ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPr)

DEA National File Reference Number:
14/12/16/3/3/2/998

Project Title:
The proposed development of a 225MW solar photovoltaic (PV) facility on several portions of farms in the Hanover district, Emthanjeni local municipality, Pixley Ka Seme district municipality; Northern Cape province.

Prepared for:

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Table 1: Document Control.

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Justin Bowers	Draft	00		01 August 2017
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Justin Bowers	Draft	02		07 November 2017
Shaun MacGregor	Draft	03		30 November 2017
Justin Bowers	Final	00		11 December 2017

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Reg: 2006/023163/23

EXECUTIVE SUMMARY

Soventix South Africa proposes to establish a commercial solar electricity generating facility between the towns of De Aar & Hanover in the Northern Cape province. The solar facility intends to accommodate photovoltaic (PV) components and associated infrastructure comprising of:

- Solar panels arranged in blocks with a total generating capacity of approximately 225 MW_{AC} to be constructed as three separate yet integrated facilities of 75 MW_{AC} each. A total footprint of approximately 170 ha is normally required per 75MW_{AC} facility, totalling approximately 510 ha, but the developer has managed to design the facility to fit comfortably within a 448 ha footprint.
- Each 75 MW_{AC} facility will have an operations building to be contained within a 30 000 m² lay down area for each facility. The facility will include areas used for security management and control room, maintenance as well as changing facilities; and
- An on-site substation with the necessary infrastructure to feed the electricity generated from all three facilities via a loop in loop out into the immediately adjacent 400 kV Eskom network.

This Environmental Management Programme (EMPr) is developed in compliance with section 24N of the NEMA, 1998, as amended and contains those requirements prescribed in the EIA Regulations, 2014, as amended, including section 23 and Appendix 4 of GN No. R. 326 of 7 April 2017.

The EMPr is to be read in conjunction with the EIA Report (EIAr) providing detail on the affected environment as well as an impact assessment for the anticipated environmental impacts and the Environmental Authorisation (EA) (once issued).

The developers propose to establish the project on the Remainder of Farm Goedehoop 26 C, Portion 6 of Leuwe Fountain 27 C, Remainder of Farm Riet Fountain 39 C**, Portion 1 of Farm Riet Fountain 39C**, Remainder of Kwanselaars Hoek 40 C, **Portion 1 of Kwanselaars Hoek 40 C**, **Portion 4 of Taaibosch Fontein 41C**, Portion 1 of Farm Kafferspoort 56C, registration district Hanover, Emthanjeni Local Municipality, Pixley Ka Seme District Municipality; Northern Cape Province. The preferred footprint, if accepted by the DEA, will only affect 3 of the 8 properties and portions listed above namely; Portion 1 of Farm Riet Fountain 39C, Portion 1 of Kwanselaars Hoek 40 C & Portion 4 of Taaibosch Fontein 41C (bolded above).

Activities to be undertaken during the construction, operational and decommissioning phases include:

<u>Construction Phase</u>

- Site preparation;
  - Clearly delineate the construction footprint to avoid construction creep outside the approved development footprint;
  - Search & rescue fauna & flora of conservation concern & protected status ahead of any construction activities;

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- Installation of perimeter fencing, during but preferably prior to construction commencement (improved access control and assurance of no construction creep);
- Establish service tracks (access roads pre-existing);
- Transport components and equipment to site;
- Establishment of laydown areas;
- Establishment of ancillary infrastructure;
- Construction of infrastructure foundations;
- Establishment of PV panels;
- Connection of PV panels to the on-site substation;
- Connection of the on-site substation to the grid;
- Site rehabilitation; and
- Environmental management & monitoring throughout the construction process, inclusive of:
    - Continuous monitoring and removal of alien & invasive plant species;
    - Avifauna monitoring and management;
    - Traffic monitoring & management, including dust emissions;
    - Dust monitoring & management, including drilling operations;
    - Storm water monitoring & management;
    - Erosion monitoring and remediation;
    - Fire management;
    - Vegetation & habitat monitoring & management;
    - Hazardous substance monitoring & management, including detecting any leakage or spillage; and
    - Monitoring & management measures to protect hydrological features.

<u>Operational Phase</u>

- Maintenance and repairs of PV and associated equipment inclusive of:
    - Maintenance of roads;
    - Cleaning and maintaining / replacing panels;
    - Maintaining buildings and other infrastructure; and
    - Maintain and repair fencing.
- Environmental management & monitoring throughout the operational process, inclusive of:
    - Continuous monitoring and removal of alien & invasive plant species;
    - Avifauna monitoring and management;
    - Storm water monitoring & management;
    - Erosion monitoring and remediation;
    - Fire management;
    - Vegetation & habitat monitoring & management;
    - Monitoring & management measures to protect hydrological features.
- Waste management; and
- Health and safety implementations.

Post Operational Phase

Two options currently exist for this phase: 1. Should an extension not be granted on the power purchase agreement (PPA), the equipment and infrastructure will be removed and recycled. The site will be fully rehabilitated thereafter. 2. If an extension is granted to the power purchase agreement, consideration would be given to infrastructure upgrade and the deploying of more advance technologies.

1. Decommissioning

Complete decommissioning can occur should it no longer be economically feasible to continue the project or the PPA is not extended. Activities will include:

- Site reparation;
- Disassembly and recycling of existing components; and
- Rehabilitation of the site.

OR:

2. Extension of tenure

Replacement of panels that reached the end of their economic life or replacement with new technology. Activities include:

- Disassembly and replacement of individual panels;
- Repair, maintenance and / or replacement of the framework structures and other required infrastructure; and
- Recycling / disposing of replaced parts.

The implementation of the EMPr within the project is not an optional additional or "add on" requirement. The EMPr is legally binding, integral to the contract and is as important as the engineering aspects of the contract. The EMPr is a working document to be used throughout the life of the project, until such time that closure is achieved.

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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. Additional requirements relating to content of the EMPr were specified in the departmental communication dated 29/05/2017 as part of the approval of the final Scoping Report as well as department correspondence dated 05/09/2017 as part of the approval of the Draft Environmental Impact Assessment report; which too have been included. The full suite of requirements are listed in Table 2, which have dictated the layout and content of this EMPr.

Table 2: Environmental Management Programme Checklist.

Content of Environmental Management Programme (EMPr)	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.	N/A
The Environmental Management Programme (EMPr) to be submitted as part of the EIAr must include the following (as per departmental communication dated 29/05/2017 & 05/09/2017 as part of the approval of the final Scoping Report & Draft EIAr, respectively):	☑
i. All recommendations and mitigation measures recorded in the EIAr and the specialist studies conducted.	☑
ii. The final site layout map.	☑
iii. Measures as dictated by the final site layout map and micro-siting.	☑
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.	☑
vi. An alien invasive management plan to be implemented during construction and operation of the facility. The plan must include mitigation measures to reduce the	☑

invasion of alien species and ensure that the continuous monitoring and removal of alien species is undertaken.	**APPENDIX 1**
vii. A plant rescue and protection plan which allows for the maximum transplant of conservation important species from areas to be transformed. This plan must be compiled by a vegetation specialist familiar with the site and be implemented prior to commencement of the construction phase.	☑ **APPENDIX 2**
viii. An avifauna monitoring and management plan to be implemented during construction and operation of the facility. This plan must be drafted by a suitably qualified avifauna specialist.	☑ **APPENDIX 3**
ix. A re-vegetation and habitat rehabilitation plan to be implemented during construction and operation of the facility. Restoration must be undertaken as soon as possible after completion of construction activities to reduce the amount of habitat converted at any one time and to speed up the recovery to natural habitats.	☑ **APPENDIX 4**
x. An open space management plan to be implemented during the construction and operation of the facility.	☑ Intrinsic in EMPr conditions.
xi. A traffic management plan for the site access roads to ensure that no hazards would result from the increased truck traffic and that traffic flow would not be adversely impacted. This plan must include measures to minimize impacts on local commuters e.g. limiting construction vehicles travelling on public roadways during the morning and late afternoon commute time and avoid using roads through densely populated built-up areas so as not to disturb existing retail and commercial operations.	☑ **APPENDIX 5**
xii. A storm water management plan to be implemented during the construction and operation of the facility. The plan must ensure compliance with the applicable regulations and prevent off-site migration of contaminated storm water or increased soil erosion. The plan must include the construction of appropriate design measures that allow surface and subsurface movement of water along drainage lines so as not to impede natural surface and subsurface flows. Drainage measures must promote the dissipation of storm water run-off.	☑ **APPENDIX 8**
xiii. A fire management plan to be implemented during the construction and operation of the facility.	☑ **APPENDIX 7**
xiv. An erosion management plan for monitoring and rehabilitation erosion events associated with the facility. Appropriate erosion mitigation must form part of this plan to prevent and reduce the risk of any potential erosion.	☑ **APPENDIX 6**
xv. An effective monitoring system to detect any leakage or spillage of all hazardous substances during their transportation, handling, use and storage. This must include precautionary measures to limit the possibility of oil and other toxic liquids entering the soil or storm water systems.	☑
xvi. Measures to protect hydrological features such as streams, rivers, pans, wetlands, dams and their catchments, and other environmental sensitive areas from construction	☑

impacts including the direct or indirect spillage of pollutants.	
The EAP must provide detailed motivation if any of the above requirements is not required by the proposed development and not included in the EMPr.	☑

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ABBREVIATIONS / ACRONYMS AND DEFINITIONS

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

Abbreviation / Acronym	Term
BA	Basic Assessment as provided for in NEMA (Act 107 of 1998) and EIA Regulations (2014), as amended.
CA	Competent Authority
CAR	Corrective Action Reports
CLO	Community Liaison Officer
CRE	Chief Resident Engineer
DEA	Department of Environmental Affairs (National)
DENC	Department of Environment and Nature Conservation (Northern Cape)
DMR	Department of Mineral Resources
DWS	Department of Water & 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.
EIAr	Environmental Impact Assessment Report
EMPr	Environmental Management Programme
ELM	Emthanjeni Local Municipality
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 & 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.

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LN3	Listing Notice 3: GN R. 985, 4 December 2014, as amended in GN. No. R. 324, 7 April 2017.
MPRDA	Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002)
NEMA	National Environmental Management Act, 1998 (Act No. 107 of 1998)
NERSA	National Energy Regulator of South Africa
NHRA	National Heritage Resources Act, 1999 (Act No. 25 of 1999)
NWA	National Water Act, 1998 (Act No. 36 of 1998)
PDM	Pixley ka Seme District Municipality
PPA	Power Purchase Agreement
REFIT	Renewable Energy Feed-in Tariff
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
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

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		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.
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.
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.

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SECTION 1: DETAILS & EXPERTISE OF THE EAP AND APPLICANT

Details of –

(i) The EAP who prepared the report;

Environmental Assessment Practitioner	Ecoleges Environmental Consultants
Contact Person	Justin Aragon Bowers
Postal Address	PO Box 9005, Nelspruit, 1200
Telephone	+27(0)83 644 7179
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Project Applicant	Soventix South Africa (Pty) Ltd
Trading Name (if any)	Soventix South Africa
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(i) The expertise of the EAP to prepare the EMPr, including a curriculum vitae;

Abbreviated Curriculum Vitae of Justin Aragon Bowers

Name	Justin Bowers
Date of birth / ID No.	15 October 1972 7210155074089
Nationality	South African
Marital Status	Married with four children
Current Address	P O Box 516, Machadodorp, 1170. ● Redwing Farm, erf. Kaalbooi 368JT, Waterval Boven District, 1195, Mpumalanga, South Africa ● Cell: 082 451-5608 ● e-mail: justin@ecoleges.co.za
Languages	English, Afrikaans and Basic Zulu
Driver's Licence	Code EB, A & C1
Specialisations	Key Fields: Compliance monitoring, vegetation ecology, rehabilitation plans, environmental / ecological management plans, environmental auditing, Environmental Impact & Basic Assessment.
Qualifications & Courses Attended	**1998 – 2000** NATIONAL DIPLOMA: NATURE CONSERVATION, Technikon Pretoria **2001 – 2002** BACCALAUREUS TECHNOLOGIAE: NATURE CONSERVATION, Technikon Pretoria **2003 – 2007** MAGISTER TECHNOLOGIAE: NATURE CONSERVATION (CUM LAUDE), Tshwane University of Technology, Pretoria **2008** Environmental Law elective (MBA Programme), Rhodes University, Grahamstown. **2010 – Present** Certificate in Aquaculture, Department of Genetics & Aquaculture, University of Stellenbosch **2014** Implementing Environmental Management Systems, Centre for Environmental Management, North-West University, Potchefstroom. **2017** Transition ISO 14001 course, Centre for Environmental Management, North-West University, Pretoria locale.
Latest Publication	Sadie J. Ryan, Paul C. Cross, John Winnie, Craig Hay, Justin Bowers, Wayne M. Getz. 2012. The utility of normalized difference vegetation index for predicting African buffalo forage quality. *Journal of Wildlife Management* DOI: 10.1002/jwmg.407.
Countries worked	South Africa, United Kingdom.
Professional affiliations	IAIA^{sa}, GSSA, SACNASP.

SECTION 2: INTRODUCTION & BACKGROUND

Photovoltaic (PV) is a method of generating electrical power by converting solar radiation into direct current electricity. A number of solar cells electrically connected to each other and mounted in a support structure or frame is called a photovoltaic module (solar panel). The facility will include areas used for management, security and control room, maintenance and canteen as well as changing facilities. An on-site substation will be required with the necessary infrastructure to feed the electricity generated, via a loop-in, loop-out, into the immediately adjacent 132kv or 400kv Eskom network.

The purpose of the new Solar PV system, includes the establishment of De Aar as a Renewable Energy Hub, which can be achieved by providing different renewable energy options. The aforesaid Hub has to be within close proximity to existing Eskom infrastructure. Locally, the establishment of the proposed project would strengthen the existing electricity grid for the area, providing power in a short space of time (potentially less than two years to commissioning). Should the proposed project be approved it would result in long-term benefits for the De Aar area, e.g. creation of employment and business opportunities.

This EMPr forms part of the feasibility study and prerequisite by National Energy Regulator of South Africa (NERSA) for awarding a Power Purchase Agreement (PPA) under the Renewable Energy Feed in-Tariff (REFIT) program. The REFIT program is also a key project component due to the fact that the next scheduled phase includes Solar PV as an option and the project proponent will take the opportunity to submit the project proposals. The requirement for the successful establishment of a Solar PV plant does include, inter alia, proximity to existing Eskom infrastructure in order to feed electricity into the grid.

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SECTION 3: 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.

Table 5 describes all of the activities that will be undertaken during the lifespan of this project including the identified listed activities and associated activities that in their own right do not require environmental authorization, but are needed to achieve the desired objective, that is the supply of renewable energy via:
a 225MW solar photo-voltaic (PV) farm, comprising 3 interconnected 75MW plants, connected to a sub-station that ties into existing ESKOM 400kV overhead power lines.

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Table 5. A detailed description of the activities (including Listed Activities as per the EIA Regulations, 2014 as amended) and resultant aspects of the project that are covered by the EMPr.

Phase	Activity	Sub-activities	Aspects
Planning & Design (including pre-construction)	Compliance with legal requirements by acquiring authorisations, permits and/or licenses for activities/uses undertaken during construction and operation	Protected Species	Impacting protected species prior to obtaining the required licenses / permits.
		Water Use (21c&i)	Impacting the watercourse prior to obtaining the required licences / permits.
		Water Use (21g)	Impacting the watercourse through disposal of waste prior to obtaining the required licences / permits.
		Water Use (21a)	Taking water from a watercourse prior to obtaining the required licences / permits.
		Borrow pits	Mining sand prior to obtaining the required licences / permits.
		Access Roads (not exceed threshold & layout to have minimal impacts)	Poor alignment & extent of linear activities like roads, fences, pipelines or other cleared servitudes can increase runoff, cause erosion and sedimentation of aquatic habitats and result in regulatory non-compliance.
		Servitudes & wayleaves	Commencement without authorisation / permit from relevant authorities.
		Compliance monitoring	Commencement without appointment of an Environmental Control Officer (ECO) to monitor compliance with the EA & EMPr.
		Municipal bylaws	Non-compliance with the municipal bylaws.
		Protection of archaeological findings	Destruction of graves and other sites of archaeological value and need for relevant permits where necessary.

Phase	Activity	Sub-activities	Aspects
	Socio-economic considerations	Employment of local labour	Insufficient employment of local labour.
			Presence of construction workforce.
			Influx of job seekers.
			Loss of farm labour to construction work.
			Job seekers may begin enquiring prior to commencement of construction as awareness of the project grows.
		Economic benefits from professionals	If the professionals are unreasonably expensive, the funds to head the projects might be exhausted.
		Expectations (SIA)	Job seekers may begin enquiring prior to commencement of construction as awareness of the project grows.
		Uncertainty (SIA)	Community confusion, frustration & lack of information.
	Rezoning and landuse **Listed Activity 28 of GN 983, as amended** ***Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture, game farming, equestrian purposes or afforestation on or after 01 April 1998 and where such development:*** *(i) will occur inside an urban area,*	Land Acquisition and Access to Site	Physical and economic displacement of households / individuals.

Phase	Activity	Sub-activities	Aspects
	where the total land to be developed is bigger than 5 hectares; or ***(ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare.*** **THE CURRENT AGRICULTURAL LAND-USE WILL BE RETAINED FOR LIVESTOCK GRAZING, WITH THE SYNERGISTIC DEVELOPMENT OF A COMMERCIAL SOLAR PV PLANT, OVER A FIXED-TERM.**		
	Layout and design	Provision of maintenance and workshop areas	Dust generation.
			Loss of vegetation, habitat and soil fertility.
			Soil contamination.
			Water Contamination.
		Construction and use of Temporary Access Roads	Dust generation.
			Loss of Vegetation, Habitat and soil fertility.
			Increased potential for erosion.
			Increase in vehicle movement in area.

Phase	Activity	Sub-activities	Aspects
		Provision of sanitation systems	Dust generation.
			Loss of vegetation, habitat and soil fertility.
			Ground water contamination.
		Bund area for fuel storage	Dust generation.
			Loss of vegetation, habitat and soil fertility.
			Soil contamination.
		Demarcation, fencing and gates	Loss of vegetation and habitat.
			Impede faunal movement.
			Impeded human movement and disrupted daily activities.
		Vegetation Clearing & Soil Hardening	Loss of vegetation, habitat and soil fertility.
		Working near or on the watercourse	Decline in water availability of water resource.
		Water Use, abstraction and Management	
		Mining of sand	Dust generation.
			Loss of vegetation, habitat and soil fertility.
			Increased potential for erosion.
			Soil contamination.
			Encroachment and establishment of alien vegetation.
			Water contamination.
			Decline in aesthetic quality of the environment.
			Increased safety risks.
nst ruc tio	Site establishment (construction	Clear & grub (fence line,	Dust generation.

Phase	Activity	Sub-activities	Aspects
	camp, sanitation, temporary accommodation)	operations area, access roads, rack foundations, transformers and inverters, cables, substation and pylons)	Loss of vegetation, habitat and soil fertility.
			Noise Generation.
		Construction and use of Temporary Access Roads	Loss of Vegetation, Habitat and soil fertility.
			Increased potential for erosion.
			Increased level of noise generation.
			Increase in vehicle movement in area.
			Dust generation.
		Sanitation	Dust generation.
			Loss of vegetation, habitat and soil fertility.
			Ground water contamination.
		Fencing & gates	Loss of vegetation and habitat.
			Impede faunal movement.
			Impeded human movement and disrupted daily activities.
		Lighting	Visual intrusion in remote areas.
	Access control including fencing of perimeter	Construction and use of Temporary Access Roads	Loss of Vegetation, habitat and soil fertility.
			Increased potential for erosion.
			Increased level of noise generation.
			Increase in vehicle movement in area.
			Dust generation.
		Fencing & gates	Loss of vegetation and habitat.
			Impede faunal movement
			Impeded human movement and disrupted daily activities.

Phase	Activity	Sub-activities	Aspects
	Contractor's employees (staff conduct, movement)	Water use and management	Water contamination.
			Misuse of available water.
		Cooking of food	Harvesting & fire control.
		Sanitation	Unpleasant odours.
			Mismanagement of sewerage.
		Employment of local labour	Insufficient employment of local labour.
			Presence of construction workforce.
			Influx of job seekers.
			Loss of farm labour to construction work.
	Construction of permanent & temporary access roads	Vegetation Clearing & Soil Hardening	Dust generation.
			Loss of vegetation, habitat and soil fertility.
			Increased level of noise generation.
		Impact on the existing road conditions	The development of potholes.
			Damage to vehicles.
			Potential increase in vehicle accidents.
	Transport on site & accommodation of traffic (parking areas)	Parking	Increase in vehicle movement in area.
			Impact on the existing road conditions.
			Increase human safety risk.
			Increase in the level of noise generation.
			Greenhouse gas emissions.
		Impact on the existing road conditions	The development of potholes.
			Damage to vehicles.
			Potential increase in vehicle accidents.

Phase	Activity	Sub-activities	Aspects
	Sourcing & management of water (for drinking, sanitation & construction activities)	Drinking, dust suppression & sanitation	Water contamination.
			Misuse of available water.
	Sourcing & management of building material / sand	Excavation of suitable bedding and backfill material	Dust generation.
			Loss of vegetation, habitat and soil fertility.
			Increased potential for erosion.
		Topsoil stripping and storage	Dust generation.
			Loss of vegetation, habitat and soil fertility.
			Increased potential for erosion.
			Soil contamination.
			Encroachment and establishment of alien vegetation.
		Slopes and slope stabilisation	Dust generation.
			Increased potential for erosion.
			Water contamination.
			Decline in aesthetic quality of the environment.
			Increase human safety risk.
	Stockpiling and material laydown areas (spoil, mulch, building sand, topsoil, windrows, material & equipment)	Topsoil stripping storage	Dust generation.
			Loss of vegetation, habitat and soil fertility.
			Increased potential for erosion.
			Soil contamination.
			Encroachment and establishment of alien vegetation.
			Reduced productivity of subsistence farmland.
		Slopes and slope stabilisation	Dust generation.
			Increased potential for erosion.

Phase	Activity	Sub-activities	Aspects
			Water contamination.
			Decline in the aesthetic quality of the environment.
			Increase human safety risk.
	Earthworks & excavations (associated with the operations area, road crossings, cabling, transformers and inverters, substation and pylons) **Listed Activity 19 of GN. No. 983, as amended** ***The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse;*** *but excluding where such infilling, depositing, dredging, excavation, removal or moving-* *(a) will occur behind a development setback;*	Cut and Fill	Dust generation.
			Increased potential for erosion.
		Trenching	Dust generation.
			Increased potential for erosion.
			Increase human safety risk.
		Importing of suitable bedding and backfill material	Dust generation.
			Loss of vegetation, habitat and soil fertility.
			Reduced productivity of subsistence farmland.
			Increased potential for erosion.
		Topsoil stripping and storage	Dust generation.
			Loss of vegetation, habitat and soil fertility.
			Increased potential for erosion.
			Soil contamination.
			Reduced productivity of subsistence farmland.
			Encroachment and establishment of alien vegetation.
		Slopes and slope stabilisation	Dust generation.
			Increased potential for erosion.
			Water contamination.
			Decline in aesthetic quality of the environment.
			Increase human safety risk.

Phase	Activity	Sub-activities	Aspects
	(b) is for maintenance purposes undertaken in accordance with a maintenance management plan; *(c) falls within the ambit of activity 21 in this Notice, in which case that activity applies.* *(d) occurs within existing ports or harbours that will not increase the development footprint of the port or harbour; or* *(e) where such development is related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies.*	Crushing of material	Dust generation. Loss of vegetation, habitat and soil fertility.
	Drilling and/or Ram piling (associated with the rack foundations for the panel mounting hardware and fence poles)	Installation of warning signage	Decrease in aesthetic quality of the environment. Lack of visibility of signage.
		Crusher Plant	Dust generation. Loss of vegetation, habitat and soil fertility.
		Use of generators	Increase in level of noise generation. Soil contamination.
	Erection and construction of the panels arrays and associated infrastructure	Spoil material generation and management	Dust generation. Loss of vegetation, habitat and soil fertility. Decline in the aesthetic quality of the environment.

Phase	Activity	Sub-activities	Aspects
	Listed Activity 1 of GN. No. 984, as amended ***The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more,*** *excluding where such development of facilities or infrastructure is for photovoltaic installations and occurs-* *(a) within an urban area; or* *(b) on existing infrastructure.* The solar PV installation will be a total of 225mw outside an urban area, on a green fields site.	Transportation and storage of the panel arrays and associated materials	Increase in vehicle movement in area.
			Impact on the existing road conditions.
			Increase human safety risk.
			Increase in the level of noise generation.
			Greenhouse gas emissions.
		Protection of archaeological findings	Destruction of graves and other sites of archaeological value.
	Feeding or tying the solar PV plant into existing Eskom grid. **Listed Activity 9 of GN. No. 984, as amended** **The development of facilities or**	Relocation of existing services	Disruption in the provision of services
		Consultation with affected parties	Insufficient consultation.
		Working near or under powerlines	Damage and inaccessibility to powerlines.

Phase	Activity	Sub-activities	Aspects
	infrastructure for the transmission and distribution of electricity with a capacity of 275 kilovolts or more, outside an urban area or industrial complex excluding the development of bypass infrastructure for the transmission and distribution of electricity where such bypass infrastructure is — (a) temporarily required to allow for maintenance of existing infrastructure; (b) 2 kilometres or shorter in length; (c) within an existing transmission line servitude; and (d) will be removed within 18 months of the commencement of development. The overhead eskom lines are 400kva and the loop-in, loop-out from the sub-station to the eskom	Working in the watercourse	Impeding the watercourse.

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Phase	Activity	Sub-activities	Aspects
	overhead lines may exceed 2 kilometres in length, depending on which of the two 400kva eskom designates for the tie-in.		
	Handling of waste & generation (solid waste including 'spoil', liquid waste, separation, storage and disposal)	Domestic and construction waste collection, storage, handling and disposal	Unpleasant odours.
			Increase in waste generation.
			Decline in the aesthetic quality of the environment.
		Spoil material generation and management	Dust generation.
			Loss of vegetation, habitat and soil fertility.
			Decline in the aesthetic quality of the environment.
	Handling of hazardous substances (fuel/oil, cement, bitumen, sewage/grey water) & management (including storage) at sanitation sites, kitchens, batching sites, workshops, washbays, refuelling areas and on site.	Maintenance of sanitation systems	Unpleasant odours.
			Soil contamination.
			Water contamination.
			Mismanagement of sewerage.
		Bund area for fuel storage	Dust generation.
			Loss of vegetation, habitat and soil fertility.
			Soil contamination.
		Provision of oil sump and separators for construction plant wash bays, refuelling and workshop areas.	Dust generation.
			Loss of vegetation, habitat and soil fertility.
			Soil contamination.
			Water Contamination.
		Use of flammable material and	Dust generation.

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Phase	Activity	Sub-activities	Aspects
		other material stores	Loss of vegetation, habitat and soil fertility.
			Soil contamination.
		Refuelling of construction vehicles and plant	Soil contamination.
			Water contamination.
		Handling, storage, disposal of hazardous waste	Unpleasant odours.
			Soil contamination.
			Water contamination
		Transportation of hazardous waste	Potential spillages of hazardous waste.
			Increase human safety risk.
			Greenhouse gas emission.
	Plant management (parking, driving, repair and maintenance, and refuelling)	Refuelling of construction vehicles and plant	Soil contamination.
			Water contamination.
		Bund area for fuel storage	Dust generation.
			Loss of vegetation, habitat and soil fertility.
			Soil contamination.
		Operation and movement of construction vehicles and plant	Dust generation.
			Increase in level of noise generation.
			Soil contamination.
			Increase human safety risk.
			Vibration.
			Greenhouse gas emissions.
	Building work (concrete work)	Water use and management	Water contamination.
			Misuse of available water.

Phase	Activity	Sub-activities	Aspects
		Spoil material generation and management	Dust generation.
			Loss of vegetation, habitat and soil fertility.
			Decline in the aesthetic quality of the environment.
		Excavation of suitable bedding and backfill material	Dust generation.
			Loss of vegetation, habitat and soil fertility.
			Increased potential for erosion.
	Disturbing natural areas	Slopes and slope stabilisation	Dust generation.
			Increased potential for erosion.
			Water contamination.
			Decline in aesthetic quality of the environment.
			Increase human safety risk.
		Topsoil stripping and storage	Dust generation.
			Loss of vegetation, habitat and soil fertility.
			Increased potential for erosion.
			Soil contamination.
			Reduced productivity of subsistence farmland.
			Encroachment and establishment of alien vegetation.
	Site closure & rehabilitation	Removal of structures and infrastructures	Increase in waste generation.
		Removal of inert waste and rubble	
		Hazardous waste and pollution control	

Phase	Activity	Sub-activities	Aspects
		Final shaping of disturbed areas	Increased potential for erosion.
		Topsoil replacement and soil amelioration	
		Ripping and scarifying	
		Planting	Reduced productivity of subsistence farmland.
		Grassing	
		Maintenance	Encroachment and establishment of alien vegetation.
		Management of alien vegetation	Loss of vegetation, habitat and soil fertility.
Operation (including maintenance)	Operation employment	Consultation with affected parties	Insufficient consultation.
		Employment of local labour	Insufficient employment of local labour.
			Presence of construction workforce.
			Influx of job seekers.
			Loss of farm labour to construction work.
	Consumption (energy, water, and other resources)	Water use and management	Water contamination.
			Misuse of available water.
		Cooking of food	Fire hazard.
			Illegal wood harvesting.
	Maintenance	Refuelling of construction vehicles and plant	Soil contamination.
			Water contamination.

Phase	Activity	Sub-activities	Aspects
		Handling, storage & disposal of waste	Unpleasant odours.
			Soil contamination.
			Water contamination.
		Maintenance of sanitation systems	Unpleasant odours.
			Mismanagement of sewerage.
	Lighting to create visibility at night	Use of generators	Increase in level of noise generation.
			Soil contamination.
		Security	Trespassing.
	Terrestrial and aquatic ecological management	Use of herbicides	Loss of vegetation, habitat and soil fertility.
			Soil contamination.
		Harvesting of indigenous plants	Encroachment and establishment of alien vegetation.
		Overgrazing	Increased potential for erosion.
			Reduced productivity of subsistence farmland.
			Dust generation.
	PV panels and inverter (substation)	Cleaning & Maintenance	Water contamination.
			Misuse of available water.
	Social & community changes	Security	Trespassing.
		Fire Control	Loss of vegetation, habitat and soil fertility.
		Employment of local labour	Insufficient employment of local labour.
			Presence of construction workforce.
			Influx of job seekers.
			Loss of farm labour to construction work.
		Visual aspects	Visual Intrusiveness.

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Phase	Activity	Sub-activities	Aspects
Decommissioning (including rehabilitation)	Disposal of PV panels and other waste	Demolition activities	Dust generation.
			Increased level of noise generation.
			Vibration.
			Increase in waste generation.
			Increase human safety risk.
		Removal of inert waste and rubble	Decline in the aesthetic quality of the environment.
			Soil contamination.
		Relocation of previously existing services	Disruption in the provision of services.
	Human influence (staff conduct, movement)	Harvesting of indigenous plants	Loss of vegetation, habitat and soil fertility.
			Decline in the aesthetic quality of the environment.
		Fires for heat & cooking	Fire hazard.
			Loss of vegetation, habitat and soil fertility.
			Illegal wood harvesting.
		Littering	Decline in the aesthetic quality of the environment.
			Unpleasant odours.
			Increase in waste generation.
			Decline in the aesthetic quality of the environment.
		Noise	Increase human safety risk.
			Increase in the level of noise generation.
	Roads and access routes	Topsoil stripping and storage	Dust generation.
			Loss of vegetation, habitat and soil fertility.
			Increased potential for erosion.

Phase	Activity	Sub-activities	Aspects
			Encroachment and establishment of alien vegetation.
		Road decommissioning & rehabilitation	Dust generation.
			Increased level of noise generation.
			Soil contamination.
	Rehabilitation of affected footprint	Removal & transportation of structures and infrastructures;	Increase in vehicle movement in area.
			Impact on the existing road conditions.
			Increase human safety risk.
			Increase in the level of noise generation.
			Greenhouse gas emissions.
			Increased potential for erosion.
		Maintenance & management of alien vegetation	Loss of vegetation, habitat and soil fertility.
			Increased potential for erosion.
		Planting & grassing	Reduced productivity of subsistence farmland.
		Topsoil replacement and soil improvement	Loss of vegetation, habitat and soil fertility.
		Final Shaping of disturbed areas	Increased potential for erosion.

SECTION 4: 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.

Apart from the abovementioned requirement (as stipulated in the EIA Regulations, 2014), three additional maps were required by the Department in their comments on the Final Scoping Report, dated 29th May, 2017 (quoted below).

"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."

Figure 1. provides a map of the final site layout of the solar PV arrays and how they fit into the preferred alternative footprint. Figure 2. provides a map of the proposed preferred development footprint in the context of the surrounding environmental sensitivities. Figure 3 combines the information in the two preceding maps to consolidate all the available layers. The preferred footprint development has been determined through an iterative process, to ensure that it remains outside of all sensitive receptors assessed, including specified buffer zones.

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Figure 1. Site layout map.

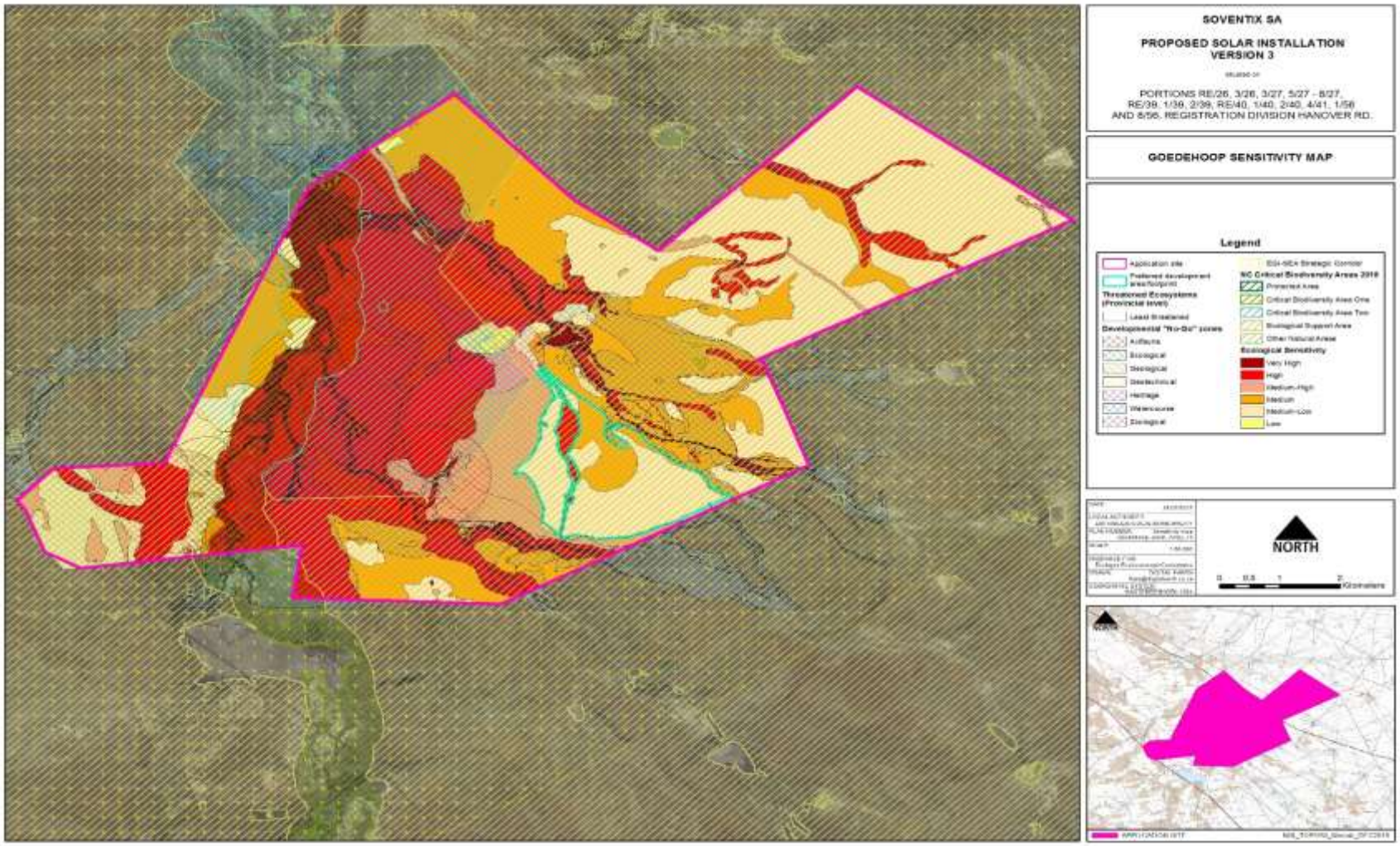

Figure 2. Site sensitivity map including proposed site development footprint.

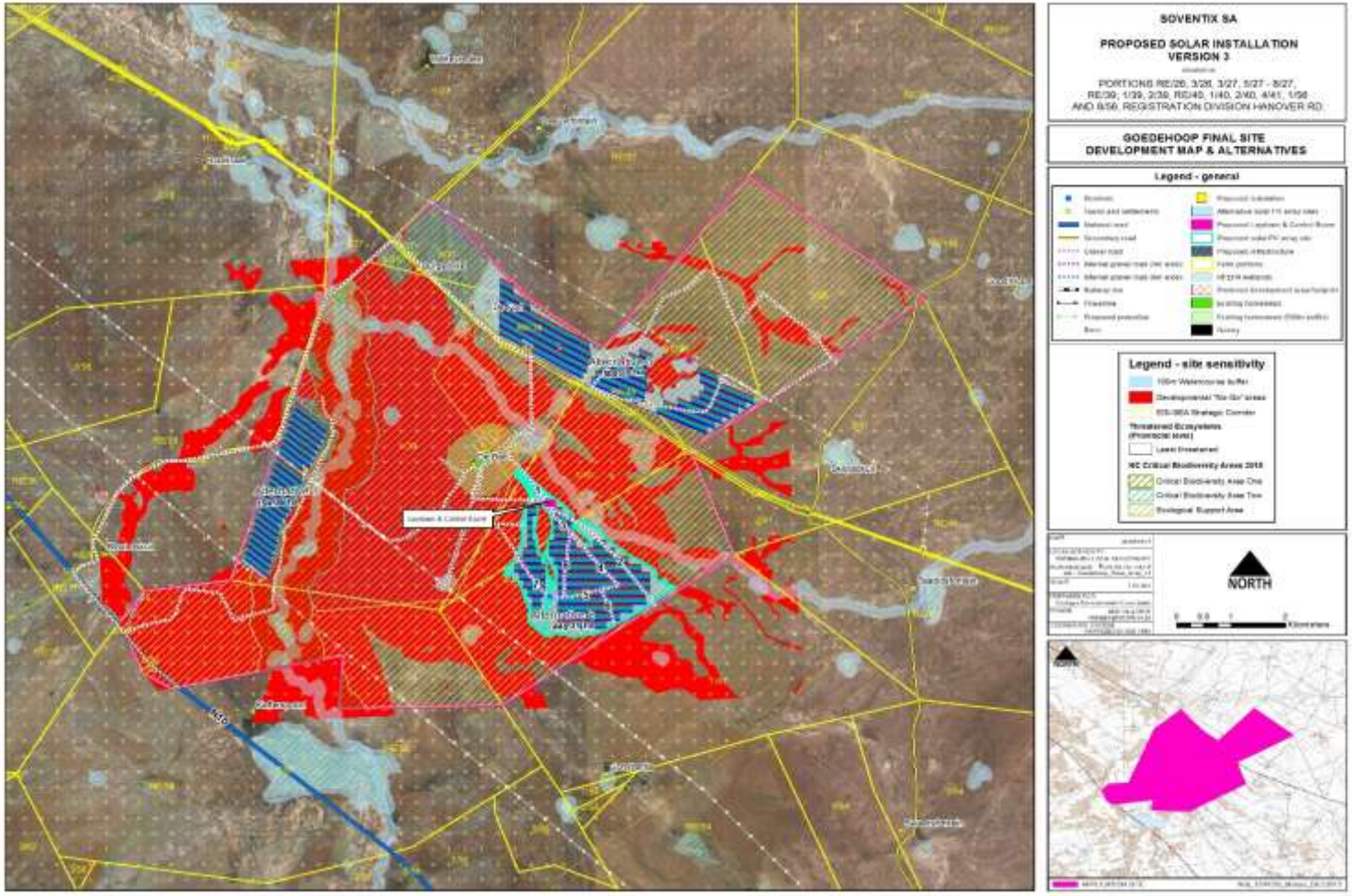

Figure 3. A map combining the final layout map superimposed (overlain) on the environmental sensitivity map (all sensitive areas consolidated & demarcated in red as “no-go” areas.

SECTION 5: ACTIVITIES, ASPECTS AND IMPACTS AND THEIR MANAGEMENT, MITIGATION & DESIRED OUTCOMES

(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;
(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;
(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.

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The impacts are considered within the scope of the project, including but not limited to the Listed Activities. The relevant impacts resulting from Listed Activities and associated activities, including environmental, socio-economic and cultural heritage, are informed by a predetermined list of potential environmental impacts (generated by way of a Leipoldt Matrix), comments received from Interested and Affected Parties and the findings contained in specialist studies that were used to generate the EIAr.

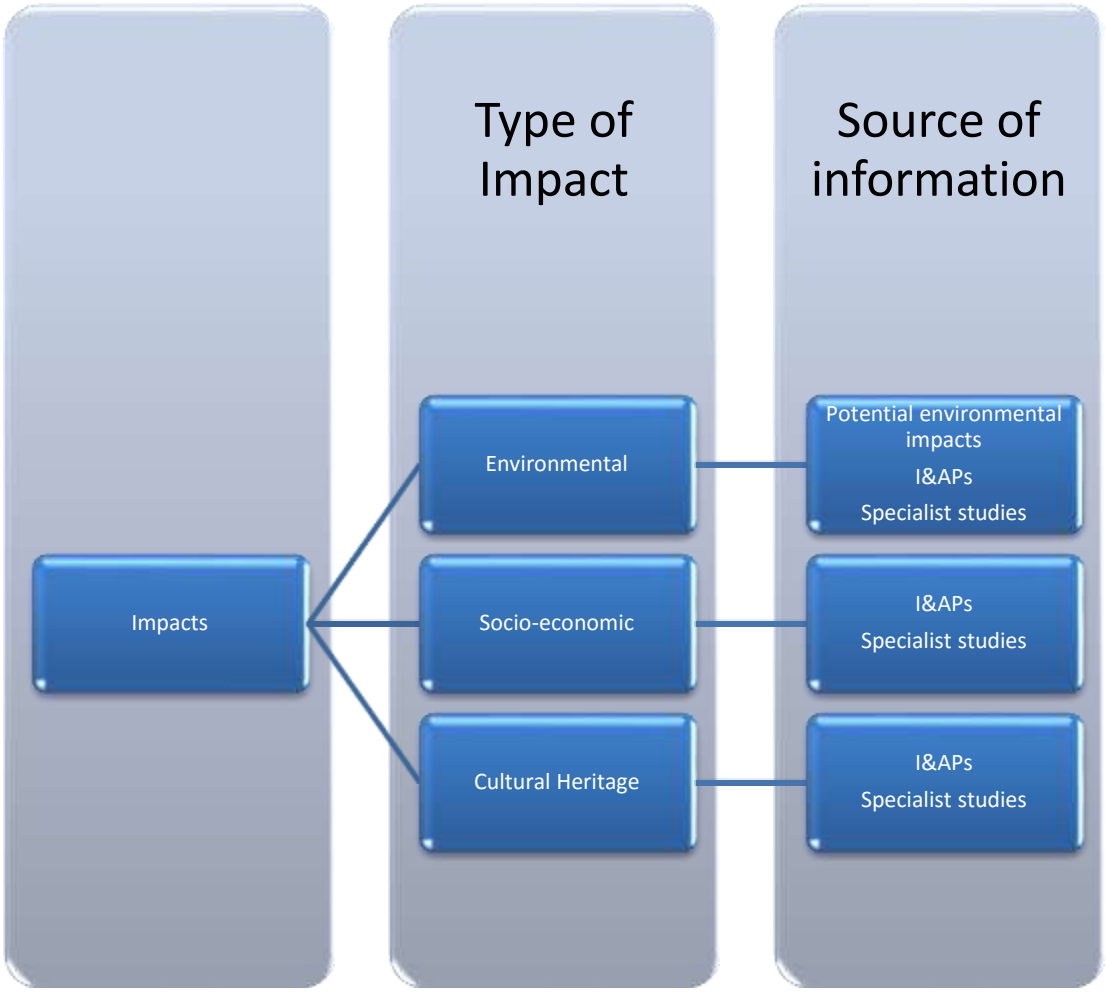

Figure 4: A breakdown of the different types of impacts including the resources used to identify them.

As stipulated in regulation 1(1)(d) of Appendix 4 of the EIA regulation (2104), as amended; the setting of desired impact management outcomes forms the principle objective of an EMPr. Outcomes are driven by impact management actions including measures and mitigations to avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation; to comply with any prescribed environmental management standards or practices, including legal requirements and in some cases, “best practices” that the Implementer aspires to fulfil (e.g. Equator Principles). The outcomes are achieved by implementing and achieving measurable Targets (both quantitative & qualitative). Management and mitigation measures are set to afford guidance and parameters to the implementer to achieve the set outcomes. The following section describes management programmes for the

different environmental attributes pertaining to the Project. As part of the Management Programmes, the section describes the potential environmental impacts which may result from the identified aspects / activities, the desired outcomes of mitigating these impacts as well as the targets used to measure the level of environmental compliance and performance.

The following legislation, guidelines, departmental policies, environmental management instruments and / or other decision-making instruments that have been developed or adopted by a competent authority in respect of activities associated with a development of this nature, were identified and considered in the preparation of this EMPr:

1. BirdLife South Africa – Position statement on the effect of solar power facilities on birds.
2. BirdLife South Africa – Guidelines to minimise the impact on birds of Solar Facilities and Associated Infrastructure in South Africa
3. Conservation of Agricultural Resources Act, 1983 (Act 43 of 1983), as amended including the regulations dealing with declared weeds and invader plants as amended from time to time;
4. Constitution of the Republic of South Africa Act (Act 108 of 1996), including section 24;
5. DEA (2010), Public Participation 2010, Integrated Environmental Management Guideline Series 7, Department of Environmental Affairs, Pretoria, South Africa.
6. Department of Environmental Affairs (2013). Draft National Renewable Energy Guideline. Department of Environmental Affairs, Pretoria, South Africa
7. DEAT (2002) Specialist Studies, Information Series 4, Department of Environmental Affairs and Tourism (DEAT), Pretoria.
8. DEAT (2004) Environmental Management Plans, Integrated Environmental Management, Information Series 12, Department of Environmental Affairs and Tourism (DEAT), Pretoria.
9. DWA (2007), Guideline for Developments within a Floodline (Edition 1), Department of Water Affairs and Forestry, Pretoria, South Africa.
10. DWS (2016) General Authorisation GN No. 509 in the Government Gazette No. 40229 dated 26 August 2016.
11. EIA Regulations, 2014 published in Government Notice No. R. 543, R. 544, R. 545, R. 546 and R. 547 in Government Gazette No. 38282 of 4 December 2014; and amended in GN No. R. 324, R. 325. R. 326 & R. 327 in Government Gazette No. 40772 of 7 April 2017;
12. Electricity Act (Act 41 of 1987);
13. Environment Conservation Act (Act 73 of 1989), including the noise regulations and litter controls promulgated thereunder;
14. Fencing Act (Act 31 of 1963);
15. General Authorisation in GN No. 538 in Government Gazette No. 40243 on 2 September 2016.
16. Land Use Planning Ordinance (Act 15 of 1985);
17. Minerals and Petroleum Resources Development Act (Act 28 of 2002) (MPRDA);
18. National Building Regulations and Building Standards Act (Act 103 of 1977);
19. National dust control regulations. GG No. 36974, GN No. R. 827, 1 November 2013;
20. National Environmental Management Act (Act 107 of 1998) (NEMA);
21. National Environmental Management: Air Quality Act (Act 57 of 2003) (NEM:AQA);

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22. National Environmental Management: Biodiversity Act (Act 10 of 2004) (NEM:BA);
23. National Environmental Management: Waste Act, 2009 (Act 59 of 2009) (NEM:WA);
24. National Forest Act (No 84 of 1998);
25. National Heritage Resources Act (Act 25 of 1999);
26. National Road Traffic Act (Act 93 of 1996);
27. National Veld and Forest Fire Act (Act 101 of 1998);
28. National Water Act (Act 36 of 1998);
29. Northern Cape Nature Conservation Act, 2009 (Act 9 of 2009);
30. Occupational Health & Safety Act (Act 85 of 1993);
31. Schedules 4 and 5 of the National Regulations regarding Noise Control made under Section 25 of the Environment Conservation Act, 1989 (Act 73 of 1989) in GN No. R 154 of Government Gazette No. 13717 dated 10 January 1992. (Note that this particular section of the Environment Conservation Act is not repealed by NEMA (Act 107 of 1998)).
32. Visser, E. 2016. The impact of South Africa's largest photovoltaic solar energy facility on birds in the Northern Cape, South Africa. Unpublished MSc thesis, University of Cape Town, Cape Town.

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The following management programme aims to set management actions to achieve stated desired outcomes for each environmental aspect, including quantifying the measurable targets. While the impacts and management & mitigations have been addressed under the various project development phases, they are not intended to be mutually exclusive, and impacts from one phase are likely to occur in subsequent phases; but in the interest of reducing redundancy they have not been repeated for each phase. The appendices to this EMPr form part of the EMPr and must be implemented accordingly. In the event that conditions with the following tables in anyway contradict the conditions of the aspect specific Management Plans (MP) in the appendices, the MP conditions must take precedent.

TABLE 6. COMPLIANCE MANAGEMENT.

No.	Potential Impacts	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
6.1	**All Phases with special emphasis on Planning & Design Phase (including Pre-Construction)**						
6.1.1	**PROTECTED SPECIES**						
6.1.1.1	Impacts on protected plants.	Comply with the relevant sections of the National Forest Act (NFA) (Act 84 of 1984), National Environmental Management: Biodiversity Act, 2004 (NEM:BA) (Act No. 10 of 2004), and the Northern Cape	Obtain and provide proof of issuance of necessary permits for any listed species under NFA, NEMBA & NCNCA.	The applicant shall apply for and obtain the relevant licenses / permits from the appropriate authorities (DAFF, DEA, and Provincial Authority) prior to disturbing or destroying any protected species. The list of affected plants are contained in the Terrestrial Ecology Specialist Report, which will need to be	Applicant / Contractor to appoint botanist.	Prior to commencement of construction.	Compliance to be verified by ECO & IEA.

No.	Potential Impacts	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
		Nature Conservation Act (NCNCA) (Act 9 of 2009).		searched for in the appropriate season & rescued if present, by a qualified ecologist / botanist prior to clearing operations. • *Stomatium pluridens;* • *Euphorbia crassipes,* (regional endemics and provincially protected); • *Aloe broomii* var. *broomii;* • *Aloe claviflora;* • *Pachypodium succulentum;* • *Ammocharis coranica;* and • *Boscia albitrunca.*			
6.1.2	**WATER USE AUTHORISATION TO WORK WITHIN A WATERCOURSE**						
6.1.2.1	Contravention of section 21 (c) & (i) of the NWA.	The commencement of water uses that are	Confirmation letter from DWS on General Authorisation	The applicant shall register a water use entitlement, i.e. a GA or WUL for section 21(c) and (i) water uses, prior to	Applicant / EAP.	Prior to commencement of construction.	Compliance to be verified by ECO & IEA.

No.	Potential Impacts	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
		authorised in terms of the NWA, 1998 (Act No. 36 of 1998).	(GA) registration (GN. No. 509, GG. No. 40229, 26 August 2016); or an issued Water Use License (WUL).	constructing access roads and erecting pylons inside a watercourse.			
6.1.3	**WATER USE AUTHORISATION FOR TREATED EFFLUENT**						
6.1.3.1	Contravention of section 21 (g) of the NWA.	The commencement of water uses that are authorised in terms of the NWA, 1998 (Act No. 36 of 1998).	Confirmation letter from DWS on relevant General Authorisation registration (GN. No. 665, GG. No. 36820, 6 September 2013); or an issued Water Use License.	The applicant shall register a water use entitlement, i.e. a General Authorization or WUL for section 21(g) water uses for the treatment of effluent via a package waste water treatment works (WWTW) (Biorock™).	Applicant / EAP.	Prior to commencement of construction.	Compliance to be verified by ECO & IEA.
6.1.4	**WATER USE AUTHORISATION FOR ABSTRACTION & STORAGE**						
6.1.4.1	Contravention of	The	Confirmation	Water required during	Applicant /	Prior to	Compliance

No.	Potential Impacts	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
	section 21 (a) of the NWA.	commencement of water uses that are authorised in terms of the NWA, 1998 (Act No. 36 of 1998).	letter from DWS on relevant General Authorisation registration (GN No. 538, GG No. 40243 on 2 September 2016; or an issued Water Use License.	construction and operation for human consumption (drinking, sanitation and food preparation), building activities (mixing concrete, watering gravel roads), livestock and maintenance (cleaning solar panels) shall be pre-authorised via a General Authorisation or Water Use License.	EAP.	commencement of construction.	to be verified by ECO & IEA.
6.1.4.2	Depletion of already constrained groundwater resource	Utilisation of borehole water within the General Authorisation or Water Use License limit.	Records demonstrating abstraction volumes in compliance with GA or WUL limits.	Abstraction must not exceed the limits prescribed in the GA for this area, and Abstraction volumes must be measured and recorded against the limit prescribed in the GA or WUL.	Applicant / Contractor.	Applicant.	Compliance to be verified by ECO & IEA.
6.1.5	**Access Roads**						
6.1.5.1	The construction or expansion of any access roads in exceedance of	Existing roads to be utilised with addition of with limited tracks	Existing roads were not widened by more than 6m	Newly constructed service roads may not be wider than 4 metres with a reserve less than 13.5 metres, nor the	Applicant / Contractor.	Prior to commencement & throughout construction.	Compliance to be verified by ECO & IEA.

No.	Potential Impacts	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
	thresholds stipulated in NEMA listed activities, 2014.	necessary for service only within the development footprint.	or lengthened by more than 1km. Newly constructed service tracks were not made wider than 4m. The cumulative area cleared for widening and lengthening existing roads, constructing new service tracks and other infrastructure (substation and office block/laydown area?) did not exceed 20ha.	widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre.			

No.	Potential Impacts	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
6.1.6	**Servitudes and Wayleaves**						
6.1.6.1	Construction without permission from ESKOM will constitute an offence in terms of the relevant legislation, including the Electricity Act, 1987 (Act 41 of 1987), as amended in 1994.	Compliance with the Electricity Act, 1987, as amended.	Wayleave issued by Eskom.	The applicant shall apply for a wayleave(s) from Eskom prior to commencing with construction within their servitude	Applicant / EAP.	Prior to commencement of construction activities within Eskom's servitude.'	Compliance to be verified by ECO & IEA.
6.1.7	**Compliance Monitoring**						
6.1.7.1	Commencement of construction prior to the appointment of an ECO.	Ensure compliance with the EA and EMPr from the onset of construction and until the rehabilitated development is handed over to the Applicant for	Proof of ECO appointment prior to commencement of construction.	A qualified, suitably experienced & accredited independent ECO must be appointed (registered with SACNASP & EAPASA) to monitor and report to the competent authority on compliance with the EA and EMPr, and where necessary oversee or facilitate the	Applicant.	Prior to commencement of construction and until the rehabilitated development is handed over to the applicant for operation. The minimum	To be verified by IEA.

No.	Potential Impacts	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
		operation.		identification and permitting / licensing of protected species prior to clearing of any vegetation.		frequency for ECO inspections is monthly.	
6.1.8	**Municipal By-laws**						
6.1.8.1	Commencement of construction prior to submission and approval of building plans by the Emthanjeni Local Municipality.	Local municipality approval of building plans.	Issuance of a certificate referred to in section 118(1) of the Local Government: Municipal Systems Act (Act 32 of 2000).	The plans and specifications for any building, whether of a temporary or permanent nature, to be erected on the land must be submitted to the Emthanjeni Local Municipality for approval in terms of the Local Government: Municipal Systems Act, 2000 (Act No. 32 of 2000).	Applicant.	Prior to commencement of construction.	Compliance to be verified by ECO & IEA.

TABLE 7. CONSTRUCTION CAMP, LAYDOWN AREAS, STOCKPILES, STORES & EQUIPMENT.

No.	Potential Impacts	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
7.1	**Planning & Design Phase (including Pre-Construction)**						
7.1.1	Land surface pollution.	Low risk of pollution or harm to sensitive environments from the inappropriate location of construction related sites within or within proximity to those sensitive environments.	Approved and effectively implemented layout plan indicating designated construction-related sites.	A construction site layout plan must be developed by the contractor and approved by the SEO to ensure that all construction related sites are located outside sensitive environments, including no-go areas and buffer zones. Furthermore, those construction related sites or activities with the greater risk or potential for causing pollution or harm to the receiving environment, including but not necessarily limited to laydown areas, material stockpiles, toilets, waste skips and stores, must not be within close proximity to the aforesaid sensitive environments, i.e. these construction related sites or activities	Applicant / Contractor	Prior to commencement of construction.	SEO, ECO & IEA.

No.	Potential Impacts	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
				must not, as far as is practical, be located on the watercourse-side of any construction camp or area demarcated for construction activities.			
7.1.2	Degradation of the environment outside of the development footprint.	Zero construction creep into and subsequent degradation of areas outside the preferred or approved development footprint.	Approved and effectively implemented (demarcated on site) layout plan indicating all environmental sensitivities, especially no-go areas,	Permanent and temporary construction footprints must be designated, and sensitive terrestrial & aquatic habitats demarcated as no-go areas during construction, including required buffer zones. The Contractor shall locate the construction camp on existing disturbed or the least sensitive sites above the 1:100-year flood line or further than 100m from the edge of a watercourse, whichever is greatest. The project footprint must be clearly demarcated on the ground to ensure that no construction creep results toward any watercourses or defined	Applicant / Contractor	Prior to and ongoing enforcement during construction.	SEO, ECO & IEA.

No.	Potential Impacts	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
				sensitive areas. Placement of infrastructure and laydown & stockpile areas must be done so as not to negatively affect surface water runoff in a way that leads to erosion and export of material to be deposited in any watercourses.			
7.2	**Construction Phase**						
7.2.1	Land surface pollution.	To avoid and reduce human induced environmental pollution.	Incident registers that indicate reduction in pollution events, from the operation of construction plant, equipment or other vehicles, over time.	Emergency breakdowns in the parking areas or along roads, must be addressed with immediate and adequate pollution containment measures have been implemented including but not limited to drip trays and spill kits. No washing, other than ready-mix concrete trucks at a designated area within the construction camp, and no repairs or servicing of construction plant, equipment or other vehicles, except for emergency breakdowns,	Applicant / Contractor	Throughout construction.	SEO, ECO & IEA.

No.	Potential Impacts	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
				are permitted within the preferred or approved development footprint, construction-related areas, no-go areas and on neighbouring properties. The contractor(s) and any sub-contractors, including their employees, are prohibited from entering the designated no-go areas (Figure 3) for whatever reason and without the prior written consent of the SEO. Refuelling of vehicles and plant may only take place at a designated and permitted (from local Fire Chief) fuel storage tank or mobile fuel bowser, under the guidance of a Specific Operating Procedure (SOP) that limits spillage and addresses remedial actions in the event of a			

No.	Potential Impacts	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
				spillage. The contractor shall restrict the following activities to the construction camp: - Sanitation, - Waste storage, - Parking, - Storing hazardous materials, - Emergency vehicle & plant repair & maintenance as far as practicable, - Re-fuelling, - Ready-mix concrete truck cleaning area - Material stockpiles (excluding works within the Brak River for the construction of the pylon), and - Lay down areas. Use chemical toilets that contain the sewerage in a closed and removable 'tank', i.e. do not use open drums.			

No.	Potential Impacts	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
				Environmentally friendly toilets should also be considered e.g. E-loo's. Use drip trays for refuelling, emergency repair / maintenance work and all stationary construction plant and equipment that can leak, such as TLBs, compressors and generators. Washing of equipment including brushes shall not occur on site or in a watercourse, but shall be restricted to the main construction camp where adequate containment measures are in place.			
7.2.2	Noise pollution.	To avoid nuisance noise to affected landowners & occupiers and reduce noise	Noise must fall within the parameters set by: **1.**(SANS)	Noise generation must be managed, including the use of radios and other music playing appliances. Vehicles and plant must be in a good	Applicant / Contractor.	Frequency of monitoring as stipulated in relevant regulation and	SEO or appointed specialist service provider.

No.	Potential Impacts	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
		impacts to the environment.	Standard 10103:2008: The measurement and rating of environmental noise with respect to annoyance and speech communication. **2.** DEA Regulations No. R.154. Noise Control Regulations promulgated in terms of Section 25 of the Environment Conservation Act, 1989 (Act	state of repair to limit noisy operations.		standard, as amended from time to time.	Verification to be done by ECO & IEA.

No.	Potential Impacts	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
			No. 73 of 1989). GG No. 13717, 10 January 1992.				
7.2.3	Degradation of the environment outside of the development footprint.	To avoid impacts to the biodiversity integrity and ecological function of areas outside the development footprint (including installation of the connection powerlines to the existing ESKOM overhead lines).	No impacts outside the development footprint. All contraventions to be recorded in incident register.	Imported material stockpiles shall be located outside the demarcated wetland system and on a disturbed site or other site approved as a stockpile area. No residues of stockpiled material must be left on site, that can impede restoration of ecological function and remain a visual intrusion on the landscape. Disturbed habitats resulting from construction-related activities must be rehabilitated immediately after the cessation of those activities on or near the disturbed habitats. The alignment of fences or roads and the placement of potential	Applicant / Contractor.	Update to incident register following each contravention.	ECO & IEA.

No.	Potential Impacts	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
				impediments, such as walls, laydown & material stockpile areas must not alter surface water runoff patterns (i.e. impede or increase surface water runoff) in a way that will cause ponding or erosion and sedimentation of a watercourse.			
No significant operational or decommissioning impacts expected.							

TABLE 8. WASTE MANAGEMENT (generation, handling, storage and disposal, including hazardous waste).

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
8.1	**Planning & Design Phase (including Pre-Construction)**						
8.1.1	Shortening the lifespan of the local waste disposal sites.	To minimise the generation of project-specific waste by implementing an effective waste management strategy based on the waste hierarchy.	Keep accurate records of waste volumes (litres, kg and / or m^3) generated by type.	Establish and implement an Integrated Waste Management Strategy including avoidance, reduction, re-using, recycling and disposal, i.e. the production of hazardous waste can be **avoided** by providing drip trays, **reduce** waste by using the correct quantities, **re-use** concrete rubble as back fill or **recycle** steel off-cuts and **dispose** of non-hazardous solid waste at a registered municipal dump site. Induct all labourers on the waste management strategy and enforce it through regular (at least	Applicant / Contractor (SEO).	Prior to commencement of construction with ongoing maintenance and updates to Strategy.	ECO & IEA.

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
				weekly) toolbox talks. Keep accurate records of waste generated by type.			
8.2	**Construction Phase**						
8.2.1	Removal of inert Waste and rubble. Loss of ecological function and agricultural potential.	Maintain ecological function and agricultural potential'	Zero concrete hard pan layers observed on the ground.	In the unlawful event of concrete hard pan layers, break up all concrete hard pan layers and dispose of appropriately (at a legitimate dump site) or re-use the concrete.	Applicant / Contractor (SEO).	For each disposal event.	ECO & IEA.
8.2.2	The high economic cost of disposing hazardous waste at authorised landfills, and potential contamination of land by illegal dumping.	The reduced generation of hazardous waste and the avoidance of environmental (land and water) contamination.	Indicators and trends in hazardous waste generation and management over time while considering amount of active construction to contextualise efforts.	The contractor shall contain contaminated water from washing brushes and other tools as well as the dirty water (possibly hazardous) from washing the ready mix concrete trucks, in a conservancy tank until sufficient volume warrants disposal by a registered hazardous waste	Applicant / Contractor (SEO).	Throughout construction.	ECO & IEA.

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
			All waste waybills and landfill licenses in register and on file.	management company. The contractor shall return used oil to the supplier or an oil recycling company. The Waste Water Treatment Package Plant should be constructed at the onset of construction activities, to ensure the reduction of hazardous waste production.			
8.2.3	Solid and liquid waste can be harmful to fauna if swallowed / ingested or if the creature becomes entangled or impaled.	Healthy animals (wild and domesticated).	Zero incidence (in the incident register) of waste induced harm to wildlife or livestock. No litter observed in the development footprint and no-	Designate a temporary waste storage area, enclose it in a fence that cannot be breached by fauna, and provide sufficient scavenger proof dust bins with black bags inside the construction camp. Do not litter and ensure	Applicant / Contractor (SEO).	Throughout construction.	ECO & IEA.

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
			go areas.	sound housekeeping.			
8.2.4	Improper handling, storage or disposal of waste can cause toxicity – the introduction of toxic or hazardous substances into a watercourse - spills can be washed into the watercourse by storm water run-off.	To ensure sound waste management practices that do not affect any aquatic environments.	Zero incidence (in the incidence register) of waste induced impacts on aquatic environments.	Hard-surfaces and parking areas with storm water outlets should not channel litter, oil and fuel spills into a watercourse, causing water pollution. The contractor is prohibited from discharging waste water, including domestic water from sanitation facilities, into a watercourse. The contractor shall store & contain hazardous chemicals within a secure, safe and bunded facility at the construction camp, to ensure spillages do not enter any aquatic environments.	Applicant / Contractor (SEO).	Throughout construction.	ECO & IEA.
8.2.5	Construction	To reduce	Low incidence of	Do not mix concrete on	Applicant /	Throughout	ECO &

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
	activities will produce solid and liquid waste, which can contaminate the ground (litter, spillage) if improperly handled, stored or disposed.	contamination of the soil through improper management of waste.	waste induced ground contamination, with a trend indicating constant improvement over time (not just quantities but procedural. improvements too). Suitable close-out documentation and reviews of SOPs & MS following significant contamination events.	open ground. Mix in a wheel barrow, a mixing tray or on a level plastic sheet. In the event of a leak or spill onto the ground, immediately remove contaminated soil to the depth of penetration and temporarily store in a designated solid hazardous waste container until sufficient volume warrants disposal at a registered hazardous waste dump site. Alternatively, onsite treatment of contaminated soil should be considered with a registered hazardous waste management company.	Contractor (SEO).	construction.	IEA.

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
				The burning, burying or illegal dumping of waste is prohibited. When handling hazardous materials, such as when refuelling vehicles or generators, the contractor shall implement appropriate precautionary measures, such as a ground cover or drip trays, to prevent spills from contaminating the ground. The contractor shall prevent the run-off of slurry or cement contaminated water from concrete / plaster mixing sites. Adequate waste			

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
				receptacles must be available, including those that track with the active work fronts, to ensure effective waste management. Remove ineffective danger tape / netting that has begun to litter the site or surrounding areas. Follow housekeeping rules in order to avoid littering (littering is likely to be more prevalent at designated eating / rest areas).			
8.2.6	The contamination of soil.	To reduce the amount of hazardous waste, specifically contaminated soil,	Sound management & disposal of contents of drip trays and / or	Use drip trays for refuelling, emergency repair work and all stationary construction plant and equipment that	Applicant / Contractor (SEO & Plant Operators).	Throughout construction.	ECO & IEA.

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
		that is generated during construction.	utilisation of alternative hydrocarbon absorbents in drip trays. Zero sand observed in drip trays and bunds. Zero spills or leaks observed under or near stationary construction plant and equipment.	can leak, such as TLBs, compressors and generators. Drip trays must be regularly emptied or they can be filled with hydrophobic hydrocarbon absorbent material to avoid the content from overflowing during rainfall events.			
8.2.7	The contamination of soil (and generation of waste) by undesirable practices.	To reduce the amount of hazardous waste, specifically contaminated soil, that is generated during	Zero observations of spills covered with soil.	Do not cover spills with virgin soil. It merely increases the disposal cost for a greater volume of hazardous waste. Utilise as an alternative, hydrocarbon absorbents,	Applicant / Contractor.	Throughout construction.	ECO & IEA.

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
		construction.		for spillages.			
8.2.8	Use of packaging material in townships, which is illegal and creates a fire hazard.	Prevent or reduce the spread of township fires started or fuelled by project-specific waste packaging.	No project-specific packaging is to be used (and observed) in the informal housing sector.	The contractor(s), sub-contractors and their employees are prohibited from taking any project-specific waste for personal use, including but not necessarily limited to, the packaging used for the solar panels.	Applicant / Contractor (SEO & Security).	Following delivery and unpacking of materials.	ECO & IEA.
8.2.9	Illegal dumping will result in the loss of certain land uses like agriculture and conservation and remove natural habitat.	Continued self-sustainability of the site's ecological and agricultural integrity.	Waybills or receipts from the service provider. No evidence of illegal dumping of project-specific waste within the development footprint, no-go areas or neighbouring	The contractor shall dispose of general waste, that cannot be recycled, at a registered municipal dump site. All waste to be removed to a suitable waste disposal facility by a registered service provider.	Applicant / Operator.	Throughout operation,	IEA.

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
			properties.				
8.3	**Operational Phase**						
8.3.1	Solid waste can be blown away and into the landscape.	A pristine environment, devoid of wind-blown litter.	No litter or other open sources of waste observed within the fenced premises.	The site will be kept tidy at all times. All waste shall be picked up daily. Maintain good housekeeping tendencies.	Applicant / Operator.	Throughout operation.	IEA.
8.4	**Decommissioning Phase**						
8.4.1	The generation of potentially harmful waste that has the potential of contaminating the environment if not disposed at a licensed landfill or, if disposed at an appropriate landfill, reduces the capacity and lifespan of that site.	To minimize waste and ensure suitable disposal at the end of project life.	No evidence of residual structures relating to the project, unless specifically retained at landowner's request.	Properly dispose of all waste & residual structures. All panels must be sent to PV Cycle (including a potential facility in South Africa at time of decommissioning), a European solar panel recycling association, that developed a mechanical and thermal treatment process last year that	Applicant.	At decommissioning phase.	IEA.

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
				achieves a 96 percent recovery rate for silicon-based photovoltaic panels. Soventix undertakes to adhere to prevailing internationally & nationally recognised protocols and procedures for disposal of solar PV panels and associated technology. Should the Electronic Waste Association of South African (e-WASA) establish a more stringent protocol regarding the recycling and handling of solar panels, Soventix will comply.			
8.4.2	Illegal dumping sites cannot retain the ecological functions and land	To ensure that no illegal waste dumps are left in situ following	Restoration of the footprint to a functional ecological and	The illegal dumping or disposal of waste generated from the	Applicant.	At decommissioning phase.	IEA.

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
	use required to generate ecosystem goods and services and tangible economic benefits including income from conservation or farming.	decommissioning.	agricultural state.	decommissioning of the Solar PV Plant within the development footprint, no-go areas or on adjacent properties is strictly prohibited.			

TABLE 9. FAUNA & FLORA MANAGEMENT.

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
9.1	**Planning & Design Phase (including Pre-Construction)**						
9.1.1	The construction of new service tracks can destroy plants of conservation concern.	To reduce the impacts of roads on fauna & flora.	The successful relocation of plants of conservation concern into suitable habitats.	Prior to the construction of any new roads, a search & rescue must be conducted by a suitably qualified specialist for protected fauna & flora and that of conservation concern; which must then be transplanted outside the works area in a comparative habitat type. Ascertaining	Applicant / Contractor.	Prior to & during construction.	SEO, ECO & IEA.

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
				similar habitat types may require soil sampling and analysis over and above above-ground similarities.			
9.1.2	Changes in bat community, abundance and activity of bat species.	To reduce impacts on known bat roosting sites and activity areas.	Activities undertaken outside of bat activity and / or roosting sites.	Permanent and temporary construction footprints (including fences) must be designated and positioned away from the bat populations, where possible, as per bat baseline assessment (Cory Toussaint, 2017) and any subsequent monitoring results. No activities within the Brak River – high bat activity zone (except for pylon construction) and other incidental roosting sites discovered prior to and during construction.	Applicant / Contractor.	Prior to & during construction.	SEO, ECO & IEA.
9.1.3	Alteration to commuting routes	To construct facilitates in the	Clear demonstration of	The applicant is to investigate available and updated	Applicant / Contractor.	Prior to & during construction.	SEO, ECO & IEA.

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
	within the landscape as routes may be altered and some species may avoid the solar arrays all together, particularly the low-flying bat species.	most sensitive manner to bats and avifauna.	adoption of technologies to mitigate impacts on bat and avifauna.	technologies to mitigate impacts on bats and avifauna, including but not limited to: • Use non-reflective material for the PV panels.			
9.2	**Construction Phase**						
9.2.1	Increased risk of alien plant invasion to the detriment of the local ecology and agricultural potential.	To effectively control the invasion of any alien plants.	No new alien plant recruitment (directly or indirectly resulting from construction activities) within the development footprint and neighbouring no-go areas or properties.	Alien invasive vegetation recruitment must be controlled within and along the fence lines of the solar PV footprints. Manual control measures are preferred, but where herbicides are used they must be those endorsed & selective for the target species with the lowest environmental toxicity. Applicant shall collect and destroy all seeds of weed,	Applicant / Contractor.	Throughout construction.	SEO, ECO & IEA.

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
				invader and alien plant species occurring within disturbed and/or rehabilitated areas. Applicant shall immediately uproot, cut or debark weed, invader and alien plant species upon being identified. Areas disturbed during construction shall be monitored for the recruitment of weed, invader and alien plant species and controlled immediately upon being found to occur. Recruitment of alien and invasive plants must be controlled to ensure they do not seed and propagate (both			

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
				declared weeds and those that are outside of their natural distribution).			
9.2.2	Construction activities (i.e. clearing and grading) have the potential to directly impact, that is damage / injure and destroy / kill, local fauna and flora. (The impacts are exacerbated when the species affected are classified as protected, sensitive, rare, or threatened and endangered).	To reduce in situ losses of protected and conservation important flora & fauna.	Spatially explicit "Search & Rescue" register indicating the nature & position of all translocated flora & fauna.	A search and rescue must be undertaken of any and all footprints that will be temporarily or permanently affected during construction of the development footprint. All fauna and flora that are protected or of conservation importance must either be cordoned off and protected, or translocated outside of the site establishment and solar PV footprint, into habitats of a similar nature. Avoid direct contact with fauna, through clearing and grading as it can cause injury or death.	Applicant / Contractor. All search & rescue & translocation activities must be carried out by suitably qualified specialists.	Pre-Construction.	ECO & IEA.
9.2.3	Harvesting of:	To ensure no	Zero incidence of	The harvesting or collection	Applicant /	Throughout	ECO & IEA.

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No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
	- indigenous plants for muthi - firewood; and - poaching of animals.	harvesting of natural resources within and adjacent to the development footprint.	harvesting. All incidences recorded in the incident register including close-out actions.	of any natural product(s) from the environment is strictly forbidden. Do not poach or hunt animals within development footprint, no-go areas and neighbouring properties. "Problem" animals must be handled with assistance from the provincial conservation authority. With the exception of search and rescue operations authorized by the ECO, no mammal, bird, reptile, invertebrate or fish shall be intentionally caught, hunted or poached, within the development footprint and no-go areas.	Contractor.	construction & operation.	

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
9.2.4	Open excavations and drill holes can trap terrestrial fauna causing injury or death, including snakes.	To minimise and potentially eliminate incidental injuries and death through open excavations & drilling operations.	Zero recorded deaths. All incidents to be recorded in incident register, including Corrective Action Reports.	Borrow pits, excavations and drill holes should as far as possible have smooth slopes, allowing access and exit points to animals, especially when filled with water. Open excavations of any kind should be regularly monitored (daily) for trapped fauna. Drill holes for the solar arrays and fence, and excavations for underground services (i.e. pipes or cables) must not remain open for more than 24 hours. In other words, the excavators, drill rigs or working front must not proceed more than one day ahead of the team(s) that install the infrastructure and	Applicant / Contractor.	During construction.	ECO & IEA.

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
				backfill. Alternatively, plugs must be placed in drill holes for the solar array mounts and fencing posts.			
9.3	**Operational Phase**						
9.3.1	Changes in bat community, abundance and activity of bat species.	To minimise deleterious effects on affected bat populations.	No significant deterioration in bat population stability as per specialist monitoring reports.	It is important that areas with low lying depressions where water pools during the autumn and summer rainfall season, are not altered as they may be important areas not only for bats to drink and forage but also for socialising – especially relevant when tying into the ESKOM powerline. A bat specialist must be appointed at the commencement of the operational phase to assess if the mitigations proposed in	Applicant / Operator.	Biennial monitoring.	Appointed Bat Specialist.

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
				the EMPr during planning, construction and operation are meeting the desired targets and outcomes; and suggest any additional mitigations or amendments based on his / her findings.			
9.3.2	Light pollution during construction and operational phase may alter bat species composition, foraging patterns, reproductive success and predation rate (by creating a preferential habitat for one species at the expense of another).	To reduce impacts on bat populations due to artificial lighting.	No impact in bat population stability & dynamics as per specialist monitoring reports.	The use of lighting at night should be kept to a minimum, so as not to unnecessarily attract invertebrates to the solar facility and possibly their avian predators, and to minimise disturbance to birds flying over the facility at night. Anthropogenic impacts must be minimized to reduce impacts on nocturnal species, including but not limited to reduced lighting that may influence bat foraging	Applicant / Operator.	Throughout operation, but applies to Planning & Design and Construction phases.	IEA.

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No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
				behaviour. Utilise down lighting, with a bulb type that has a lower insect attractant value.			
9.3.3	Electric fences can cause death or injury to mammals.	To eliminate death & injury to mammals (wild & livestock) through electrification of fences.	No electrocution induced deaths of mammals.	Ensure electric strands are only installed along the top of the fenceline to mitigate unauthorised human access to the area, without posing a threat to fauna. Fencing options must be utilised that provide adequate security to the plant, but will not result in animal mortality or require onerous vegetation clearing. ClearvuTM type fencing is preferred over electric fencing.	Applicant / Operator.	Throughout operation, but applies to Planning & Design and Construction phases.	IEA.
9.3.4	Potential loss of land use and / or	To maintain access to the	Grazing of livestock within	Allow the landowners sheep to access the fenced-off	Applicant / Operator /	Throughout operation.	Qualified Ecologist &

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
	agricultural potential to the farmer and biological functioning.	development footprint for livestock as a natural vegetation management tool.	the calculated grazing capacity & return periods. Visible signs of grazing, i.e. droppings as a form of verification that grazing access to the landowner is being maintained.	footprint at the calculated grazing capacity (see Grazing Capacity report by F. de Wet, 2017) and return periods. The Applicant / Landowner are to keep a written record of the dates and stocking densities when grazing is undertaken within the development footprint. The record / register can be kept at the security gate / entrance.	Landowner.	Triennial assessments to refine Grazing Capacity calculations.	IEA.
9.3.5	Parking and driving carelessly can increase collisions with mammals, birds, reptiles, amphibians and insects – road kills.	To reduce the incidence of accidental road kills.	A record of registered road kills that (1) accurately reflects the number of observations	Designate parking areas in order to protect local flora and fauna. All road kills within the development footprint and directly adjacent properties	Applicant / Operator.	Throughout Construction & Operation - daily	IEA.

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
			made or the number given during interviews undertaken by the auditor, and (2) is less than one incident per month.	must be recorded to monitor and target a decreasing trend aiming for zero incidence. Driving is to be limited around the development at dawn and dusk, when nocturnal or crepuscular creatures are more active.			
9.3.6	The associated overhead power lines will pose a risk to avifauna susceptible to collisions and electrocution.	To minimise power line induced avifauna mortality.	No power line induced mortality, and any mortalities recorded in operational phase mortality reports.	Bird kills as a consequence of overhead powerlines, substation or solar panel collision, must be reported to the developer immediately, and corrective actions implemented to mitigate & remedy the casual factors. Active monitoring for avifauna mortalities underneath the powerlines must be undertaken.	Applicant / Operator.	Throughout Operation. Monitor avifauna mortalities: • **Summe**r: bi-weekly; • **Winter**: weekly.	IEA & Avifauna Specialist (inputs for corrective actions and remedies).

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No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
				All powerlines within the project development area, and the loop-in, loop-out powerlines, must have bird flappers installed to reduce collision and electrocution risk.			
9.3.7	Potential collisions with panels by avifauna and bats.	To reduce avifauna & bat collisions with the solar PV panels.	No panel induced mortality, and any mortalities recorded in operational phase mortality reports.	All incidents of collision with panels should be recorded as meticulously as possible, including data related to the species involved, the exact location of collisions within the facility, and suspected cause of death. Operational Phase monitoring with the aid of video surveillance should be considered, as this will contribute towards understanding bird	Applicant / Operator.	Throughout Operation.	IEA & Avifauna & Bat Specialist (inputs for corrective actions and remedies).

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
				interactions with solar panels. It has been suggested by Visser (2016) that collision mortality could be reduced at solar facilities by using 28 cm-spaced contrasting bands or 10 cm spatial gaps between solar panels. This enables birds, particularly waterbirds, to differentiate the expansive layout of panels as a solid structure, reducing the likelihood that they may try to land and collide with the panels. These recommendations should therefore be incorporated into new solar facilities until further research into panel design and layout suggests otherwise.			

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
9.3.8	Disturbance to or destruction of roosting & nesting sites.	An uninterrupted breeding season for the avifauna.	The effective control of incidental bird breeding sites with the least impact to the affected birds during the breeding season, and then the prevention of future disturbances.	If birds are nesting on the infrastructure of the facility and cannot be tolerated due to operational risks of fire, electrical short, soiling of panels or other problems, birds should be prevented from accessing nesting sites by using mesh or other manner of excluding them. Birds should not be shot, poisoned or harmed as this is not an effective control method and has negative ecological consequences. Birds already with eggs and chicks should be allowed to fledge their chicks before nests are removed.	Applicant / Operator through appointed avifauna specialist.	Throughout construction & operation.	IEA & Avifauna Specialist.

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
				If there are any persistent problems with avifauna, then an avifaunal specialist should be consulted for advice on further mitigation.			
9.4	**Decommissioning Phase**						
9.4.1	Impacts on biological functioning and productivity of vegetation.	To ensure restoration of ecological function following decommissioning.	No degraded areas within the decommissioned footprint.	Reinstate ecological function by recreating an open system by removing all project related fencing. The Applicant is to rehabilitate the site after decommissioning in accordance with conditions in 9.2.4 and 9.3.4 of this EMPr.	Applicant / Landowner.	At completion of decommissioning activities	IEA.
9.4.2	Alien Plant Invasion Risk.	To ensure no residual alien plants at cessation of operations.	Zero incidence of alien plants within the decommissioned footprint.	The rehabilitated servitudes shall be monitored following the completion of decommissioning of the Solar PV plant for the recruitment and subsequent control of	Applicant / Landowner.	At completion of decommissioning activities, within the growth season, as well as the following	IEA.

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
				weed, invader and alien plant species, in accordance with Appendix 1 of this EMPr.		growth season following decommissioning.	

TABLE 10. WATER USE & MANAGEMENT (INCLUDING WATERCOURSES).

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
10.1	**Planning & Design Phase (including Pre-Construction)**						
10.1.1	Impact on riparian vegetation by permanent footprints.	Ensure all development is outside the riparian zone of affected watercourses.	Layout plans indicate development footprint is at least 100m outside of any watercourses. Observation of surveyor pegs outside the 100m watercourse buffer zones (the 100m buffer zone is included in Figure 3 of EMPr).	The development layout plan or drawings to be used by the surveyor and contractor must clearly show the site-co-ordinates of the development footprints relative to and outside of the identified no-go areas, including the 100m buffer zones alongside the watercourses. The development footprint (including fence poles) must me designated and clearly demarcated on the construction site layout	Applicant / EAP / Design Engineer / Contractor.	At time of design & pre-construction.	Compliance to be established by surveyor and verified by ECO & IEA.

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
				plan and on the ground. Provide the appointed Design Engineer and Surveyor with accurate coordinates of the Brak River and other potentially affected watercourses as well as the footprint boundary, to determine buffer extent.			
10.1.2	Decrease in water quality of watercourses.	To minimise the risk of impacts to water resources in and around the project footprint.	No high-risk activities located within close proximity to water resources.	Avoid placing high risk (pollution generating) activities within close proximity to a watercourse as they can cause water pollution.	Applicant / Contractor.	During site establishment & throughout construction.	SECO, ECO & IEA.
10.1.3	Uncontrolled and unsustainable abstraction from a watercourse or aquifer (borehole) and depletion of	Utilisation of borehole water within the sustainable yield of the groundwater	Implementation of a register recording static head of borehole against "control" boreholes elsewhere on the property.	The static head of the borehole must be measured to ensure the resource is not being depleted (taking cognisance of seasonal	Applicant / Contractor / Land owner	Prior to and on a monthly basis throughout construction.	SECO, ECO & IEA.

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
	already constrained groundwater resource.	resource.	Provision of adequate storage of water allowing for abstraction rates within sustainable yield of borehole / s.	variability and comparative "control" borehole levels – will also require ongoing monitoring). Adequate storage of water must be provided, to allow for suitable abstraction rates that will not exceed the borehole recharge rate throughout the construction process. Adequate storage will allow a slower abstraction rate, equal to or less than the recharge rate. Water meters must be installed on all			

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
				boreholes to ensure that utilisation rates are measured and monitored and do not exceed the permissible limits.			
10.1.4	Increased sedimentation of watercourses.	To ensure no project-induced sedimentation effects.	Layout plans, indicating the alignment and placement of structures and infrastructure, relative to the prevailing slope and watercourses, which will result in the least potential for rill, gully or donga erosion and sedimentation. Zero signs (observations) of sedimentation and erosion, specifically rills, gullies or dongas,	Layout, alignments and design (including poor alignment) of structures and roads should not influence or redistribute surface water flow patterns, increase runoff, cause erosion and/or sedimentation of aquatic habitats. Layout plans must include contour lines to determine whether, particularly, linear infrastructure is poorly	Applicant / Contractor.	Prior to and on a monthly basis throughout construction.	SECO, ECO & IEA.

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
			resulting from the poor alignment of infrastructure and redistribution of surface water runoff into concentrated channels.	aligned and poses a high risk for redistributing or channelling surface water runoff into watercourses.			
10.2	**Construction Phase**						
10.2.1	Increased sedimentation of watercourses.	No sedimentation of water resources due to construction of project.	No evidence of sedimentation of water resources linked to construction activities.	Ensure that water laden with silt does not exit excavations and cause sedimentation of aquatic and / or terrestrial systems. Storm water must be well managed (in accordance with appended Storm Water Management Plan compiled by Jones & Wagener – October 2017) to avoid erosion and resultant export of	Applicant / Contractor.	Throughout construction.	SECO, ECO & IEA.

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
				in situ soil, into watercourses. Ensure that rainfall does not wash soil from stockpiles and windrows into a watercourse and cause sedimentation.			
10.2.2	Excessive abstraction from a watercourse or aquifer.	To reduce water usage for construction activities.	Evidence of dust control additives used to minimise water usage for dust suppression activities, including completed logbooks and no evidence of over wetting, i.e. erosion or pools of water (puddles).	An environmentally friendly water-soluble dust control additive / binder must be added as an additive to the water used for dust suppression. The additives generally assist with surface stabilization thereby significantly reducing water usage. All water bowsers must maintain logbooks in	Applicant / Contractor.	Throughout construction.	SECO, ECO & IEA.

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
				which quantities used for construction and dust suppression are recorded. Water bowsers implementing dust suppression, must determine optimal rates of application to ensure over-wetting does not occur.			
10.2.3	Decrease in water quality of water resources.	To minimise the risk of water contamination and activities that impact negatively on water quality.	All high-risk activities to be located at least 100m away from any water resource (surface or ground).	Chemical toilets shall be located in the shade, at least 100m from any watercourse. Re-fuelling with a mobile fuel bowser shall take place outside any watercourse.	Applicant / Contractor.	Throughout construction.	SECO, ECO & IEA.
10.3	**Operational Phase**						
10.3.1	Impediments to	To retain as far	Limited signs of erosion	Fence lines must be	Applicant /	Throughout	IEA.

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
	surface water runoff.	as possible surface water hydrology.	along or resulting from the fence line.	regularly cleared of accumulating debris (accumulating debri does not refer to living plants, otherwise the removal of plants will cause more erosion), to allow surface water to flow uninhibited across the development footprint.	Operator.	operation.	
10.3.2	The excessive and / or wasteful use of water has the potential to reduce the ecological reserve required for sustaining the local ecosystem.'	To use water in a manner that is ecologically sustainable and not wasteful.	No drips, leaks or other evidence of wasteful water use.	Water leaks shall be repaired immediately upon being found. Water-saving showerheads shall be used, where relevant. Place a cistern displacement device in the toilet cistern. Educate employees on	Applicant / Operator.	Throughout operation.	IEA.

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
				the importance and practices of water efficiency. If practical, consider harvesting rainwater from drainpipes. Use an aerator and / or a water flow-reducing spout on the taps and shower heads.			
10.3.3	Poor water quality can be a health risk or harmful to humans and animals.	To ensure safe potable water for employees and livestock.	Compliance of potable water to SANS 241 standard.	Water used for potable (drinking) purposes must be tested to ensure compliance with the minimum standards. Should elements of the water not comply, the water must be treated to ensure no acute or chronic health risks.	Applicant / Operator.	Quarterly.	IEA.
There are no significant decommissioning related impacts expected.							

TABLE 11. AIR QUALITY MANAGEMENT.

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
11.1	**Planning & Design Phase (including Pre-Construction)**						
No pre-construction impacts associated with this phase.							
11.2	**Construction Phase**						
11.2.1	Old and poorly maintained vehicles cause the most air pollution from cars, specifically GHG emissions that are released to the atmosphere, contributing to global warming and acid rain.	To reduce the level of car or other combustion-related pollutants entering the atmosphere (by keeping well-maintained plant and equipment).	Evidence of servicing at required intervals. No visible evidence of excessive emissions.	Construction plant and equipment shall be kept in a good state of repair to reduce combustion-related emissions.	Applicant / Contractor.	During construction.	Plant Manager, SEO, ECO & IEA.
11.2.2	Negative effects on floral photosynthetic functioning and potential increase in breathing ailments of site staff, surrounding landowners, communities and	To manage dust entrainment on access roads which may not exceed the thresholds stipulated in the National Dust Control	Full compliance with National Dust Regulations. Acceptable Dust fallout rate	Effective implementation of the National Dust Control Regulations. Excessive vehicle movement, and the transport and off-loading of dispersive materials shall be avoided during windy conditions, unless additional dust suppression	Applicant / Contractor.	During construction, monthly.	Monitoring of dust fallout to be undertaken by a professional service provider and compliance to be verified by

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
	fauna.	Regulations.	(mg/m^2/day): Residential area < 600 Non-residential area < 1200 Exceedance not more than twice in a year, not sequential months.	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. Dust suppressant must be prioritised for the drilling activities.			ECO & IEA.
11.2.3	Safety risks and road accidents due to reduced visibility.	To reduce vehicular accidents due to poor dust-induced visibility.	Full compliance with National Dust Regulations.	Dust suppression must be carried out on access roads where high dust entrainment is evident.	Applicant / Contractor.	During construction. Dust fallout evaluation monthly and dust suppression as conditions dictate.	Monitoring of dust fallout to be undertaken by a professional service provider and compliance to be verified by ECO & IEA.
11.2.4	Unpleasant odours.	To reduce	Records of	Chemical toilets shall be kept	Applicant /	During	SEO, HSO,

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
		unpleasant odours often associated with ablution facilities.	regular servicing, and daily cleaning log.	hygienic and cleaned daily to avoid unpleasant odours.	Contractor.	construction.	ECO & IEA.
11.3	**Operational Phase**						
11.3.1	Decrease in air quality.	To manage dust entrainment on access roads which may not exceed the thresholds stipulated in the National Dust Control Regulations.	Full compliance with National Dust Regulations.	Effective implementation of Dust Control Regulations. Dust suppression must be carried out on access roads to minimise operational dust emissions.	Applicant / Operator.	As required to minimise dust emissions.	IEA.
There are no significant impacts anticipated during the decommissioning phase.							

TABLE 12. SOIL MANAGEMENT.

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
12.1	**Planning & Design Phase**						
12.1.1	Loss of valuable topsoil.	To minimise disturbance & contamination of topsoil.	Compliance with site layout plans.	Clearing, and the location of topsoil stockpiles and / or windrows, shall take place in pre-authorised and clearly defined areas only.	Applicant / Contractor.	Prior to and during construction.	ECO & IEA.
12.2	**Construction Phase**						
12.2.1	Decline in soil organisms.	To maintain the biological integrity of disturbed soil.	The list of plant species, and their relative abundancies, chosen for rehabilitation reflects the natural plant communities that need to be rehabilitated.'	Seed disturbed areas after construction with grass seeds of the naturally occurring plant species to encourage invertebrate species richness.	Applicant / Contractor (SEO).	Following construction or construction induced disturbance.	ECO & IEA.
12.2.2	Loss of valuable topsoil.	To retain all disturbed and cleared topsoil.	Comparative quantification of cleared and reinstated topsoil volumes.	Any topsoil removed during the establishment of parking areas, temporary roads, or any other cleared areas, must be protected from vehicular and construction impacts.	Applicant / Contractor (SEO).	During initial clearing and prior to reinstatement of topsoil.	ECO & IEA.

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No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
				Do not mix topsoil with cement and / or subsoil or let it be pulverised by trucks.			
12.2.3	Potential sterilisation of the soil.	To maintain soil viability.	Use of only selective, environmentally friendly herbicides.	Where possible, refrain from using non-selective herbicides to control vegetation, depending on the active ingredient, it can sterilise the soil. Application of herbicides may only be applied by or under the supervision of a Certified Pest Control Officer.	Applicant / Contractor (SEO).	Every treatment episode.	ECO & IEA.
12.2.4	Soil contamination.	To reduce and avoid soil contamination.	No evidence of contaminating activities on unprotected ground, or in the case of accidental spills, documented evidence of rapid	Construction plant and equipment shall be kept in a good state of repair to reduce hydrocarbon leakages. Immediately remove contaminated soil to the depth of penetration and temporarily store in a designated solid hazardous waste container until sufficient volume warrants disposal at a registered hazardous	Applicant / Contractor (SEO).	During construction.	ECO & IEA.

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
			remediation.	waste dump site. Alternatively, onsite treatment of contaminated soil should be considered with and / or in consultation with a registered hazardous waste management company. Soil horizons must be stockpiled or windrowed separately during excavation to ensure they can be reinstated in reverse order and ensure restored soil structure.			
12.2.5	Soil erosion, soil loss & associated degradation of ecosystems.	To reduce erosion induced soil losses and consequential ecosystem degradation.	To record all areas prone and affected by erosion and implement suitable pre-emptive and remedial measures.	Areas disturbed and rehabilitated during construction shall be monitored for signs of erosion and if found to occur, immediately corrected ('source') and repaired ('symptom'). Bulk shape the areas where material is introduced to mimic or blend in with the surrounding, natural topography. Do not fine	Applicant / Contractor (SEO).	During construction.	ECO & IEA.

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
				shape or rake because an uneven surface will impede surface water run-off and facilitate infiltration. Correct any cause of erosion at the onset thereof by controlling / diverting storm water run-off, immediately repairing and stabilizing / rehabilitating impacted areas in the most appropriate manner. Ensure a quick and adequate cover with indigenous and local grass species on all PV Solar Plant servitudes. Ensure storm water run-off is adequately controlled on disturbed sites before rehabilitating them (ripping, replacing the topsoil and mulching/brush packing), i.e. cut-off berms.			

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No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
				Grading of existing farm roads must not be promoted, but farm tracks must be utilised as far as possible. Sediment traps may be necessary to prevent erosion and soil movement if there are topsoil or other waste heaps present during the wet season. The Contractor shall monitor the rehabilitated servitudes for the duration of the contract defects and liability period for signs of erosion.			
There are no significant impacts expected during the operational and decommissioning phases.							

TABLE 13. SOCIAL-ECONOMIC MANAGEMENT (HEALTH, SAFETY & SECURITY & COMMUNICATION).

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
13.1	**Planning & Design Phase (including Pre-Construction)**						
13.1.1	Concerns about social disturbance and community safety (including loitering at construction site).	To reduce human induced impacts and nuisance factors.	No complaints from affected parties in the on-site complaints register. Where complaints are lodged effective and timeous close-out must be demonstrated.	Adequate accommodation and transport must be provided for all staff to reduce impact on the property owner and adjacent farms as well as relieving pressure off road networks.	Applicant / Contractor (via CLO and SO).	Prior to and during construction and operation.	ECO & IEA
13.1.2	Community confusion, frustration & lack of information.	To avoid creating false hope where job creation opportunities are concerned.	Development of an effective job seeker database.	Implementation of a community relations strategy until all activities on site cease and rehabilitation is completed. Develop a job seeker database, or integrate with an existing service	Applicant / Contractor / Operator	Prior to and during construction and operation.	ECO & IEA

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
				provider in the adjacent towns, to ensure job seekers' details are captured. As positions become available, this database can be searched for suitable skills within the local populous before positions are outsourced. These measures will reduce the potential nuisance factor to the land owner, caused by job seekers reverting to visiting the proposed site of development.			
13.2	**Construction & Operation Phase**						
13.2.1	Increase in crime including damage to farm infrastructure and vandalism.	Reduce impacts associated with crime.	No perpetuating criminal activity. Improvements to security must be demonstrated following an incident.	Security must be appointed throughout construction & operation phases to discourage criminal elements from site.	Applicant / Contractor / Operator.	At commencement of construction, especially site establishment and during operation.	ECO & IEA.
13.2.2	Potential social	Reduce impacts	No strike	Ensure effective communication	Applicant /	At	ECO & IEA.

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
	pathologies (social unrest).	associated with disgruntled staff.	actions by staff. Improvements to engagement with staff must be demonstrated following an incident.	and engagement with staff and surrounding community via inter alia the appointment of a suitably qualified CLO. Transparent communication through the right channels to communicate with the community as to when and how their contracts will come to an end.	Contractor / Operator (CLO).	commencement of construction, and during operation.	
13.2.3	Injury to site staff from construction, demolition and blasting activities.	To ensure effective Health & Safety implementation.	Appointment of a suitably qualified HSO and compliance monitoring against the OHSA (Act 85 of 1993).	Implement a safety plan, access protocols, grievance mechanism and compensation policy. All staff must undergo a site induction that outlines the socio-environmental constraints of the site.	Applicant / Contractor (HSO) / Operator.	Throughout Construction & Operation.	Health & Safety Audits biannually.
13.2.4	Injury to trespassers resulting in possible lawsuits.	To avoid inadvertent injuries to trespassers.	No recorded injuries to trespassers.	Increase security to protect trespassers from being electrocuted. Keep lighting on at night and	Applicant / Contractor.	Throughout construction	ECO & IEA.

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
				increasing security will help improve security to prevent unauthorised access. Adequate signage must be placed around the development warning uninformed people of the potential hazards and dangers associated with the project.			
13.2.5	Negative effects on the wellbeing of the local inhabitants and site staff as well as the potential outbreak of disease (including HIV/AIDS).	To avoid negative impacts on the health of the local residents and occupiers.	Effective implementation of awareness training including measures to assess effectiveness of training.	AIDS / HIV awareness training must be undertaken to ensure that the labour force is well informed on the matter. Dangerous fumes, noise, dust and water impacts must be avoided that may affect both the labour force and surrounding landowners and users.	Applicant / Contractor / Operator	Ongoing	ECO & IEA.
13.2.6	Potential increase in pedestrian and livestock accidents.	To reduce impacts and injuries to pedestrian and livestock.	No injuries recorded in incident register.	An awareness must be fostered to drive carefully in order to avoid killing or injuring people or animals and damage to property.	Applicant / Contractor / Operator.	Ongoing awareness and following cessation of use of borrow	ECO & IEA.

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
			Close-out Reports must demonstrate improvements to avert a recurrence.	Open borrow pits, excavation and quarries must be fenced-off and / or demarcated when construction activities are taking place, to ensure the safety of unsuspecting public or job seekers and animals. Open excavations must be secure and cordoned off to avoid accidental injury to humans and animals alike.		pits.	
13.3	**Decommissioning Phase**						
13.3.1	Increased unemployment after construction & operation ends.	To minimize the negative social impacts at the end of each phase of the project.	Develop & effective implementation of an Exit Strategy.	Develop and implement a holistic Exit Strategy that adequately and timeously communicates and buffers staff lay-offs and mitigates losses in employment and income through formalised and structured skills development programmes. Clearly make the terms and conditions of employment known to all employees (temporary &	Applicant.	Prior to commencement of construction.	ECO & IEA.

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
				permanent) including anticipated duration of each phase.			

TABLE 14. CULTURAL, HERITAGE, ARCHAEOLOGICAL & PALEONTOLOGICAL MANAGEMENT.

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
14.1	**Planning & Design Phase (including Pre-Construction)**						
14.1.1	Surveying and pegging of temporary footprints can disturb sites of historical significance, i.e. Graves.	To ensure initial survey & clearing activities do not disturb know heritage sites.	All graves and know heritage sites are secure (fenced or cordoned-off)	Ensure that none of the layout & designs of permanent footprints will disturb sites of historical significance, including graves. All formal and informal cemeteries and burials must be left in situ and not be disturbed. If this is not possible, a permit must be applied for in terms of Section 36 of the NHRA (Act 25 of 1999), and is subject to mandatory public consultation.	Applicant.	Prior to surveying.	ECO & IEA.
14.1.2	Lack of awareness of heritage resources.	To promote awareness about heritage resources and	Heritage content in site induction and toolbox and	Include an awareness of heritage resources in the environmental induction. Categories of heritage resources include, inter alia:	Applicant / Contractor.	Throughout construction.	ECO & IEA.

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
		their presence within the development area.	awareness talks.	• Evidence of archaeological sites or remains include remnants of stone-made structures, indigenous ceramics, bones, stone artifacts, ostrich eggshell fragments, marine shell and charcoal/ash concentrations. • Archaeological or paleontological sites over 100 years old, • Sites of cultural significance associated with oral histories, • Significant cultural landscapes or viewscapes, • Burial grounds, unmarked human burials, graves of victims of conflict, and/or graves older than 60 years, • Structures older than 60 years, • Fossils, etc.			
14.2	**Construction Phase**						
14.2.1	Loss of archaeological & palaeontological valuable artefacts.	To ensure construction activities do not disturb know or	No loss of archaeological valuable artefacts.	All areas of heritage value must be demarcated and avoided. Incidental discoveries during clearing and grubbing must be	Applicant / Contractor.	Throughout construction.	ECO & IEA.

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
		incidental heritage sites.	All known "heritage" sites within the development footprint is suitably cordoned off.	disclosed to site management with immediate cessation of activities until their significance can be assessed by a qualified heritage specialist. Any archaeological artefacts unearthed during excavations must be protected and left in situ. Works must cease until the significance of the finding can be assessed by a qualified archaeological specialist.			
14.2.2	Loss of cultural and heritage value to society.	To ensure correct procedures are followed following chance finds to preserve the heritage resource.	Adherence to protocols specified in management actions following a chance find.	Contact a professional archaeologist, depending on the nature of the finds, as soon as possible to inspect the findings. In the event of discovering a heritage resource, stop reconstruction activities and alert the SAHRA Archaeology, Palaeontology and Meteorites (APM) Unit immediately. Natasha	Applicant / Contractor.	Throughout construction.	ECO & IEA.

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
				Higgitt, Heritage Officer T: +27 21 462 4502 | F: +27 21 462 4509 | C: +27 82 507 0378. E: nhiggitt@sahra.org.za			
14.2.3	Disturbance, destruction or damage to fossils preserved at or below surface through surface clearance and excavations during construction phase.	Avoidance of palaeontologically sensitive areas (riverine alluvium). Reporting of chance fossil finds to SAHRA.	Older (orange-brown) consolidated alluvial deposits along major water courses (e.g. Brakrivier) – see area outlined in blue in Fig. 30. in Paleontology Assessment (Almond, 2017).	Ongoing monitoring for chance fossil finds within development footprint during construction phase. The older consolidated fluvial deposits along the Brakrivier be avoided during construction since they do contain fossil wood. Substantial fossils (vertebrate bones, teeth, large blocks of petrified wood) to be safeguarded, preferably in situ, and reported to SAHRA for recording and sampling by professional palaeontologist.	ECO Developer to appoint palaeontologist following significant new fossil finds.	Ongoing during construction phase.	Compliance to be verified by ECO.
14.3	**Operational & Decommissioning Phases**						
Significant heritage impacts are mostly expected to occur during the construction phase.							

<table>
<tr><th colspan="3">Table 14.4. CHANCE FOSSIL FINDS PROCEDURE: SOVENTIX SOLAR PV PROJECT ON VARIOUS FARMS, NEAR HANOVER</th></tr>
<tr><td>Province & region:</td><td colspan="2">PIXLEY KA SEME DISTRICT, NORTHERN CAPE</td></tr>
<tr><td>Responsible Heritage Management Authority</td><td colspan="2">SAHRA, P.O. Box 4637, Cape Town 8000.
Contact: Dr Ragna Redelstorff. Tel: 021 202 8651. Email: rredelstorff@sahra.org.za
or Ms Natasha Higgitt. Tel: 021 462 4502. Email: nhiggitt@sahra.org.za</td></tr>
<tr><td>Rock unit(s)</td><td colspan="2">Adelaide Subgroup (Lower Beaufort Group), Pleistocene alluvium</td></tr>
<tr><td>Potential fossils</td><td colspan="2">Vertebrate bones & teeth, vertebrate and other burrows, plant compressions, petrified wood</td></tr>
<tr><td rowspan="3">ECO protocol</td><td colspan="2">1. Once alerted to fossil occurrence(s): alert site foreman, stop work in area immediately (N.B. safety first!), safeguard site with security tape / fence / sand bags if necessary.</td></tr>
<tr><td colspan="2">2. Record key data while fossil remains are still in situ:
• Accurate geographic location – describe and mark on site map / 1: 50 000 map / satellite image / aerial photo
• Context – describe position of fossils within stratigraphy (rock layering), depth below surface
• Photograph fossil(s) in situ with scale, from different angles, including images showing context (e.g. rock layering)</td></tr>
<tr><td>3. If feasible to leave fossils in situ:
• Alert Heritage Management Authority and project palaeontologist (if any) who will advise on any necessary mitigation
• Ensure fossil site remains safeguarded until clearance</td><td>3. If not feasible to leave fossils in situ (emergency procedure only):
• Carefully remove fossils, as far as possible still enclosed within the original sedimentary matrix (e.g. entire block of fossiliferous rock)
• Photograph fossils against a plain, level background, with scale
• Carefully wrap fossils in several layers of newspaper / tissue paper / plastic bags
• Safeguard fossils together with locality and collection data (including</td></tr>
</table>

	is given by the Heritage Management Authority for work to resume	collector and date) in a box in a safe place for examination by a palaeontologist • Alert Heritage Management Authority and project palaeontologist (if any) who will advise on any necessary mitigation
	4. If required by Heritage Management Authority, 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 Management Authority	
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 Management Authority. Adhere to best international practice for palaeontological fieldwork and Heritage Management Authority minimum standards.	

TABLE 15. INFRASTRUCTURAL & TRAFFIC MANAGEMENT (INCLUDING PARKING ON SITE).

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
15.1	**Planning & Design Phase (including Pre-Construction)**						
15.1.1	Decrease in surface quality of access roads.	To ensure the quality and function of unsurfaced roads leading to and from the project area.	Signed MoU with Roads Division of Responsible Municipality.	Consult with the Roads Division of the Responsible Municipality and enter into a Memorandum of Understanding (MoU) outlining costs and responsibilities to be shared by both parties for the ongoing maintenance of affected unsurfaced roads.	Applicant.	Following successful award of tender.	ECO & IEA.
15.2	**Construction & Operation Phase**						
15.2.1	Dust entrainment from unsurfaced roads can result in unacceptably high dust fallout.	To manage dust entrainment on access roads which may not exceed the thresholds stipulated in the National Dust Control Regulations.	Full compliance with National Dust Regulations. Acceptable Dust fallout rate ($mg/m^2/day$): Residential area < 600 Non-residential area < 1200	Dust suppression must be carried out on access roads where high dust entrainment is evident. To reduce water usage, a suitable soil binder must be used in dust suppression activities. Excessive water usage to control dust on dirt roads can cause erosion and lead to hazardous conditions for road users.	Applicant / Contractor.	During construction, monthly.	Monitoring of dust fallout to be undertaken by a professional service provider and compliance to be verified by ECO & IEA.

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
			Exceedance not more than twice in a year, not sequential months.				
15.2.2	Parking and driving carelessly can increase collisions with mammals, birds, reptiles, amphibians and insects – collectively referred to as "roadkills".	To avoid and minimise impacts from traffic on animals residing on and around the property.	Compliance to speed limits. No recorded project vehicle associated animal mortalities.	Drivers shall adhere to the relevant speed limit(s) (ON the existing road network) at all times and restrict their movements to the existing and / or approved roadway or servitude. The speed limit on the property shall be 40 km/h and 30km/h within the development footprint. A register must be maintained of all animal mortalities recorded on the property and localised access roads.	Applicant / Contractor.	During construction.	Compliance to be verified by ECO & IEA.
15.2.3	Contamination from spills when refuelling, parking, driving, emergency repairing, operating plant or equipment	To reduce contamination of soil from leaking plant and vehicles and upon occurrence is	Spills are removed within 48 hours of event. Records of	Oil & fuel spills on roadways and parking areas must be removed to depth of penetration following their discovery and placed in a designated hazardous container for safe disposal.	Applicant / Contractor.	During construction.	Compliance to be verified by ECO & IEA.

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
	to soil or nearby or within the watercourse.	remediated promptly.	servicing by off-site workshop. Drip tray issued to all plant and recorded in a register.	Drip trays must be placed under all plant that is parked overnight and extended periods not in operation. Drip trays can be filled with hydrophobic hydrocarbon absorbent material to avoid content being leached out during rainfall events. No servicing or washing of vehicles or plant may take place in parking bays, and all servicing must be done off-site, no service or wash-bays are to be constructed on site. Emergency breakdowns in the parking areas or along roads, must be addressed after adequate pollution containment measures have been implemented including but not limited to drip trays and spill kits.			

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
				Refuelling of vehicles and plant may only take place at a designated and permitted (from local Fire Chief) fuel storage tank or mobile fuel bowser, under the guidance of a Specific Operating Procedure (SOP) that limits spillage and addresses remedial actions in the event of a spillage.			
15.2.4	Delivery of the solar panels and the personnel trips will influence the existing traffic operations on the affected roads.	To reduce traffic related impacts from project related activities.	Compliance with EMPr mitigations & Traffic Management Plan (see Appendix 6).	It is anticipated that only the delivery of the solar panels and the personnel trips will influence the existing traffic operations on the affected road. The construction machinery will only have a traffic impact on delivery to and collection from the site and are therefore regarded as negligible. Delivery & collection from the site need to take place in bulk and / or	Applicant / Contractor.	During construction.	Compliance to be verified by ECO & IEA.

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
				around the same time, in order to minimally affect the existing traffic operations.			
15.3	**Decommissioning Phase**						
There are no significant impacts expected during this phase.							

TABLE 16. VISUAL ASPECT MANAGEMENT.

No.	Potential Impact	Desired Outcomes	Targets & Indicators	Management Actions & Mitigation Measures	Responsibility	Timeframe / Frequency	Monitoring
16.1	**Planning & Design Phase (including Pre-Construction)**						
There are no significant impacts expected during this phase, as footprint location has already mitigated the planning and design requirements.							
16.2	**Construction & Operational Phase**						
16.2.1	Impact of construction on visual receptors in close proximity to the solar facility, including road users and local homesteads.	To manage the facility in a way that minimised its reflectance impacts on the surrounding environment.	Demonstration of effects to minimise visual impacts.	Use visual screens to minimise the visual impact on the scenic resources of this region. Have minimal placements that can be visually intrusive to sensitive receptors. Utilise fencing options that do not create a significant visual barrier.	Applicant.	Throughout the project lifecycle.	ECO & IEA.
There are no significant impacts expected during the decommissioning phase.							

MEMBERS: J.A. Bowers (M Tech, Pr.Sci.Nat., MGSSA) & S.D. MacGregor (MSc., Pr.Sci.Nat.)
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SECTION 6: ENVIRONMENTAL AWARENESS PLAN (Cape Lowlands Environmental Services, 2012)

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

The EMPr needs to include, inter alia:
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;

Throughout the construction & operational phases environmental as well as health and safety awareness training should be provided to all employees in order to promote the effective implementation of the EMPr actions.

This section of the report focusses on the environmental awareness training. It provides a guideline as to the possible environmental risks that may be experienced as part of the project as well as way to avoid the risks and subsequent environmental degradation. The aim is to provide a guide to developing a comprehensive yet easily understandable awareness plan to present to employees of all education and skill levels which should be presented to the employees at least one week prior to commencement of construction. The following pointers are given for the environmental awareness training course:

- Environmental awareness training should be undertaken by the environmental and / or health and safety representative of Soventix with the input of an EAP or ECO if required;
- Environmental awareness reminders should be undertaken at least bi-annually to ensure that employees and Contractors are kept aware of the risks and management thereof;
- It is recommended that awareness posters be developed and placed on site in highly visible areas to provide the required information when it needs to be referred to as well as reminding employees of their obligations with regard to environmental protection;
- A slideshow can also be developed for initial awareness induction and for use as a reminder of the environmental risks and responsibilities at the site or induction of future Contractors; and
- Throughout the presentations (posters, meetings, slideshows, etc.), it is recommended that visual aids be used to explain the potential risks and management thereof as thoroughly as possible.

Should any new personnel be contracted or arrive on site during the construction period, they should attend the environmental awareness course. The environmental awareness training should be provided to all labourers, technical staff and any other Contractor appointed.

The awareness training forms part of this EMPr and should be implemented as part of the conditions of environmental management and risk prevention. Refer to the management measures in Tables 6 through 26 above for proposed management and mitigation actions to be

undertaken in order to prevent or minimise the risks described below. Attention should be focussed on the following areas of sensitivity during the construction phase:

- Removal of vegetation during site clearance;
- Animal habitat disturbance due to vegetation clearance;
- Soil erosion and pollution;
- Soil compaction;
- Health and safety;
- Degradation of roads; and
- Fire risks.

Other elements to be taken into consideration by the employees during both the construction and operational phases include:

- The presence of animals on site;
- Disturbances to neighbours due to noise and traffic;
- The positive impacts, of the greener technology being implemented, on the biophysical and socio-economic environments; and
- Awareness should be raised regarding the possible occurrence of sensitive plant and animal species and heritage features.

The awareness training for this project should aim to prevent, and where prevention is not possible, mitigate detrimental environmental impacts. It should promote awareness of environmental risks and management thereof. It should furthermore promote green thinking and provide information on alternative energy sources and energy consumption reduction.

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SECTION 7: RESPONSIBILITIES OF ROLE PLAYERS

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, 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 & operations associated with the development of a solar PV facility, once the Planning and Authorisation phases are complete. The tabulated management programmes assign responsibilities to one or more role player, the below descriptions identify responsibilities and accountabilities in the case of 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 developer is responsible for ensuring that sufficient resources (time, financial, man-power, equipment, etc.) are available to the other role players (e.g. the contractor, SECO, etc) to efficiently perform their tasks in terms of the EMPr. The responsibility of restoring the environment in the event of any negligence, which leads to damage of the environment, also falls to the applicant.

The applicant must ensure that the EMPr is included in any documents (tender, appointment etc.) so that any contractor who is appointed is bound to the conditions of the EMPr. The applicant must appoint an independent Environmental Control Officer (ECO) prior to commencement of construction, to help identify pre-construction & construction criteria that need to be fulfilled timeously, to avoid non-compliance with the overarching authorisation conditions and / or legislation.

Contractor

The contractor, as the developer's agent on site, is bound to the EMPr conditions through his / her contract with the developer, and is responsible for ensuring that she / he adheres to all the conditions of the EMPr. 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 must ensure that he / she has provided sufficient budget for complying with all EMPr conditions at the tender / appointment stage.

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 (SECO) shall be appointed by the contractor to implement the EMPr daily. The SEO shall ensure that all construction activities are carried out in accordance with the relevant conditions of the EMPr, Environmental Authorisation (EA), General Authorisation (GA) or Water Use License (WUL) (under the National Water Act), wayleaves, provincial ordinances & provincial bylaws.

Environmental Control Officer (ECO)

The Environmental Control Officer (ECO) is appointed by the applicant as an independent monitor of the implementation of the EMPr, EA & GA / WUL. He / she must form part of the project team and be involved in all aspects of the project planning that can influence environmental conditions on the site.

The ECO must attend relevant project meetings, conduct inspections to assess compliance with the EMPr, EA & GA / WUL and be responsible for providing feedback on potential environmental problems associated with the development. In addition, the ECO is responsible for:

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

The ECO has the right to enter the site and undertake monitoring and auditing 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)

An IEA shall be appointed by the Applicant to undertake EMPr, EA & GA / WUL compliance audits at 6-monthly intervals. The purpose of conducting a periodic compliance audit would be to systematically check and evaluate progress on EMPr, EA & GA / WUL implementation. The environmental audit will serve as a 'snapshot' of the environmental situation and progress at a given point in time. The purpose of the audit is to illustrate whether there has been any improvement or change over time.

The IEA will fulfil the auditing requirements by systematically auditing the Project's performance & compliance against the requirements of the EA, EMPr & GA / WUL in a process that is carefully planned, structured and organised. The audit process must, on a sampled basis, track past actions, activities, events, and procedures through using existing documentation, conducting interviews with managers and personnel, and observing practices on site.

SECTION 8. COMMUNICATION

At least monthly site meetings should be held where feedback can be given and any potential problems identified and remedied. If they cannot be remedied then construction in that area should be stopped, until a suitable remedy is identified.

Monitoring Compliance

Pre-construction, Construction and Post-construction:

The ECO will be responsible for monitoring and reporting on compliance of the activity from pre- to post-construction.

Inspections and resulting compliance reports shall be a systematic, independent and documented process for obtaining compliance evidence and evaluating it objectively to determine the extent to which the compliance criteria are fulfilled. The compliance criteria (or reference) against which the compliance evidence is compared shall include this EMPr, the Environmental Authorisation & General Authorisations or a Water Use License (under then National Water Act).

The ECO must undertake bi-weekly inspections of the site and submit monthly environmental compliance reports to the National Department of Environmental Affairs (DEA) as the competent authority for this project, unless otherwise prescribed in the EA. The compliance reports must 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). The compliance reports must measure the applicant / contractor's level of compliance against the aforesaid criteria. Performance scoring / reporting is optional.

The SECO shall maintain an on-site diary to record environmental aspects (elements of the construction activities that can interact with the environment) and environmental impacts (any change to the environment, whether adverse or beneficial, wholly or partially resulting construction activities), daily.

Operation:

The relevant authorities should be responsible for monitoring compliance with aspects of the activity that fall within their jurisdiction.

Time Periods and Failure to Comply with the EMPr

The time periods within which the measures prescribed in this EMPr must be implemented shall be applicable to the full duration of the activity that is being undertaken and mitigated. The time periods within which corrective and preventive actions need to be implemented shall be determined by the SECO and / or ECO, depending on the nature and severity of the finding. In the absence of a prescribed deadline or completion date, findings shall be corrected or prevented immediately upon being found to occur, if practical.

The EMPr is a legally binding document and should form part of the contract. Should there be failure to comply with the EMPr the following steps are envisaged:

Step 1
The ECO meets with the contractor and points out the deviation from the EMPr. The ECO and Contractor agree on a solution and this non-compliance is recorded by the ECO as well as the solution put forward to rectify it.

Step 2
Should there still be non-compliance or there is a more serious infringement of the EMPr the contractor is informed in writing with a deadline by which the problem must be rectified. Any extra costs that may be accrued must be borne by the contractor.

Step 3
If non-compliance persists, the Chief Resident Engineer (CRE) or Project Manager (PM) shall order the contractor to suspend construction in that specific area or the project as a whole until the activity at variance with the EMPr is corrected and or remedial actions taken. Any cost that occurs as a result of such action shall be for the account of the contractor.

Step4
Where there is non-compliance with the EMPr and no evidence that the contractor intends complying even though the above 3 steps have been taken the applicant may terminate the contract due to non-compliance (breach of contract). Such measures do not replace any legal proceedings that may occur as a result of such non-compliance.

Environmental Awareness Plan

The applicant shall ensure that his project team, contractor and labourers are adequately trained with regard to the implementation of the EMPr, EA & GA / WUL throughout construction.

Pre-construction

Environmental Awareness Inductions shall be targeted at two distinct levels of employment: management (applicant, architect, engineer, contractor / site agent) and labourers (including the site foreman). The SEO shall be responsible for preparing and presenting inductions appropriate to the audience. Inductions shall be undertaken prior to the commencement of construction. 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, the following:

- Measures required during the Planning and Design, and Pre-construction phase, and
- Site establishment.

The Environmental induction for the contractor's labourers and foreman shall, as a minimum, include the following:

- A description of the actual and potential environmental impacts,
- Standard operating procedures for undertaking construction activities (i.e. mixing concrete, driving, etc.) that can have an environmental impact,
- Staff conduct including sanitation and movement,
- The integrated waste management strategy,
- The steps to be taken should any item of perceived environmental importance including archaeological artefacts be located or unearthed, and
- The environmental emergency plan.

Construction

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. Training shall be given during toolbox talks.

The SEO and ECO shall keep records of the environmental inductions and subsequent toolbox talks in an on-site file designated for all matters pertaining to environmental management.

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SECTION 9: ENVIRONMENTAL EMERGENCY PLAN FOR THE CONTROL OF ENVIRONMENTAL INCIDENTS

Definition of an 'Environmental Incident'

1. An unexpected sudden occurrence including a major emission, fire or explosion leading to serious danger to the public or potentially serious pollution of or detriment to the environment whether immediate or delayed (NEMA, 1998, section 30 (1) (a)).

2. Any incident or accident in which a substance-
   (a) pollutes or has the potential to pollute a water resource or
   (b) has, or is likely to have, a detrimental effect on a water resource (NWA, 1998, section 20 (1))

Procedure

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

- Action to be taken
- Removal 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 SECO 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. Sand bags
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)

Contact Numbers

Organisation	Name	Telephone/cell Number
Project Personnel		
Applicant		
Engineer		
Contractor		
HSO		
SEO		
ECO		
Interested and Affected Parties		
Land Owner		
Adjacent Land Owner		
Adjacent Land Owner		
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		
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)		
DEA (Director General)		
DEA (Director: Environmental Impact Evaluation)		

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 extent of the spill, i.e. 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.
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 PRE-DETERMINED 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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SPILLAGE IN A WATERCOURSE

REMOVAL 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 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.
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.

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.
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 Land Owner, 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'.
SEO	Reporting	Report the incident to the following authorities within 24 hours. 1. DEA (Director General), 2. DWS (Director General and Chief Director), 3. SA Police Services, 4. Fire Department, 5. Catchment Management Agency, 6. DEA (provincial Head of Department) or Local Municipality, and 7. Any persons whose health may be affected by the incident.

MEMBERS: J.A. Bowers (M Tech, Pr.Sci.Nat., MGSSA) & S.D. MacGregor (MSc., Pr.Sci.Nat.)
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SEO	Reporting	Provide the following information: 1. The nature of the incident, 2. Any risks posed by the incident to public health, safety & property, 3. the toxicity of substances or by-products released by the incident, and 4. any steps that should be taken in order to avoid or minimise the effects of the incident on public health and the environment.
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, 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.

SPILLAGE IN A WATERCOURSE

PRESCRIBED REPORTING PROCEDURE		
Incident recording		
Personnel	**Responsibility**	**Action**
SEO	Investigation	Conduct an investigation, including interviews, and record all details of the incident. ● The cause must be investigated.
SEO	Reporting	Complete an Environmental Incident Report and forward it to all key project personnel, with the exception of the Emergency Services.
SEO	Reporting	Within 14 days of the incident, report the incident to the following authorities. 1. DEA (Director General), 2. DEA (Provincial Head of Department), 3. Local Municipality, 4. DWS (Regional Director).
SEO	Reporting	Provide 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 of time, 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	Identify methods for preventing the incident from

	Procedures	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.

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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 extent of the spill, i.e. 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.
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 sand bags 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.

SPILLAGE ON LAND

REMOVAL 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 if necessary.
SEO	Monitoring	Take photographs of the affected area during rehabilitation.

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.
SEO	Reporting	If the spill is too big for the spill kit, contact a Spill Clean-Up Service Provider.
SEO	Reporting	Report the incident to the following authorities. 1. DEA (Director General), 2. SA Police Services, 3. Fire Department, 4. DEA (Provincial Head of Department) or Local Municipality, and 5. Any persons whose health may be affected by the incident.
SEO	Reporting	Provide the following information: 1. The nature of the incident, 2. Any risks posed by the incident to public health, safety & property, 3. the toxicity of substances or by-products released by the incident, and 4. Any steps that should be taken in order to avoid or minimise the effects of the incident on public health and the environment.
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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SPILLAGE ON LAND

PRESCRIBED REPORTING PROCEDURE		
Incident recording		
Personnel	**Responsibility**	**Action**
SEO	Investigation	Conduct an investigation, including interviews, and record all details of the incident. ● The cause must be investigated.
SEO	Reporting	Complete an Environmental Incident Report and forward it to all key project personnel, with the exception of the Emergency Services.
SEO	Reporting	Within 14 days of the incident, report the incident to the following authorities. 1. DEA (Director General) 2. DEA (Provincial Head of Department), and 3. Local Municipality.
SEO	Reporting	Provide 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		
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.

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.
Land Owner	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	Extinguish the fire or assist in doing so.
SEO	Co-ordination	Stop the spread of the fire.
SEO	Co-ordination	Provide assistance to a fire protection officer or forest officer in the event that they take control over the fighting of a fire.
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.

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.
SEO	Reporting	If there is potential for a fire to spread and endanger life, property or the environment, alert the landowner and Fire Department.
Land Owner	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.
SEO	Reporting	Report the incident to the following authorities. 1. DEA (Director General), 2. SA Police Services, 3. Fire Department, 4. DEA (Provincial Head of Department) or Local Municipality, and 5. Any persons whose health may be affected by the incident.
SEO	Reporting	Provide the following information: 1. The nature of the incident, 2. Any risks posed by the incident to public health, safety & property, 3. the toxicity of substances or by-products released by the incident, and 4. any steps that should be taken in order to avoid or minimise the effects of the incident on public health and the environment.
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.

FIRE

PRESCRIBED REPORTING PROCEDURE		
Incident recording		
Personnel	**Responsibility**	**Action**
SEO	Investigation	Conduct an investigation, including interviews, and record all details of the incident. ● The cause must be investigated.
SEO	Reporting	Complete an Environmental Incident Report and forward it to all key project personnel, with the exception of the Emergency Services.
SEO	Reporting	Within 14 days of the incident, report the incident to the following authorities. 1. DEA (Director General), 2. DEA (Provincial Head of Department), and 3. Local Municipality.
SEO	Reporting	Provide 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		
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.

APPENDICES

The following appendices form part of this EMPr and must be implemented in accordance with their management measures and mitigations through the life-cycle of the project. They have been compiled as stand-alone documents in accordance with the requirements of the Department and will facilitate their use a Method Statement (MS) during construction and a Standard Operating Procedure (SOP) during operation. An Open Space Management Plan was not deemed necessary, as the development footprint will be securely fenced, and all areas outside the development footprint are deemed out-of-bounds. Furthermore, measures to monitor and detect any leakage or spillage of all hazardous substances during their transportation, handling, use and storage was not deemed relevant to this project due to the nature of the project and the associated lack of use and storage of such substances. Hazardous substances are dealt with under the management of waste in this EMPr.

Appendix 1 - Alien invasive management plan

Appendix 2 - Plant rescue and protection plan

Appendix 3 - Avifauna monitoring and management plan

Appendix 4 - Re-vegetation and habitat rehabilitation plan

Appendix 5 - Traffic management plan

Appendix 6 – Erosion management plan

Appendix 7 – Fire Management plan

Appendix 8 – Storm Water & Hydrology Management plan

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APPENDIX 1 - ALIEN INVASIVE MANAGEMENT PLAN

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APPENDIX 2 - PLANT RESCUE AND PROTECTION PLAN

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APPENDIX 3 - AVIFAUNA MONITORING AND MANAGEMENT PLAN

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APPENDIX 4 - RE-VEGETATION AND HABITAT REHABILITATION PLAN

REVEGETATION & HABITAT REHABILITATION PLAN (Cape Lowlands Environmental Services, 2012)

CONSTRUCTION PHASE

Various construction activities, such as establishing construction camp and waste collection area, construction of access roads, clear & grub activities and levelling could cause environmental damages leading to erosion. These environmental damages include disruption and disturbance of protected / endangered vegetation, damage to topsoil and compacting of ground.

In order to ensure reversal of the abovementioned impacts, the environment will be rehabilitated. Rehabilitation will occur subsequent to completion of construction & during decommissioning. Throughout the construction phase the management and mitigation measures prescribed in Table 24 must also be implemented. This will ensure not only that the environment is minimally damaged, but also that rehabilitation activities will be more effective.

- The Contractor shall take all appropriate and active measures to prevent erosion, especially wind and water erosion, during the rehabilitation of the construction phase. Any erosion caused on site during the construction phase as a result of runoff needs to be rehabilitated;
- Temporary erosion protection measures must be kept in place until permanent preventative measures (such as establishment of vegetation) is concluded;
- Areas where disturbance and loss of topsoil, scarring of the soil surface and land features have occurred (such as at the construction camp) must be filled with rehabilitated topsoil;
    - Topsoil removed during construction must be conserved and stockpiled (no more than 2 m in height) for rehabilitation use; and
    - All spills must be removed and disposed of at an approved dumping site and rehabilitated immediately.
- Compacted ground shall be rehabilitated by ripping to a minimum depth of 600mm;
    - Ripping will increase the soil's water storage capacity;
    - Stop soil erosion;
    - Alleviate the re-compaction; and
    - Allow deep root growth and water infiltration.
- Topsoil of at least 20 cm should be placed on top of the ripped soil. Following topsoil, the affected area should be re- vegetated;
- Areas prone to erosion caused by the removal of vegetation (such as around the bases of the panel foot pieces) must be rehabilitated with topsoil and the area re-vegetated:
    - Re- vegetation must include the use of only indigenous vegetation and plants similar to that of the natural surrounding areas;

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  - A Contractor appointed by the developer and Engineer shall be tasked to ensure that all weeds and alien & invasive species are removed as instructed and approved by the ECO;
  - No on-site burying, dumping or stockpiling of any weeds and aliens or invasive species may occur. Such should be removed from the site to a suitable dumping site from which seed cannot escape;
  - Site rehabilitation requires a well- designed planting program to be developed prior to re-vegetation; and
  - No construction equipment, vehicles or unauthorised personnel shall be allowed onto areas that have been re-vegetated.
- There must be no vegetation interfering with structures and statutory safety requirements upon completion of the contract;
- On completion of works, the contractor shall clear away and remove from the site all construction paint, surplus materials, foundations, plumbing and other fixtures, rubbish and temporary works of every kind.
- The construction sites shall be cleared, and cleaned to the satisfaction of the Developer and the ECO; and perimeter fencing must be removed at the end of construction in order to ensure that they do not deteriorate and result in an aesthetically unpleasing development.

Topsoil removed during the construction phase should not be stockpiled for use during the decommissioning phase, as the end of life of operations is unknown at this stage. Should topsoil be stored indefinitely, it will lose viability. All topsoil must thus be used during construction phase rehabilitation.

OPERATIONAL PHASE

No rehabilitation will be necessary during this phase. Refer to maintenance procedure above.

DECOMMISSIONING PHASE

Decommissioning of this development is not foreseen in the near future. Due to the changes in technology anticipated to occur, decommissioning phase specific rehabilitation measures will not be provided at this stage.

Prior to undertaking any decommissioning activities, impacts will be determined and management, mitigation and rehabilitation measures determined. A rehabilitation plan will also be developed prior to undertaking any decommissioning activities.

APPENDIX 5 - TRAFFIC MANAGEMENT PLAN

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APPENDIX 6 – EROSION MANAGEMENT PLAN

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APPENDIX 7 – FIRE MANAGEMENT PLAN

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APPENDIX 8 – STORM WATER & HYDROLOGY MANAGEMENT PLAN

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