inverters, field transformers, on-site substation, pylons and operational area (building, on-site disposal facility) and trenches for underground cables and pipes, and water storage tanks and deionization plant.	Chemical pollution of the water resources.	No incidents of chemical pollution of watercourses.	Waybills	Waste material should be removed to a licensed waste disposal facility, if it cannot be re-used or recycled.	Holder, Contractor	On-going	Compliance to be monitored by the SEO and verified by ECO and IEA.

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Table 49. Management Protocol for Aquatic Ecosystem

Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
24	Handling hazardous substances	Chemical pollution of the water resources.	No incidents of chemical pollution of watercourses	No signs of refuelling in sensitive areas.	Refuelling with a mobile fuel bowser shall take place 100 m away from the ecological buffer, as well as any boreholes and soakaways.	Contractor	Construction	Compliance to be verified by ECO and IEA
24	Handling hazardous substances	Chemical pollution of the water resources.	No incidents of chemical pollution of watercourses.	No signs of concrete batching in sensitive areas.	No concrete batching shall take place within the delineated riparian zone or within the ecological buffer of the watercourse.	Contractor	Construction	Compliance to be verified by ECO and IEA
24	Alien plant management	Alien invasive plants: Prevent the cleared areas from degrading, as invasive non-native plants will spread into degraded areas	Reduce invasive alien plant recruitment	Weed and alien invasive species control plan	A weed and alien invasive species control plan should be implemented during the contract period.	Contractor, SEO	Construction	Compliance to be verified by ECO and IEA
24	Alien plant management	Alien invasive plants: Prevent the cleared areas from degrading, as invasive non-native plants will spread into degraded areas	Reduce invasive alien plant recruitment	No signs of alien plants on site	Control involves killing the plants present, killing the seedlings which emerge, and establishing and managing an alternative plant cover to limit re-growth and re-invasion.	Holder, Contractor, SEO	On-going	Compliance to be verified by ECO and IEA

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
24	Alien plant management	Alien invasive plants: Prevent the cleared areas from degrading, as invasive non-native plants will spread into degraded areas	Reduce invasive alien plant recruitment	No signs of alien plants on site	Any materials brought into construction sites should be from sources free of invasive alien species.	Contractor	Construction	Compliance to be verified by ECO and IEA
24	Alien plant management	Alien invasive plants: Prevent the cleared areas from degrading, as invasive non-native plants will spread into degraded areas	Reduce invasive alien plant recruitment	No signs of alien plants or bare patches on site	Clearing of invasive alien plants must take place coupled with the sowing of seeds of indigenous species to stabilise disturbed habitats.	Holder, Contractor	On-going	Compliance to be verified by ECO and IEA
24	Alien plant management	Water and soil pollution by chemicals Herbicides can enter waterbodies either directly through spray or spray drift, or they can move into waterbodies via surface water run-off or leaching and sub-surface draining.	Avoid spillage onto soil or into water while mixing or using chemicals. Prevent contamination of ecologically sensitive environments. Prevent loss of biodiversity and non-targeted plant species (damage to	No signs of excessive use of herbicides	Minimise the use of herbicides near waterways by considering other techniques that can be alternatives to, or complementary with, herbicides.	Holder, Contractor	On-going	Compliance to be verified by ECO and IEA

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
			indigenous trees).					
24	Alien plant management	Water and soil pollution by chemicals Herbicides can enter waterbodies either directly through spray or spray drift, or they can move into waterbodies via surface water run-off or leaching and sub-surface draining.	Avoid spillage onto soil or into water while mixing or using chemicals. Prevent contamination of ecologically sensitive environments. Prevent loss of biodiversity and non-targeted plant species (damage to indigenous trees).	Chemical spraying is undertaken as per guidelines	If chemical spraying is adopted: (a) use only approved herbicides prescribed by the Working for Water guidelines. (b) Staff using chemicals are trained and aware of the risks of using chemicals. (c) Chemicals are mixed on impermeable and level surfaces as per the manufacturer's instructions. (d) All waste material and containers are safely and properly removed after use. (e) Chemicals are stored, mixed and used in demarcated areas. (f) Do not apply foliar hand spray chemical applications under conditions where chemical drift may impact non-targeted species (as indicated on the manufacturer's directions for use on the herbicide label).	Holder, Contractor, SEO	On-going	Compliance to be verified by ECO and IEA
24	Quarry (Sourcing	The generation of excessive	Minimise dust generation.	No signs of quarry mining outside of	Mining of suitable material from a quarry for road	Contractor	Construction	Compliance to be verified

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
	materials (aggregate) for roads and concrete)	wind-blown dust could 'choke' the ecologically sensitive ephemeral drainage line system.		the wet summer season	construction and associated rock crushing should as far as is practical take place during the wet summer season prior to the commencement of the civil construction phase.			by ECO and IEA.
24	Linear Infrastructure Crossings	The crossing alignments will result in the loss of aquatic or river habitat equivalent to the size of the development footprint or in the case of construction creep, greater.	Contain construction and avoid the unnecessary loss of aquatic habitat.	Demarcated areas	Suitable demarcation must be erected around the construction area, including the servitude, areas where material is stored and the actual footprint of the development to prevent access to sensitive areas.	Contractor, SEO	Construction	Compliance to be verified by ECO and IEA.
24	Linear Infrastructure Crossings	The crossing alignments will result in the loss of aquatic or river habitat equivalent to the size of the development footprint or in the case of construction creep, greater.	Contain construction and avoid the unnecessary loss of aquatic habitat.	Barrier around restricted areas	Demarcate ecological sensitive habitats such as riparian areas as no-go areas (ecological sensitivity 'High' refer to Appendix M) during construction with construction tape or similar markers and signage.	Contractor, SEO	Pre-construction	Compliance to be verified by ECO and IEA.
24	Linear Infrastructure Crossings	The crossing alignments will result in the loss	Contain construction and avoid the	Pipeline corridors are no wider than 10m through	All Pipelines corridors (affected areas) should be implemented to a maximum 10	Contractor, SEO	Construction	Compliance to be verified

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
		of aquatic or river habitat equivalent to the size of the development footprint or in the case of construction creep, greater.	unnecessary loss of aquatic habitat.	ephemeral drainage line	metres wide through wetlands during construction.			by ECO and IEA.
24	Linear Infrastructure Crossings	The crossing alignments will result in the loss of aquatic or river habitat equivalent to the size of the development footprint or in the case of construction creep, greater.	Contain construction and avoid the unnecessary loss of aquatic habitat.	Underground cables are below subsurface flows and rehabilitated once complete	All underground cables bisecting sensitive habitats must be placed below the subsurface flow of the ephemeral wetlands with the linear construction pits subjected to full rehabilitation in order to maintain normal subsurface flow.	Engineer, Contractor	Construction	Compliance to be verified by ECO and IEA.
24	Linear Infrastructure Crossings	The crossing alignments will result in the loss of aquatic or river habitat equivalent to the size of the development footprint or in the case of construction creep, greater.	Contain construction and avoid the unnecessary loss of aquatic habitat.	Zero interruption to flow.	Horizontal directional drilling is preferred for the crossing of wetlands. A hole is dug below the stream crossing and pulling a prefabricated section of pipe through the hole.	Engineer, Contractor	Construction	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
24	Linear Infrastructure Crossings	The crossing alignments will result in the loss of aquatic or river habitat equivalent to the size of the development footprint or in the case of construction creep, greater.	Contain construction and avoid the unnecessary loss of aquatic habitat.	Zero interruption to flow.	Should horizontal directional drilling not be possible, open-cut crossings can be used. This involves cutting a trench across the waterbody while water flows through the trenching area. Where the water is shallow enough, it may be diverted by flumes and pumps. A flume pipe may be placed to divert the water around the trenching area. Pumps in combination with dams may also be used to divert the water during open-cut trenching.	Engineer, Contractor	Construction	Compliance to be verified by ECO and IEA.
24	Linear Infrastructure Crossings	The crossing alignments will result in the loss of aquatic or river habitat equivalent to the size of the development footprint or in the case of construction creep, greater.	Contain construction and avoid the unnecessary loss of aquatic habitat.	Zero interruption to flow.	Where possible, pipelines can be installed using the push-pull technique-- stringing and welding the pipeline outside of the wetland and excavating and backfilling the trench using a backhoe supported by equipment mats or timber riprap. The prefabricated pipeline is installed in the wetland by pushing or pulling it across the trench. After the pipeline is floated into place, the floats are removed and the pipeline sinks into place.	Engineer, Contractor	Construction	Compliance to be verified by ECO and IEA.
24	Linear Infrastructure Crossings	The crossing alignments will result in the loss	Contain construction and avoid the	Limit transformation of	The trench is backfilled to the proper grade to maintain wetland hydrology and grades	Engineer, Contractor	Construction	Compliance to be verified

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
		of aquatic or river habitat equivalent to the size of the development footprint or in the case of construction creep, greater.	unnecessary loss of aquatic habitat.	aquatic ecosystem	are restored to the original elevation. If topsoil is segregated from subsoil, then subsoil is backfilled first.			by ECO and IEA.
24	Linear Infrastructure Crossings	The crossing alignments will result in the loss of aquatic or river habitat equivalent to the size of the development footprint or in the case of construction creep, greater.	Contain construction and avoid the unnecessary loss of aquatic habitat.	Roads do not impede surface or subsurface flows	All roads and crossings must be engineered not to impede surface or subsurface flow in any way.	Contractor	Construction	Compliance to be verified by ECO and IEA.
24	Linear Infrastructure Crossings	The crossing alignments will result in the loss of aquatic or river habitat equivalent to the size of the development footprint or in the case of construction creep, greater.	Contain construction and avoid the unnecessary loss of aquatic habitat.	Roads do not impede surface or subsurface flows	A temporary road in a wetland needs to provide adequate crossroad drainage at all natural drainageways. Temporary drainage structures include culverts, bridges, and porous material.	Engineer, Contractor	Construction	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
24	Linear Infrastructure Crossings	The crossing alignments will result in the loss of aquatic or river habitat equivalent to the size of the development footprint or in the case of construction creep, greater.	Contain construction and avoid the unnecessary loss of aquatic habitat.	Roads do not impede surface or subsurface flows	It is preferable to eliminate fill roads and utilise raised bridges and culverts with adequate sizing and spacing of water crossing structures, proper choice of the type of crossing structure, and installation of drainage structures at a depth adequate to pass subsurface flow.	Contractor	Construction	Compliance to be verified by ECO and IEA.
24	Linear Infrastructure Crossings	The crossing alignments will result in the loss of aquatic or river habitat equivalent to the size of the development footprint or in the case of construction creep, greater.	Contain construction and avoid the unnecessary loss of aquatic habitat.	No dilapidated/broken demarcations	Site demarcations should be maintained until the cessation of all construction activities.	Contractor, SEO	Construction	Compliance to be verified by ECO and IEA.
24	Linear Infrastructure Crossings	The crossing alignments will result in the loss of aquatic or river habitat equivalent to the size of the development footprint or in the case of	Contain construction and avoid the unnecessary loss of aquatic habitat.	No signs of vehicles in natural areas	Vehicular or pedestrian access is prohibited in natural areas beyond the demarcated boundary of the construction site, including working servitudes across the ephemeral drainage system.	Contractor	Construction	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
		construction creep, greater.						
24	Linear Infrastructure Crossings	The crossing alignments will result in the loss of aquatic or river habitat equivalent to the size of the development footprint or in the case of construction creep, greater.	Contain construction and avoid the unnecessary loss of aquatic habitat.	Limited equipment within the ephemeral drainage line	Construction equipment used while working in wetlands is limited to only those pieces that are essential and non-essential equipment is allowed to travel through wetlands only once during deployment and once during extraction.	Contractor	Construction	Compliance to be verified by ECO and IEA.
24	Linear Infrastructure Crossings	The crossing alignments will result in the loss of aquatic or river habitat equivalent to the size of the development footprint or in the case of construction creep, greater.	Contain construction and avoid the unnecessary loss of aquatic habitat.	No unnecessary vegetation clearance	Limit vegetation clearing to the physical footprint and if no bare patches are available in the vicinity, then temporary stockpiles of excavated material.	Contractor	Construction	Compliance to be verified by ECO and IEA.
24	Linear Infrastructure Crossings	The crossing alignments will result in the loss of aquatic or river habitat equivalent to the size of the development	Contain construction and avoid the unnecessary loss of aquatic habitat.	No unnecessary vegetation clearance	Vegetation and soil should be retained in position for as long as possible and should only be removed immediately ahead of construction / earthworks in any specific area so that cleared areas are not unnecessarily exposed to	Contractor	Construction	Compliance to be verified by ECO and IEA.

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		footprint or in the case of construction creep, greater.			erosion for extended periods prior to working in those areas.			
24	Linear Infrastructure Crossings	The crossing alignments will result in the loss of aquatic or river habitat equivalent to the size of the development footprint or in the case of construction creep, greater.	Contain construction and avoid the unnecessary loss of aquatic habitat.	No bare surfaces	Conduct active rehabilitation during the construction activities according to a rehabilitation plan or implement the Bare Patch Restoration Protocol (Appendix C) that will restore the natural vegetation to what it was prior to the construction of the pylons, roads etc, so that the long-term impact could be negligible.	Contractor	Construction	Compliance to be verified by ECO and IEA.
24	Linear Infrastructure Crossings	The crossing alignments will result in the loss of aquatic or river habitat equivalent to the size of the development footprint or in the case of construction creep, greater.	Contain construction and avoid the unnecessary loss of aquatic habitat.	Rehabbed areas are protected	Cordon off areas under rehabilitation as “no-go areas” to prevent vehicular, pedestrian and livestock access	Contractor, SEO	Construction	Compliance to be verified by ECO and IEA.Co
24	Linear Infrastructure Crossings	River diversion works may result in sedimentation and increased turbidity of the	Preserve aquatic ecosystem structure and function, as well as riparian habitat.	No construction creep.	If it is practical to do so, construct river diversion works on the perimeter of the working servitude before clearing the in-situ material.	Contractor	Construction	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
		ephemeral drainage system.						
24	Linear Infrastructure Crossings	River diversion works may result in sedimentation and increased turbidity of the ephemeral drainage system.	Preserve aquatic ecosystem structure and function, as well as riparian habitat.	Roads do not impede surface or subsurface flows	Avoid or minimise any restriction to subsurface water flow by constructing road crossings at or above (not below) natural ground level (NGL) and, where applicable, retaining the in-situ topsoil with vegetation root mass (or mat). In the case of building road crossings above NGL, and if the natural vegetation is cleared, then ensure that the grader does not penetrate the abovementioned root mat and maintains a flat surface. Topsoil removed from other infrastructure placement sites can be added below the road surface to protect the vegetative binding below.	Contractor	Construction	Compliance to be verified by ECO and IEA.
24	Linear Infrastructure Crossings	River diversion works may result in sedimentation and increased turbidity of the ephemeral drainage system.	Preserve aquatic ecosystem structure and function, as well as riparian habitat.	Aggregate is protected from any flowing water	Aggregate used in the construction of river diversion works shall not be in direct contact with flowing water, by using for example, plastic sheets, sandbags, culverts, or pipes.	Contractor	Construction	Compliance to be verified by ECO and IEA.
24	Linear Infrastructure Crossings	River diversion works may result in sedimentation and increased turbidity of the	Preserve aquatic ecosystem structure and function, as well	No dispersive soils used	Aggregate used in the construction of river diversion works shall not include dispersive soils.	Contractor	Construction	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
		ephemeral drainage system.	as riparian habitat.					
24	Linear Infrastructure Crossings	River diversion works may result in sedimentation and increased turbidity of the ephemeral drainage system.	Preserve aquatic ecosystem structure and function, as well as riparian habitat.	No spoil stockpiled on site	All surplus spoil material from the foundation excavations (e.g., not used as backfill) should be removed from the site as soon as is practically possible.	Contractor	Construction	Compliance to be verified by ECO and IEA.
24	Linear Infrastructure Crossings	Operation of heavy equipment in a channel bed can directly destroy spawning habitat for fish and macro-invertebrate habitat and produce increased turbidity (lower dissolved oxygen) and increased suspended sediment downstream.	Preserve aquatic ecosystem structure and function, as well as riparian habitat.	No signs of vehicles in sensitive areas and buffers except in working servitude areas	Vehicles and other machinery are prohibited from accessing the ecologically sensitive ephemeral drainage system and its ecological buffer unless confined to the demarcated construction servitudes associated with the construction of linear infrastructure crossings.	Contractor	Construction	Compliance to be verified by ECO and IEA.
25	Road Management Construction of permanent and	Roads concentrate surface water run-off, increasing its velocity and	Preserve aquatic ecosystem structure and function, as well as riparian habitat.	No signs of erosion	The applicant shall in response to bank erosion at road crossings either maintain existing or implement new storm water control measures as soon as is reasonably	Holder Contractor	On-going	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
	temporary access roads (including upgrading existing roads and establishing new roads), As WELL AS maintenance of District gravel road	potential to erode river or stream banks at crossings.			practical (e.g., within 5 working days of being noticed).			
25	Road Management Construction of permanent and temporary access roads (including upgrading existing roads and establishing new roads), As WELL AS maintenance of District gravel road	Roads concentrate surface water run-off, increasing its velocity and potential to erode river or stream banks at crossings.	Preserve aquatic ecosystem structure and function, as well as riparian habitat.	No signs of erosion	The applicant shall rehabilitate any erosion of river or stream.	Holder Contractor	On-going	Compliance to be verified by ECO and IEA.
25	Clearing, grubbing and grading	Clearing of vegetation for the construction of access roads,	Reduce sedimentation of watercourses	No clearing done during rainfall periods	Clearing of vegetation, including for temporary access roads, should preferably be	Contractor	Construction	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
		solar panel installations, substations and other infrastructure can cause sediment load in the water courses before the cleared areas can be stabilized.			done outside the main rainfall periods.			
25	Earthworks - holes for racks and fence posts, inverters, field transformers, on-site substation, pylons and operational area (building, on-site disposal facility) and trenches for underground cables and pipes, and water storage tanks and	Alteration of natural drainage lines may lead to ponding or increased runoff patterns.	Preserve aquatic ecosystem structure and function, as well as riparian habitat.	Limit transformation of aquatic ecosystem	Ensure that any dedicated stream crossings use road crossing designs, such as box culverts or concrete drifts with rock fill, which spread the surface water into a broadly distributed sheet whilst maintaining unrestricted subterranean flow.	Contractor	Construction	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
	deionization plant.							
25	Earthworks - holes for racks and fence posts, inverters, field transformers, on-site substation, pylons and operational area (building, on-site disposal facility) and trenches for underground cables and pipes, and water storage tanks and deionization plant.	Alteration of natural drainage lines may lead to ponding or increased runoff patterns.	Preserve aquatic ecosystem structure and function, as well as riparian habitat.	Limit transformation of aquatic ecosystem	Road crossing designs, such as box culverts or concrete drifts with rock fill, which spread the surface water into a broadly distributed sheet whilst maintaining unrestricted subterranean flow should be sized to accommodate at least 1:100 yr flood events	Contractor	Construction	Compliance to be verified by ECO and IEA.
25	Stockpiling and Storing (Laydown)	Altered aquatic ecosystem structure and function.	Preserve aquatic ecosystem structure and function, as well as riparian habitat.	Stockpiles are outside of sensitive areas	Aggregate (sand) stockpiles must be stored in the construction camp and outside the ecological buffer zones, including the 1:100-year flood line and delineated riparian habitat.	Contractor	Construction	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
25	Stormwater management and erosion control	Disturbing topsoil might result in increased turbidity, as well as siltation in watercourses.	Preserve topsoil	No signs of stormwater erosion	Storm water management and erosion control measures should be implemented. These should include the following: (a) The excavated soil should be placed on the upstream side of construction activities in order to act as a storm water diversion berm. (b) Where such diversion berms create concentrated flows, as well as in steep and/or sensitive areas (such as wetlands) the use of swales, silt fences or other effective erosion control measures is recommended to attenuate runoff. (c) All storm water management measures should be regularly maintained.	Contractor, SEO	Construction	Compliance to be verified by ECO and IEA.
25	Stormwater management and erosion control	Disturbing topsoil might result in increased turbidity, as well as siltation in watercourses.	Preserve topsoil	Gypsum applied.	The project areas are situated on Karoo sediments that are known for high sodium and magnesium content in the soil. Water infiltration can be improved by means of mechanical intervention and the application of gypsum or similar ameliorants.	Contractor	Construction	Compliance to be verified by ECO and IEA.
25	Stormwater management	Disturbing topsoil might	Preserve topsoil	Silt traps	Silt traps should be used where there is a danger of	Contractor	Construction	Compliance to be verified

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
	and erosion control	result in increased turbidity, as well as siltation in watercourses.			topsoil eroding and entering streams and other sensitive areas.			by ECO and IEA.
25	Water management (abstraction, storage and use)	Water storage tanks can topple over, leak or overflow.	Avoid erosion from water storage tanks.	Water storage tanks are on a solid foundation, platform or stand.	Place water tanks on solid foundations, platforms or stands to ensure that they are level, will not fall over and are above the ground to build up the necessary water pressure for the outlet.	Holder, Engineer Contractor	Construction	Compliance to be verified by ECO and IEA.
25	Water management (abstraction, storage and use)	Water storage tanks can topple over, leak or overflow.	Avoid erosion from water storage tanks.	Water storage tanks are fastened to the platform or stand.	The platform or stand for water storage tanks must be level and must have hooks onto which the tank can be anchored or fastened.	Holder, Engineer, Contractor	Construction	Compliance to be verified by ECO and IEA.
25	Water management (abstraction, storage and use)	Water storage tanks can topple over, leak or overflow.	Avoid erosion from water storage tanks.	Water pipes are visibly secured.	The pipes leading to and from the water storage tanks should also be anchored to prevent them from breaking, cracking and leaking.	Holder, Engineer, Contractor	Construction	Compliance to be verified by ECO and IEA.
25	Water management (abstraction, storage and use)	Water storage tanks can topple over, leak or overflow.	Avoid erosion from water storage tanks.	Design includes an overflow pipe to a soakaway.	Each water storage tank or series of water storage tanks should have an overflow pipe to prevent water being forced out of the inlet when the tank is full. The overflow pipe should be diverted to a soakaway.	Holder, Engineer, Contractor	Construction	Compliance to be verified by ECO and IEA.
25	Water management (abstraction, storage and use)	Water storage tanks can topple over, leak or overflow.	Avoid erosion from water storage tanks.	No signs of erosion around water storage tanks.	If water storage tanks are placed on a raised platform or stand, then a layer of gravel should be placed around and/or under the platform or	Holder, Engineer, Contractor	Construction	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
					stand to ensure good drainage and to prevent forming mud and puddles.			

Table 50. Management Protocol for Economical

Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
26	Employee management (including appointment, conduct and movement)	Risk of veld fires caused by workers during the construction of the facility	Limited risk of financial losses to neighbouring farmers.	Minimise risk of and control runaway fires: no evidence of open fires are observed on site.	No open fires.	Contractor	Construction	Compliance to be verified by ECO and IEA
26	Construction Plant Management including Deliveries	Damage to farm infrastructure	Build and maintain trusting relationships with affected stakeholders.	Compensation	Affected landowners must be compensated for losses resulting from any damage to farm infrastructure.	Holder, Contractor	On-going	Compliance to be verified by ECO and IEA
26	Security	Damage to farm infrastructure	Build and maintain trusting relationships with affected stakeholders.	No security breaches of boundary fence	Inspections of boundary fences should be done daily in areas where there are activities.	Holder, Contractor, SEO	On-going	Compliance to be verified by ECO and IEA
26	Security	Damage to farm infrastructure	Build and maintain trusting relationships with affected stakeholders.	No debris blocking boundary fence	All fences should be inspected and be kept clear of debris, especially in the rainy season.	Holder, Contractor, SEO	On-going	Compliance to be verified by ECO and IEA

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
26	Road Management Construction of permanent and temporary access roads (including upgrading existing roads and establishing new roads), As WELL AS maintenance of District gravel road	Damage to vehicles.	Limited risk of financial losses to neighbouring farmers.	Roads are in good condition.	The applicant shall maintain any deterioration to the district gravel roads resulting from increased traffic during construction.	Holder, Contractor	On-going	Compliance to be verified by ECO and IEA
26	Road Management Construction of permanent and temporary access roads (including upgrading existing roads and	Damage to vehicles.	Limited risk of financial losses to neighbouring farmers.	Roads are in good condition.	Corrugations shall be removed as soon as is reasonably practical (e.g., within 5 working days of being noticed).	Holder, Contractor	On-going	Compliance to be verified by ECO and IEA

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
	establishing new roads), As WELL AS maintenance of District gravel road							
26	Road Management Construction of permanent and temporary access roads (including upgrading existing roads and establishing new roads), As WELL AS maintenance of District gravel road	Damage to vehicles.	Limited risk of financial losses to neighbouring farmers.	Roads are in good condition.	Potholes and puddles will be filled in and compacted as soon as is reasonably practical (e.g., within 5 working days of being noticed).	Holder, Contractor	On-going	Compliance to be verified by ECO and IEA
26	Road Management Construction of permanent and temporary	Damage to vehicles.	Limited risk of financial losses to neighbouring farmers.	Roads are in good condition.	Apply environmentally friendly soil binding agents to the road surface to reduce ripple and pothole occurrences as well as help production machines last longer	Holder, Contractor	On-going	Compliance to be verified by ECO and IEA

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
	access roads (including upgrading existing roads and establishing new roads), As WELL AS maintenance of District gravel road							
27	Quarry (Sourcing materials (aggregate) for roads and concrete)	Excessive dust can damage the durability of the crushing plant, leading to bearing failure, lubricant contamination and increased risk of fire autoignition.	Preserve lifespan of rock crushing plant	Rock crushing plant is kept clean	Regular plant washing and maintenance.	Contractor	Construction	Compliance to be verified by ECO and IEA
27	Quarry (Sourcing materials (aggregate) for roads and concrete)	Excessive dust can damage the durability of the crushing plant, leading to bearing failure, lubricant contamination and increased risk of fire autoignition.	Preserve lifespan of rock crushing plant	Dry misting system, dust collectors.	Combination of engineered dust control solutions, such as installing a Dry Misting System, dust collectors, improvements of feeding, discharge and transfer points and enclosures.	Contractor	Construction	Compliance to be verified by ECO and IEA

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Table 51. Management Protocol for Social

Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
28	Construction plant management including deliveries	Potential congestion and delays on the surrounding road network.	Minimise risk of congestion and delays to local farmers.	No deliveries during peak hours	Stagger delivery trips and schedule deliveries outside of the peak traffic periods.	Contractor	Construction	Compliance to be verified by ECO and IEA.
28	Construction plant management including deliveries	Potential congestion and delays on the surrounding road network.	Minimise risk of congestion and delays to local farmers.	No staff trips during peak hours	Staff trips should also occur outside of the peak hours where possible.	Holder, Contractor	Construction	Compliance to be verified by ECO and IEA.
29	General and hazardous waste management	Large amounts of stored waste can cause unpleasant odours	Reduce odours with good waste management	No odours	Waste receptacles must not be overfilled. General waste shall be disposed of at the nearest licensed landfill.	Holder, Contractor	On-going	Compliance to be verified by ECO and IEA.

Table 52. Management Protocol for Property

Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
31	Installing panel arrays and associated infrastructure (from racks to field transformers) including	Damage to property caused by flooding.	Property is protected from flooding	No risk to flood damage.	All electrical connectors and other items vulnerable to flood water should be located at a minimal level of the maximum flood depth determined by the engineers plus a 0,3 m free board above ground level to ensure that they are protected from the design flood event (1:100 year).	Engineer, Contractor	Construction	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
	within 100 m of a watercourse or 500 m of a wetland/pan							
32	Blasting	Fly rock and vibrations from blasting could damage property	Property is protected from blasting activities	Safe explosive magnitude	The contractor carrying out the blasting work shall apply the absolute minimum magnitude and amount of 'explosive' material.	Contractor	Construction	Compliance to be verified by ECO and IEA.
32	Blasting	Fly rock and vibrations from blasting could damage property	Property is protected from blasting activities	Blast mat	The contractor carrying out the blasting work shall use a blast mat (not soil) to reduce fly rock.	Contractor	Construction	Compliance to be verified by ECO and IEA.
32	Blasting	Fly rock and vibrations from blasting could damage property	Property is protected from blasting activities	Notify neighbours of blasting	The applicant shall at least 7 days prior to the commencement of blasting advise owners and occupiers of neighbouring properties.	Contractor	At least 7 days prior to the commencement of blasting	Compliance to be verified by ECO and IEA.
32	Blasting	Fly rock and vibrations from blasting could damage property	Property is protected from blasting activities	Photographs of any existing damage to buildings prior to blasting	Buildings within the potential damaging zone of the blast will be surveyed with the presence of the owner, or a representative nominated by the owner, and any cracks or latent defects will be pointed out and recorded using photographs.	Contractor	Construction	Compliance to be verified by ECO and IEA.
32	Blasting	Fly rock and vibrations from blasting could damage property	Property is protected from blasting activities	Method statement	The contractor carrying out the blasting work will prepare a method statement prior to blasting.	Contractor, SEO	Construction	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
32	Blasting	Fly rock and vibrations from blasting could damage property	Property is protected from blasting activities	Method statement	The aforesaid method statement will include: (a) A locality plan of the blast site; (b) The zones of influence of the ground and air shockwaves; (c) Expected limits of fly rock; and (d) Each dwelling, structure, service and water source within the zones of influence.	Contractor	Construction	Compliance to be verified by ECO and IEA.
32	Blasting	Fly rock and vibrations from blasting could damage property	Property is protected from blasting activities	Logbook	The contractor carrying out the blasting work shall log the blasting activities.	Contractor	Construction	Compliance to be verified by ECO and IEA.
32	Blasting	Fly rock and vibrations from blasting could damage property	Property is protected from blasting activities	Permit for blasting	The contractor carrying out the blasting work shall hold and be in possession of a permit authorizing such use in terms of the Explosives Act, 2003 (Act No. 15 of 2003), unless the activity relates to occupational health or occupational safety, in which case the matter is regulated under the Occupational Health and Safety Act, 1993 (Act No. 85 of 1993).	Contractor	Construction	Compliance to be verified by ECO and IEA.
32	Blasting	Fly rock and vibrations from blasting could damage property	Property is protected from blasting activities	Approval letter	If the explosive to be used is defined in terms of the Occupational Health and Safety Act, 1993 (any substance or article as listed in Class 1: Explosives in the South African Bureau of Standards Code of Practice for the	Contractor	Construction	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
					Identification and Classification of Dangerous Substances and Goods, SABS 0228), the contractor carrying out the blasting work shall apply in writing to the chief inspector of occupational health and safety for written approval to use the explosive in the workplace.			

Table 53. Management Protocol for Health and Safety

Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
34	Construction Plant Management including Deliveries	Potential impact on traffic safety and increase in accidents with other vehicles or animals.	Zero traffic safety incidents.	No signs of speeding	Consider speed control by means of stop and go systems.	Holder, Contractor	On-going	Compliance to be verified by ECO and IEA.
34	Construction Plant Management including Deliveries	Potential impact on traffic safety and increase in accidents with	Zero traffic safety incidents.	No signs of speeding	Enforce speed control through speed limit road signage and fines.	Holder, Contractor	On-going	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
		other vehicles or animals.						
34	Construction Plant Management including Deliveries	Traffic accidents at primary access location off the N10.	To ensure the safe exit of Single-Unit Trucks (SU) and especially Single-Unit Truck plus Trailers (SU+T) at the junction of the N10 with the existing Burgerville (District) Road.	No traffic incidents	Place appropriate traffic accommodation on the eastern approach of the N10, indicating a construction access ahead with a possible flagman to alert drivers and slow them down.	Contractor	Construction	Compliance to be verified by ECO and IEA.
34	Construction Plant Management including Deliveries	Stakeholders are concerned about traffic safety	Zero traffic safety incidents.	Road signage	The necessary road signage must be erected on the affected roads to warn road users about the construction activities and traffic.	Contractor	Construction	Compliance to be verified by ECO and IEA.
35	General and hazardous waste management	Reuse of certain containers may be harmful to people.	Good waste management	No containers which held a Hazardous Chemical Substance (HCS) are being reused	Reusable containers which held a Hazardous Chemical Substance (HCS) may not be donated to any person for reuse, and preferably returned to the supplier to be cleaned and decontaminated, otherwise if that is not possible then punctured and disposed of at a licensed hazardous waste disposal facility.	Contractor	Construction	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
35	General and hazardous waste management	Improper safety procedures followed when refuelling.	Avoid injury or fatality amongst staff.	All staff have PPE	Implement the following restrictions on all staff operating on the site: (a) No work may be done without the use of PPE (b) No alcohol or illegal substance use on site (c) No firearms permitted on site.	Contractor, SEO	Construction	Compliance to be verified by ECO and IEA.
35	General and hazardous waste management	Improper safety procedures followed when refuelling.	Avoid injury or fatality amongst staff.	First Aid kit	A first aid kit must always be accessible on site and must include the number of the local emergency service.	Contractor	Construction	Compliance to be verified by ECO and IEA.
35	General and hazardous waste management	Improper safety procedures followed when refuelling.	Avoid injury or fatality amongst staff.	Smoking areas	Set up and enforce use of designated smoking area(s)	Contractor	Construction	Compliance to be verified by ECO and IEA.
35	General and hazardous waste management	Improper safety procedures followed when refuelling.	Avoid injury or fatality amongst staff.	First Aid certificate	At least one person within each working team must have a valid First Aid Certificate and a First Aid Kit that is adequate to deal with the range of possible life-threatening injuries.	Contractor	Construction	Compliance to be verified by ECO and IEA.
36	Blasting	Fly rock from blasting	Avoid injury or fatality amongst staff.	Copy of license to blast	Any blasting activity must be conducted by a suitably licensed blasting contractor.	Contractor	Construction	Compliance to be verified by ECO and IEA.
36	Blasting	Fly rock from blasting	Avoid injury or fatality amongst staff.	Notification of neighbour's	Notification of surrounding landowners, emergency services site personnel of blasting activity 24 hours prior to such activity taking place on Site.	Contractor, SEO, CLO	24 hours prior to blasting	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
36	Blasting	Fly rock from blasting	Avoid injury or fatality amongst staff.	No rock more than 150mm outside the working area	Fly rock from blasting activity must be minimised and any pieces greater than 150 mm falling beyond the Working Area, must be collected, and removed.	Contractor	Construction	Compliance to be verified by ECO and IEA.
36	Blasting	Fly rock from blasting	Avoid injury or fatality amongst staff.	Compliance with noise bylaws	Adhere to any local bylaws and regulations regarding the generation of noise.	Contractor	Construction	Compliance to be verified by ECO and IEA.

Table 54. Management Protocol for Security

Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
37	Employee management (including appointment, conduct and movement)	Increases in stock theft and other crimes.	A secure solar PV facility	Staff wear photo ID cards	All contractors and employees need to wear photo identification cards.	Holder, Contractor	On-going	Compliance to be verified by ECO and IEA.
37	Construction Plant Management including Deliveries	Increases in stock theft and other crimes	A secure solar PV facility	Roster given to landowners	A roster stating dates and approximate times that contractors will be on the farms must be given directly to affected landowners. All access arrangements should be made at least 24 hours before farm access is required.	Holder, Contractor, SEO, CLO	At least 24 hours before farm access is required.	Compliance to be verified by ECO and IEA.
37	Construction Plant Management including Deliveries	Increases in stock theft and other crimes	A secure solar PV facility	Marked vehicles	Vehicles should be clearly marked as construction vehicles and should have Soventix, or the contractor's logo clearly exhibited.	Holder, Contractor	On-going	Compliance to be verified by ECO and IEA.

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37	Security	Increases in stock theft and other crimes.	A secure solar PV facility	Access control	Entry and exit points of the site should be controlled.	Holder, Contractor	On-going	Compliance to be verified by ECO and IEA.
37	Stockpiling and storing (Laydown)	Increases in stock theft and other crimes.	A secure solar PV facility	Fenced stockpile areas	Areas where materials are stockpiled must be fenced.	Contractor	Construction	Compliance to be verified by ECO and IEA.

Table 55. Management Protocol for Public Services

Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
38	Road Management Construction of permanent and temporary access roads (including upgrading existing roads and establishing new roads), As WELL AS maintenance of District gravel road	Increased traffic can result in corrugations and potholes on roads.	Good road conditions.	No corrugations or potholes	Undertake regular maintenance of the gravel access roads during all phases of the project, especially during the construction phase.	Holder, Contractor	On-going	Compliance to be verified by ECO and IEA.
38	Road Management Construction of permanent and temporary access roads	Transport of abnormal roads could be delayed.	Safe (unobstructed) delivery of abnormal loads to site.	Internal roads are in good condition	Upgrade the internal farm access road (e.g., internal private roads leading off the Burgerville Road) to suitable standards as specified by the civil engineer.	Holder, Engineer, Contractor	Construction	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
	(including upgrading existing roads and establishing new roads), As WELL AS maintenance of District gravel road							

Table 56. Management Protocol for Visual

Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
40	General and hazardous waste management	Short-term landscape change from the current rural agricultural sense of place to the semi-industrial RE landscape - Wind-blown litter from the laydown and construction sites (fencing can trap wind-blown litter).	A less dominant landscape change to local or neighbouring receptors	No signs of litter	Littering should be a finable offence.	Holder, Contractor	On-going	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
40	Clearing, grubbing and grading	Decrease in the "sense of place" as it relates to noise, visual and light pollution.	A less dominant landscape change to local or neighbouring receptors	No excessive or unnecessary disturbed areas	Minimise areas of surface disturbance.	Holder, Contractor	On-going	Compliance to be verified by ECO and IEA.

Table 57. Management Protocol for Heritage and Culture

Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
43	Chance Finds Protocol Clearing, grubbing and Grading. Earthworks	Earthmoving activities could damage or destroy artefacts or fossils.	Protection and preservation of heritage resources.	Avoid unnecessary damage or destruction of heritage resources: Vigilance is observed.	The bulk of archaeological and palaeontological remains are normally located beneath or near the soil surface, so please be especially vigilant when clearing and grubbing, and excavating (see **Appendix A**).	Contractor, SEO	During clearing and grubbing operations and excavations.	Compliance to be monitored by the SEO and verified by ECO and IEA.
43	Chance Finds Protocol Clearing, grubbing and Grading. Earthworks	Earthmoving activities could damage or destroy artefacts or fossils.	Protection and preservation of heritage resources.	Avoid unnecessary damage or destruction of heritage resources: Written findings or photographs of cursory inspection.	The ECO must give a cursory inspection of the soil surface for Stone Age open-air surface scatters (cores, waste-flakes, more formal tools such as blades, scrapers and broken points) before clearing, and of the bedrock after clearing and before drilling, in this case for small marine invertebrates and/or trace fossils (e.g., footprints, trails, burrows, etc.) (see **Appendix A**).	Contractor, SEO, ECO	Before clearing and grubbing of bedrock in river.	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
43	Chance Finds Protocol Clearing, grubbing and Grading. Earthworks	Earthmoving activities could damage or destroy artefacts or fossils.	Protection and preservation of heritage resources.	Avoid unnecessary damage or destruction of heritage resources: Supervision when clearing and grubbing, and excavating	The SEO shall supervise all clearing and grubbing, as well as excavation activities: (1) Examples of cultural or archaeological objects include *inter alia* (a) Stone Age open-air surface scatters (e.g., cores, waste-flakes, more formal tools such as blades, scrapers and broken points), and (b) stone cairns. (2) Examples of paleontological objects (fossils) include inter alia (a) Rare vertebrate bones and teeth, (b) petrified wood and other plant material, (c) Fossil mammal bones, teeth, horn cores, freshwater molluscs, calcretised termitaria, plant material in Late Caenozoic alluvium and pan deposits, and (d) Blocks of reworked silicified wood within surface gravels and older alluvium. (see **Appendix A**).	Contractor, SEO	During clearing and grubbing operations and excavations.	Compliance to be monitored by the SEO and verified by ECO and IEA.
43	Chance Finds Protocol Clearing, grubbing and Grading. Earthworks	Earthmoving activities could damage or destroy artefacts or fossils.	Protection and preservation of heritage resources.	Avoid unnecessary damage or destruction of heritage resources: Construction has ceased at a site of discovery.	If any evidence of archaeological sites or artefacts (e.g., remnants of stone-made structures or artefacts, indigenous ceramics, bones, stone cairns, ostrich eggshell fragments, charcoal, and ash concentrations), fossils or other categories of heritage resources are found or uncovered by construction staff during construction:	Contractor, SEO or ECO.	Chance Find Protocol - artefacts	Compliance to be monitored by the SEO and verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
					1. IMMEDIATELY cease the construction activity, 2. notify the ECO, 3. Alert SAHRA APM Unit (Natasha Higgitt/Phillip Hine 021 462 5402) and 4. don't tamper with the finds. (see **Appendix A**).			
					If any evidence of archaeological sites or remains (e.g. remnants of stone-made structures, indigenous ceramics, bones, stone artefacts, ostrich eggshell fragments, charcoal and ash concentrations), fossils or other categories of heritage resources are found during the proposed development, SAHRA APM Unit (Natasha Higgitt/Phillip Hine 021 462 5402) must be alerted			
43	Chance Finds Protocol Clearing, grubbing and Grading. Earthworks	Earthmoving activities could damage or destroy artefacts or fossils.	Protection and preservation of heritage resources.	Avoid unnecessary damage or destruction of heritage resources: Site of discovery has been cordoned off.	The site of discovery must be cordoned off and demarcated a no-go area with security tape / fence / sand bags if necessary. Access to construction staff shall be prohibited until further notice by the ECO. (see **Appendix A**).	Contractor, SEO or ECO.	Chance Find Protocol - artefacts	Compliance to be monitored by the SEO and verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
43	Chance Finds Protocol Clearing, grubbing and Grading. Earthworks	Earthmoving activities could damage or destroy artefacts or fossils.	Protection and preservation of heritage resources.	Avoid unnecessary damage or destruction of heritage resources: A written response from the LIHRA.	A professional archaeologist or palaeontologist, depending on the nature of the finds, must be contracted as soon as possible to inspect the heritage resource and assess the significance of the findings.	SEO or ECO, Heritage Specialist.	Chance Find Protocol - artefacts	Compliance to be verified by ECO and IEA.
43	Chance Finds Protocol Clearing, grubbing and Grading. Earthworks	Earthmoving activities could damage or destroy artefacts or fossils.	Protection and preservation of heritage resources.	Avoid unnecessary damage or destruction of heritage resources: A written response from the SAPS.	In the case of unmarked human burials, the ECO shall also alert the local police and SAHRA Burial Grounds and Graves (BGG) Unit (Thingahangwi Tshivhase/ Ngqabutho Madida 012 320 8490).	SEO or ECO.	Chance Find Protocol - artefacts	Compliance to be verified by ECO and IEA.
43	Chance Finds Protocol Clearing, grubbing and Grading. Earthworks	Earthmoving activities could damage or destroy artefacts or fossils.	Protection and preservation of heritage resources.	Avoid unnecessary damage or destruction of heritage resources: Implement Chance Fossil Finds Protocol	In the case of finding any small pieces of petrified wood, particularly when excavating through the ephemeral drainage line between PV Blocks 1 and 2 (see Figure 2 of the SSV Report for Palaeontology, May 2022), simply relocate these to a safe place (a similar setting, preferably). Major finds of fossil wood or other fossil material (of high scientific and conservation value) will, however, trigger the Chance Fossil Finds Protocol (see **Appendix A**).	SEO or ECO.	Chance Find Protocol - artefacts	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
43	Chance Finds Protocol Clearing, grubbing and Grading. Earthworks	Earthmoving activities could damage or destroy artefacts or fossils.	Protection and preservation of heritage resources.	Avoid unnecessary damage or destruction of heritage resources: Phase 2 rescue	If the newly discovered heritage resources prove to be of archaeological or paleontological significance, a Phase 2 rescue operation may be required subject to permits issued by SAHRA.	SEO or ECO.	Chance Find Protocol - artefacts	Compliance to be verified by ECO and IEA.
43	Chance Finds Protocol Clearing, grubbing and Grading. Earthworks	Earthmoving activities could damage or destroy artefacts or fossils.	Protection and preservation of heritage resources.	Avoid unnecessary damage or destruction of heritage resources: Area is cordoned off	Ensure the heritage site remains safeguarded until clearance is given by the Heritage Specialist and/or SAHRA for work to resume.	SEO or ECO.	Chance Find Protocol - artefacts	Compliance to be verified by ECO and IEA.

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POST-CONSTRUCTION PHASE

Table 58. Management Protocol for Terrestrial Fauna

Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
01	Facility Management	Roadkill, electrocutions of fauna during construction and post-construction.	Faunal mortalities are reduced.	Log of fauna related incidents	A log should be kept detailing all fauna-related incidences or mortalities that occur on site, including roadkill, electrocutions etc. during construction and operation. These should be reviewed annually and used to inform operational management and mitigation measures.	Holder	On-going. Reviewed annually	Compliance to be verified by ECO and IEA.
01	Facility Management	Roadkill, electrocutions of fauna during construction and post-construction.	Faunal mortalities are reduced.	Operational EMPr	An EMPr for the Operational Phase must be created and be updated every three years in order to revaluate the effectiveness of the mitigations.	Holder, ECO	Operation and updated every 3 years	Compliance to be verified by ECO and IEA.
01	Facility Management	Bird mortalities during the operational phase due to the addition of grazing sheep to the footprint which may attract raptor SCC who may scavenge on dead lambs/	Ensure protection of aves	Livestock carcasses are removed from site.	Strict carcass retrieval. Where carcasses are removed and correctly disposed of within the same day of death. This will require constant monitoring of all sheep herds in the footprint.	Holder, Landowner, ECO Contractor, SEO	On-going	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
		adult sheep or prey upon livestock.						
02	Maintenance and Monitoring	Possible bat fatalities incurred from collisions with infrastructure associated with the solar PV facility including solar arrays, security fencing, transmission lines, and buildings.	Ensure protection of bats	Bat monitoring results	Perform continuous bat monitoring using passive bioacoustic recording systems in line with the South African Good Practice Guidelines for Surveying Bats at WEF's (Sowler and Stoffberg, 2014) and SAGPG for Operational Monitoring (Aronson et al. 2014) for one year pre-construction, during construction and two years post-construction (operation). During the first two years of operation, it is expected that any changes in bat activity and perceived impacts will be most evident.	Holder, Bat specialist	Two years post-construction	Compliance to be verified by ECO and IEA.
02	Maintenance and Monitoring	Possible bat fatalities incurred from collisions with infrastructure associated with the solar PV facility including solar arrays, security fencing, transmission	Ensure protection of bats	Bat monitoring systems in working order	A specialist should maintain these systems and determine the impacts of solar PV facility on bat populations in relation to landscape changes in both the physical changes with the installation of the solar PV panels, the resulting change in vegetation structure underneath the solar PV panels and the management strategy of the operational facility.	Holder, Bat specialist	Two years post-construction	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
		lines, and buildings.						
02	Maintenance and Monitoring	Possible bat fatalities incurred from collisions with infrastructure associated with the solar PV facility including solar arrays, security fencing, transmission lines, and buildings.	Ensure protection of bats	Bat carcasses	Mortality searches near infrastructure and along the security fence line must be conducted to determine if the security fences pose a threat to bats	Holder, Bat specialist, SEO	On-going	Compliance to be verified by ECO and IEA.
03	Maintenance and Monitoring	Impact: birds may collide with panels and overhead powerlines.	Ensure protection of aves	Avian monitoring results	Two years (repeat baseline monitoring, plus carcass searches); may include construction phase.	Holder, Avian specialist, SEO	Two years (including construction phase)	Compliance to be verified by ECO and IEA.
03	Maintenance and Monitoring	Impact: birds may collide with panels and overhead powerlines.	Ensure protection of aves	Avian monitoring results	The need for further baseline data collection is assessed, particularly if considerable time elapses between collection of data for impact assessment and the commencement of construction (Appendix K)	Holder, Avian specialist, SEO	Two years (including construction phase)	Compliance to be verified by ECO and IEA.
03	Maintenance and Monitoring	Impact: birds may collide with panels	Ensure protection of aves	Avian monitoring results	The post-construction monitoring protocols are refined, and post-construction monitoring is initiated as soon	Holder, Avian specialist, SEO	As soon as the solar arrays are in place	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
		and overhead powerlines.			as the solar arrays are in place (Appendix K). Post-construction phase monitoring data are periodically analysed, and if necessary, data collection protocols are adjusted to ensure that sufficient data are accumulated, and sufficient coverage is achieved to adequately inform operational decisions.			
03	Maintenance and Monitoring	Cumulative impact of the project and other projects in the area concerning collision risk, habitat loss and fragmentation and loss of suitable habitat for threatened species.	Cumulative impacts are monitored during post construction of the facility.	Avian monitoring results	Formal post construction monitoring must be applied once the development has been activated, as per the most recent edition of the best practice guidelines (Jenkins et al. 2017) – Appendix K.	Holder, Avian Specialist, SEO	Operation	Compliance to be verified by ECO and IEA.
03	Maintenance and Monitoring	Cumulative impact of the project and other projects in the area concerning collision risk,	Cumulative impacts are monitored during post construction of the facility.	Avian monitoring results	Post-construction monitoring should be undertaken as per the EMPr. The exact scope, nature and frequency of the post-construction monitoring will be informed on an ongoing basis by the results of the	Holder, Avian Specialist, SEO	On-going	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
		habitat loss and fragmentation and loss of suitable habitat for threatened species.			monitoring through a process of adaptive management (Appendix K).			
03	Maintenance and Monitoring	Cumulative impact of the project and other projects in the area concerning collision risk, habitat loss and fragmentation and loss of suitable habitat for threatened species.	Cumulative impacts are monitored during post construction of the facility.	Target species movement and breeding is tracked	High value target species such as Tawny Eagle, Verreaux's Eagle, Secretary Bird, Bustards and Martial Eagles can be tracked using periodic ECO monitoring regimes to monitor movement patterns and breeding success. These programs should be implemented during and post construction (Appendix K).	Holder, Avian Specialist, SEO	On-going	Compliance to be verified by ECO and IEA.

Table 59. Management Protocol for Terrestrial Flora

Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
04	Rehabilitation	New growth will be selected for by grazers resulting in overgrazing,	Restoration of provisioning services, particularly	No signs of restoration areas being grazed	Protect vegetation recruitment from grazers by packing brush from legitimate bush clearing	Holder, Contractor	On-going	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
		which can weaken plant vigour or its capacity to recover.	food or grazing for livestock, and regulating services such as erosion control.		operations onto topsoiled and/or reseeded areas.			
04	Rehabilitation	New growth will be selected for by grazers resulting in overgrazing, which can weaken plant vigour or its capacity to recover.	Restoration of provisioning services, particularly food or grazing for livestock, and regulating services such as erosion control.	No sheep in rehabilitated areas	Do not allow sheep into rehabilitated areas during the first growing season.	Holder, Landowner, Contractor	On-going	Compliance to be verified by ECO and IEA.
05	Maintenance and Monitoring	Risk of erosion at the base of the panels.	Preserve topsoil, control erosion	No bare areas between and below panels	A vegetation cover that at least matches the natural, pre-development cover, should be always maintained between and beneath the solar panels.	Holder	On-going	Compliance to be verified by ECO and IEA.
05	Maintenance and Monitoring	Risk of erosion at the base of the panels.	Preserve topsoil, control erosion	Visual inspections	Monitoring in the form of visual inspections of the vegetation cover.	Holder	On-going	Compliance to be verified by ECO and IEA.
05	Maintenance and Monitoring	Risk of erosion at the base of the panels.	Preserve topsoil, control erosion	Grass cover at panel bases is maintained	Grass cover at base of panels, particularly on drip line, should be actively maintained.	Holder	On-going	Compliance to be verified by ECO and IEA.
05	Maintenance and Monitoring	Risk of erosion at the base of the panels.	Preserve topsoil, control erosion	Inspections after heavy rainfall events	Inspection of the area frequently especially after intense rainfall and runoff events, with particular emphasis on the dripline areas and at access roads.	Holder	Ongoing	Compliance to be verified by ECO and IEA

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
05	Maintenance and Monitoring	Revegetation may not be sufficient to bind and protect the topsoil from erosion	Restoration of ecological functioning or ecosystem services.	Successful rehabilitation	Regularly monitor the effectiveness of revegetation on the rehabilitated areas, and if necessary, implement appropriate corrective measures, which may include bringing in additional topsoil, mulching and/or additional brush packing depending on the reasons for the failure of the original re-vegetation methods.	Holder, Contractor, SEO	On-going	Compliance to be verified by ECO and IEA.

Table 60. Management Protocol for Aquatic Flora

Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
06	Rehabilitation	A direct loss of local aquatic plants by construction activities in a watercourse.	Reinstate the 'riparian' habitat.	No bare patches	Conduct active rehabilitation during the construction activities according to a rehabilitation plan or implement the Bare Patch Protocol (Appendix C) that will restore the natural vegetation to what it was prior to the construction of, for example, underground pipeline and cable routes, so that the long-term impact could be negligible.	Contractor, SEO	On-going	Compliance to be verified by ECO and IEA.
06	Rehabilitation	A direct loss of local aquatic plants by construction activities in a watercourse.	Reinstate the 'riparian' habitat.	No artificial seeding in the ephemeral drainage line.	As emergent wetlands will recover more quickly than others, artificial seeding is not advised as it creates competition for reestablishment of native facultative and obligate wetland vegetation.	Contractor, SEO	On-going	Compliance to be verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
06	Rehabilitation	A direct loss of local aquatic plants by construction activities in a watercourse.	Reinstate the 'riparian' habitat.	Rehabilitated areas are protected	Cordon off areas under rehabilitation as “no-go areas” to prevent vehicular, pedestrian and livestock access.	Contractor, SEO	On-going	Compliance to be verified by ECO and IEA.
06	Rehabilitation	A direct loss of local aquatic plants by construction activities in a watercourse.	Reinstate the 'riparian' habitat.	Successful rehabilitation using stockpiled sods	Once construction is completed, those sods that were removed during the clearing operation and stored, should be used to rehabilitate the disturbed areas from where they were removed. In the absence of timely rainfall, the sods should be watered well after planting and at least twice more over the next 2 weeks.	Contractor, SEO	On-going	Compliance to be verified by ECO and IEA.

Table 61. Management Protocol for Soil and Rock

Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
07	Rehabilitation	Hydrocarbon spills can contaminate soil resulting in soil pollution	Good quality soil for reinstatement.	No signs of pollution, e.g., contaminated soil. Waybill(s)	Remove all signs of pollution from site, e.g., hydrocarbon spills, slurry, concrete hardpan layers, etc. to the depth of penetration for disposal at an appropriate licensed landfill.	Contractor, SEO	Ongoing	Compliance verified by ECO and IEA
07	Rehabilitation	Hydrocarbon spills can contaminate soil resulting	Good quality soil for reinstatement.	No signs of pollution, e.g., contaminated soil.	Remove all waste from site, e.g., litter, concrete debris or rubble, used oil, etc. for collection by a	Contractor, SEO	Ongoing	Compliance verified by ECO and IEA

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
		in soil pollution		Waybill(s)	registered collector and/or disposal at an appropriate licensed landfill.			
07	Maintenance and Monitoring	Spills from damaged and leaking substations will contaminate the topsoil	Good quality soil for reinstatement.	Field transformers are well maintained	Regular inspections (monthly) and maintenance of field transformers.	Holder	On-going	Compliance to be verified by ECO and IEA
08	Rehabilitation	Altered surface water flow pattern causing ponding or erosion.	Preserve landscape hydrological pattern.	Shaped to natural forms indicative of the site's location within the landscape	All disturbed areas should be reshaped to retain landscape hydrological pattern, that is the natural functioning of the site (as a source, transfer, sink or any combination of these) relating to the redistribution of surface water and sediment.	Contractor	On-going	Compliance to be verified by ECO and IEA
08	Rehabilitation	Altered surface water flow pattern causing ponding or erosion.	Preserve landscape hydrological pattern.	Shaped to natural forms indicative of the site's location within the landscape	Revegetate denuded areas as soon as possible to maintain ground cover across the site.	Contractor	As soon as possible	Compliance to be verified by ECO and IEA
08	Rehabilitation	The driving and parking of vehicles, for example, will compact the ground increasing surface water run-off and erosion.	Good quality soil for reinstatement	Ripped areas have been covered with a sufficient topsoil layer	All compacted surfaces from construction activities must be ripped to a minimum depth of 250 mm in two directions at right angles.	Contractor, SEO	Once-off	Compliance verified by ECO and IEA

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
08	Rehabilitation	The driving and parking of vehicles, for example, will compact the ground increasing surface water run-off and erosion.	Good quality soil for reinstatement	Ripped areas have been covered with a sufficient topsoil layer	Alternatively, smaller compacted or bare areas can be tilled using a hand-held hoe to a depth of 150 – 200 mm, and perpendicular to the prevailing slope.	Contractor, SEO	Once-off	Compliance verified by ECO and IEA
08	Rehabilitation	Insufficient topsoil	Good quality soil for reinstatement	Ripped areas remain rough.	All ripped areas must be left rough to facilitate binding of topsoil.	Contractor, SEO	Once-off	Compliance verified by ECO and IEA
08	Rehabilitation	Insufficient topsoil	Good quality soil for reinstatement	Ripped areas have been covered with a sufficient topsoil layer	Reinstate 150mm – 200mm of topsoil on the ripped subsoil.	Contractor, SEO	Once-off	Compliance verified by ECO and IEA
08	Rehabilitation	Insufficient topsoil	Good quality soil for reinstatement	No rills in the replaced topsoil	Topsoil replaced on steep slopes that are particularly susceptible to erosion must be stabilised with erosion control fabric, mats, netting, or blankets made of natural fibres (proper installation is critical to success).	Engineer, Contractor, SEO	Ongoing	Compliance to verified by ECO and IEA.
08	Rehabilitation	Insufficient topsoil	Good quality soil for reinstatement	Rehabilitated areas have been mulched.	Reinstated topsoil must be stabilised by brush packing the stockpiled mulch from the clearing operations (good mulch-to-soil contact is critical to success).	Contractor, SEO	Once-off	Compliance to be verified by ECO and IEA.
08	Rehabilitation	Topsoil that has been stockpiled for	Restoration of ecosystem services.	Stockpile test results and ameliorated	If the topsoil has been stockpiled for two or more growing seasons, then it shall be tested for pH, nutrients,	Contractor, SEO	Once-off	Compliance to be verified

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
		too long may lose its viability.			colloidal matter, microbes, etc. to determine its viability, and ameliorated accordingly, prior to its reinstatement on disturbed areas.			by ECO and IEA.
08	Rehabilitation	Topsoil that has been stockpiled for too long may lose its viability.	Restoration of ecosystem services.	Topsoil harvesting during dry season	All topsoil harvesting must take place in the dry season (late dry season).	Contractor, SEO	Once-off	Compliance to be verified by ECO and IEA.
08	Rehabilitation	Bare patches (or areas where the original vegetation was cleared or severely disturbed) are susceptible to erosion.	Improve surface water infiltration and minimise erosion.	Restored bare patches.	Implement the Bare Patch Restoration Protocol (Appendix C) from the onset of construction.	Holder, Cpntractor	Continuous	Compliance verified by ECO and IEA
08	Rehabilitation	Areas cleared or disturbed around site might be affected by erosion of topsoil.	Minimize loss of topsoil	Successful revegetation	Replanting activities should be undertaken at the end of the dry season (middle to end September) to ensure optimal conditions for germination and rapid vegetation establishment.	Contractor, SEO	End of dry season	Compliance to be verified by ECO and IEA
08	Rehabilitation	Areas cleared or disturbed around site might be affected by erosion of topsoil.	Minimize loss of topsoil	Successful revegetation	The sowing of grass seeds in combination with the chemical and mechanical water infiltration improvement measures should also be considered for highly degraded areas.	Contractor, SEO	On-going	Compliance to be verified by ECO and IEA

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
08	Rehabilitation	Areas cleared or disturbed around site might be affected by erosion of topsoil.	Minimize loss of topsoil	Successful revegetation	Should plants not successfully establish within two growing seasons after the first planting, new plant material should be provided.	Contractor, SEO	Two growing seasons	Compliance to be verified by ECO and IEA
08	Maintenance and Monitoring	Erosion of rehabilitated terrestrial areas.	Control soil erosion	No signs of erosion	Regularly monitor rehabilitated areas for signs of erosion and implement appropriate stormwater management and erosion control measures at the onset of erosion.	Contractor, SEO	Ongoing	Compliance to verified by ECO and IEA.
08	Maintenance and Monitoring	Erosion of rehabilitated terrestrial areas.	Control soil erosion	No signs of erosion	Stormwater management and erosion control measures shall adhere to the following principles: (a) Identify and control the source of the erosion. (b) Diffuse any concentrated flows. (c) Encourage infiltration of surface water runoff (e.g., good mulch-to-soil contact). (d) Avoid releasing stormwater directly into a watercourse. (e) Repair and stabilise the site of erosion.	Contractor, SEO	Ongoing	Compliance to verified by ECO and IEA.
08	Maintenance and Monitoring	Risk of erosion	Control soil erosion	No signs of erosion	Annual rehabilitation activities in line with the EMPr requirements. Any erosion problems observed on-site should be rectified as soon as possible using the appropriate	Holder, Contractor, SEO	Annually	Compliance to verified by ECO and IEA.

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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
					revegetation and erosion control works.			
08	Maintenance and Monitoring	Natural revegetation may not be sufficient to bind and protect the topsoil from erosion.	Restoration of ecological functioning or ecosystem services.	Revegetated areas must achieve at least 75% of the aerial cover of adjacent undisturbed areas within the first growing season.	Rehabilitated areas are to be re-seeded by hand with locally indigenous plants if sufficient aerial cover has not been achieved after the first growing season.	Contractor, SEO	Ongoing	Compliance to verified by ECO and IEA.
08	Maintenance and Monitoring	Revegetation may not be sufficient to bind and protect the topsoil from erosion.	Successful revegetation and rehabilitation of disturbed areas.	No signs of erosion	Implement the revegetation and rehabilitation plan.	Contractor, SEO	On-going	Compliance to verified by ECO and IEA.
09	Maintenance and Monitoring	Change the visual aesthetics of the Nama Karoo.	Retain aesthetic values and sense of place or restore ecosystem cultural services.	Shaped to natural forms indicative of the site's location within the landscape	All disturbed areas must be reshaped to blend in with the natural surrounding landforms.	Contractor, SEO	Once-off	Compliance to verified by ECO and IEA.

MEMBERS: J.A. Bowers (M Tech, Pr.Sci.Nat.) & S.D. MacGregor (M.Sc., Pr.Sci.Nat.)
Reg: 2006/023163/23

Table 62. Management Protocol for Ground and Surface Water

Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
10	Rehabilitation	The retention of foreign temporary structures and materials could alter river or stream channel hydraulics during high flows.	Preserve river channel hydrological pattern.	No sign of temporary man-made structures or infrastructure on site.	Remove all temporary man-made structures, e.g., river diversion works and materials, e.g., sandbags, plastic sheets, etc. from within the watercourse.	Contractor, SEO	Once-off	Compliance to be verified by the ECO and IEA
10	Rehabilitation	Reshaping could alter river or stream channel hydraulics during high flows.	Preserve river channel hydrological pattern.	Shaped to natural forms.	The final grading of the disturbed areas within the bed and banks should not significantly alter the flow characteristics of the river during periods of high flows, e.g., shaped to natural forms that blend in with pre-construction topography.	Engineer, Contractor, SEO	Once-off	Compliance to be verified by ECO and IEA.
10	Rehabilitation	Reshaping could alter river or stream channel hydraulics during high flows.	Preserve river channel hydrological pattern.	Shaped to natural forms.	Road crossings and stormwater outlets associated with any watercourse crossing should be designed in such a way so as not to cause erosion of the bed or banks by incorporating such stabilisation mechanisms as terracing, boulder and rock placement, minor gabion basket work construction, reno mattresses and/or rock pitching.	Engineer, Contractor, SEO	Once-off	Compliance to be verified by ECO and IEA.

MEMBERS: J.A. Bowers (M Tech, Pr.Sci.Nat.) & S.D. MacGregor (M.Sc., Pr.Sci.Nat.)
Reg: 2006/023163/23

Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
10	Rehabilitation	Areas cleared or disturbed around site might be affected by erosion of topsoil. Consequence: Increased turbidity and siltation in watercourses.	Minimize loss of topsoil	No signs of exposed erosions channels	Any erosion channels developing after the construction period should be appropriately backfilled (and compacted where relevant) and the areas restored to a condition similar to the condition before the erosion occurred.	Holder, Contractor, SEO	Post-construction	Compliance to be verified by ECO and IEA.
10	Rehabilitation	Areas cleared or disturbed around site might be affected by erosion of topsoil. Consequence: Increased turbidity and siltation in watercourses.	Minimize loss of topsoil	Shaped to natural forms.	Site rehabilitation should as far as is feasible aim to restore surface draining patterns, natural soil and vegetation.	Contractor, SEO	Post-construction	Compliance to be verified by ECO and IEA.
10	Maintenance and Monitoring	Erosion of rehabilitated watercourses.	Preserve stream or river channel hydrological pattern.	No signs of erosion	Regularly monitor watercourse crossings for signs of erosion and implement appropriate stormwater management and erosion control measures at the onset of erosion.	Contractor, SEO	Post-construction	Compliance to be verified by ECO and IEA.
11	Maintenance and Monitoring	Natural Resource depletion (groundwater reserve) -	Minimise water usage during construction (and operation) to	Abstraction records	The abstraction of groundwater from both properties combined (but limited to sub-catchment HRU2 of Quaternary Catchment D62D), including all boreholes	Holder, Contractor.	Ongoing	Compliance to be verified by ECO and IEA.

MEMBERS: J.A. Bowers (M Tech, Pr.Sci.Nat.) & S.D. MacGregor (M.Sc., Pr.Sci.Nat.)
Reg: 2006/023163/23

Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
		Construction will require the abstraction of water from boreholes for dust suppression, mixing concrete and potable usage. Declining groundwater abstraction yields as a result of no water quality and quantity monitoring plan.	avoid depleting the underground aquifer.		contained thereon, shall not exceed 216 m3/ day (or 78 840,43 m3/ yr) during the construction period (including when it overlaps with operation), and 150 m3/day (or 54 750,3 m3/ yr) during operation.			
11	Maintenance and Monitoring	Natural Resource depletion (groundwater reserve) - Construction will require the abstraction of water from boreholes for dust suppression, mixing concrete and potable usage.	Minimise water usage during construction (and operation) to avoid depleting the underground aquifer.	Abstraction records	Abstraction may not exceed the sustainable abstraction yield at the recommended pumping rate of 8 hrs per day for each borehole, that is 6,58 l/s @ 8hrs (or 189,5 m3/8hr day) for BH4 and 5,11 l/s @ 8 hrs (or 147,17 m3/8hr day) for BH5.	Holder, Contractor.	Ongoing	Compliance to be verified by ECO and IEA.

MEMBERS: J.A. Bowers (M Tech, Pr.Sci.Nat.) & S.D. MacGregor (M.Sc., Pr.Sci.Nat.)
Reg: 2006/023163/23

Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
		Declining groundwater abstraction yields as a result of no water quality and quantity monitoring plan.						
11	Maintenance and Monitoring	Natural Resource depletion (groundwater reserve) - Construction will require the abstraction of water from boreholes for dust suppression, mixing concrete and potable usage. Declining groundwater abstraction yields as a result of no water quality and quantity monitoring plan.	Minimise water usage during construction (and operation) to avoid depleting the underground aquifer.	Water level monitoring results	Undertake water level monitoring of boreholes within a 1.5 km radius of the pumping borehole. If a decline in water levels is noted in all boreholes, because of pumping, the abstraction rate should be lowered to prevent aquifer depletion.	Holder	Ongoing	Compliance to be verified by ECO and IEA.

MEMBERS: J.A. Bowers (M Tech, Pr.Sci.Nat.) & S.D. MacGregor (M.Sc., Pr.Sci.Nat.)
Reg: 2006/023163/23

Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
11	Maintenance and Monitoring	Natural Resource depletion (groundwater reserve) - Construction will require the abstraction of water from boreholes for dust suppression, mixing concrete and potable usage. Declining groundwater abstraction yields as a result of no water quality and quantity monitoring plan.	Minimise water usage during construction (and operation) to avoid depleting the underground aquifer.	Pump tests	All new boreholes drilled in the project area (such as T1 or T2) must be pump tested, and interference (if any) with other existing boreholes (closer than 500 m) be evaluated by long-duration pump tests.	Holder	When new boreholes are drilled.	Compliance to be verified by ECO and IEA.
11	Maintenance and Monitoring	Natural Resource depletion (groundwater reserve) - Construction will require the abstraction of water from boreholes for	Minimise water usage during construction (and operation) to avoid depleting the underground aquifer.	Water level logbook	Conduct multi borehole water level logging, to ensure that no cumulative dewatering impacts are taking place for boreholes which may be in the same contact zones.	Holder	Ongoing	Compliance to be verified by ECO and IEA.

MEMBERS: J.A. Bowers (M Tech, Pr.Sci.Nat.) & S.D. MacGregor (M.Sc., Pr.Sci.Nat.)
Reg: 2006/023163/23

Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
		dust suppression, mixing concrete and potable usage. Declining groundwater abstraction yields as a result of no water quality and quantity monitoring plan.						
11	Maintenance and Monitoring	Natural Resource depletion (groundwater reserve) - Construction will require the abstraction of water from boreholes for dust suppression, mixing concrete and potable usage. Declining groundwater abstraction yields as a result of no	Minimise water usage during construction (and operation) to avoid depleting the underground aquifer.	Water wise technologies are installed	Continually investigate and implement water-saving strategies and technologies or alternatives, including designs.	Holder	Ongoing	Compliance to be verified by ECO and IEA.

MEMBERS: J.A. Bowers (M Tech, Pr.Sci.Nat.) & S.D. MacGregor (M.Sc., Pr.Sci.Nat.)
Reg: 2006/023163/23

Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
		water quality and quantity monitoring plan.						
11	Maintenance and Monitoring	It is anticipated that soils downstream of the proposed development, and the non-perennial streams (feeding into temporary livestock watering dams) are the receivers of any sediment runoff or poor-quality runoff from the site. Suspended sediment (or turbidity) during construction in the watercourse can influence water quality.	Minimise water usage during construction (and operation) to avoid depleting the underground aquifer.	Groundwater Monitoring protocol results	Implement the Surface and Groundwater Monitoring Protocol during construction and operation (Appendix D).	Holder	Ongoing	Compliance to be verified by ECO and IEA.

MEMBERS: J.A. Bowers (M Tech, Pr.Sci.Nat.) & S.D. MacGregor (M.Sc., Pr.Sci.Nat.)
Reg: 2006/023163/23

Table 63. Management Protocol for Atmosphere

Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
12	Maintenance and Monitoring	Altered surface water flow patterns, e.g., changing sheet flow (natural open system) to concentrated flows leads to erosion.	Preserve topsoil, control soil erosion.	No excessive dust	Ensure dust abatement measures are in place during and post construction.	Holder, Contractor, SEO	Ongoing	Compliance to be verified by ECO and IEA.
13	Maintenance and Monitoring	The PV "heat island" (PVHI) effect.	Increased ecosystem resilience to atmospheric warming.	Reduce the potential PVHI: Restored bare patches.	Halt and reverse existing ecological degradation primarily from extensive livestock production or other drivers to counter increased climatic uncertainty - restore all bare patches of soil with vegetation.	Holder	Continuous	Compliance to be verified by ECO and IEA.
13	Maintenance and Monitoring	The PV "heat island" (PVHI) effect.	Increased ecosystem resilience to atmospheric warming.	Reduce the potential PVHI: No signs of overgrazing.	Ensure responsible natural resource management that maintains the integrity of ecosystems and the continued provision of ecosystem services to current and future generations.	Holder, Landowner	Continuous	Compliance to be verified by ECO and IEA.

Table 64. Management Protocol for Terrestrial and Avian Ecosystem

MEMBERS: J.A. Bowers (M Tech, Pr.Sci.Nat.) & S.D. MacGregor (M.Sc., Pr.Sci.Nat.)
Reg: 2006/023163/23

Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
14	Rehabilitation	The retention of temporary structures and infrastructure (including roads) will change the habitat to the benefit or detriment of various faunal species.	Restoration of ecological functioning or biodiversity pattern.	No sign of temporary man-made structures or infrastructure on site.	Remove all temporary man-made structures and infrastructure including buildings, fences, barriers, and other demarcations, e.g., danger tape, associated with the construction site.	Contractor, SEO	Once-off	Compliance to be verified by ECO and IEA.
14	Rehabilitation	The retention of temporary structures and infrastructure (including roads) will change the habitat to the benefit or detriment of various faunal species.	Restoration of ecological functioning or biodiversity pattern.	No sign of temporary man-made structures or infrastructure on site.	The contractor must ensure that all fence uprights are appropriately removed, ensuring that no uprights are cut at ground level but rather removed completely.	Contractor, SEO	Once-off	Compliance to be verified by ECO and IEA.
14	Rehabilitation	The retention of temporary structures and infrastructure (including roads) will change the habitat to the benefit or detriment of various faunal species.	Restoration of ecological functioning or biodiversity pattern.	Revegetated unused roads	Any access route deviation from that in the written agreement must be closed and re-vegetated immediately, at the contractor's expense.	Contractor, SEO	Once-off	Compliance to be verified by ECO and IEA.

MEMBERS: J.A. Bowers (M Tech, Pr.Sci.Nat.) & S.D. MacGregor (M.Sc., Pr.Sci.Nat.)
Reg: 2006/023163/23

Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
14	Rehabilitation	Habitat changes beneath the solar panels.	Ensure least impact on animal behaviour.	No bare areas between and below panels	Restore the natural vegetation on disturbed bare areas between and below the solar panels after construction to protect the topsoil and encourage invertebrate species richness, that is suitable prey availability for bats.	Contractor, SEO	Once-off	Compliance to be verified by ECO and IEA.
14	Rehabilitation	Habitat changes beneath the solar panels.	Ensure least impact on animal behaviour.	No bare areas between and below panels	Sow indigenous plant seed mixes into the tilled rows, using a combination of palatable locally indigenous Karoo dwarf shrubs (or 'bossies') and grasses at a seeding density or rate of 5 to 15 kg of seed mixture per hectare.	Contractor, SEO	Once-off	Compliance to be verified by ECO and IEA.
14	Facility management	Impacts on Ecological Support Areas (ESAs) and general ecological processes within the site	Good environmental management of the facility in accordance with management plans.	Compliance with open space management plan	Adhere and implement the open space management plan.	Holder	On-going	Compliance to be verified by ECO and IEA.
14	Facility management	Impacts on Ecological Support Areas (ESAs) and general ecological processes within the site	Good environmental management of the facility in accordance with management plans.	Compliance with all plans and monitoring taking place	Ensure that all the operational phase management plans are fully implemented and that the associated monitoring and feedback mechanisms to management are in place.	Holder	On-going	Compliance to be verified by ECO and IEA.

MEMBERS: J.A. Bowers (M Tech, Pr.Sci.Nat.) & S.D. MacGregor (M.Sc., Pr.Sci.Nat.)
Reg: 2006/023163/23

Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
15	Grazing management	Removal of vegetation and disruption to the watercourse	Preserve the agricultural potential and maintain or improve the agricultural productivity of the land.	Grazing sheep	The use of domestic livestock (preferably sheep) should be used to control the height of vegetation instead of herbicides.	Holder, Landowner	On-going	Compliance to be verified by ECO and IEA.
15	Grazing management	Removal of vegetation and disruption to the watercourse	Preserve the agricultural potential and maintain or improve the agricultural productivity of the land.	No signs of overgrazing	Ensure that the vegetation in the solar plant farm footprint is not overgrazed.	Holder, Landowner	On-going	Compliance to be verified by ECO and IEA.
15	Grazing management	Overgrazing	Improve surface water infiltration and minimise erosion. Achieve good to excellent veld condition classes.	Grazing strategy	Develop a long-term grazing strategy using the findings (land capability classes/grazing units and carrying capacities) as well as Grazing Management Principles (Appendix F) identified in the Soil Mapping and Grazing Potential Assessments.	Holder, Landowner	On-going	Compliance to be verified by ECO and IEA.
15	Grazing management	Overgrazing	Improve surface water infiltration and minimise erosion. Achieve good to excellent veld condition classes.	Grazing strategy	Implement good rangeland management practices defined by an adopted long-term grazing strategy with small stock for the areas underneath the solar panels to maintain optimal vegetation cover and to reduce soil erosion and runoff.	Holder, Landowner	On-going	Compliance to be verified by ECO and IEA.

MEMBERS: J.A. Bowers (M Tech, Pr.Sci.Nat.) & S.D. MacGregor (M.Sc., Pr.Sci.Nat.)
Reg: 2006/023163/23

Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
15	Maintenance and monitoring	Removal of vegetation and disruption to the ephemeral watercourse	Improve surface water infiltration and minimise erosion. Achieve good to excellent veld condition classes	Grazing monitoring results	Monitor the effects of the grazing management strategy on veld condition as (a) grazing during and shortly after a drought can cause palatable plant species to die off, (b) heavy grazing pressure in summer will favour the growth of karoid shrubs, and (c) high grazing pressure during winter will favour the growth of perennial grasses (Mucina and Rutherford, 2011) all of which can affect insect abundance which in turn may affect bats.	Holder, Landowner	On-going	Compliance to be verified by ECO and IEA.
15	Maintenance and monitoring	The development of bare patches is a degradation process that can be attributed to overgrazing and patch selection, usually in combination with drought conditions	Ecological restoration to improve climate change resilience and increase the production potential for improved grazing capacity.	Vegetation surveys	Undertake vegetation surveys of rehabilitated bare patches annually, measuring at least plant density, species composition and richness, vegetation cover and growth stage (seedling, vegetative and reproductive).	Holder	Annually	Compliance to be verified by ECO and IEA.
15	Maintenance and monitoring	The development of bare patches is a degradation process that can be attributed to	Ecological restoration to improve climate change resilience and	Vegetation survey results	The results of the vegetation surveys should inform the need for and nature of any further interventions.	Holder	Annually	Compliance to be verified by ECO and IEA.

MEMBERS: J.A. Bowers (M Tech, Pr.Sci.Nat.) & S.D. MacGregor (M.Sc., Pr.Sci.Nat.)
Reg: 2006/023163/23

Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
		overgrazing and patch selection, usually in combination with drought conditions	increase the production potential for improved grazing capacity.					
15	Maintenance and monitoring	The development of bare patches is a degradation process that can be attributed to overgrazing and patch selection, usually in combination with drought conditions	Ecological restoration to improve climate change resilience and increase the production potential for improved grazing capacity.	Restored areas	Interventions and vegetation surveys may cease once the fence has been removed after 4 years and the site has been restored to the same or a better condition than the adjacent remnant vegetation, e.g., species richness, vegetation cover and plant density are comparable or better, and seedling, vegetative and reproductive growth stages of all species are recorded.	Holder	4 years after the fence has been removed and site is restored	Compliance to be verified by ECO and IEA.
15	Maintenance and monitoring	Mismanagement	Improve surface water infiltration and minimise erosion. Achieve good to excellent veld condition classes.	Grazing assessments and Veld condition results	Apply follow-up grazing assessments as well as annual monitoring of veld condition and veld condition trends, estimate current grazing capacity, and adapt grazing management accordingly.	Holder, Landowner	Annually	Compliance to be verified by ECO and IEA.
15	Maintenance and monitoring	Mismanagement	Improve surface water infiltration and minimise erosion. Achieve good to excellent	Veld condition results	Annual monitoring of veld condition should also investigate the influence of planned resting on veld condition as the exclusion of grazing can result in degradation of the veld and erosion.	Holder, Landowner	Annually	Compliance to be verified by ECO and IEA.

MEMBERS: J.A. Bowers (M Tech, Pr.Sci.Nat.) & S.D. MacGregor (M.Sc., Pr.Sci.Nat.)
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Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
			veld condition classes.					
16	Maintenance and monitoring	Recruitment of alien invasive plants. Disturbance can favour the recruitment of pioneer species and alien invasive plants, threatening habitats and alter the composition, structure and functioning of ecosystems.	Reduce the potential for the recruitment of alien invasive plants.	No adult or reproductively mature alien invasive plants observed on site.	The rehabilitated construction site must be monitored regularly for the presence of alien invasive plant species.	Holder Contractor, SEO	Once-off	Compliance to be verified by ECO and IEA.
16	Maintenance and monitoring	Recruitment of alien invasive plants. Disturbance can favour the recruitment of pioneer species and alien invasive plants, threatening habitats and alter the composition, structure and functioning of ecosystems.	Reduce the potential for the recruitment of alien invasive plants.	No adult or reproductively mature alien invasive plants observed on site.	Immediately control alien invasive plants upon being identified, using preferably mechanical control methods.	Holder, Contractor, SEO	On-going	Compliance to be verified by ECO and IEA.

MEMBERS: J.A. Bowers (M Tech, Pr.Sci.Nat.) & S.D. MacGregor (M.Sc., Pr.Sci.Nat.)
Reg: 2006/023163/23

Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible Person(s)	Timeframe / Frequency	Monitoring
16	Maintenance and monitoring	Recruitment of alien invasive plants. Disturbance can favour the recruitment of pioneer species and alien invasive plants, threatening habitats and alter the composition, structure and functioning of ecosystems.	Reduce the potential for the recruitment of alien invasive plants.	No adult or reproductively mature alien invasive plants observed on site.	Do not apply foliar hand spray chemical applications under conditions where chemical drift may impact non-targeted species (as indicated on the manufacturer's directions for use on the herbicide label)	Holder, Contractor, SEO	On-going	Compliance to be verified by ECO and IEA.
16	Maintenance and monitoring	Recruitment of alien invasive plants. Disturbance can favour the recruitment of pioneer species and alien invasive plants, threatening habitats and alter the composition, structure and functioning of ecosystems.	Reduce the potential for the recruitment of alien invasive plants.	No adult or reproductively mature alien invasive plants observed on site.	Use Working for Water guidelines for approved herbicides.	Holder, Contractor, SEO	On-going	Compliance to be verified by ECO and IEA.

MEMBERS: J.A. Bowers (M Tech, Pr.Sci.Nat.) & S.D. MacGregor (M.Sc., Pr.Sci.Nat.)
Reg: 2006/023163/23

Table 65. Management Protocol for Aquatic Ecosystem

Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
17	Maintenance and monitoring	The largest risk is potential run-off and stormwater discharge from the site into the surrounding causing soil erosion.	Minimise the risk of erosion on dispersive soils.	Good stormwater management	Stormwater run-off and discharge from the site shall be managed according to the CSWMP (Appendix E).	Holder, Contractor, SEO	On-going	Compliance to be verified by ECO and IEA.

Table 66. Management Protocol for Economic and Social

Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
19	Facility management	A solar PV facility of this size (400 MW), particularly when considered together with Phases 1 and 2 (1 GW in total), will make a significant contribution to our country's power deficit when supply	The Solar PV facility is energy efficient, social, and financially feasible.	A well-managed facility	Planning decisions relating to the design and management of the Solar PV Facility and associated infrastructure should always be founded on the guiding principle to optimise generational efficiency whilst simultaneously improving the economic feasibility of the project as well as the social and ecological integrity of the local community and ecosystem that supports it, or at the very least without compromising either aspect.	Holder	On-going	Compliance to be verified by ECO and IEA

MEMBERS: J.A. Bowers (M Tech, Pr.Sci.Nat.) & S.D. MacGregor (M.Sc., Pr.Sci.Nat.)
Reg: 2006/023163/23

Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
		falls behind demand.						

Table 67. Management Protocol for Public Services

Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
20	Rehabilitation	Increased traffic can result in corrugations and potholes on roads.	Good road conditions.	No corrugations or potholes	Ensure access roads are restored to original pre-construction road condition.	Holder, Contractor SEO	On-going	Compliance to be verified by ECO and IEA.
21	Maintenance and monitoring	It is anticipated that soils downstream of the proposed development, and the non-perennial streams (feeding into temporary livestock watering dams) are the receivers of any sediment runoff or poor-quality runoff from the site. Sedimentation (or turbidity)	Minimise the risk of erosion on dispersive soils.	No signs of erosion and sedimentation	Implement the Surface and Groundwater Monitoring Protocol during construction and operation (Appendix D).	Holder	On-going	Compliance to be verified by ECO and IEA.

MEMBERS: J.A. Bowers (M Tech, Pr.Sci.Nat.) & S.D. MacGregor (M.Sc., Pr.Sci.Nat.)
Reg: 2006/023163/23

Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
		caused by working in the watercourse can increase the cost of treating drinking water.						

Table 68. Management Protocol for Visual Aesthetics

Impact No.	Mgt Category	Identified Impacts and Risks	Impact Management Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsible person(s)	Timeframe / Frequency	Monitoring
22	Rehabilitation	Decrease in the “sense of place” as it relates to noise, visual and light pollution.	Retain aesthetic values and sense of place or restore ecosystem cultural services.	Successful rehabilitation	Sense of place is a personal experience, but successful rehabilitation will go a long way in recreating a rural sense of place.	Holder, Contractor, SEO	On-going	Compliance to be verified by ECO and IEA.
22	Rehabilitation	Change the visual aesthetics of the Nama Karoo.	Retain aesthetic values and sense of place or restore ecosystem cultural services.	Shaped to natural forms indicative of the site’s location within the landscape	All disturbed areas must be reshaped to blend in with the natural surrounding landforms.	Contractor, SEO	Post-construction	Compliance to be verified by ECO and IEA.

MEMBERS: J.A. Bowers (M Tech, Pr.Sci.Nat.) & S.D. MacGregor (M.Sc., Pr.Sci.Nat.)
Reg: 2006/023163/23

Appendix A - CHANCE FINDS PROTOCOL

<table>
<tr><th colspan="3">PIA SPECIALISTS CHANCE FOSSIL FINDS PROTOCOL</th></tr>
<tr><th colspan="3">APPENDIX 1: SOVENTIX SOLAR PV PROJECTS (PHASES 1 TO 3) ON VARIOUS FARMS NEAR HANOVER</th></tr>
<tr><td>Province & region:</td><td colspan="2">Northern Cape: Pixley Ka Seme District</td></tr>
<tr><td>Responsible Heritage Resources Agency</td><td colspan="2">SAHRA (Contact details: SAHRA, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa. Phone: +27 (0)21 462 4502. Fax: +27 (0)21 462 4509. Web: www.sahra.org.za).</td></tr>
<tr><td>Rock unit(s)</td><td colspan="2">Middle Permian Adelaide Subgroup (Lower Beaufort Group, Karoo Supergroup), Late Caenozoic alluvium, pan sediments, surface gravels, soils</td></tr>
<tr><td>Potential fossils</td><td colspan="2">Rare vertebrate bones and teeth, petrified wood and other plant material, trace fossils within Beaufort Group sediments. Fossil mammal bones, teeth, horn cores, freshwater molluscs, calcretised termitaria, plant material in Late Caenozoic alluvium and pan deposits.Blocks of reworked silicified wood within surface gravels and older alluvium.</td></tr>
<tr><td rowspan="9">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:</td></tr>
<tr><td colspan="2">Accurate geographic location – describe and mark on site map / 1: 50 000 map / satellite image / aerial photo</td></tr>
<tr><td colspan="2">Context – describe position of fossils within stratigraphy (rock layering), depth below surface</td></tr>
<tr><td colspan="2">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:</td><td>3. If <u>not</u> feasible to leave fossils in situ (emergency procedure only):</td></tr>
<tr><td>Alert Heritage Resources Agency and project palaeontologist (if any) who will advise on any necessary mitigation.</td><td>Carefully remove fossils, as far as possible still enclosed within the original sedimentary matrix (e.g. entire block of fossiliferous rock)</td></tr>
<tr><td>Ensure fossil site remains safeguarded until clearance is given by the Heritage Resources Agency for work to resume.</td><td>Photograph fossils against a plain, level background, with scale</td></tr>
<tr><td></td><td>Carefully wrap fossils in several layers of newspaper / tissue paper / plastic bags</td></tr>
<tr><td></td><td>Safeguard fossils together with locality and collection data (including collector and date) in a box in a safe place for examination by a palaeontologist</td></tr>
</table>

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		Alert Heritage Resources Agency and project palaeontologist (if any) who will advise on any necessary mitigation
	4. If required by Heritage Resources Agency, ensure that a suitably-qualified specialist palaeontologist is appointed as soon as possible by the developer.	
	5. Implement any further mitigation measures proposed by the palaeontologist and Heritage Resources Agency	
Specialist palaeontologist	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.	

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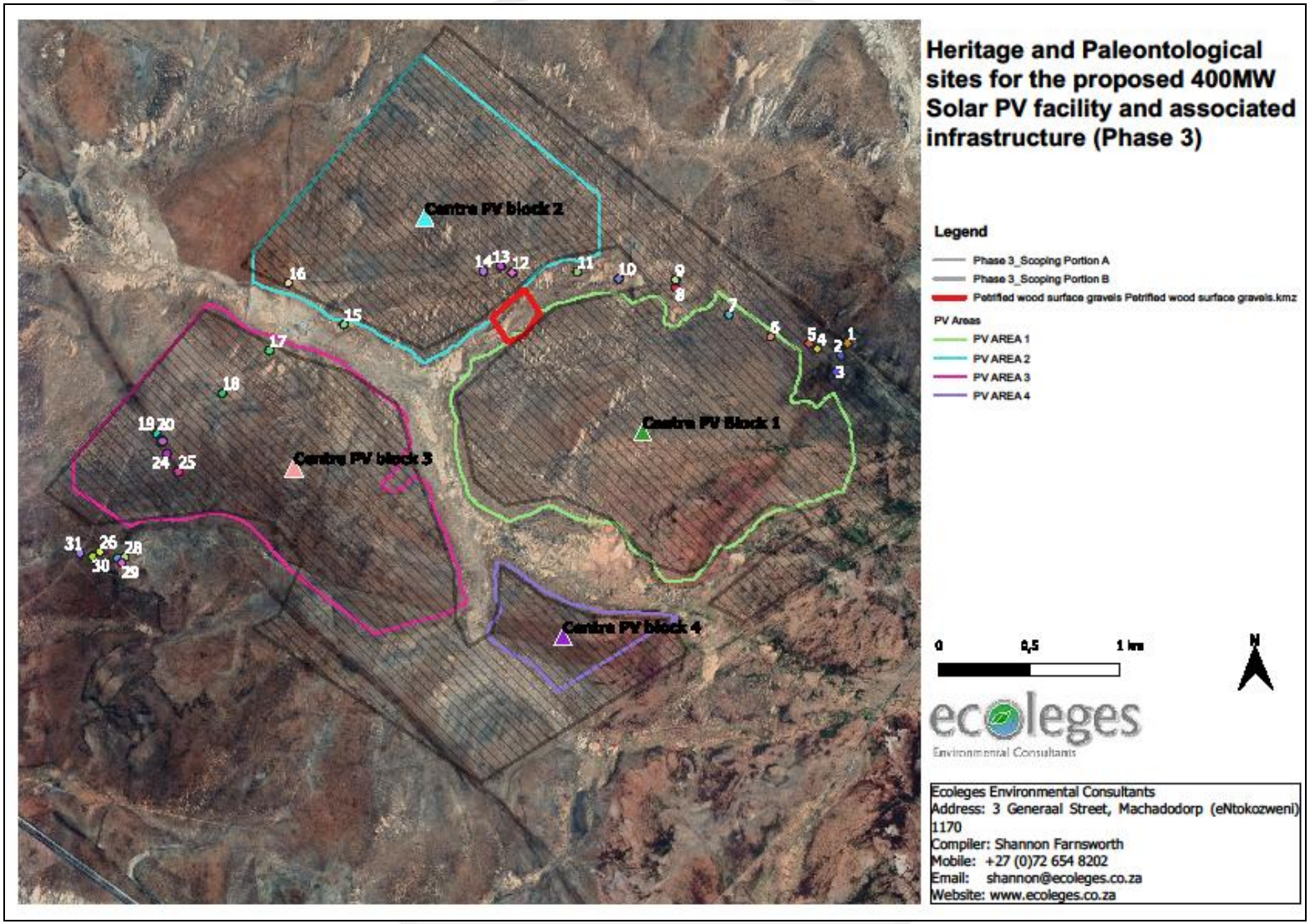

Figure 4: Heritage sites including the Old Wagon Road Section (to be preserved sites 19 - 23) and Palaeontological site on Phase 3**.**

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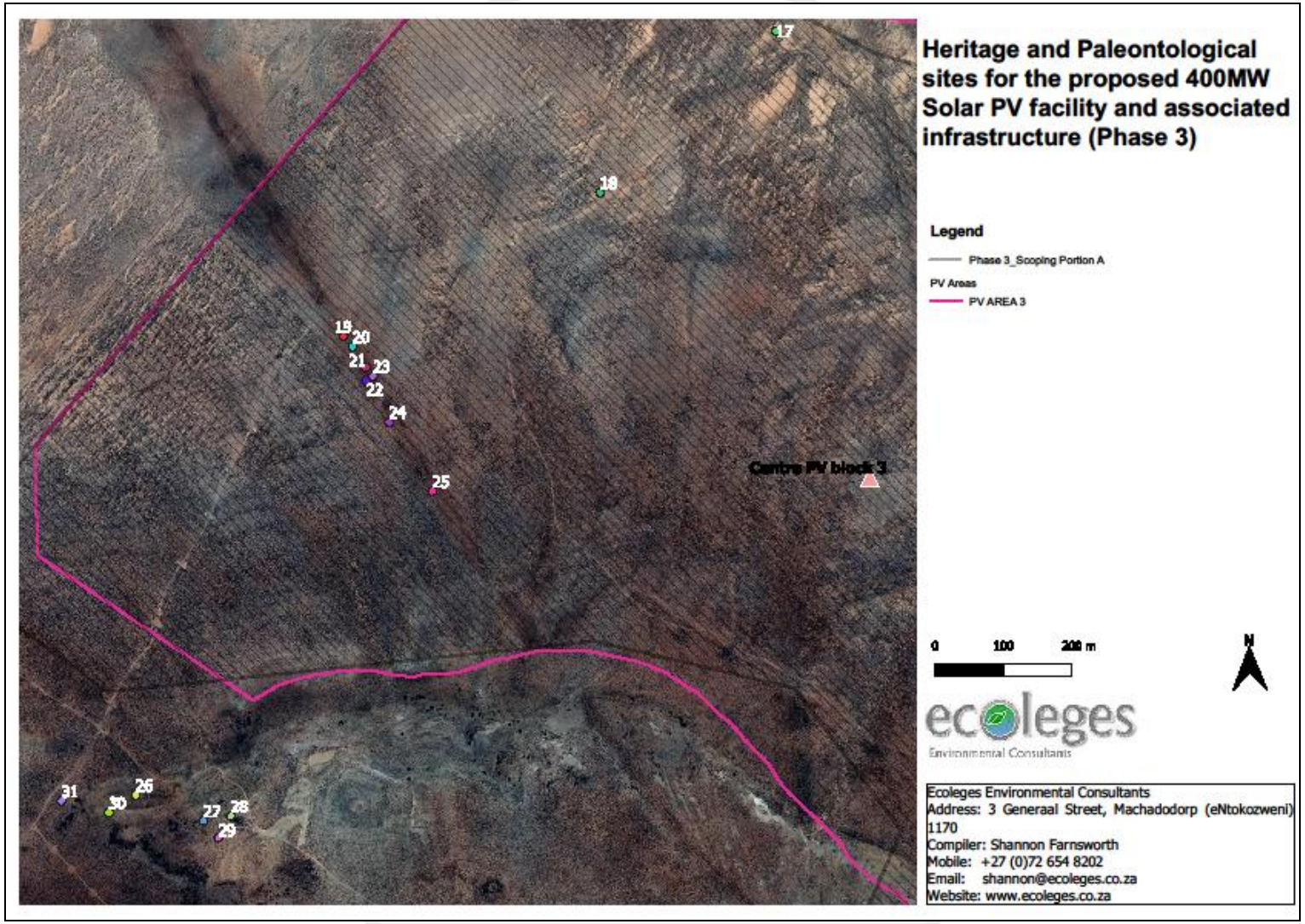

Figure 5: Close up scale of the Old Wagon Road Section (to be preserved sites 19 - 23) on Phase 3.

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Figure 6: Isolated small block of dark, cherty silicified wood found among surface gravels (scale in cm and mm) (30.854486° S, 24.339279° E). Similar blocks of reworked wood are likely to occur widely within the project area but are of very limited scientific value.

Figure 7: Isolated small block of pale silicified wood reworked into surface gravels (scale in cm and mm). The preservation of the woody fabric here is good (30.828441° S, 24.361058° E).

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Figure 8: The distribution of 31 sites found during the June 2022 field assessment (Google Earth 2022).

Figure 9: One of the stone cairns that formed part of the old wagon road/track (Sites 19- 25).

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Appendix B1 - TRENCHING IN DISPERSIVE SOILS PROTOCOL

Activity:
Trenching for underground cables and/or pipelines
Management Outcome:
Minimise the risk of tunnel erosion in dispersive soils.
Source:
Hardie M. (2009), "Dispersive Soils and their Management, Technical Reference Manual." Department of Primary Industries and Water, State of Tasmania, Australia (ISBN 978-0-7246-6774-1)
Impact:
Supplying services via trenches in dispersive soils can cause tunnel erosion.
Consequence:
Trenches may be used to supply services such as water and electricity, however in dispersive soils, the increased porosity of repacked soil within the trench can lead to tunnel erosion and damage to pipes and cables.
Any degradation of the soil-terrain complex that undermines its capacity to function - from storing water and recycling nutrients to resisting erosion - will lead to a decline in primary production and diminish energy flow to higher trophic levels. Primary production is an ecosystem supporting service that maintains other ecosystem services, so its harm can lead to ecosystem collapse.
Mitigations:
1. Identify areas with dispersive subsoils – determine if any affected bare patches are potential sodic sites by performing a chemical analysis, such as Exchangeable Sodium Percent (ESP) or Sodium Absorption Ratio (SAR) to relate the relative abundance of exchangeable cations to aggregate stability and dispersion.
2. As far as is practical, avoid disturbance to areas with dispersive subsoils.
3. Minimise excavation of dispersive soils or where possible do not remove or disturb topsoil or vegetation.
4. Undertake chemical amelioration. Undertake soil analyses to determine appropriate application rates for gypsum (calcium sulphate) or lime (calcium carbonate) to treat sodic soils.
5. Perform precise compaction. A high degree of compaction reduces soil permeability, restricting the movement of water and dispersed clay through the soil matrix, which decreases the severity of dispersion and restricts tunnel development.
6. Reshape the surface. The surface of the repacked material should be finished with a convex shape to ensure runoff is not able to pond on top of the reclaimed area.

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7. Install sand blocks/barriers. Sand blocks trap entrained sand and silt, blocking the exit of the tunnel and preventing further tunnel development.

- Install a sand block perpendicular to the trench every 20 m down the slope. Secure geotextile to the cable or pipeline to prevent water flowing past the sand block.
- The depth of the sand block is determined by the depth of dispersive soils or tunnel erosion.
- The span length of the structure is determined by the width of the tunnelling.
- Extremities should be curved upslope to prevent the structure from being by-passed.
- Install geotextile on the downslope wall to prevent collapse or removal of sand following settlement or erosion.
- Apply gypsum (around 5% by weight) to act as an electrolyte source for water infiltrating into the sand block and prevent further dispersion.
- Construct an earth mound upslope of the structure to prevent run-on entering the sand blocks.

8. Apply topsoil and revegetate.

- Cover exposed dispersive subsoils with at least 150 mm of non-dispersive topsoil.
- Sow with an appropriate mix of grass and/or shrub species.
- In some cases, it will be necessary to protect the topsoil from erosion with 'jute' cloth or similar product.

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Appendix B2 - ROADS AND CULVERTS IN DISPERSIVE SOILS

Activity:
Construction of roads and culverts
Management Outcome:
Minimise the risk of erosion.
Source:
Hardie M. (2009), "Dispersive Soils and their Management, Technical Reference Manual." Department of Primary Industries and Water, State of Tasmania, Australia (ISBN 978-0-7246-6774-1)
Impact:
Constructing roads and culverts in dispersive soils can cause erosion.
Consequence:
Construction of roads on dispersive soils is difficult due to their low bearing capacity when wet. Concentrating water in roadside culverts and drains which have been excavated into dispersive soils often leads to erosion and collapse of the road batter adjacent embankments.
Any degradation of the soil-terrain complex that undermines its capacity to function - from storing water and recycling nutrients to resisting erosion - will lead to a decline in primary production and diminish energy flow to higher trophic levels. Primary production is an ecosystem supporting service that maintains other ecosystem services, so its harm can lead to ecosystem collapse.
Mitigations:
1. Identify areas with dispersive subsoils – determine if any affected bare patches are potential sodic sites by performing a chemical analysis, such as Exchangeable Sodium Percent (ESP) or Sodium Absorption Ratio (SAR) to relate the relative abundance of exchangeable cations to aggregate stability and dispersion.
2. As far as is practical, avoid disturbance to areas with dispersive subsoils.
3. Minimise excavation of dispersive soils or where possible do not remove or disturb topsoil or vegetation.
4. Consider carting non-sodic soil to create appropriate road surfaces without the need for excavation.
5. Undertake chemical amelioration. Undertake soil analyses to determine appropriate rates of application rates for gypsum (calcium sulphate) or lime (calcium carbonate) to treat sodic soils.
6. Perform precise compaction. A high degree of compaction reduces soil permeability, restricting the movement of water and dispersed clay through the soil matrix, which decreases the severity of dispersion and restricts tunnel development.
7. Consideration should be given to spreading topsoil, applying gypsum and re-vegetating either side of the roadway to ensure runoff doesn't initiate further tunnelling.
8. In most cases managing runoff without excavating culverts is the best means of reducing the erosion risk.
9. Road design needs to ensure runoff is spread out and dissipated over wide, well vegetated areas.
10. Consider carting non-sodic soil to create appropriate drains without the need for excavation, e.g., alternative road design using road bars and diversion mounds (instead of mitre drains) to shed water into stable areas.

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11. If possible do not discharge runoff from hard areas into areas with dispersive soils or excavate culverts and drains in dispersive soils.
12. Ensure that culverts and drains excavated into dispersive subsoils are capped with non-dispersive clays mixed with gypsum, topsoiled, and vegetated. • Treat exposed subsoil with gypsum or hydrated lime. • Cover/cap treated subsoil with a thick layer (e.g., 200-300mm) of non-dispersive clay preferably also mixed with either gypsum or hydrated lime. • Sow with an appropriate mix of grass species. • In some cases, it will be necessary to protect the topsoil from erosion with 'jute' cloth or similar product.

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Appendix B3 - SOLAR ARRAYS ON DISPERSIVE SOILS PROTOCOL

Activity:
Construction of solar PV panel arrays
Management Outcome:
Minimise the risk of erosion on dispersive soils.
Source:
Hardie M. (2009), "Dispersive Soils and their Management, Technical Reference Manual." Department of Primary Industries and Water, State of Tasmania, Australia (ISBN 978-0-7246-6774-1)
Impact:
Run-off from solar PV arrays in dispersive soils can cause erosion.
Consequence:
Storm water and runoff from hard surfaces such as solar PV panels, need to be managed to prevent initiation of erosion.
Any degradation of the soil-terrain complex that undermines its capacity to function - from storing water and recycling nutrients to resisting erosion - will lead to a decline in primary production and diminish energy flow to higher trophic levels. Primary production is an ecosystem supporting service that maintains other ecosystem services, so its harm can lead to ecosystem collapse.
Mitigations:
1. Identify areas with dispersive subsoils – determine if any affected bare patches are potential sodic sites by performing a chemical analysis, such as Exchangeable Sodium Percent (ESP) or Sodium Absorption Ratio (SAR) to relate the relative abundance of exchangeable cations to aggregate stability and dispersion.
2. Treat and rehabilitate sodic bare patches with appropriate application rates for gypsum (calcium sulphate) or lime (calcium carbonate), ample topsoil and revegetation.
3. As far as is practical, avoid disturbance to areas with dispersive subsoils.
4. Where possible do not remove or disturb topsoil or vegetation.
5. Minimise excavation of dispersive soils - pier or post style construction is a low-risk option for the construction of footings in dispersive soils.
6. Poles should be installed using augurs rather than excavated trenches and ensure the hole is completely filled with concrete above the soil surface or repacked with a mixture of gypsum and soil, with a high level of compaction.
7. Stormwater and runoff should not be allowed to collect or pond on dispersive soils.
8. Runoff should be directed away from susceptible areas (exposed dispersive soils) using diversion mounds created from imported non-dispersive clays rather than trenches or culverts which risk excavation and exposure of dispersive subsoils.
9. Captured runoff should be dissipated and spread over as wide an area as possible, not concentrated in drainage lines.
10. Where possible dispose of captured water in 'safe' areas such as existing well vegetated areas with ample topsoil, stony elevated areas, etc.

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Appendix C - BARE PATCH RESTORATION PROTOCOL

Impact:
The development of bare patches is a degradation process that can be attributed to overgrazing and patch selection, usually in combination with drought conditions.
Consequences:
Bare patches are like open wounds in the landscape, which can fester leading to dysfunctional landscapes, and a loss of ecosystem services, including diminished carrying capacity (supporting service through primary production) and farm income (provisioning service through livestock sales).
Diminished climate change resilience.
Source:
N Visser, C Morris, MB Hardy and JC Botha (2007) Restoring bare patches in the Nama-Karoo of South Africa, African Journal of Range and Forage Science, 24:2, 87 – 96
Assumptions:
Bare patches in the Nama-Karoo can be successfully revegetated with tillage treatments providing for rapid recolonisation of plants as reflected in significantly higher plant density and species richness when compared with no-till alternatives in the short term (over 2 years) (Visser *et al*. 2007).
The addition of branches and seeds only to bare areas in the Nama-Karoo has the potential to result in revegetating the bare areas to the same plant density as tillage treatments in the medium term (5 years); it's just a slower process than when combined with tillage (Visser *et al*. 2007).
Tillage not only breaks the soil crust, allowing the germinated seeds of sown species to take root, but also allows the rapid establishment of plants from the underlying seedbank, thereby increasing species richness compared with no-till treatments (Visser *et al*. 2007).
If branches are readily available, they should be used together with tillage to protect the soil, trap water and nutrients, and provide shelter for seedlings, increasing the chance of survival and overall success rate of the restoration action (Visser *et al*. 2007).
Mitigations:
1. Determine if the bare patches are potential sodic sites by performing a chemical analysis, such as Exchangeable Sodium Percent (ESP) or Sodium Absorption Ratio (SAR) to relate the relative abundance of exchangeable cations to aggregate stability and dispersion.
2. Restoration works should be undertaken in late autumn or early spring at the beginning of the rain season.
3. If the soils are sodic, then undertake chemical amelioration by applying appropriate application rates for gypsum (calcium sulphate) or lime (calcium carbonate) to treat sodic soils.
4. Till the bare patch using a hand-held hoe to a depth of 150 – 200 mm, simultaneously working the lime or gypsum into the soil (if applicable).
5. Tilled rows should be perpendicular to the prevailing slope.
6. Spread topsoil thinly over the tilled area prior to sowing seed using the stockpiled topsoil saved from construction activities.

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7. Sow seed into the tilled rows, using a combination of palatable locally indigenous Karoo dwarf shrubs (or 'bossies') and grasses at a seeding density or rate of 5 to 15 kg of seed mixture per hectare.
8. Brush pack the tilled, topsoiled, and sown area. Lay down cut brunches (from legitimate bush clearing operations, for example) along the fetch or inter-patch zones whilst ensuring there is good contact with the ground. Not only would these branches provide the necessary obstructions to impede run-off, but, and particularly thorny branches, protect recruitment (emerging plants) from grazers or browsers, giving them an opportunity to become established.
9. If brush packing is not possible due to the absence of trees, lightly mulch the surface with stockpiled organic matter saved from construction activities.
10. Fence off the restored areas to prevent grazing by livestock.
11. The fence should extend beyond the edge of the bare patch and encompass at least 2 m of remnant vegetation adjacent to the bare patches being restored as they potentially provide propagules of desirable species that could enhance the restoration process.
12. The restored bare patches should be rested for 4 years before removing the fence.
13. Undertake vegetation surveys of rehabilitated bare patches annually, measuring at least plant density, species composition and richness, vegetation cover and growth stage (seedling, vegetative and reproductive).
14. The results of the vegetation surveys should inform the need for and nature of any further interventions.
15. Interventions and vegetation surveys may cease once the fence has been removed after 4 years and the site has been restored to the same or a better condition than the adjacent remnant vegetation, e.g., species richness, vegetation cover and plant density are comparable or better, and seedling, vegetative and reproductive growth stages of all species are recorded.
Management Outcome:
Ecological restoration to improve climate change resilience and increase the production potential for improved grazing capacity.
Targets:
The seedling, vegetative and reproductive growth stages of all species, including palatable or preferred grazing species are recorded in follow-up vegetation surveys (post-treatment monitoring), indicating the successful establishment of the species, and providing evidence that the restoration intervention was sustainable.

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Appendix D - SURFACE AND GROUNDWATER MONITORING PROTOCOL

Impact:
Declining groundwater abstraction yields as a result of no water quantity and quality monitoring plan.
Consequences:
Water pollution and depletion of groundwater reserve
Source:
Hydrological Assessment (Version – Final 3) 18 August 2022 GCS Project Number: 22-0076 by Hendrik Botha
Assumptions:
Currently, no groundwater (GW) monitoring is taking place. It is proposed that a proper monitoring programme be implemented to monitor both the water quality and quantity at the site.
From the risk assessment undertaken, it is anticipated that soils downstream of the proposed development, boreholes which fall within and downstream of the proposed development areas and the non-perennial streams (feeding into temporary livestock watering dams) are the receivers of any sediment runoff or poor-quality seepage/runoff from the site
Mitigations:
Ephemeral Drainage Lines (permanent monitoring)
Undertake visual observations (e.g., monthly inspections and inspections shortly after rainfall events) of the banks associated with the ephemeral drainage lines and the general condition of the cleared areas to determine if there is any erosion and/or sedimentation of watercourses.
Surface water (up to 2 years after the completion of development)
• Establish four (4) surface water monitoring sites (see Figure 8-1 on report page 40 of the Hydrology Assessment Report 2022) in the ephemeral drainage line and temporary dams constructed by the landowner. • Surface water should be monitored bi-annually for pH, Electrical Conductivity (EC) or Total Dissolved Solids (TDS) and Temperature.
Groundwater (permanent monitoring)
• Monitor the abstraction rates and groundwater levels monthly at BH4, BH5 and any additional (new) boreholes (e.g., T1 or T2) to determine the impact on the local aquifer system. • Monitor the groundwater quality monthly by undertaking field measurements at BH4, BH5 and any additional (new) boreholes (e.g., T1 or T2) for Temperature, pH, Electrical Conductivity (EC), and Total Dissolved Solids (TDS). • Monitor the groundwater quality annually by taking samples from BH4, BH5 and any additional (new) boreholes (e.g., T1 or T2) for laboratory analysis, including pH, Electrical Conductivity (EC) or Total Dissolved Solids (TDS), COD, Turbidity, Major cations (Ca, Mg, Na, K, Cl, NO_3, SO_4, PO_4 and F) and Microbes (E. coli, total coliforms and standard plate count).
Annual Hydrocensus (boreholes) (permanent monitoring)

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- An annual hydrocensus is to be undertaken according to the following recommendations:
- Undertake a hydrocensus within a 2.5 km radius of the activity (including all 3 phases) to identify new water users, and re-visit all the already identified groundwater boreholes within the delineated sub-catchment. The aim is to gather water level data, verify the owner, usage & usage volumes (if possible), and evaluate complaints by landowners for declining yields which may relate to the project.
- There should be a budget allocated for the testing of at least 8 of the boreholes visited, focusing on the boreholes which are considered higher value/risk (e.g., if a borehole close to the development is used for water supply, this borehole should be monitored to determine if the development has a long term impact).
- Typical hydrochemistry screening should include Temperature, pH, Electrical Conductivity (EC), Total Dissolved Solids (TDS), Talk, HCO_3, Ca, Mg, Na, K, Cl, F, NO_3, PO_4, SO_4, Al, Mn and Fe.
- An annual report capturing the data above, and discussing the change in water levels and chemistry over time should then be produced and kept on record for the groundwater status associated with the area.

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Appendix E - CONCEPTUAL STORMWATER MANAGEMENT PLAN

(to be read with Section 6 on page 25 of Hydrology Assessment Report 2022)

Impact:
The largest risk is potential run-off and stormwater discharge from the site into the surrounding causing soil erosion and **should be managed according to this CSWMP (Appendix E)**.
Consequences:
Dysfunctional ecosystem
Source:
Hydrological Assessment (Version – Final 3) 18 August 2022 GCS Project Number: 22-0076 by Hendrik Botha
Mitigations:
Free drainage to the environment is recommended with no installation of any storm water systems as vegetation cover should be sufficient to manage stormwater run-off, particularly given the proposed activities, calculated peak flows and the ecological sensitivity of the project area. The proposed development aims to maintain sheet flow into the watercourse and not create distinct discharge points or outlets, which would require additional invasive and often destructive implementation measures (e.g., the digging of a trench, installation of a swale or digging and placing berms).
No dirty stormwater generation areas are anticipated as long as the vegetation is kept intact.
Erosion and sediment transport will likely take place from the concentrated rainfall volumes off the solar PV panels. Efforts should be made in managing run-off from the PV panels and arrays onto the soils, and then managing the distribution of the accumulated water back to the environment.
Proposed stormwater management measures:
1. Sandbags should be used to manage stormwater run-off (if storms do occur).
2. The (civil) construction phase should take place during the winter months (e.g., June to September) with a decreased probability of storm events.
3. Temporary stormwater systems should be sufficient to manage the stormwater at the site during the construction phase.
4. Ensure that all stormwater systems are kept clean of any debri to reduce flooding risk.
6. Minimise vegetation disturbance.
7. Revegetate as soon as possible to maintain ground cover across the site.
8. Conduct regular inspections and maintenance of the site to ensure that vegetation cover is adequate, and no rivulets are generated.
The following stormwater systems are proposed if a storm event does occur and free drainage back to the environment shows evidence of erosion and sedimentation (refer to section 6.6.3 on report page 27 of the Hydrology Assessment Report 2022):
1. It is proposed that vegetated swales be installed downstream of the PV array areas to decrease peak run-off volumes from the panels and divert the water to the lower-lying swales for each area. The swales are to be sized according to the calculated storm peak flows (refer to sections 6.5 and 6.6 of the Hydrology Assessment Report 2022). Connecting

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vegetated swales as a type of herringbone system to the final discharge area (e.g., lowest point associated with the site) will help to slowly divert any run-off back to the environment which is generated by the solar panels.
2. At the lowest positions in each vegetated swale system, an outfall to the environment should be constructed. The outfall should simply comprise a vegetated discharge area (from the vegetated swales). Additional stormwater controls at the outfall can include rock riprap along with vegetation cover.
3. Native species should be planted in the swales and maintained to circumvent potential erosion and sedimentation in open and unvegetated areas.
4. Stormwater monitoring requirements of swales: • Routine hydraulic monitoring, e.g., observations of any blockages in the swale systems, and clean out of the stormwater systems. • Routine revegetation of the swales to ensure optimum operation. • No quality monitoring is recommended.

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Appendix F - GRAZING MANAGEMENT PROTOCOL

Impact:
Mismanagement (overgrazing or continuous grazing, selective grazing and undergrazing)
Consequences:
Landscape degradation from **undergrazing**, such as 'woody', unpalatable grasses in phase 3 growth stage, low organic material on soil surface, shading from moribund material, poor basal cover, soil capping, sheet erosion (onset of poor veld condition following longer fetch zones between perennial tufts), donga erosion and desertification.
Landscape degradation from **overgrazing**, such as grasses in phase 1 growth stage, very low grass cover and abundance of bossies, a dominance of annuals, decreased forage production (due to low abundance of perennials), minimal organic material on soil surface, poor basal cover and erosion.
Reduced grazing carrying capacity and loss in agricultural potential or production.
Assumption
Regenerative grazing management improves the grass basal cover, water cycle, as well as the accumulation of organic matter on the soil surface, enhancing the mineral cycle and improving the water holding capacity of the soil, ensuring minimal soil temperature fluctuations, and improving the grass composition and forage production potential of the grass layer.
Ultra-high density grazing strategies results in the controlled impact of hooves, trampling grasses in moribund state ("taller unpalatable, woody grasses, with vertical growth form and unfavourable structure for grazers), covering bare ground and improving the carbon cycle.
Kraaling, that is short duration trampling & over-night occupancy of patches to allows for the deposition of manure and grass seed.
Resting camps will improve the recovery of forage reserves, allow grasses to seed and establish Decreaser species, thereby improving the grass production potential.
The total exclusion of grazers in such environments will be detrimental to maintaining important ecological processes such as the energy cycle, mineral cycle, and water cycle.
Source:
De Wet, S.F., 2017. Soventix Solar PV Project in the Hanover District, Northern Cape (De Aaar/Hanover Area). Grazing Assessment Report. Unpublished report for Ecoleges.
De Wet, S.F., 2021. Soventix Solar PV Project in the Hanover District, Northern Cape (De Aar/Hanover Area) Grazing Potential Assessment on several portions of farms in the Hanover District, Emthanjeni Local Municipality, Pixley Ka Seme District Municipality, Northern Cape Province. Unpublished report for Ecoleges.
Grazing Potential Assessment prepared by Francois de Wet of Enviro Pulse and Shobie Arnoldi of Topveld dated June 2022.
Esler, J., Milton, S.J. and Dean, W.R., 2010. Karoo Veld. Ecology and Management. Briza Publications, Arcadia, Pretoria. 214 pp.
Mitigations:

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Regenerative grazing management is strongly recommended, e.g., use regenerative grazing management plans – implement scheduled grazing days and strategic removal of grazers: • Grazing management should include the strict use of holistic management grazing charts, where the number of animal days per camp are estimated, based on the grazing capacity at each camp. • Grazing management should include the removal of sheep at the critical time, e.g., before the end of winter, to prevent deterioration in animal condition and allow time to reassess herd composition, based on the productivity from the past months.
Determine the grazing capacity of each camp (or PV block and no-go corridor/ephemeral drainage line) either directly through veld condition assessments (VCAs) or by considering the grazing capacities of representative monitoring sites under different rainfall regimes (see De Wet, S.F., 2017 and 2021, and De Wet & Arnoldi, 2022) together with the Department of Agriculture's guidelines (Elser *et al.*, 2010).
It is recommended that the range and median carrying capacities of representative monitoring sites within the grazing units and/or camps (or PV block and no-go corridor/ephemeral drainage line) are used when determining stocking rates as the median focusses on the value in the middle of a range of numbers, thereby excluding potential outliers (or non-representative values), whereas the average, or mean, considers all values, including outliers (extreme values).
Stocking rates in the no-go corridor/ephemeral drainage line should consider the existing populations of wild game.
Grazing management should be adaptive as the stocking rates will be influenced by the grazing capacity under drier or wetter conditions as well as the adopted grazing strategy, which should include but not be limited to: • Ultra-high density grazing and/or kraaling at selected areas, followed by controlled recovery periods, when there are signs or symptoms of landscape degradation because of **undergrazing**, e.g., 'woody', unpalatable grasses in phase 3 growth stage, low organic material on soil surface, shading from moribund material, poor basal cover, soil capping, sheet erosion (onset of poor veld condition following longer fetch zones between perennial tufts), donga erosion and desertification. • Improve time control with grazing by shortening grazing period whilst allowing for relatively high stocking rates, followed by controlled recovering periods, when there are signs or symptoms of **overgrazing**, e.g., grasses in phase 1 growth stage, very low grass cover and abundance of bossies, a dominance of annuals, decreased forage production (due to low abundance of perennials), minimal organic material on soil surface, poor basal cover and erosion.
Grazing Management should include planned resting as time management per camp is essential. This includes removing grazers when available forage reserves become low, and resting camps for periods up to 12 months, at a frequency of once every four years.
No area should be excluded from grazing.
More information is available from grazing management courses at the Herding Academy, Graaf-Reinet (Roland Kroon: 082 883 2710 & Johan Bouwer: 082 776 0257).
Apply follow-up grazing assessments as well as annual monitoring of veld condition and veld condition trends, estimate current grazing capacity, and adapt grazing management accordingly.

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Annual monitoring of veld condition should also investigate the influence of planned resting on veld condition as the exclusion of grazing can result in degradation of the veld and erosion.
Management Outcome
Prevent undergrazing, overgrazing or continuous grazing.
Achieve good to excellent veld condition classes to maintain or improve agricultural potential.
A record of veld condition and grazing capacity under different rainfall conditions.

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Appendix G – RECOMMENDATIONS: CORPORATE SOCIAL RESPONSIBILITY PROJECTS

Impact:
Economic benefits may not be achieved by local residents/service providers.
Consequences:
Limited real benefits to local communities.
Source:
Social Impact Assessment Report prepared by Ilse Aucamp of Equispectives Research & Consulting Services dated August 2022.
Recommendations:
Corporate Social Responsibility (CSR) is a form of corporate self-regulation incorporated into a business model. CSR policy functions as a built-in, self-regulating mechanism whereby a business monitors and ensures its active compliance with the spirit of the law, ethical standards, and international norms. Through the RFP document the Department of Energy (DoE), requires that all renewable energy bidders must illustrate how the Project will benefit the local community.
This must be done through: • Enterprise development; and • Socio-economic development.
When considering potential projects to invest in, Soventix should keep in mind that social development is a long-term process, and not something that can be achieved in a couple of years. The recommendation is therefore that Soventix identifies a sustainable project that they can be involved with and grow throughout the life of their project.
Given that enterprise and socio-economic development are not the core business of Soventix, the best option is to liaise with a local NGO/NPO that have the expert knowledge on how to implement these kinds of projects.
There are a number of other renewable energy developments taking place in the area, and pooling resources and co-investing in projects must be investigated. Since the focus of the operational solar facilities is on De Aar, Soventix must consider focussing on Hanover to ensure resources are shared optimally.
Potential CSR projects can include: • Business incubator – development of entrepreneurs and SMME's. • Skills development programme aimed at skills required for the Fourth Industrial Revolution. • Investment in higher education such as the Veritas School, which is the only secondary school with in the Pixley Ka Seme region that over both technical and mainstream education. • Educational campaigns to prevent FASD amongst pregnant mothers. • Programmes focussing on early intervention services for children born with FASD (between birth and 36 months is a critical time for these children to learn critical skills). • Special education programmes to meet the needs of older children with FASD. • Investment in programmes that address gender-based violence.

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Appendix H - STAKEHOLDER ENGAGEMENT PLAN

Impact:
There is an expectation from the affected communities and municipalities that the Soventix project will result in similar benefits and opportunities as other existing renewable projects in the area.
Consequences:
If Soventix does not manage stakeholder expectations from the beginning of the project, it can result in reputational damage for the company, bad stakeholder relationships and in the worst-case scenario violent protests.
Source:
Social Impact Assessment Report prepared by Ilse Aucamp of Equispectives Research & Consulting Services dated August 2022.
Recommendations:
Social impacts already start in the planning phase of a project and as such it is imperative to start with stakeholder engagement as early in the process as possible. A stakeholder engagement plan will assist Soventix to outline their approach towards communicating in the most efficient way possible with stakeholders throughout the life of the project. Such a plan cannot be considered a once off activity and should be updated on a yearly basis to ensure that it stays relevant and to capture new information. Stakeholders must provide input in the Stakeholder Engagement Plan.
The Soventix Stakeholder Engagement Plan should have the following objectives: • To identify and assess the processes and/or mechanisms that will improve the communication between local communities, the wider community and Soventix. • To improve relations between Soventix staff and the people living in the local communities. • To provide a guideline for the dissemination of information crucial to the local communities in a timely, respectful, and efficient manner. • To provide a format for the timely recollection of information from the local communities in such a way that the communities are included in the decision-making process.

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The Stakeholder Engagement Plan should be compiled in line with International Finance Corporation (IFC) Guidelines and should consist of the following components:

- Stakeholder Identification and Analysis – time should be invested in identifying and prioritising stakeholders and assessing their interests and concerns.
- Information Disclosure – information must be communicated to stakeholders early in the decision-making process in ways that are meaningful and accessible, and this communication should be continued throughout the life of the project.
- Stakeholder Consultation – each consultation process should be planned out, consultation should be inclusive, the process should be documented, and follow-up should be communicated.
- Negotiation and Partnerships – add value to mitigation or project benefits by forming strategic partnerships and for controversial and complex issues, enter into good faith negotiations that satisfy the interest of all parties.
- Grievance Management – accessible and responsive means for stakeholders to raise concerns and grievances about the project must be established throughout the life of the project.
- Stakeholder Involvement in Project Monitoring – directly affected stakeholders must be involved in monitoring project impacts, mitigation, and benefits. External monitors must be involved where they can enhance transparency and credibility.
- Reporting to Stakeholders – report back to stakeholders on environmental, social, and economic performance, both those consulted and those with more general interests in the project and parent company.
- Management Functions – sufficient capacity within the company must be built and maintained to manage processes of stakeholder engagement, track commitments and report on progress.

It is of critical importance that stakeholder engagement takes place in each phase of the project cycle and it must be noted that the approach will differ according to each phase. The stakeholder analysis done in Section 7 of the Social Impact Assessment Report must inform the stakeholder engagement strategy.

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Appendix I - GRIEVANCE MECHANISM PROTOCOL

Impact:
Damage to farm infrastructure
Vulnerable group's susceptible to negative influences in society such as prostitution, relationships with minors, alcohol and drug abuse, gambling and fighting due to the presence of people from outside the area.
Decrease in the "sense of place" as it relates to noise, visual and light pollution.
Consequences:
Economic costs in replacing damaged infrastructure.
Higher rates of crimes, HIV rates.
Lower aesthetic values enjoyed by the community.
Source:
Social Impact Assessment Report prepared by Ilse Aucamp of Equispectives Research & Consulting Services dated August 2022.
Recommendations:
In accordance with international good practice Soventix should establish a specific mechanism for dealing with grievances. A grievance is a complaint or concern raised by an individual or organisation that judges that they have been adversely affected by the project during any stage of its development. Grievances may take the form of specific complaints for actual damages or injury, general concerns about project activities, incidents and impacts, or perceived impacts. The IFC standards require Grievance Mechanisms to provide a structured way of receiving and resolving grievances. Complaints should be addressed promptly using an understandable and transparent process that is culturally appropriate and readily acceptable to all segments of affected communities and is at no cost and without retribution. The mechanism should be appropriate to the scale of impacts and risks presented by a project and beneficial for both the company and stakeholders. The mechanism must not impede access to other judicial or administrative remedies.
The grievance mechanism should be based on the following principles: • Transparency and fairness. • Accessibility and cultural appropriateness. • Openness and communication regularity. • Written records. • Dialogue and site visits; and • Timely resolution.
Based on the principles described above, the grievance mechanism process involves four stages: • Receiving and recording the grievance. • Acknowledgement and registration. • Site inspection and investigation; and • Response.
The Grievance Mechanism should be communicated to all stakeholders.

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Appendix J - SOCIAL IMPACT MANAGEMENT PLAN

Phase	Management action	Timeframe for implementation	Responsible party for implementation (frequency)	Responsible party for monitor/audit/review (frequency)
Planning and Design Phase	Develop social impact management plan	As soon as project enters public domain	Applicant (involve municipality where appropriate)	CLO *Internal once appointed*
				Social expert *External but not legally required*
	Appoint appropriately qualified community liaison officer (CLO) to deal with social aspects of the project throughout the life of the project	Before consultation with stakeholders start (excluding EIA consultation)	Applicant *Appointment for the life of the project*	Not required apart from usual HR processes
	Develop community relations and stakeholder engagement strategy	Before consultation with stakeholders start (excluding EIA consultation)	Applicant *Continued for the life of project*	CLO *Internal*
				No external review required
	Develop safety plan, access protocols, grievance mechanism and compensation policy	In consultation with stakeholders	Applicant *Continued for the life of project*	CLO *Internal*
				No external review required
Construction Phase	Monitoring of social mitigation and management measures	Throughout construction	Applicant (CLO) *Continued for the life of project*	Management *Once a year or as required*
	Implementation of community relations and stakeholder engagement strategy	Throughout construction	Applicant (CLO) *Continued for the life of project*	Management *Once a year or as required*
	Implement safety plan, access protocols, grievance mechanism and compensation policy	Throughout construction	Applicant (CLO) *Continued for the life of project*	Management *Once a year or as required*

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Operation Phase	Monitoring of social mitigation and management measures	Throughout operation	Applicant (CLO) *Continued for the life of project*	Management *Once a year or as required*
	Implementation of community relations strategy	Throughout operation	Applicant (CLO) *Continued for the life of project*	Management *Once a year or as required*
	Implement safety plan, access protocols, grievance mechanism and compensation policy	Throughout operation	Applicant (CLO) *Continued for the life of project*	Management *Once a year or as required*
Decommissioning, Closure and Rehabilitation Phase	Implement safety plan, access protocols, grievance mechanism and compensation policy	Throughout decommissioning until all rehabilitation activities have ceased	Applicant (CLO) *Continued for the life of project*	Management *Once a year or as required*
	Continue community relations strategy and stakeholder engagement plan until all activities on site cease and rehabilitation is completed	Throughout decommissioning until all rehabilitation activities have ceased	Applicant (CLO) *Continued for the life of project*	Management *Once a year or as required*
	Implement social mitigation for closure	Throughout decommissioning	Applicant (CLO) *Continued for the life of project*	Management *Once a year or as required*

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Appendix K - GENERAL AVIFAUNA MONITORING PLAN STRUCTURE

Post-construction monitoring as per the relevant guidelines at the time must be implemented. The following outlines a general monitoring plan (EMPr) structure.

Title: SCC community monitoring	
Stressor	Project Activities, Micro Climatic Changes
Receptor(s)	Avifauna SCC diversity and densities in each habitat type
Variables	Presence/absence of bird species of conservation concern, including observed breeding behaviour, proportion of SCC species present per sample site, species richness and densities.
Sampling Method	• Drive Transects (species lists) – all species seen to be recorded along set transects to be driven during dawn till pre 10 am; and • Walked Transects (species lists) – all species heard and seen to be recorded along set transects to be walked at dawn chorus
Sampling Frequency	• Annual wet and dry season surveys; and • Continuous observations by ECO.
Sampling Site(s)	As provided in EMPr with focus on drainage lines, koppies, nesting sites and 500 m buffer around the project footprint.
Change and Action Thresholds	Loss/decrease in any SCC parameter, unnatural decline (cannot be explained by stochastic weather changes) in species densities and/or richness. Similarly, positive changes (e,g, unusual presence in high densities of nomadic species such as Ludwig's Bustard or establishment of SCC breeding population such as Blue Cranes, Large SCC Raptors and Secretary Bird) in species densities and/or richness that indicate disturbance. Rapid surveys of greater surrounding area should be conducted to attempt to determine cause of change detected.
Data Analysis	All variables acquired should be statistically and graphically compared to the available data and the original targeted baseline data. Photographs should be taken of as many SCC observed in the field.
Reporting requirements	Annual reporting presenting data analysis results and mapping indicating locations of change. Specific reporting on negative change detection not directly attributable to Project activities (Solar Facility Operation) and their cause. All reporting to be accompanied by GIS shapefiles and any original photographs.

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TITLE: Mortality monitoring	
Stressor(s)	Avifauna-Panel and powerline collisions (incidents)
Receptor(s)	Avifauna community composition, density and distribution
Variables	Species, geographical location and date of every avifaunal mortality
Sampling Method	• For powerlines: Weekly surveys before dawn (prior to scavenger activity) by driving slowly along the servitudes and documenting each collision kill location and species (a georeferenced photograph as evidence is required). • For panel location sites: weekly inspection on foot of cleared areas for birds killed during the operation process. Location and species must be recorded (a georeferenced photograph as evidence is also required).
Sampling Frequency	Weekly for powerlines, weekly for panels
Sampling Site(s)	Along the entire powerline network on the PAOI. All operational panels.
Collision Action Thresholds	Collision frequency and intensity (#kills per species per unit time) will need to be assessed per species by specialist. However, any non-specific collision concentrations (> 10 kills per month clustering in a stretch of powerline or a specific turbine) must initiate investigation and corrective measures (including retrofitting of mitigation measures).
Data Analysis	Geospatial analysis of density and dispersion of avifaunal mortalities highlighting the core areas of mortalities so that corrective measures can be implemented. Time-series and trend analysis to accompany evaluation to inform on temporal fluctuations (e.g. seasonality) and steer adaptive management. Cumulative species-specific summary statistics to be calculated.
Reporting requirements	Bi-annual reporting of faunal avifaunal mortalities associated with collision data highlighting locations where corrective measures are to be taken (if necessary).

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Appendix L - EMERGENCY RESPONSE PLANS

Definition of an Incident

An "Incident" is an unexpected, sudden, and uncontrolled (loss of containment) release of a hazardous substance, including from a major emission, fire or explosion, that causes, has caused or may cause significant (have noticeable effects) harm to the environment, human life or property (definition in Section 30(1) of NEMA).

Procedure

The contractor shall ensure that emergencies are reported and controlled in accordance with the sequence of events prescribed for spillages in a watercourse, spillages on land and fire, including:

- Action to be taken
- Clean-up and remediation measures to be implemented
- Internal and external communication plan
- Prescribed reporting procedure

The contractor shall ensure that their employees are adequately trained to react to environmental emergencies in accordance with this procedure.

The SEO shall complete the table of contact numbers, erect them in a conspicuous place within the construction camp and make its whereabouts known to all of the contractor's staff.

Equipment

The following equipment is required to successfully implement this procedure. It must be ensured that the equipment is supplied to or is readily available for all living quarters, site offices, kitchen areas, workshop areas, stores and on site.

1. A spill kit including absorbent fibres, mats, and booms
2. A net
3. A whistle
4. Adequate lighting for night shifts
5. Spades
6. Sandbags
7. Designated hazardous waste drums
8. (Trained personnel with) protective clothing for extinguishing fires
9. Fire extinguishers
10. Fire beaters
11. Water carts/tankers with pumps and hoses

12. Water pumps and pipes (for fires started at the watercourse crossings)

Hazardous Substances

A "hazardous substance" is a solid, liquid, vapour, gas or aerosol, or combination thereof, which is a source of danger to persons and to the environment, by reason of its toxic, corrosive, irritant, strongly sensitizing or flammable nature, or because it generates pressure through decomposition, heat, or other means.

The contractor must consult the Safety Data Sheets of all substances stored on site and/or used during construction to identify which substances are listed as hazardous in the "Guidelines on the Administration of Incidents" published by DEA (2019) and update the table below (**Table 33**) to reflect applicable substances including their Reportable Quantity (RQ) in either kg (for solids) or litres (for liquids).

Table 33. List of hazardous substances and their reportable quantities (RQs).

Substance	RQ (kg or l)
Benzene	5
brake fluid, hydraulic	10
Battery fluid	10
Chlorine	5
Coal	1000
Creosote	0.5
Diesel fuel	100
Gasoline	100
Lubricating oil	5000
Paraffin	100
Petrol	100
Petroleum crude oil	10
Petroleum thinners (turpentine)	100
Printing ink, flammable	10
Urea	1000

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Contact Numbers

Organisation	Name	Cell phone and Email
Project Personnel		
Applicant/Landowner		
Reserve Manager		
Engineer		
Contractor		
HSO		
SEO		
ECO		
Interested and Affected Parties		
Adjacent Landowner		
Adjacent Landowner		
Adjacent Landowner		
Emergency Services		
Spill Clean-up Service Provider		
Fire Department		
Chief Fire Officer (Fire Chief)		
SA Police Services		
Disaster Management Centre		
Local Municipality		
District Municipality		
Irrigation Board		

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Water Catchment Management Agency		
Water Treatment Works		
DWS (Regional Head of Department / Chief Director)		
DWS (Regional Director: Water sector Regulation & Use)		
DEA (Provincial Head of Department)		
DEA (Director: Environmental Impact Management)	Mrs T. Patience Makgoka Deputy Director, Directorate: Environmental Compliance and Enforcement, LEDET	083 640 5583 Makgokatp@ledet.gov.za
DEA (Director General)		

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SPILLAGE IN A WATERCOURSE

ACTION TO BE TAKEN		
Personnel	**Responsibility**	**Action**
Employee	Reporting	The person responsible for, or who discovers, a hazardous substance spill must report the incident to their immediate Supervisor.
Supervisor	Reporting	Report the incident to the SEO, HSO and Resident Engineer. ● Note that the SEO will take control of all relevant actions once he/she arrives on the scene.
HSO	Reporting	Report the incident to an Inspector (designated under section 28 of the Occupational Health & Safety Act, 1993) within the prescribed period and manner.
Supervisor / SEO	Initial investigation	Determine the amount of hazardous substance that was released, if it exceeds the RQ and whether it is reportable in terms of the definition of an incident, e.g., was it an unexpected, sudden, and uncontrolled (loss of containment) release? Determine the extent of the spill, e.g., its boundaries, by observing for the following: 1. Any visual indication of pollution, 2. Any odours or emissions detected, 3. Any indication of the source of pollution, 4. Any sign of damage to the natural system. ● The Supervisor / SEO should provide lighting if working at night.
Supervisor / SEO	Co-ordination	Sound an alarm/whistle. ● The designated response team consisting of area specific personnel and including the environmental leader, will congregate at the spill kit. ● All other employees who do not have specific duties to perform are to evacuate the affected area to a location designated by the Supervisor / SEO.

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Supervisor / SEO	Co-ordination	Minimise the effects of the incident on the environment and persons by removing the source of the spill at least 100m away from the watercourse or cut-off the supply of the spill if the source is not moveable.
Supervisor / SEO	Co-ordination	Contain the spill by laying an absorbent sock or boom across the width of the watercourse at a predetermined location downstream of the construction area (spill). ● A series of parallel booms may be required.
Supervisor / ECO	Co-ordination	Secure the affected area with danger tape.
HSO	Co-ordination	The site shall not be disturbed, and no article or substance may be removed (without the consent of the inspector) if there is or likely to be a death, or if there is a loss of limb or part of a limb. However, action can be taken to prevent a further accident, to remove the injured or dead or rescue persons from danger.
Engineer / SEO / HSO	Decision-making	The Engineer will assess the situation in consultation with the SEO and HSO and act as required. ● The risk involved shall be assessed before anyone approaches the scene of the incident. ● The HSO will consult the MSDSs. ● The scale of the spill will dictate whether the spill will be cleaned up by using the on-site spill kit and in the prescribed manner, or by contacting a Spill Clean-Up Service Provider for assistance. ● The SEO will take photographs of the affected area. ● No person shall be allowed to approach a spill unless he/she is equipped with the personal protective clothing.
SEO	Directions	If a Spill Clean-Up Service Provider is used, assist the emergency services by clearly marking the route to be taken to the spill site.
SEO	Co-ordination	Take such measures as the Catchment Management Agency may either verbally or in writing direct within the time specified by such institution.

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CLEAN-UP AND REMEDIATION MEASURES TO BE IMPLEMENTED		
Personnel	**Responsibility**	**Action**
SEO	Co-ordination	Remove the contaminated sock or boom from the surface of the water. If lose fibres were scattered on the surface to capture hydrocarbons in shallow (still) pools, 'fish' it out with a net.
SEO	Co-ordination	Remove the contaminated soil from the banks of the watercourse to the depth of penetration using a spade or shovel.
SEO	Co-ordination	Temporarily store the contaminant in the designated hazardous waste storage facility at the construction camp.
SEO	Co-ordination	Contact a licensed hazardous waste service provider to collect and transport the waste to a licensed hazardous waste landfill site.
SEO	Co-ordination	Rehabilitate the banks of the watercourse by replacing the topsoil and planting indigenous plants.
SEO	Monitoring	Immediately follow any known spillage of toxic substances into a stream or river with monitoring of the receiving streams or rivers and public health to assess the immediate and long-term effects on these sensitive receptors.
SEO	Co-ordination	Should water downstream of the spill be polluted, and fauna and flora show signs of deterioration or death, specialist hydrological or ecological advice must be sought for appropriate treatment and remedial procedures to be followed.
SEO	Monitoring	Take photographs of the affected area during rehabilitation.

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SPILLAGE IN A WATERCOURSE

INTERNAL & EXTERNAL COMMUNICATION PLAN		
Personnel	**Responsibility**	**Action**
Employee	Reporting	The person responsible for, or who discovers, a hazardous waste spill must report the incident to their immediate Supervisor.
Supervisor	Reporting	Report the incident to the SEO, HSO and Resident Engineer.
HSO	Reporting	Report the incident to an Inspector (designated under section 28 of the Occupational Health & Safety Act, 1993) within the prescribed period and manner.
SEO	Reporting	Report the incident to the Site Agent and / or Manager and the ECO or Reserve Manager.
SEO	Reporting	If the spill is too big for the spill kit, contact a Spill Clean-Up Service Provider.
SEO	Reporting	If the spill is going to affect downstream users, inform the Landowner, the Irrigation Board and water treatment works (if applicable). ● Provide the following information to the water treatment works: 1. The exact location of the spillage, 2. The time of the spillage, 3. As much information about the nature of the pollution, 4. The name and telephone number of the person contacting them. ● Irrigation Boards control river structures and may be able to divert/or impound the river to protect 'water supply intakes'.

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SEO	Reporting	The responsible person or the employer of the responsible person must generate an Alarm Report immediately and without delay. The Alarm Report must be submitted by the responsible person to the following relevant authorities: 1. DEA (Director General), 2. DWS, Polkwane (Director General and Chief Director), 3. SA Police Services, 4. Emergency Services or Fire Department, 5. Catchment Management Agency, 6. LEDET (provincial Head of Department) or Local Municipality, and 7. Any persons whose health may be affected by the incident, e.g., neighbours and/or downstream water users.
SEO	Reporting	The Alarm Report must contain the following information: • The nature of the incident, • Any risks posed by the incident to public health, safety and property, • The toxicity of substances or by-products released by the incident, • Any steps that should be taken to avoid or minimise the effects of the incident on public health and the environment, • Responsible person name, location, organisation, and telephone number, • Name and address of the party responsible for the incident, • Date and time of the incident, • Location of the incident, • Medium (e.g., land, water) affected by release or spill, • Number and types of injuries or fatalities (if any),

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		• Weather conditions at the incident location, • Name of the carrier or vessel, the railcar/truck number, or other identifying information, • Whether an evacuation has occurred, • Other departments notified or about to be notified, and • Any other information that may help emergency personnel respond to the incident.
ECO / Applicant / Site Agent / CRE	Reporting	If the nature of the impact constitutes a gross violation of the EA or any legislation: ● The ECO must report the incident to the applicant. ● The applicant must report the incident to the Local Municipality, LEDET, and DWS (Polokwane). ● The Site Agent and / or Manager must report the incident to their Environmental Group Manager, Divisional MD and CEO. ● The Resident Engineer must report the incident to his Superiors.

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SPILLAGE IN A WATERCOURSE

PRESCRIBED REPORTING PROCEDURE		
Incident Reporting		
Personnel	**Responsibility**	**Action**
SEO	Investigation	Investigate, including interviews, and record all details of the incident. ● The cause must be investigated.
SEO	Reporting	Complete an Incident Report and forward it to all key project personnel, with the exception of the Emergency Services. ● An Incident Report Template is provided in the "Guidelines on the Administration of Incidents" published by DEA (2019)
SEO	Reporting	The responsible person or his or her employer, must, within 14 days of the incident, submit the Incident Report to the following authorities. 1. DEA (Director General), 2. LEDET (Provincial Head of Department), 3. Local Municipality, 4. DWS, Polokwane (Regional Director).

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SEO	Reporting	The Incident Report shall include the following information: 1. The nature of the incident, 2. The substances involved, and an estimation of the quantity released and their possible acute effect on persons & the environment & data needed to assess these effects, 3. Initial measures to minimise impacts, 4. Causes of the incident, whether direct or indirect including equipment, technology, system or management failure, and 5. Measures taken & to be taken to avoid a recurrence of such incident.
SEO	Reporting	Submit an action plan within 14 days, or a shorter period, if specified by the Regional Director (DWS).
SEO	Reporting	The action plan must include the following information: 1. A detailed time schedule of measures taken to: 1.1 Correct the impacts resulting from the incident; 1.2 Prevent the incident from causing any further impact; and 1.3 Prevent a recurrence of a similar incident.
Progress reporting		
SEO	Revising Procedures	Identify methods for preventing the incident from re-occurring and revise method statements and/or procedures for implementing as early as possible.
SEO	Training	Conduct either a toolbox talk or environmental awareness training/re-induction to the all employees and include additional mitigations to avoid a re-occurrence. ● Keep the program, including a signed attendance register, in the on-site environmental file.

MEMBERS: J.A. Bowers (M Tech, Pr.Sci.Nat.) & S.D. MacGregor (M.Sc., Pr.Sci.Nat.)
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SPILLAGE ON LAND

ACTION TO BE TAKEN		
Personnel	**Responsibility**	**Action**
Employee	Reporting	The person responsible for, or who discovers, a hazardous substance spill must report the incident to their immediate Supervisor.
Supervisor	Reporting	Report the incident to the SEO, HSO and Resident Engineer. ● Note that the SEO will take control of all relevant actions once he/she arrives on the scene.
HSO	Reporting	Report the incident to an Inspector (designated under section 28 of the Occupational Health & Safety Act, 1993) within the prescribed period and manner.
Supervisor / SEO	Initial investigation	Determine the amount of hazardous substance that was released, if it exceeds the RQ and whether it is reportable in terms of the definition of an incident, e.g., was it an unexpected, sudden, and uncontrolled (loss of containment) release? Determine the extent of the spill, e.g., its boundaries, by observing for the following: ● Any visual indication of pollution, ● Any odours or emissions detected, ● Any indication of the source of pollution, ● Any sign of damage to the natural system. The Supervisor / SEO should provide lighting if working at night.
Supervisor / SEO	Co-ordination	Sound an alarm/whistle. ● The designated response team consisting of area specific personal and including the environmental leader, will congregate at the spill kit. ● All other employees who do not have specific duties to perform are to evacuate the affected area to a location designated by the Supervisor / SEO.

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Supervisor / SEO	Co-ordination	Minimise the effects of the incident on the environment and persons by removing the source of the spill at least 100m away from the watercourse or cut-off the supply of the spill if the source is not moveable.
Supervisor / ECO	Co-ordination	Contain the spill to a confined area to prevent the spreading of the spilled chemical or substance. ● Use sandbags or construct earth berms. ● If relevant, close off all storm water drains with absorbent mats. ● Do not wash the spill with water as it will cause the spill to spread.
Supervisor / ECO	Co-ordination	Secure the affected area with danger tape.
HSO	Co-ordination	The site shall not be disturbed, and no article or substance may be removed (without the consent of the inspector) if there is or likely to be a death, or if there is a loss of limb or part of a limb. However, action can be taken to prevent a further accident, to remove the injured or dead or rescue persons from danger.
Engineer / SEO / HSO	Decision-making	The Engineer will assess the situation in consultation with the SEO and HSO and act as required. ● The risk involved shall be assessed before anyone approaches the scene of the incident. ● The HSO will consult the MSDSs. ● The scale of the spill will dictate whether the spill will be cleaned up by using the on-site spill kit and in the prescribed manner, or by contacting a Spill Clean-Up Service Provider for assistance. ● The SEO will take photographs of the affected area. ● No person shall be allowed to approach a spill unless he/she is equipped with the personal protective clothing.
SEO	Directions	If a Spill Clean-Up Service Provider is used, assist the emergency services by clearly marking the route to be taken to the spill site.

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SPILLAGE ON LAND

CLEAN-UP AND REMEDIATION MEASURES TO BE IMPLEMENTED		
Personnel	**Responsibility**	**Action**
SEO	Co-ordination	Remove the contaminated soil to the depth of penetration using a spade or shovel.
SEO	Co-ordination	Temporarily store the contaminant in the designated hazardous waste facility at the construction camp.
SEO	Co-ordination	Contact a licensed hazardous waste service provider to collect and transport the waste to a licensed hazardous waste landfill site.
SEO	Co-ordination	Rehabilitate the area cleared of hazardous waste by replacing the topsoil and planting indigenous plants.
SEO	Monitoring	Immediately follow any known spillage of toxic substances with monitoring of the receiving environment, and public health to assess the immediate and long-term effects on these sensitive receptors.
SEO	Monitoring	Take photographs of the affected area during rehabilitation.

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SPILLAGE ON LAND

INTERNAL & EXTERNAL COMMUNICATION PLAN		
Personnel	**Responsibility**	**Action**
Employee	Reporting	The person responsible for, or who discovers, a hazardous waste spill must report the incident to their immediate Supervisor.
Supervisor	Reporting	Report the incident to the SEO, HSO and Resident Engineer.
HSO	Reporting	Report the incident to an Inspector (designated under section 28 of the Occupational Health & Safety Act, 1993) within the prescribed period and manner.
SEO	Reporting	Report the incident to the Site Agent and/or Manager and the ECO or Reserve Manager.
SEO	Reporting	If the spill is too big for the spill kit, contact a Spill Clean-Up Service Provider.
SEO	Reporting	The responsible person or the employer of the responsible person must generate an Alarm Report immediately and without delay. The Alarm Report must be submitted by the responsible person to the following relevant authorities: 1. DEA (Director General), 2. South African Police Services, 4. Emergency Services or Fire Department, 5. Catchment Management Agency, 6. LEDET (provincial Head of Department) or Local Municipality, and 7. Any persons whose health may be affected by the incident, e.g., neighbours and/or downstream water users.

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SEO	Reporting	The Alarm Report must contain the following information: • The nature of the incident, • Any risks posed by the incident to public health, safety and property, • The toxicity of substances or by-products released by the incident, • Any steps that should be taken to avoid or minimise the effects of the incident on public health and the environment, • Responsible person name, location, organisation, and telephone number, • Name and address of the party responsible for the incident, • Date and time of the incident, • Location of the incident, • Medium (e.g., land, water) affected by release or spill, • Number and types of injuries or fatalities (if any), • Weather conditions at the incident location, • Name of the carrier or vessel, the railcar/truck number, or other identifying information, • Whether an evacuation has occurred, • Other departments notified or about to be notified, and Any other information that may help emergency personnel respond to the incident.
ECO / Applicant / Site Agent / RE	Reporting	If the nature of the impact constitutes a gross violation of the EA or any legislation: ● The ECO must report the incident to the applicant. ● The applicant must report the incident to the Local Municipality and LEDET. ● The Site Agent and/or Manager must report the incident to their Environmental Group Manager, Divisional MD and CEO. ● The Resident Engineer must report the incident to his Superiors.

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SPILLAGE ON LAND

PRESCRIBED REPORTING PROCEDURE		
Incident recording		
Personnel	**Responsibility**	**Action**
SEO	Investigation	Investigate, including interviews, and record all details of the incident. ● The cause must be investigated.
SEO	Reporting	Complete an Incident Report and forward it to all key project personnel, except for the Emergency Services. ● An Incident Report Template is provided in the "Guidelines on the Administration of Incidents" published by DEA (2019)
SEO	Reporting	The responsible person or his or her employer, must, within 14 days of the incident, submit the Incident Report to the following authorities. 1. DEA (Director General), 2. LEDET (Provincial Head of Department), 3. Local Municipality.
SEO	Reporting	The Incident Report shall include the following information: 1. The nature of the incident, 2. The substances involved, and an estimation of the quantity released and their possible acute effect on persons & the environment & data needed to assess these effects, 3. Initial measures to minimise impacts, 4. Causes of the incident, whether direct or indirect including equipment, technology, system or management failure, and 5. Measures taken & to be taken to avoid a recurrence of such incident.
Progress reporting		

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SEO	Revising Procedures	Identify methods for preventing the incident from re-occurring and revise method statements and/or procedures for implementing as early as possible.
SEO	Training	Conduct either a toolbox talk or environmental awareness training/re-induction to the employee(s) responsible for the spill and include additional mitigations to avoid a re-occurrence. ● Keep the program, including a signed attendance register, in the on-site environmental file.

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FIRE

ACTION TO BE TAKEN		
Personnel	**Responsibility**	**Action**
Employee	Reporting	The person who starts or discovers a fire must report the incident to their immediate Supervisor.
Supervisor	Reporting	Report the incident to the SEO, HSO and Resident Engineer. ● Note that the SEO will take over co-ordination of all relevant actions once he/she arrives on the scene.
SEO	Reporting	If there is potential for a fire to spread and endanger life, property, or the environment, alert the landowner and Fire Department.
Landowner	Reporting	Alert the owners of adjacent land.
HSO	Reporting	Report the incident to an Inspector (designated under section 28 of the Occupational Health & Safety Act, 1993) within the prescribed period and manner.
Supervisor / SEO	Co-ordination	Sound an alarm/whistle. ● The designated response team consisting of area specific personnel and including the environmental leader, will congregate at the fire-fighting equipment. ● All other employees who do not have specific duties to perform are to evacuate the affected area to a location designated by the Supervisor / SEO.
SEO	Directions	Assist the Fire Department by clearly marking the route to be taken to the fire.
SEO	Co-ordination	Stop the spread of the fire.
SEO	Co-ordination	Extinguish the fire or assist in doing so.
SEO	Co-ordination	Aid a fire protection officer or forest officer if they take control over the fighting of a fire.

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HSO	Co-ordination	The site shall not be disturbed, and no article or substance may be removed (without the consent of the inspector) if there is or likely to be a death, or if there is a loss of limb or part of a limb. However, action can be taken to prevent a further accident, to remove the injured or dead or rescue persons from danger.

FIRE

REMEDIATION MEASURES TO BE IMPLEMENTED		
Personnel	**Responsibility**	**Action**
SEO	Assessment	Immediately follow any fire with an assessment of the effects on the environment, public health, safety, and property.
SEO	Search	Search the scorched earth for reptiles and other creatures that can be rehabilitated and saved. ● Use only a licensed rehabilitation facility.
SEO	Monitoring	Monitor for signs of erosion after the first few rains and new flush. ● Manage erosion resulting from a loss in plant basal or aerial cover. ● Ensure that the control measures are not destructive.
SEO	Managing	No Vehicles or plant are permitted to drive through burnt areas.

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FIRE

INTERNAL & EXTERNAL COMMUNICATION PLAN		
Personnel	**Responsibility**	**Action**
Employee	Reporting	The person who starts or discovers a fire must report the incident to their immediate Supervisor.
Supervisor	Reporting	Report the incident to the SEO, HSO and Resident Engineer. ● Note that the SEO will take control over all relevant actions once he/she arrives on the scene.
SEO	Reporting	Report the incident to the Site Agent and/or Manager and the ECO or Reserve Manager.
SEO	Reporting	If there is potential for a fire to spread and endanger life, property, or the environment, alert the landowner, Fire Department, and the South African Police Service.
Landowner	Reporting	Alert the owners of adjacent land, e.g., neighbours.
HSO	Reporting	Report the incident to an Inspector (designated under section 28 of the Occupational Health & Safety Act, 1993) within the prescribed period and manner.
ECO / Applicant / Site Agent / RE	Reporting	If the nature of the impact constitutes a gross violation of the EA or any legislation: ● The ECO must report the incident to the applicant. ● The applicant must report the incident to the Local Municipality, DEA, and DWS. ● The Site Agent and / or Manager must report the incident to their Environmental Group Manager, Divisional MD and CEO. ● The Resident Engineer must report the incident to his Superiors.

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FIRE

PRESCRIBED REPORTING PROCEDURE		
Incident recording		
Personnel	**Responsibility**	**Action**
SEO	Investigation	Investigate, including interviews, and record all details of the incident. ● The cause must be investigated.
SEO	Reporting	Complete an Incident Report and forward it to all key project personnel, except for the Emergency Services.
SEO	Reporting	The Incident Report must include the following information: 1. The nature of the incident, 2. Initial measures to minimise impacts, 3. Causes of the incident, whether direct or indirect including equipment, technology, system, or management failure, and 4 Measures taken & to be taken to avoid a recurrence of such incident.
Progress reporting		
SEO	Revising Procedures	Identify methods for preventing the incident from re-occurring and revise method statements and/or procedures for implementing as early as possible.
SEO	Training	Conduct either a toolbox talk or environmental awareness training/re-induction to the employee(s) responsible for the spill and include additional mitigations to avoid a re-occurrence. ● Keep the program, including a signed attendance register, in the on-site environmental file.

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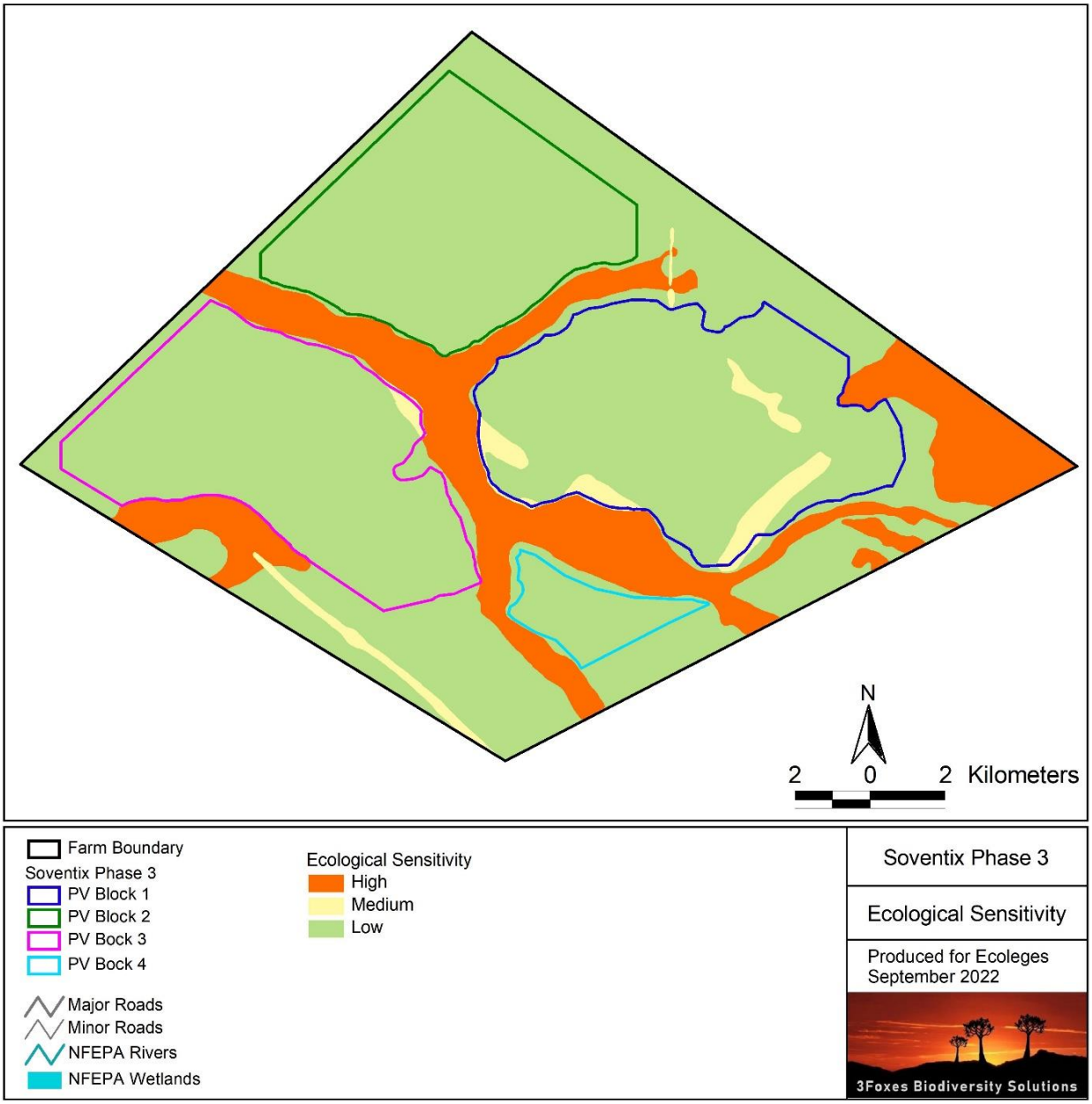
Appendix M – TERRESTRIAL BIODIVERSITY ECOLOGICAL SENSITIVITY MAP



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Appendix N – ESKOM REQUIREMENTS FOR WORK IN OR NEAR ESKOM SERVITUDES

TO WHOM IT MAY CONCERN

Eskom requirements for work in or near Eskom servitudes.

1. Eskom's rights and services must be acknowledged and respected at all times.

2. Eskom shall at all times retain unobstructed access to and egress from its servitudes.

3. Eskom's consent does not relieve the developer from obtaining the necessary statutory, land owner or municipal approvals.

4. Any cost incurred by Eskom as a result of non-compliance to any relevant environmental legislation will be charged to the developer.

5. If Eskom has to incur any expenditure in order to comply with statutory clearances or other regulations as a result of the developer's activities or because of the presence of his equipment or installation within the servitude restriction area, the developer shall pay such costs to Eskom on demand.

6. The use of explosives of any type within 500 metres of Eskom's services shall only occur with Eskom's previous written permission. If such permission is granted the developer must give at least fourteen working days prior notice of the commencement of blasting. This allows time for arrangements to be made for supervision and/or precautionary instructions to be issued in terms of the blasting process. It is advisable to make application separately in this regard.

7. Changes in ground level may not infringe statutory ground to conductor clearances or statutory visibility clearances. After any changes in ground level, the surface shall be rehabilitated and stabilised so as to prevent erosion. The measures taken shall be to Eskom's satisfaction.

8. Eskom shall not be liable for the death of or injury to any person or for the loss of or damage to any property whether as a result of the encroachment or of the use of the servitude area by the developer, his/her agent, contractors, employees, successors in title, and assignees. The developer indemnifies Eskom against loss, claims or damages including claims pertaining to consequential damages by third parties and whether as a result of damage to or interruption of or interference with Eskom's services or apparatus or otherwise. Eskom will not be held responsible for damage to the developer's equipment.

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9. No mechanical equipment, including mechanical excavators or high lifting machinery, shall be used in the vicinity of Eskom's apparatus and/or services, without prior written permission having been granted by Eskom. If such permission is granted the developer must give at least seven working days' notice prior to the commencement of work. This allows time for arrangements to be made for supervision and/or precautionary instructions to be issued by the relevant Eskom Manager

   Note: Where and electrical outage is required, at least fourteen work days are required to arrange it.

10. Eskom's rights and duties in the servitude shall be accepted as having prior right at all times and shall not be obstructed or interfered with.

11. Under no circumstances shall rubble, earth or other material be dumped within the servitude restriction area. The developer shall maintain the area concerned to Eskom's satisfaction. The developer shall be liable to Eskom for the cost of any remedial action which has to be carried out by Eskom.

12. The clearances between Eskom's live electrical equipment and the proposed construction work shall be observed as stipulated by *Regulation 15* of the *Electrical Machinery Regulations of the Occupational Health and Safety Act, 1993 (Act 85 of 1993).*

13. Equipment shall be regarded electrically live and therefore dangerous at all times.

14. In spite of the restrictions stipulated by Regulation 15 of the Electrical Machinery Regulations of the Occupational Health and Safety Act, 1993 (Act 85 of 1993), as an additional safety precaution, Eskom will not approve the erection of houses, or structures occupied or frequented by human beings, under the power lines or within the servitude restriction area.

15. Eskom may stipulate any additional requirements to highlight any possible exposure to Customers or Public to coming into contact or be exposed to any dangers of Eskom plant.

16. It is required of the developer to familiarise himself with all safety hazards related to Electrical plant.

17. Any third party servitudes encroaching on Eskom servitudes shall be registered against Eskom's title deed at the developer's own cost. If such a servitude is brought into being, its existence should be endorsed on the Eskom servitude deed concerned, while the third party's servitude deed must also include the rights of the affected Eskom servitude.

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