Final EMPr

FINAL EMPR FOR THE 200 MW PHOTOVOLTAIC ENERGY FACILITY FOR SIBANYE GOLD LIMITED, GAUTENG.

Sibanye Solar PV (Pty) Ltd

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Abbreviations

AIP	Alien and Invasive Plant
BA	Basic Assessment (as provided for in NEMA (Act 107 of 1998) and EIA Regulations [2014]).
CA	Competent Authority
DEA	Department of Environmental Affairs
DFFE	Department of Fisheries, Forestry and Environment (previous name of the DEA)
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
I&AP	Interested and Affected Party
NEMA	National Environmental Management Act (Act No. 107 of 1998)
GDARD	Gauteng Department of Agriculture and Rural Development
PPP	Public Participation Process
PV	Photovoltaic
SCC	Species of Conservation Concern

Table 1: Requirements of an Environmental Management Programme (EMPr) as detailed in Appendix 4 of the NEMA EIA Regulations 2014 (as amended).

Requirement	Reference
Details of the EAP who prepared the EMPr and the expertise of the EAP, including a CV.	Appendix A
A detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description.	Section 1 and Section 2
A map at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that should be avoided, including buffers.	Appendix 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** (v) **where relevant, operation activities**	Section 4 to Section 10
A description of proposed impact management actions, identifying the manner in which the impact management outcomes 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** (iv) **comply with any provisions of the Act regarding financial provision for rehabilitation, where applicable**	Section 4 to Section 10
The method of monitoring the implementation of the impact management actions.	Section 3.6 and Section 4 to Section 10
The frequency of monitoring the implementation of the impact management actions.	Section 3.6 and Section 4 to Section 10
An indication of the persons who will be responsible for the implementation of the impact management actions.	Section 3 and Section 4 to Section 10

The time periods within which the impact management actions must be implemented.	Section 4 to Section 10
The mechanism for monitoring compliance with the impact management actions.	Section 3 and Section 4 to Section 10
A program for reporting on compliance, taking into account the requirements as prescribed by the Regulations.	Section 3
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** (ii) **risks must be dealt with in order to avoid pollution or the degradation of the environment**	Section 3.5.1.
Any specific information that may be required by the competent authority.	Section 1.2.1

1 INTRODUCTION

The proposed 200 MW photovoltaic energy facility for Sibanye Gold Limited (the Applicant), situated close to Sibanye Gold's Driefontein and Kloof mining operations near Westonaria, Gauteng, was granted an Environmental Authorisation (EA) by then Department of Environment Affairs (now known as the Department of Forestry, Fisheries and the Environment (DFFE) on 16 January 2017 (ref no. 14/12/16/3/3/2/919). The EA is included in Appendix B of this document.

Since 2017, the Competent Authority (CA) has changed from the DFFE[1] to the Gauteng Department of Agriculture and Rural Development (GDARD).

This EAs would have expired on 15 January 2022, but GDARD granted an extension of its validity by non-substantive amendments under Part 1 (Regulations 29 and 30) of Chapter 5 of the Environmental Impact Assessment (EIA) Regulations (Government Notice no. 982 of 2014) with reference number Gaut 006/21-22/E0087. This amendment is provided in Appendix C of this document. Additionally, the holder of the authorisation was amended to reflect the details of the Special Purpose Vehicle (SPV) company Sibanye Solar PV (Pty) Ltd that will construct and operate the plant. Further, the EA for the 200 MW PV Energy Facility has been split into four phases of 50MW each that will be developed by different independent power producers (IPPs), each with their own financing and other requirements.

Condition 16 of the EA requires the Applicant to amend the Environmental Management Programme (EMPr) which was compiled as part of the Environmental Impact Assessment (EIA) process to include updated layout plans and the conditions contained in the EA. This Final EMPr responds to this requirement.

The solar PV plant is to be developed in four 50 MW phases as follows:

- Phase 1: On Portions 5 and 6 of the Farm Uitval 280
- Phase 2: On Portion 2 of the Farm Uitval 280
- Phase 3: On Portion 1 of the Farm Uitval 280
- Phase 4: On Portion 4 of the Farm Uitval 280

Only Phase 1 is proposed to be developed now. Phases 2 to 4 will be developed later, possibly by other SPVs.

Besides this Final EMPr, the applicant intends to undertake two other processes to apply for additional amendments and applications for authorisations for the PV plant namely:

1. A substantive (Part 2) amendment of the EA to change the height of the solar PV panels; The authorised height of the solar panels is 2.1m. This is proposed to be increased to 4.5m. The reference number for this application is 006/23-23/E0014.
2. Basic Assessment (BA) process to authorise a change of land use from agriculture. The reference number for this application GAUT 002/22-23/E3298.

The Part 2 amendment and Basic Assessment also require an EMPr as part of their respective submissions. This EMPr has been compiled to comply with the existing EA conditions as well as the Part 2 Amendment and the BA processes. Aspects related to all these three processes will be captured in this Final EMPr. This complete and updated EMPr is proposed to be approved by the CA as part of these three processes.

1.1 Purpose of the EMPr

In addition to complying with the conditions of the EA as described above, this EMPr provides for environmental management throughout the various lifecycle stages of the proposed development. The following stages are included:

[1] Known as the Department of Environmental Affairs (DEA) in 2017 when these EAs were issued

- Planning and design;
- Pre-construction and construction;
- Operation; and
- Decommissioning.

Furthermore, this EMPr aims for alignment and optimisation of environmental management processes with conditions contained within the approved EA, thereby ensuring that identified environmental considerations are considered during all stages of development.

1.2 Legal requirements

The development of the PV plant is expected to be done through an Engineering, Procurement and Construction (EPC) appointment. As such, the final detailed designs to be constructed will be drawn up by the specific EPC contractor. However, the layout plan included in this EMPr has taken the conditions of the EA, further specialist assessments of the authorised footprint, the EIA and its associated EMPr into account and will be provided to the EPC contractor as basis for their detailed designs.

Should any changes to the layout plan be required, the CA shall be informed by submitting the revised layout with a detailed motivation together with an updated EMPr by following the applicable amendment process as set out in Sections 35 to 37 of the EIA Regulations of 2014. Mitigation measures related to the final detailed design phase have also been included and shall be adhered to by the EPC appointment.

1.2.1 Conditions of the EA

Condition 16 of the EA (Appendix A) states that the EMPr, which was compiled as part of the EIA process at that time, was **not** approved and must be amended to include the final layout plan and other documentation that was not available at the time of it being issued. An updated layout plan is included in Appendix D.

This layout, together with the site sensitivities will be provided to the appointed EPC contractor as a footprint within which to finalise their detailed infrastructure layout.

The additional requirements of the EA are tabulated below, with references to where these have been addressed within this EMPr.

Table 2: EA conditions and document references

EA Condition related to EMPr	Reference within this EMPr
All recommendations and mitigation measures recorded in the EIA and specialist studies attached as part of EMPr	The specialist recommendations and proposed mitigation measures have been incorporated in Section 4 to Section 10 of the EMPr.
The requirements and conditions of this EA	Throughout the EMPr. EA attached in Appendix B.
The final site layout map	Appendix D.
An alien invasive management plan to be implemented during construction and operation of the facility	Requirements included in Section 4 (Construction), Section 9.1.2 (Operation) and Appendix G-1.
A plant rescue and protection plan	Not applicable since no species of conservation concern or protected species are present within the PV plant footprint (see specialist memo in Appendix G). A site walkdown was restricted to phase 1 of the Sibanye PV plant project and was

	done by a Terrestrial Ecologist who searched for SCC with a hand-held Global Positioning System (GPS). No Floral SCC were recorded within the Phase 1 PV plant.
A revegetation and rehabilitation plan to be implemented during construction and operation of the facility	Refer to Section 4 and Appendix G-2. Rehabilitation is required to be completed as part of the construction phase of the project, in a phased approach, to prevent large areas of exposed soil at any time. Revegetation and rehabilitation are not expected to be required during the operational phase of the project, due to the limited activity associated with a PV plant.
A stormwater and wash water management plan to be implemented during construction and operation of the facility	Appendix E contains the stormwater management plan. Section 5.3, Section 7.1, and Section 8.1 provides a surface water management plan. Section 9.1 provides requirements for PV panel washing.
A traffic management plan for the site access roads to ensure that no hazards would result of the increased truck traffic and that traffic flow would not be adversely affected	Section 5.2 and Appendix G.
An erosion management plan for monitoring and rehabilitating erosion events associated with the facility	Section 4 (Pre-construction and construction site environmental management, flora, and fauna, aquatic, and rehabilitation sections), Section 9.3 and Appendix G-3.
An effective monitoring system to detect any leakage or spillage of any hazardous substance during their transportation, handling, use or storage. To include precautionary measures	Section 4 (Materials and Waste), Section 9.4 and Appendix G-4.
Measures to protect hydrological features and other environmental sensitive areas from construction impacts	Throughout Section 4, with specialist mitigation measures captured in the Fauna, Flora, and Water section of **Table 4-1**, and Section 9.2.
A fire management plan to be implemented during construction and operation of the facility	Appendix G-4.
An environmental sensitivity map	Section 2, **Figure 2-2**.
A final site layout map	Section 2, **Figure 2-1**.
A final site layout map superimposed on the sensitivity map.	Section 2, **Figure 2-3**.
This final EMPr, once approved, must be implemented and strictly enforced during all phases of the project.	Noted

Considering these additions to the EMPr, it is the EAP's opinion that it complies with the requirements and conditions of the EA.

1.2.2 General Requirements for EMPrs

The content of EMPrs must meet the requirements in Section 24N (2) and (3) of NEMA and Appendix 4 of the NEMA EIA Regulations 2014 (as amended). Appendix 4 specifies the required contents of an EMPr.

The EMPr must address the potential environmental impacts of the proposed activity on the environment throughout the project life cycle including an assessment of the effectiveness of monitoring and management arrangements after implementation. The Department requires that the EMPr be submitted together with the Assessment Report so that it can be considered simultaneously.

Section 24N (2) and (3) of the NEMA listing the requirements of an EMPr are given below.

24N.(2) *the environmental management programme must contain-*

*(*a) *information on any proposed management, mitigation, protection or remedial measures that will be undertaken to address the environmental impacts that have been identified in a report contemplated in subsection 24(1A), including environmental impacts or objectives in respect of –*

(i) planning and design;

(ii) pre-construction and construction activities;

(iii) the operation or undertaking of the activity in question;

(iv) the rehabilitation of the environment; and

(v) closure, where relevant.

(b) details of –

(i) the person who prepared the environmental management programme; and

(ii) the expertise of that person to prepare an environmental management programme

(c) a detailed description of the aspects of the activity that are covered by the draft environmental management plan;

(d) information identifying the persons who will be responsible for the implementation of the measures contemplated in paragraph (a);

(e) information in respect of the mechanisms proposed for monitoring compliance with the environmental management programme and for reporting on the compliance.

(f) as far as is reasonably practicable, measures to rehabilitate the environment affected by the undertaking of any listed activity or specified activity to its natural or predetermined state or to a land use which conforms to the generally accepted principle of sustainable development; and

(g) a description of the manner in which it intends to-

(i) modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation;

(ii) remedy the cause of pollution or degradation and mitigation of pollutants; and

(iii) comply with any prescribed environmental management standards or practices.

(3) *the environmental management programme must, where appropriate-*

(a) set out time periods within which the measures contemplated in the environmental management programme must be implemented;

(b) contain measures regulating responsibilities for any environmental damage, pollution, pumping and treatment of extraneous water or ecological degradation as a result of prospecting or mining operations or related mining activities which may occur inside and outside the boundaries of

the prospecting area or mining area in question; and

(c) develop an environmental awareness plan describing the manner in which-

(i) the applicant intends to inform his or her employees of any environmental risk which may result from their work; and

(ii) risks must be dealt with in order to avoid pollution or the degradation of the environment.

The EMPr aims to meet the EMPr requirements as legislated by these NEMA Regulations

This document should be seen as a live document that allows for improvements and adjustments throughout the life cycle of the project as new information is made available, unforeseen situations arise or new conditions warrant adaptation.

1.2.3 Structure of the EMPr

This EMPr has been structured for implementation by the project as a whole, but also includes phase-specific mitigation measures. The sections have been structured as follows:

Section 4: Mitigation measures applicable to the construction phase of all four phases of the project.

Section 5: Phase 1 mitigation measures

Section 6: Phase 2 mitigation measures

Section 7: Phase 3 mitigation measures

Section 8: Phase 4 mitigation measures

Section 9: Operational mitigation measures for all four phases

Section 10: Decommissioning mitigation measures

1.3 Details of the Environmental Assessment Practitioner

Section 33 of EIA Regulations and Section 24N (2) and (3) of the NEMA requires that an EMPr must include the details of the person(s) who prepared the EMPr, and the expertise of that person to prepare an EMPr. Zutari has selected a team of highly experienced specialists and multi-disciplinary practitioners to execute this project in a professional and unbiased manner. A synopsis of the qualifications and experience of Zutari's Environmental Assessment team this project is provided hereunder. Full CVs are available in Appendix B.

The Lead Environmental Assessment Practitioner (EAP), Natanya Whitehorn, is a manager and an environmental practitioner at Zutari. She specialises in environmental auditing and her expertise consists of risk assessment, environmental monitoring and social impact assessments (SIAs), including the study of human interaction with one another and the natural environment. She has experience in fieldwork for impact assessments, environmental monitoring as well as the public participation process (PPP), where, she has assisted and translated at various landowner, stakeholder and public meetings and also gained experience in environmental compliance monitoring by working on a large construction project. Further significant experience includes integrated environmental management (IEM) processes such as environmental impact assessments (EIAs), basic assessment reports (BARs) and the development of environmental management plans (EMPs). She has previous working experience in geo-informatics and geographic information systems (GIS). She has more than a decade of experience working with GIS, which she has gained whilst working on projects for the government, local authorities as well as the private sector. She has also gained skills in spatial representation and interpretation through her involvement in the engineering environment. Natanya has specialised in spatial analysis, data processing and mapping while her technical responsibilities include inter alia the evaluation of data,

digitising, editing and converting spatial data and non-spatial data from various formats and manipulating data in Esri ArcMap with extension (XTools, ET Geowizards, ET Geotools), ArcView 3.2 and Planet GIS. She has research experience on biodiversity, natural resources management, and human developmental issues and tutoring experience at a tertiary institution in the field of Information Science (IS). Natanya obtained a Bachelor's degree (Honours) in Geography, majoring in Geo-Informatics and Strategic Environmental Planning, form the University of Johannesburg, South Africa, in 2002. She has also completed a South African Auditor and Training Certification Authority (SAATCA) Certified ISO 14001 Lead Auditors Course. She is a member of the International Association for Impact Assessment South Africa (IAIAsa) as well as the Geo-Information Society of South Africa (GISSA). She is also registered with the Environmental Assessment Practitioners Association of South Africa (EAPASA).

Mr Reuben Heydenrych has 28 years' experience in managing the environmental impacts of various small and large-scale infrastructural and environmental projects. He is employed as an Environmental Practitioner at Zutari's Tshwane office. He has been involved in EIA processes in South Africa and in various other African countries, as required by relevant national legislation and in terms of international requirements as EIA team leader and team member. These projects have included exemptions, scoping, and full EIAs for projects such as rezoning, filling stations, water and sewage pipelines, roads (national, provincial and municipal), residential developments, game lodges, telecommunications structures, mines, infrastructure in sensitive environments and industrial processes. Reuben also has experience in environmental advisory services and strategic environmental management, including strategic environmental assessments, environmental scans, environmental feasibility studies and environmental management frameworks (EMFs); EMPrs for the construction and operational phases of infrastructure developments and environmental auditing, including due diligence assessments, ISO 14001 systems development and auditing, legal compliance and waste management audits.

He obtained a Master's in Philosophy: Environmental Management from the University of Cape Town, South Africa in 1993 and a Bachelors' Degree in Landscape Architecture from the University of Pretoria, South Africa, in 1991. Reuben is registered as a professional landscape architect with the South African Council for the Landscape Architectural Profession (SACLAP).

The assistant EAP, Mrs. Candice Dürr, has over eight years of environmental science-related experience and has a Bachelor of Science degree in Environmental and Biological Sciences with an Honours degree in Environmental Management.

2 PROJECT DESCRIPTION

Sibanye Solar PV (Pty) Ltd (Sibanye) proposes to develop a 200 Megawatt (MW) alternating current (MW_{ac}) Photovoltaic (PV) energy facility as an additional source of energy to Eskom-supplied power, for its mines. The PV plant and associated infrastructure are proposed to be developed on the Farm Uitval 280, portions 1, 2, 4, 5 and 6 near the Sibanye Gold Driefontein and Kloof mining operations near Westonaria, in the Gauteng Province.

The PV plant is proposed to consist of the following:

- **A photovoltaic component,** comprising of numerous rows of PV modules mounted on steel tracking mounts and footings (concrete or driven into the ground) with associated support infrastructure to generate up to 200 MW_{ac};
- An **on-site substation (also referred to as HV yard),** including;
    - **Inverters,** to convert the direct current (DC) generated by the PV modules into alternating current (AC);
    - **Transformers,** to step up the 22 kV power generated by the inverters to 132 kV to connect to 132 kV overhead transmission lines;
- **Underground cabling** to connect the PV modules to the on-site substation and inverters;
- **Internal access roads** for servicing and maintenance of the site;
- External access road from the R501 to gain access to the facility, with associated access control; **Stormwater infrastructure**;
- Temporary **laydown areas** for use during construction;
- **Buildings**, including a connection building, control building, guard cabin;
- **Weather stations** within and along the fenced perimeter of the site; and
- **Perimeter fencing**.

Figure 1 shows the environmentally sensitive areas in proximity to the PV site. Note that the apart from heritage features, biodiversity sensitivities (including wetlands, vegetation, terrestrial fauna and birds) are uniformly negligible across the site. Therefore, only heritage sensitivities are shown in this figure.

The only issues that vary across the site are soil / agricultural potential, geotechnical suitability, palaeontology (which had a minimal influence) and heritage resources, although none of the sensitive heritage resources occur within the proposed footprint. **Figure 2** provides a second sensitivity map of the site that considers soils, geotechnical and palaeontological sensitivities**.**

Figure 2 shows that the area with the highest sensitivity is a band stretching from south-east to north-west across the site. Although this zone corresponds with the areas of highest geotechnical risk, it must be emphasized that the geotechnical investigations revealed no fatal flaws and indicated that all potential risks across the site can be mitigated. Thus, the red (highest sensitivity zone) does not imply that this area is unsuitable for development or has geotechnical red flags. The “red zone” is more sensitive only in the sense of having a slightly higher degree of risk than the adjacent areas, but it remains suitable for development.

Accordingly, an interpretation of the resulting sensitivity zones is provided below:

- Very high: a combination of moderate geotechnical risk (but still suitable, with appropriate design that prevents potential sources of subsidence) and moderate to high agricultural potential;
- High: A combination of moderate geotechnical risk (but still suitable, with appropriate design that prevents potential sources of subsidence) and soils of moderate agricultural potential;
- Moderate: a combination of lowest geotechnical risk (technically suitable, with appropriate design that prevents potential sources of subsidence) and soils of moderate agricultural potential;

- Low: A combination of low agricultural potential and lowest geotechnical risk.

Given the fact that the entire site needs to be used for the PV plant (due to the space requirements for a 200 MW (4 X 50MW) plant), the sensitivity mapping did not result in a change to the layout.

There is a cluster of archaeological sites adjacent to (but outside) the western boundary of the proposed footprint of the PV plant, and another close to the northern boundary of the site (SB2-SB8). **The sites that are close to the western and northern boundaries will be avoided as long as construction activity remains within the designated footprint.** Apart from that, there are recent buildings, with no heritage value, located close to the south-eastern corner of the site (SB1 and SB9). These two sites can be destroyed, with no implication for heritage conservation.

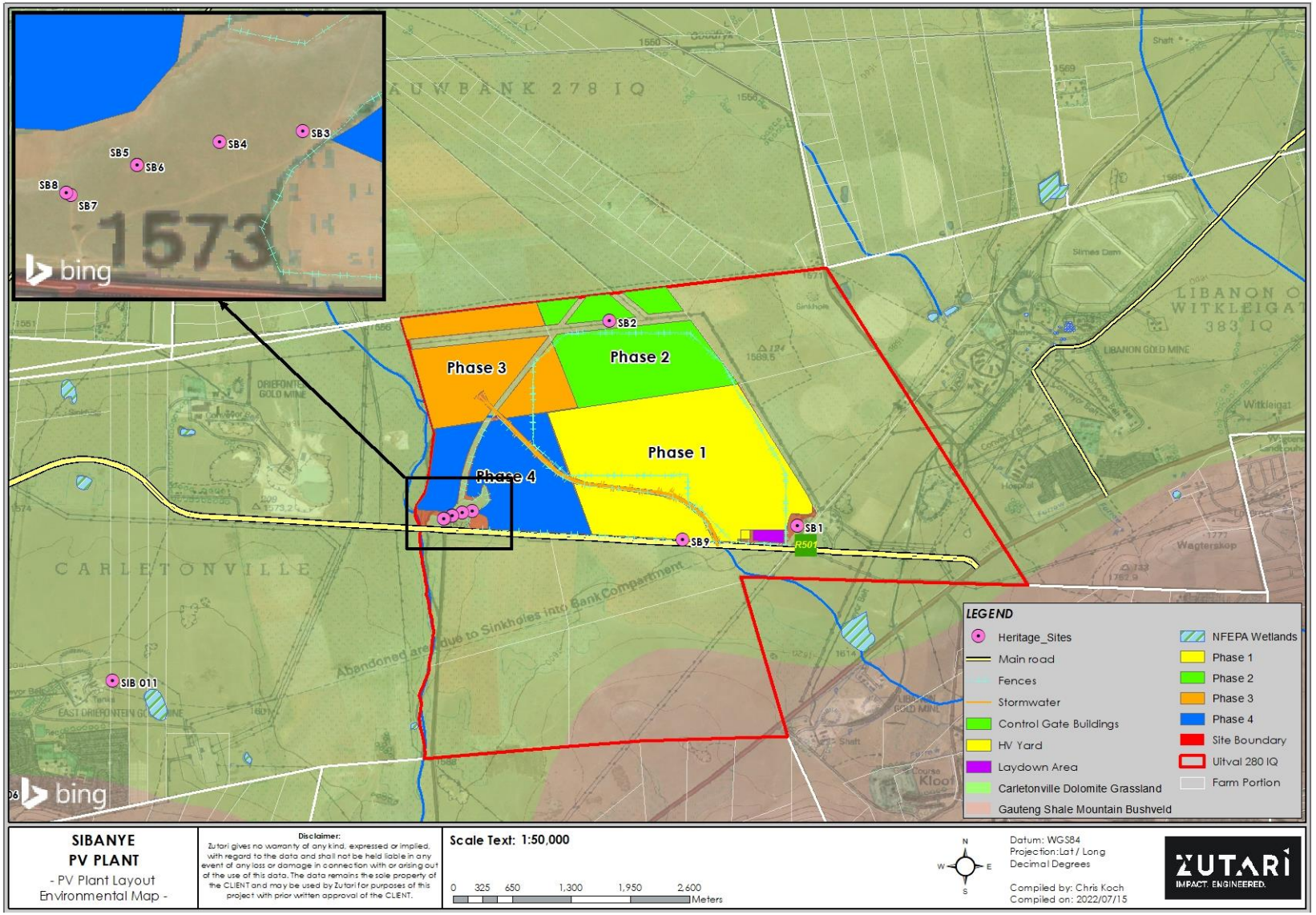

Figure 1: A map combining the final layout map superimposed (overlain) on the environmental sensitivity map

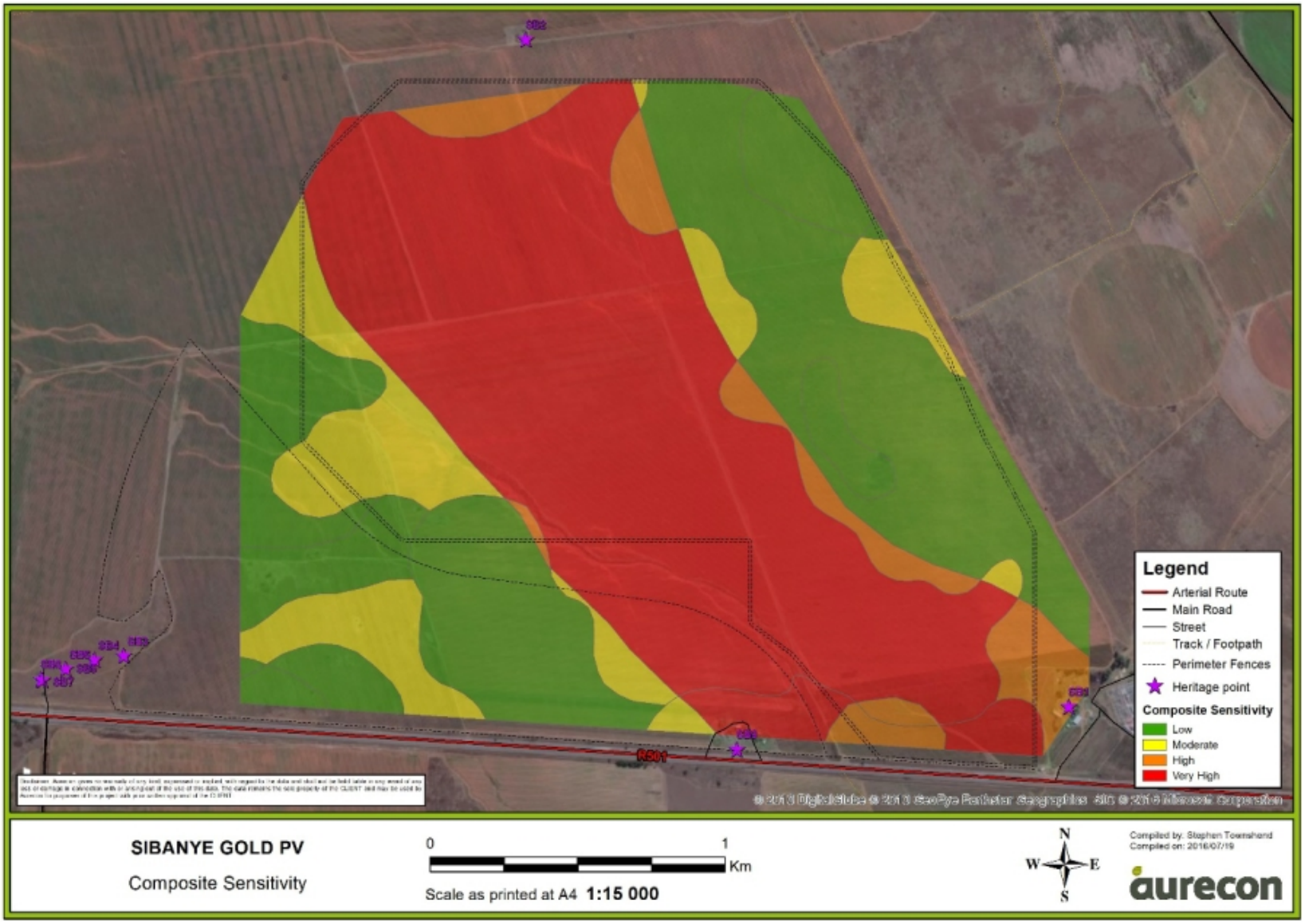

Figure 2: Combined sensitivity map of the solar PV site (from the 2016 Final Environmental Impact Report)

3 ROLES AND RESPONSIBILITIES

This Chapter provides a description of the roles and responsibilities of the various parties involved with the construction of the proposed development.

3.1 Environmental Control Officer

The Developer shall appoint a suitably qualified, experienced, and independent Environmental Control Officer (ECO) prior to the commencement of activities to monitor the Contractor's compliance in terms of this EMPr and the conditions contained in the EA, as well as address environmental site issues. Details of the appointed ECO must be submitted to the *Director: Compliance Monitoring* of the DFFE as per condition 26.2 of the EA. The ECO shall remain employed for the duration of the construction phase, until rehabilitation is completed, and the entire site is ready for operation.

The ECO shall work in close relation with the Contractor's appointed Environmental Control Officer (CECO). The designation is reserved for a suitably qualified (National Diploma / Degree in Natural Science or an equivalent qualification), independent, environmental manager, with adequate environmental knowledge to understand and implement the EMPr.

The duties of the ECO include but are not limited to:

- Liaison with the Developer, Project Manager and/or Engineer and DFFE;
- Update the EMPr to include relevant conditions of approval contained in the EA (if applicable);
- Conduct environmental induction training with the contractor prior to commencement of work (Section 3.5);
- Undertake ECO site inspections. The frequency of site inspections can be determined between the ECO, SE, Environmental Site Agent (ESA) or any specific conditions of authorisation contained in the EA. It is recommended that the ECO be supported by a full-time ESA during the initial construction period/activities (see section 3.5 below) and that the ECO undertake monthly ECO inspections with the ESA. The ECO must attend/arrange a site meeting with the engineer, contractor and other relevant project team members during his/her site inspection to discuss any environmental matters;
- Compilation of ECO Reports that must be submitted to the project team, DEA, developer and Eskom (or any other authority/body deemed necessary by the project team). The ECO must liaise with the ESA to ensure that action items are carried out;
- Review ESA weekly compliance monitoring reports and include information in monthly ECO Reports;
- Monitoring compliance with the various environmental conditions/requirements contained in the EA and EMPr;
- Assist the ESA in reviewing of the Contractor's method statements;
- Ensuring that the requisite remedial action is implemented in the event of non-compliance;
- Ensuring the proactive and effective implementation and management of environmental protection measures;
- Ensuring that a register of public complaints is maintained by the Contractor and that any and all public comments or issues are appropriately reported and addressed;
- Attend monthly site meetings; and
- Recording and reporting of environmental incidents.

3.2 Developer

Generally, the developer would refer to the holder of the EA who would assume overall responsibility for the administration and implementation of the EA and EMPr..

The developer will be responsible for the following tasks amongst others:

- Ensure that all conditions of approval as contained in the EA are adhered to;
- Ensure that the requirements as set out in this EMPr are adhered to and implemented;
- Ensure all authorisations, permits, consents are in place and any other legal requirements are settled before construction commences;
- Allocate the responsibilities assigned to the ECO to an independent suitably qualified individual prior to the start of construction activities on site; and
- Provide all principal contractors working on the project with a copy of this EMPr as part of tender contract documentation to allow the contractors to cost for its requirements within their respective construction contracts.

3.3 Site Engineer

The Engineer responsible for the design of the PV plant and yard will be a Sibanye appointment. It will be the responsibility of the Engineer to oversee the overall implementation of the project as well as the compliance of the EMP and incorporate any potential environmental aspects mentioned into the design.

3.4 Contractor

As part of being responsible for the construction of the proposed PV plant, the Contractor will also be responsible for the overall implementation of the EMP. The Contractor will nominate a suitably qualified representative on site as his environmental representative, known as the CECO. The contractor must issue site instructions to rectify any environmental non-compliance, based on the CECO's findings. The Sibanye Site Manager can also issue site instructions.

3.5 Contractor's Environmental Control Officer

The CECO will be responsible, on behalf of the contractor, to ensure that the EMP is implemented and complied with on site on a daily basis. The CECO will liaise with the ECO (see above) on all matters relating to the implementation of the EMP. The CECO needs a certain amount of environmental management experience in the field and preferably experience on solar PV plant construction projects.

3.5.1 Environmental Awareness on Site

Prior to construction, all contractor teams involved in work on the project are to be briefed on their obligations towards environmental controls and methodologies in terms of this EMPr. It is recommended that the briefings take the form of an on-site talk and demonstration by the CECO. The education/awareness programme should be aimed at all levels of management and construction workers within the contractor team. All new employees arriving on site shall undergo this training. Environmental induction must be done according to the Contractor's Environmental Management System, and must include all aspects of the site specific EMPr.

Toolbox talks are to be used as a tool for continuous training of employees and must be conducted on a weekly basis. Toolbox talks must be conducted in an interactive way to ensure the employees understand the content and purpose of the specific EMPr requirements. Relevant environmental site

matters, incidents and issues shall form part of the Contractor's toolbox talks. The Contractor shall make a note of the environmental subjects discussed.

As construction continues, an effort must be made by the Contractor to assess the training needs of workers on site. Cognisance must be taken of the specific work to be undertaken at the time and, if necessary, additional training on environmental requirements must be conducted to ensure all workers understand the risks involved as well as how to adequately implement mitigation measures.

A signed register documenting all employees' environmental training and awareness programmes must be kept on record for verification purposes.

The Comprehensive Construction Environmental Management Plan (CEMP), attached as Annexure F, provides requirements for controlling construction activities' impacts on the environment. Section 2 of the CEMP further details requirements for environmental awareness and fulfil the EIA Regulation GN No. R. 982 requirement for the inclusion of an environmental awareness plan.

3.5.2 Record Keeping

The CECO is responsible for maintaining all records in relation to the EMPr requirements on site. Such records must be made available to the ECO on request during the monthly audits, as well as at any time as requested by the ECO, auditor or project managers. Recordkeeping must be done in an orderly fashion with the intent of ensuring easy reference.

3.6 Monitoring and auditing framework

The purpose of the monitoring programme is to ensure that mitigation measures identified and described in the EMPr are implemented. Construction activities of the PV plant will be monitored and recorded by the ECO and audited against the EMPr monthly. A report must be submitted at the end of each month prior to the progress meetings where they will form part of the agenda. The ultimate target is to achieve 100% compliance with the EMPr.

Relevant environmental site matters, incidents and issues shall form part of the Contractor's toolbox talks. The Contractor shall make a note of what environmental subjects were discussed.

As per condition 30 of the EA, the developer must also submit the environmental audit reports to the GDARD within 30 days of completion of the construction phase. A final audit report must be submitted to the GDARD within 30 days of the completion of all rehabilitation activities.

The audit reports contemplated in condition 30 of the EA must be compiled in accordance with Appendix 7 of the EIA Regulations, 2014. Records relating to the monitoring and auditing on site must be kept and made available on site should the GDARD wish to conduct an inspection from time to time.

Additionally, a notification must be sent to the GDARD no later than 14 days prior to the commencement of the activity, which includes site preparation.

4 IMPACTS AND ASSOCIATED MITIGATION MEASURES FOR ALL PHASES

The following table (Table 4-1) covers the activities and associated environmental impacts that will occur during the development of the proposed Sibanye PV plant. These impacts are considered applicable to **all four phases** of the project.

The table considers the expected impacts during the different phases of the project, as well as the mitigation measures and environmental management procedures required to manage the expected impacts. Table 4-1 includes the following sections:

- Pre-construction and construction site environmental management
- Flora and fauna
- Heritage and palaeontology
- Materials and waste
- Dust
- General construction activities
- Rehabilitation

The following components are identified / described:

- Activity: Component / activity of the project for which the impact has been identified.
- Aspect: The aspect of the above activity which will be impacted.
- Impact: The environmental impact identified and to be mitigated.
- Mitigation measure: Measures identified for implementation in terms of environmental management to reduce, rectify or contain the identified environmental impact. The following aspects of mitigation are discussed:
  - Objective: Desired outcome of mitigation measure; and
  - Mechanism: Method of achieving the objective.
- Performance indicators: Outcomes that will indicate achievement of objective/s.
- Responsibility: Party or parties identified for implementation of mitigation measure/s.
- Resources: Available resources to aid implementation of mitigation.
- Schedule: Timeframe in which identified impact and mitigation measure is anticipated to occur.
- Verification: Party or parties identified as responsible for review and assessment of final outcome

Table 3: EMPr for all phases of the proposed 200 MW PV energy facility development

Activity	Aspect	Potential Impact	Mitigation Measure (Objective and Target)	Performance Indicator	Implementation Responsibility	Time Schedule	Verification Responsibility	Frequency
Pre-construction and construction site environmental management								
Engineering Design	All the aspects listed in the EMP	Design incompatible with environment	**Objective:** • To ensure the design of the PV facility takes the environment into account. **Target:** • Assimilate requirements of the EMP in design and construction management giving special attention to the impact ratings and suggestions of specialists; and • The "no go"-zones identified by specialists shall be communicated to anyone entering the site, indicated/demarcated as such, and avoided during all phases of the project	Design meets objectives and does not degrade the environment.	Contractor	Planning and design	Contractor/ Developer	Once-off
Establishment of the construction camp sites	Construction camp	Damage or loss of existing vegetation and changes to the area's water quality	**Objective:** • To prevent negative influence to the surrounding surface and groundwater. **Target:** • Site establishment shall take place in an orderly manner and all amenities shall be installed at Camp sites before the main workforce move onto site; • A method statement is required from the Contractor at appointment stage that includes the layout of the camp, management of ablution facilities and wastewater management; • The planning and design for the construction camp must ensure that there is a minimum impact on the environment; • A site plan of the construction camp must be provided indicating waste areas, storage areas and placement of ablution facilities; • The Contractor camp shall have the necessary ablution facilities with chemical toilets where such facilities are not available at commencement of construction; • The Contractor shall supply a wastewater management system that will comply with legal requirements and be acceptable to Sibanye; • Where Sibanye facilities are available the Contractor may make use of such facilities where it is viable and possible; • The Contractor shall inform all site staff to the use of supplied ablution facilities and under no circumstances shall indiscriminate excretion and urinating be allowed other than in supplied facilities;	Construction camp established in compliance with objectives	Contractor, CECO	Pre-construction (site establishment)	ECO	Once-off

Activity	Aspect	Potential Impact	Mitigation Measure (Objective and Target)	Performance Indicator	Implementation Responsibility	Time Schedule	Verification Responsibility	Frequency
			• The Contractor shall supply waste collection bins where such is not available, and all solid waste collected shall be disposed of at a registered waste dump; • A certificate of safe disposal shall be obtained by the Contractor and kept on file; • Where a registered waste site is not available close to the construction site, the Contractor shall provide a method statement about waste management. Under no circumstances may solid waste be burned on site; • The construction camp must be placed on already disturbed land as far as possible; • The construction camp should be fenced off so as to limit the removal of unnecessary vegetation; Fences and security access must be maintained, throughout the project; • All fences removed to facilitate access will be replaced by the contractor once machinery and personnel have been removed from the site to the satisfaction of all the relevant landowners; and • Emergency and contact numbers of the contractors must be available and prominently displayed on a signage board that is clearly visible.					
Establishment of the construction camp site.	Construction camp.	Loss of soil fertility.	**Objective** • The environmental objective when establishing the contractor's camp is to minimise the footprint of disturbance thereby preventing the degradation and loss of topsoil. **Target:** • Allowance for one contractor's camp at the site; • The construction camp site shall be strictly within the approved boundaries; • Once the site has been cleared of vegetation, the topsoil should be stripped; • Topsoil must be stored in a demarcated area which protected from wind and rain; • The topsoil stockpiles must not exceed 2 m in height; and • The area must be rehabilitated once the construction camp has been decommissioned.	Established construction camp in compliance with objectives and no evidence of environmental degradation.	Contractor, CECO	Pre-construction (site establishment)	ECO	Once off
Closure of the construction camp.	Construction camp.	Potential impacts associated with the closure of	**Objective(s):** • To limit potential impacts on the environment for the period for which the construction camp is closed. **Target:**	Closure of the construction camp in line with the requirements of the EMP.	Engineer, Contractor and CECO	Closure of camp	Engineer, ECO	Whenever the construction camp is closed for

Activity	Aspect	Potential Impact	Mitigation Measure (Objective and Target)	Performance Indicator	Implementation Responsibility	Time Schedule	Verification Responsibility	Frequency
		the construction camp.	Should the construction camp be closed for a period of more than one week, a report on compliance will be lodged with the Contractor, Site Engineer confirming the following: • No persons allowed other than project employees; • Minimal materials are stored; • All waste disposal bins will be emptied periodically; • Materials are stored in leak-proof, sealable containers or packaging; • The store area is secure and locked; • Fire extinguishers are serviced and accessible; • The area is secure from accidental damage through vehicle collision, etc.; • Emergency and contact numbers of the contractor are available and prominently displayed; • All stores will be secured; • Chemical toilets are empty, kept hygienically clean and secured; and • 24 hour security will be on site during this period.					longer than a week.
Storage of topsoil.	Stripping and stockpiling of topsoil.	Mixing of topsoil and subsoil. Erosion of topsoil. Contamination of topsoil. Dust.	**Objective(s):** • Topsoil is conserved, maintained and reused. **Target :** • The topsoil in the specific region is regarded as the top 300 mm (maximum) of the soil profile irrespective of the fertility appearance or physical depth, unless otherwise confirmed by the ECO; • Topsoil is to be stripped up to this depth when it is in as dry a condition as possible in order to prevent compaction; • The topsoil, including the existing grass cover is to be shallowly ripped (only the depth of the topsoil) before removal. This is to ensure that organic plant material, and the natural seed base is included in the stripping process; • Stockpiles shall not be allowed to become contaminated with oil, diesel, petrol, garbage or any other material, which may inhibit the later growth of vegetation; • The contractor shall apply soil conservation measures to the stockpiles to prevent erosion. This could include the use of erosion control fabric or grass seeding; • All grass and other vegetation should be left on the topsoil stockpiles so that they colonize the area after construction; • Photographic record must be kept of the topsoil stockpiles; • Dust and erosion of topsoil from runoff must be minimised through appropriate watering and the avoidance of transporting and	Topsoil is kept free of weeds and contaminants and can be used for rehabilitation.	Contractor, CECO	Pre-construction (site establishment)	ECO	Weekly

Activity	Aspect	Potential Impact	Mitigation Measure (Objective and Target)	Performance Indicator	Implementation Responsibility	Time Schedule	Verification Responsibility	Frequency
			placing of topsoil in areas exposed to high wind or excessively rainy conditions; • The contractor shall devise a soil conservation and stockpiling plan, to be approved by the ECO and Engineer, which shall detail: o Stockpile sizes, layout and form; o Means of erosion (wind and water) prevention for stockpiles; o The rehabilitation measures to be taken for the area occupied by the temporary stockpile; o A generic schedule of soil replacement for areas where work has been completed. Soil replacement should preferably run in parallel (where feasible) with the construction process; and o Soil erosion prevention measures for general site use. • Alien vegetation growing on stockpiles must be eradicated; and • Herbicides shall not be used to remove alien vegetation unless approved by the ECO.					
Construction of site buildings.	Site buildings materials.	Soil pollution and permanent alternation to the natural environment.	**Objective(s):** • To ensure the material for site buildings are recyclable and to minimise the impacts of the construction of the buildings on the environment. **Target:** • No permanent structures will be permitted at the contractor's camp; • Temporary structures shall be founded on a platform, either subsoil or screed slab; • Buildings should preferably be pre-fabricated or constructed of re-usable / recyclable materials; • All temporary structures must be soundly built and not pose a danger to workers; • Containers are to be used for the storage of materials which have the potential to release pollutants into the environment; and • All structure footprints to be rehabilitated and re-vegetated after construction is complete.	On site buildings constructed according to the requirements of the EMP.	Contractor and CECO	Pre-construction (site establishment)	ECO	Once off
Fencing of the construction sites that will be affected by the proposed	Demarcation of the site.	Unnecessary removal of vegetation. Loss of topsoil. Safety.	**Objective(s):** • Whilst establishing the site, the footprint of disturbance must be minimised and the extent of soil erosion, loss of vegetation and the potential for the pollution of soils must be prevented. **Target:**	The site is demarcated according to the requirements of this section of the EMP.	Contractor and CECO	Construction sites must be fenced off along the alignment before site clearance.	Engineer, ECO	As construction proceeds along the alignment.

Activity	Aspect	Potential Impact	Mitigation Measure (Objective and Target)	Performance Indicator	Implementation Responsibility	Time Schedule	Verification Responsibility	Frequency
project.			• All excavations posing a risk to both human and animal safety must be demarcated as indicated in the EMP using danger tape with steel droppers or other methods approved by the ECO; • The width of the construction footprint must be agreed upon by the ECO and the Engineer and as far as possible must be kept to a minimum. Should additional space be needed for the temporary storage of material, the ECO must advise on an adequate area away from any sensitive areas; and • No personnel or construction materials will be allowed to move outside the designated / demarcated site during construction activities.					
Cooking of food	Cooking facilities	Type and placement of cooking facilities used, and how they will be used.	**Objective(s):** • To ensure that the cooking facilities used on site do not pose risks to the environment. **Target:** • The contractor must supply gas and /or electricity cooking facilities for the labourers at the construction camp; • If gas cooking facilities are not available fires (for the purposes of cooking) will be allowed in a demarcated area that has been cleared of any combustible materials; • Firewood, or other suitable fuels, must be supplied by the Contractor; • No vegetative matter may be removed from the area for firewood; and • After use, all cooking fires must be extinguished.	Evidence of presence of gas and / or electricity cooking facilities and / or demarcated area for cooking with fire.	Contractor	Pre-construction (site establishment)	ECO	Once off
Operation of the sanitation system(s).	Sanitation systems.	Unpleasant odours on site. Inadequate number of latrines on site. Position of latrines and shower systems. Poor management of waste water.	**Objective(s):** • To ensure good sanitation system and management throughout the construction period. **Targets:** • Adequate chemical toilets must be provided for all staff. Alternatively, existing ablution facilities on site can be utilised if available; • Chemical toilets must be emptied / serviced on a regular basis to prevent them overflowing. Proof of this must be provided to the ECO; • A minimum of one toilet must be provided per 11 persons at each working area within 100 m from worker activity, or as required by the Occupational Health & Safety Act; and • Where shower facilities be provided for use by staff the following must be imposed:	Adequate toilets and showers will be positioned at the right places as per the EMP and ECO. Absence of odours, erosion and build-up of detergents.	Contractor	Pre-construction (site establishment)	ECO	Once off

Activity	Aspect	Potential Impact	Mitigation Measure (Objective and Target)	Performance Indicator	Implementation Responsibility	Time Schedule	Verification Responsibility	Frequency
			o Positioning of the showers, specifically the discharge point, must be placed in a way to ensure that erosion and build-up of detergents does not occur; o All discharge from the shower and other washing facilities must pass through a suitable filter to reduce the load of detergents to the environment; and o Use of the shower facilities must be limited to staff or authorised persons only.					
Vehicle parking area. Storage of equipment.	Vehicle parking and parking area(s). Storage of equipment.	Pollution of soils. Disturbance of soils due to parking of vehicles outside of designated areas.	**Objective(s):** • To ensure vehicles are parked according to the specifications in the EMP and that equipment is handled appropriately. **Target:** • No storage of vehicles or equipment will be allowed outside of the designated area; and • Drip trays or any form of oil absorbent material must be placed underneath vehicles and equipment when not in use for periods longer than 3 days and / or for those vehicles and plant showing evidence of leaking hydrocarbons.	Drip trays must be provided and placed under vehicles and equipment which are not being utilised on site.	Contractor and CECO	Throughout the construction period.	ECO	Whenever parking, servicing or maintaining vehicles throughout the construction period.
Servicing and washing of vehicles and machinery	Workshop and Equipment Storage Areas	Water contamination, Soil contamination, Noise pollution.	**Objective(s):** • To ensure that the environment is not polluted by ensuring that service areas and wash bays for vehicles and machinery are made available and utilised. **Target:** • Where possible and practical, all maintenance of vehicles and equipment shall take place in a workshop area; • During servicing of vehicles or equipment in the approved area, a suitable drip tray shall be used to prevent spills onto the soil, especially where emergency repairs are affected outside the workshop area; • Leaking equipment shall be repaired immediately or be removed from site to facilitate repair; • All potentially hazardous and non-degradable waste, including used ballast or the waste water effluent from washing the contaminated ballast, shall be collected and removed to a registered waste site; • Workshop areas shall be monitored for oil and fuel spills and such spills shall be cleaned and re-mediated to the satisfaction of the ECO; • A method statement is required from the Contractor showing how to show procedures for dealing with possible emergencies that can occur, such as fire and accidental leaks and spillage;	Evidence of prescribed servicing and washing services.	Contractor, CECO	During construction	ECO	Whenever servicing or maintaining of vehicles or equipment throughout the construction period.

Activity	Aspect	Potential Impact	Mitigation Measure (Objective and Target)	Performance Indicator	Implementation Responsibility	Time Schedule	Verification Responsibility	Frequency
			• The Contractor shall be in possession of an emergency spill kit that must be complete and available at all times on site; • Should emergency repairs be necessary, drip trays or tarpaulins must be utilised to ensure the collection of the oil. The area for emergency repairs should be identified by the ECO; • Should repair centers not be available in close proximity to the site, the contractor may erect maintenance areas / workshops at designated areas approved by the ECO. • The contractor must ensure that delivery drivers and plant operators are informed of all relevant procedures and restrictions required ensuring compliance with this document; • All vehicles and equipment must be well maintained to ensure that there are no oil or fuel leakages; and • The following shall apply: o All contaminated soil / yard stone shall be removed and be placed in containers for further disposal; o Contaminated material can be taken to one central point where bioremediation can be done; o Smaller spills can be treated on site; o A specialist Contractor shall be used for the bioremediation of contaminated soil where the required remediation material and expertise is not available on site; and o All major spills of hazardous substances constituting a section 30 environmental incident (according to the NEMA) must be reported to the ECO and relevant authorities within 14 days of the incident occurring.					
Personnel conduct	Personnel	Infringement of the EMP requirements by personnel.	**Objective(s):** • To ensure that personnel are adhering to the EMP requirements. **Target:** • The Contractor will adhere to all requirements of the Occupational Health and Safety Act (Act 56 of 2004), including the drafting of a suitable Health and Safety Plan which will be implemented during the construction phase; • All personnel to undergo Environmental Awareness Training. A signed register of attendance must be kept for proof; • Tool box talks to include aspects of the EMP; • Labourers associated with the contractor must be easily recognizable (i.e. company issued overalls with company name / logo etc.), and other persons will not be allowed within the construction camp at any time without prior permission from the project manager;	Personnel wearing proper safety uniform. Absence of trespassers on site.	Contractor and labourers.	Approved PPE must be issued to all employees prior to construction but must be used for the duration of the construction period.	ECO	Throughout construction period

Activity	Aspect	Potential Impact	Mitigation Measure (Objective and Target)	Performance Indicator	Implementation Responsibility	Time Schedule	Verification Responsibility	Frequency
			• The Contractor shall take all necessary precautions against trespassing on private properties; • Warning signs must be placed on and around the site as per the Occupational, Health and Safety requirements; • Adequate first aid services must be provided by the contractor at the contractor's camp; • The contractor will be responsible for his own security arrangements and shall comply will all site security instructions; • Basic firefighting equipment must be available on site; • PPE to be provided and well maintained at contractor's camp; and • All environmental incidents should be reported to ECO, investigated, documented, and kept on file.					
Construction activities	Safety of the Public / surrounding landowners.	Injuries to Public / landowners. Health of Public / landowners.	**Objective(s):** • To ensure that the Public at large is not injured or affected negatively in any way. **Target:** • The Contractor shall recognise that the Site is situated close to inhabited and agricultural areas and shall therefore take all reasonable measures to ensure the safety of people in the surrounding communities; • Where the public could be exposed to danger by any of the Works or Site activities, the Contractor shall as appropriate provide suitable flagmen, barriers and / or warning signs in English, Afrikaans and SiSwati (or other language/s appropriate for the site), all to the approval of the Project Manager; • All unattended open excavations shall be adequately demarcated (fencing shall consist of a minimum of three strands of wire and made clearly visible). Adequate protective measures must be implemented to prevent unauthorised access to and climbing of partly constructed structures and protective scaffolding.	No injuries or health consequences to neighbouring people. No complaints from neighbouring people.	Contractor and CECO	Throughout the construction period.	ECO	Throughout construction period
Flora and Fauna and Water								
PV facility construction	Floral habitat	Impact on floral habitat	**Objective:** • Preservation of floral habitat characteristics **Target:** Essential construction phase mitigation measures: • Avoid disturbance of moderately-high sensitivity habitat units as far as possible. • Demarcate the construction footprint, and ensure that all construction activities remain within this footprint.	Little or no alien species on construction site. No disturbances beyond project footprint.	ECO	Construction	ECO	Throughout construction period

Activity	Aspect	Potential Impact	Mitigation Measure (Objective and Target)	Performance Indicator	Implementation Responsibility	Time Schedule	Verification Responsibility	Frequency
			• Ensure that the proposed development footprint area remain as small as possible. • Restrict vehicles to travelling only on designated roadways to limit the ecological footprint of the proposed development activities. • Proliferation of alien and invasive species is expected within any disturbed areas. These species should be eradicated and controlled to prevent their spread beyond the project footprint. Recommended construction phase mitigation measures: • All soils compacted as a result of construction activities falling outside of the footprint area should be ripped and profiled.					
PV facility operation			**Objective:** • Preservation of floral habitat characteristics **Target:** Essential operation phase mitigation measures: • Ensure that operational related activities are kept strictly within the footprint area. • Alien and invasive vegetation control should take place throughout the operational phase of the development.	Floral basal cover recovery on site	Developer	Operation	Developer	Weekly.
PV facility construction	Floral diversity	Impact on floral diversity	**Objective:** • Floral diversity outside footprint is not damaged unnecessarily. **Target:** Essential construction mitigation measures: • Ensure that the proposed development footprint area remain as small as possible. • Restrict vehicles to travelling only on designated roadways to limit the ecological footprint of the proposed development activities. • Prohibit the collection of plant material for firewood or for medicinal purposes. • Species specific and area specific eradication recommendations: o Care should be taken with the choice of herbicide to ensure that no additional impact and loss of indigenous plant species occurs due to the herbicide used; and o Footprint areas should be kept as small as possible when removing alien plant species.	Little or no alien species on construction site. No disturbances beyond project footprint.	ECO, Contractor	Construction	ECO	Throughout construction period
PV facility operation			**Objective:** • Floral diversity increases or remains as is. **Target:**	Floral basal cover recovery on site	Developer	Operational phase	Developer	Weekly.

Activity	Aspect	Potential Impact	Mitigation Measure (Objective and Target)	Performance Indicator	Implementation Responsibility	Time Schedule	Verification Responsibility	Frequency
			Essential operation mitigation measures: • Ensure that operational related activities are kept strictly within the footprint area. • Alien and invasive vegetation control should take place throughout the operational phase of the development.					
PV facility construction and site preparation	Species conservation	Loss of floral Species of Conservational Concern (SCC)	**Objective:** • SCCs are preserved **Target:** Essential construction mitigation measures: • Prohibit the collection of plant material for medicinal purposes. • Edge effect control such as alien floral control needs to be implemented to ensure no further degradation outside of the proposed footprint area. Recommended construction mitigation measures: • Should any SCC or other protected plant species be encountered within the subject property in the future, the following should be ensured: o If any threatened species will be disturbed, ensure effective relocation of individuals to suitable offset areas; and o All rescue and relocation plans should be overseen by a suitably qualified specialist.	Successful transplantation of SCCs	Contractor, ECO	Pre-construction and construction	ECO	Throughout construction period
PV facility operation			**Objective:** • SCCs are preserved **Target:** Essential operational phase mitigation measures: • Ensure that operational related activities are kept strictly within the footprint area. • Restrict vehicles to travelling only on designated roadways to limit the ecological footprint of the proposed development activities. • Prohibit the collection of plant material for medicinal purposes		Developer	Operation	Developer	Whenever site is visited for maintenance or panel washing purposes.
PV facility construction	Faunal habitat	Decreased faunal habitat area and integrity	**Objective:** • Faunal habitats are preserved **Target:** Essential construction phase mitigation measures: • It must be ensured that, as far as possible, all proposed infrastructure is placed outside of sensitive habitat areas. Where this is not possible, suitable mitigation measures, must be implemented.	No fires on site. No destruction of natural vegetation units outside of footprint.	Contractor, ECO.	Construction	ECO	Throughout construction period

Activity	Aspect	Potential Impact	Mitigation Measure (Objective and Target)	Performance Indicator	Implementation Responsibility	Time Schedule	Verification Responsibility	Frequency
			• Keep the construction footprint as small as possible to minimise impact on the surrounding faunal habitat. • Demarcate the construction footprint, and ensure that all construction activities remain within this footprint. • Areas of increased ecological importance and sensitivity, including wetland and ridge areas, should be considered during all phases of the development planning and construction • Restrict vehicles to travelling only on designated roadways to limit the ecological disturbance footprint of the proposed development activities. • Manage edge effects such as alien floral invasion such as alien floral invasion to ensure further loss of faunal habitat does not occur in the surrounding areas. • Proliferation of alien and invasive species is expected within any disturbed areas. These species should be eradicated and controlled to prevent their spread beyond the development area. • Fires in the vicinity of development area should be prohibited during all development phases. • No trapping or hunting of fauna is to take place. • Recommended construction phase mitigation measures: • Fence footprint areas to ensure that all activities are contained within the demarcated areas.					
PV facility operation		Decreased faunal habitat area and integrity	**Objective:** • Faunal habitats are preserved **Target:** Essential operational phase mitigation measures: • All disturbed areas must be rehabilitated. • Ensure that operational related activities are kept strictly within the development footprint. • Alien and invasive vegetation control should take place throughout the operational / maintenance phase of the development. • Restrict vehicles to travelling only on designated roadways to limit the ecological disturbance footprint of the proposed development activities.		Developer	Operation	Developer	Weekly.
PV facility construction	Faunal diversity	Decline in faunal diversity	**Objective:** • Faunal habitats are preserved **Target:** Essential construction mitigation measures:	No faunal deaths reported	Contractor, ECO	Construction	ECO	Throughout construction period

Activity	Aspect	Potential Impact	Mitigation Measure (Objective and Target)	Performance Indicator	Implementation Responsibility	Time Schedule	Verification Responsibility	Frequency
			• Keep all development infrastructure within designated areas within the study area, whilst minimising the construction as far as possible. • Planning of temporary roads and access routes should take the site sensitivity plan into consideration. As far as possible pre-existing roads are to be used, whilst new roads must avoid any wetland and water systems. Recommended construction mitigation measures: • It is recommended that a speed limit of 40km/h be implemented on all roads running through and accessing the study area, to minimise the risk of vehicle collisions with faunal species.					
PV facility operation			**Objective:** • Faunal habitats are preserved **Target:** • Essential operation mitigation measures: • All disturbed areas falling outside the project footprint must be rehabilitated. • Restrict vehicles to travelling only on designated roadways to limit the ecological disturbance footprint of the proposed development activities. • No dumping or waste disposal is to occur within the study area.		Developer	Operation	Developer	Weekly
PV facility construction	Species conservation	Loss of faunal SCC	**Objective:** • SCCs are preserved **Target:** Essential construction mitigation measures: • Disturbance to important avifaunal habitat, such as the ridges and wetlands, must be minimised. • Ensure that as far as possible all development infrastructure is placed outside of sensitive areas.		ECO, Contractor	Construction	ECO	Throughout construction period
PV facility operation			**Objective:** • SCCs are preserved **Target:** Essential operational phase mitigation measures: • Ensure that operational related activities are kept strictly within the development footprint. • Restrict vehicles to travelling only on designated roadways to limit the ecological disturbance footprint of the proposed development activities.		Developer	Operation	Developer	Weekly
PV facility construction	Wetland integrity	Wetland habitat and ecological	**Objective:** • Wetlands are protected **Target:**	No construction materials are disposed of and	ECO, Contractor	Construction	ECO	Throughout construction period

Activity	Aspect	Potential Impact	Mitigation Measure (Objective and Target)	Performance Indicator	Implementation Responsibility	Time Schedule	Verification Responsibility	Frequency
		structure fragmentation	• Essential mitigation measures for construction phase: • Limit the footprint area of the construction activities to what is absolutely essential in order to minimise environmental damage. Construction vehicles must use existing roads where possible. • During construction all building materials should be kept out of the wetland areas • All waste and remaining building materials should be removed from site on completion of the project; • No vehicles should be allowed to indiscriminately drive through the wetlands. • The duration in which soils are exposed during construction activities should remain as short as possible; • Concurrent rehabilitation is to take place as far as possible and footprint areas should be minimised as far as possible; Recommended mitigation measures for construction phase: • As far as possible, all construction activities should occur in the low flow season, during the drier winter months.	no driving occurs in wetland areas. No erosion at site.				
PV facility operation			**Objective:** • Wetlands are protected **Target:** Essential mitigation measures for operational phase: • Any area where active erosion is observed must be immediately rehabilitated in such a way as to ensure that the hydrology of the area is re-instated to conditions which are as natural as possible.	No erosion originating at site	Developer	Operation	Developer	Whenever site is visited for maintenance or panel washing purposes.
PV facility construction	Wetland hydrology	Impacts on Wetland Hydrological Function and Sediment Balance	**Objective:** • Wetlands are protected **Target:** Essential mitigation measures for construction phase: • Limit the footprint area of the construction activities to what is absolutely essential in order to minimise environmental damage. Construction vehicles must use existing roads where possible. • During construction all building materials should be kept out of the wetland areas • All waste and remaining building materials should be removed from site on completion of the project; • No vehicles should be allowed to indiscriminately drive through the wetlands.	No construction materials are disposed of and no driving occurs in wetland areas. No erosion at site.	ECO, Contractor	Construction	ECO	Throughout construction period

Activity	Aspect	Potential Impact	Mitigation Measure (Objective and Target)	Performance Indicator	Implementation Responsibility	Time Schedule	Verification Responsibility	Frequency
			• The duration in which soils are exposed during construction activities should remain as short as possible; • Concurrent rehabilitation is to take place as far as possible and footprint areas should be minimised as far as possible; • Stormwater management systems should include energy dissipation structures to minimize the potential impact or erosion and sedimentation; Recommended mitigation measures for construction phase: • As far as possible, all construction activities should occur in the low flow season, during the drier winter months.					
PV facility operation			**Objective:** • Wetlands are protected **Target:** Essential mitigation measures for operational phase: • Any area where active erosion is observed must be immediately rehabilitated in such a way as to ensure that the hydrology of the area is re-instated to conditions which are as natural as possible.	No erosion originating at site	Developer	Operation	Developer	Whenever eroded areas are encountered.
Construction activities (Physical issues and their control).	Terrain.	Scarring of soil surface, disturbance / loss of topsoil.	**Objective(s):** • Minimise scarring of the soil surface and land features; • Minimise disturbance and loss of topsoil; and • Rehabilitate all disturbed areas. **Target:** • Topsoil to be stripped to 300 mm where required by ECO; • Topsoil only to be stripped where absolutely necessary; and • The areas within and around the servitude will most likely be disturbed by construction activities and rehabilitation is required to reinstate such areas.	No visible erosion scars once construction is completed. Minimum loss of topsoil at the site. No barren area visible 3 months after construction is completed. All damaged areas successfully rehabilitated.	Contractor and CECO	Pre-construction	ECO	Vegetation will be cleared as construction proceeds.
PV facility closure	Agriculture	Damage to agricultural equipment	**Objective:** • Agriculture can continue after project is decommissioned **Target:** • Any pole structures such as fences, sign boards, light poles etc. should be removed with the concrete footing and may not be cut off above surface.	No infrastructure remains on site after closure of facility	Contractor, Developer	Decommissioning	Developer	Once-off
PV facility closure	Soil	Impacts on land arability	**Objective:** • Soil quality is improved after facility closure, or re-instated as close as possible to pre-commencement state.	All waste materials and decommisioned			Developer	Once-off

Activity	Aspect	Potential Impact	Mitigation Measure (Objective and Target)	Performance Indicator	Implementation Responsibility	Time Schedule	Verification Responsibility	Frequency
			Target: • The footprint of structures such as foundations (usually partly below surface), roads, parking areas, paved or tarred surfaces should be cleaned properly and waste material should be removed to a suitable disposal facility. • The footprints should be ripped to alleviate compaction. • After demolishing the structures the footprint may not be left abandoned and unproductive as weeds and aliens will immediately invade the area. • The total footprint can immediately be reintroduced to crop farming or otherwise the soils should be ameliorated and seeded with a grass mixture such as *Digitria eriantha*, *Cenchrus cilliaris* • A mixture of grass seed can be used provided the mixture is carefully selected to ensure the following: o Annual and perennial grasses are chosen; o Pioneer species are included; o All the grasses shall not be edible; o Species chosen will grow in the area without many problems; o Root systems must have a binding effect on the soil; and o The final product should not cause an ecological imbalance in the area.	infrastructure are cleared from site. Weeds are absent.				
Precipitation and panel washing	Soil; dust	Soil erosion and/or water logged conditions	**Objective:** • No soil erosion or water logging occurs on site. Panels function optimally. **Target:** • The Surface Water Management Plan (SWMP) must be adhered to at all times. • The project area (and under PV panels) should be covered with grass. • Surfaces/areas covered with road building material should be contained as far as possible. • Any occurrences of soil erosion or waterlogged spots should be remediated immediately. • The amount of roads within the panel footprint should be reduced as far as possible.	Little runoff, water logging and soil erosion. Dust doesn't accumulate on panels. Adherence to the SWMP.	Developer	Construction, Operation	Developer	Whenever site is visited for maintenance or panel washing purposes.
Heritage and palaeontology								
PV facility construction	Heritage	Destruction of heritage resources	**Objective:** • Compliance with relevant legislation and recommendations from SAHRA under Section 35, 36 and 38 of NHRA.	No legal directives, legal compliance audit scores	Developer, ECO, Heritage specialist	Planning / Pre-Construction	ECO	Monthly

Activity	Aspect	Potential Impact	Mitigation Measure (Objective and Target)	Performance Indicator	Implementation Responsibility	Time Schedule	Verification Responsibility	Frequency
			Target: • Include section on possible heritage finds in induction prior to construction activities take place. • Heritage chance finds are reported and dealt with as advised by the heritage specialist.	(legal register, ECO Monthly Checklist/Report)				
			Objective: • Compliance with relevant legislation and recommendations from SAHRA under Section 35 and 38 of NHRA. **Target:** • Implement chance find procedures in cases where possible heritage finds area made.	ECO Monthly Checklist/Report. No heritage finds destroyed.		Construction	ESA and ECO	Weekly (ESA)/ Monthly (ECO)
Method statement development	Fossil discovery	Destruction of fossils	**Objective:** • Compliance with relevant legislation and recommendations from SAHRA under Section 35 and 38 of NHRA. **Target:** • Develop finds protocol for palaeontological resources.	Completion and development of mitigation measures	Developer, ECO, Palaeontologist	Pre-construction	ECO	Once-off
PV facility site preparation	Heritage	Destruction of graves	**Objective:** • Compliance with relevant legislation and recommendations from SAHRA under Section 35 and 38 of NHRA. **Target:** • A 20m precautionary buffer should be placed around the two potential grave sites, unless it has been confirmed via suitable testing that the sites are not graves Alternately, the graves must be relocated (see below)	Grave 20 m buffer zones are avoided	Developer, ECO, Heritage specialist	Pre-construction	ECO	Once-off
			Objective: • Compliance with relevant legislation and recommendations from SAHRA under the National Health Act (No 61 of 2003) and Section 35 and 38 of NHRA. **Target:** • If so required by construction activities, graves should be relocated with the necessary permits. • Destruction permits should also be applied for.	Completion of mitigation measures and obtaining relocation and destruction permits	Contractor, Developer, Heritage specialist	Construction	ECO	Once-off
		Destruction of heritage resources	**Objective:** • Compliance with relevant legislation and recommendations from SAHRA under Section 35 and 38 of NHRA. **Target:** • A 20 m buffer should be established around historical structures identified on site.	Historical structure 20 m buffer zones are avoided	Contractor, Developer, Heritage specialist	Pre-construction	ECO	Once-off
			Objective: • Compliance with relevant legislation and recommendations from SAHRA under Section 35 and 38 of NHRA.	Historical structure destruction permit obtained.	Contractor, Developer, Heritage specialist	Pre-construction& during	ECO	Once-off

Activity	Aspect	Potential Impact	Mitigation Measure (Objective and Target)	Performance Indicator	Implementation Responsibility	Time Schedule	Verification Responsibility	Frequency
			Target: • If so required by construction activities: o The sites are to be documented through mapping and excavations to determine its layout and history. o Further archival research into the existence of the possible past presence of a school is to be conducted. o A mitigation permit should be applied for and issued by SAHRA under section 34 and 35 of the NHRA, as/if required o Upon completion of the abovementioned documentation, the applicant can apply for a destruction permit			construction		
Project decommissioning	Visual	Impact on visual receptors	**Objective:** • Removal of visual disturbance. **Target:** • Remove all PV panels and ancillary infrastructure from site after project lifetime.	No complaints of glint and glare from motorists.	Contractor, Developer	Decommissioning	Developer	Once-off
PV facility construction			**Objective:** • Minimisation of visual disturbance. **Target:** • The invertor housing within the PV panels should be dminimal in size. • The colour of the roof-scape and exterior walls of buildings should be charcoal and the colour of the exterior walls should be dark stone or dark grey or, where dark colours might affect the building temperature, natural/ neutral tones should be used instead. • Perimeter fencing should be grey and visually permeable.	Dark grey or neutral/muted colours present on plant's ancillary infrastructure.	Contractor, Developer	Construction	Developer	Once-off
PV facility operation		Impact on landscape character	**Objective:** • Improvement of landscape character after construction. **Target:** • Grasses and low shrubs (less than 300mm in height) should be planted underneath PV panels., if natural vegetation has not returned by the end of the first wet season	Proliferation of endemic vegetation under panels.	Contractor, Developer, ECO	Operation	ECO	Once-off
		Disturbance / confusion of nocturnal fauna	**Objective:** • Little night-time lighting. **Target:** • Limit mounting lights and specifying foot lights and bollard level lighting • Use minimum lumen or wattage in fixtures	Limited night-time lighting beyond site perimeter	Contractor, Developert, ECO	Construction, operation	Developer	Once-off

Activity	Aspect	Potential Impact	Mitigation Measure (Objective and Target)	Performance Indicator	Implementation Responsibility	Time Schedule	Verification Responsibility	Frequency
			• Place down lights and shielded fixtures • Place motion detectors on security lighting.					
Materials and waste								
Transportation of material	Material transport	Traffic congestion. Dust during transportation. Excessive noise.	**Objective(s)** • To ensure that whilst material is transported, it cannot be of negative influence to the surrounding environment. **Target:** • Existing access roads must be utilised as far as possible, with only the minimum new access roads being constructed where absolutely necessary; • Access to privately owned land will be arranged with the various landowners; • Adequate and appropriate traffic warning signage must be erected where applicable, along transport routes and access roads; • The Contractor shall take preventative measures e.g. screening, muffling, timing, pre-notification of affected parties to minimise complaints regarding noise and vibration nuisance from sources; • Fine materials (such as sand) must be covered during transportation; • Appropriate response plans must be prepared by Contractors to ensure the fastest possible reaction to spills or accidents; • Deliveries must be scheduled for off-peak hour traffic times; • All trucks and vehicles removing spoil from the site must have load areas and must be covered by a tarpaulin (plastic / synthetic sheets (covers) to prevent rocks and spoil falling onto the road surfaces; • Vehicle speeds on site should not exceed 30 km / hr. on gravel roads; • All drivers and operators are to have licences for driving and moving of plant on site; and • All road vehicles should be roadworthy.	Mufflers and silencers fitted to construction vehicles and equipment. Covering of material during transportation. Emergency reaction plan (for spills / accidents) always readily available on site.	Contractor and CECO	Prior to construction start	ECO	Throughout construction period or as required by the ECO.
Storage of hazardous material	Hazardous material storage areas	Contamination of soil by hazardous material	**Objective(s):** • To ensure adequate protection of soil and soil remediation measures in case of spills. **Target:** • Hazardous materials, such as paint, cement, fuels, bitumen, oil, herbicides, battery acid or detergents, must be stored in sealed, lockable containers when not in use;	Storage of hazardous materials in sealed and lockable containers. No evidence of spills on site. Absorbent and clean-up material readily	Contractor and CECO.	Construction period	ECO	For the duration of the construction period dependent on the presence of hazardous material on site.

Activity	Aspect	Potential Impact	Mitigation Measure (Objective and Target)	Performance Indicator	Implementation Responsibility	Time Schedule	Verification Responsibility	Frequency
			• A register shall be kept on all substances and be available for inspection at all times. Areas shall be monitored for spills and any spills shall be contained, cleaned and rehabilitated immediately; • No decantation into unmarked containers or containers with no or incorrect labelling; • To avoid fire risks, no decanted fuel will be left unattended in the sun; • When handling hazardous materials, manufacturer's specifications must be complied with. The 16 point Material Safety Data Sheet should be available on site; • Reasonable care must be taken to prevent spills of any hazardous material when in use; • All spills (minor and major) must be cleaned and remediated to the satisfaction of the ECO and CECO within 24 hours of occurrence; • The contractor must ensure that there is a supply of absorbent material (e.g. Drizit) and clean-up materials readily available to absorb, break down and, where possible, encapsulate minor hazardous material spillages; • No hazardous material may be stacked higher than 2 m; • All products are to be stored with compatibility in mind; • Storage areas shall display the required safety signs depicting "No smoking", "No naked flames" and "Danger". Containers shall be clearly marked to indicate contents **as well as** safety requirements; • Any other hazardous substances stored in bulk will require bunding; and • The contractor shall supply a method statement to the contractor for approval for the storage of hazardous materials prior to site preparation works.	available on site.				
Storage of fuel	Storage areas	Contamination of soil by fuel. Inadequate remediation measures for spills.	**Objective(s):** • To ensure that there is optimum environmental protection (especially soil) from fuel spills. **Target:** • Fuel must be stored in above ground storage tanks or sealed containers, contained within a bunded area with sump drainage; • All bunds must be designed to contain at least 110% of the tank or drum storage capacity (this shall apply to above ground storage, and include fuels, welding equipment and oxy-acetylene cutting equipment); and • No drainage from fuel storage areas shall be permitted.	Established fuel storage areas in compliance with the objectives of the EMP.	Contractor and CECO	Pre-construction (site establishment)	ECO	Once off

Activity	Aspect	Potential Impact	Mitigation Measure (Objective and Target)	Performance Indicator	Implementation Responsibility	Time Schedule	Verification Responsibility	Frequency
Use of cement	Cement	Contamination of soil and surrounding environment by cement. Decrease in ambient air quality.	**Objective(s):** • To ensure that the environment is protected from cement that will be used on site. **Target:** • Cement must be delivered in sound and properly secured bags or in approved bulk containers; • Cement in bags must be stored in containers to be provided at the construction camp and should only be opened when needed; • The storage facility and surrounding area must be swept and cleaned regularly as necessary to ensure that cement products do not the pollute the surrounding environment; • Empty cement bags are to be collected in hessian, material or plastic bags which, once full, can be disposed of at a registered landfill site; • Cement bags are not to be burnt on site; and • No concrete batching is to occur on bare soil, but rather on lined specially constructed bunded areas.	Cement delivery, storage and use will be in line with the EMP requirements.	Contractor and CECO	Construction period	ECO	As long as cement is in use on site.
Storage, removal and disposal of construction waste	Construction waste	Land pollution. Compaction of soil by rubble. Decreased aesthetic integrity of the site.	**Objective(s):** • To ensure that waste is correctly stored and disposed of, decreasing the visual and environmental impact during the construction and post construction period; • To keep the site neat and clean; • Disposal of rubble and refuse in an appropriate manner; • Minimise litigation; and • Minimise landowner complaints. **Targets:** • No material shall be left on site that could be harmful to humans and animals; • Broken, damaged and unused nuts, bolts and washers shall be picked up and removed from site for future use or recycling; • Surplus concrete may not be dumped indiscriminately on site, but shall be removed from site when nearing completion of the different stages of work; • Concrete trucks shall not be washed on site unless adequate washing and concrete collection facilities are introduced to site; • Bins and containers must be made available by the contractor for the storage of construction waste; • All construction waste shall be stored in waste skips located strategically on site. A licensed waste contractor shall collect these skips for removal to a licensed landfill site. No construction waste	Construction waste stored, collected and disposed of as per the requirements of this EMP.	Contractor and CECO	Waste bins / skips must be available prior to construction. Removal of waste throughout the construction period.	ECO	The ECO will determine the frequency of waste removed from site.

Activity	Aspect	Potential Impact	Mitigation Measure (Objective and Target)	Performance Indicator	Implementation Responsibility	Time Schedule	Verification Responsibility	Frequency
			may be stored on site for longer than 30 days; • The Contractor will be responsible to remove and transport all construction waste material off site to a registered waste disposal facility (proof of this, as well as a copy of the site's Registration Permit, must be provided by the Contractor to the ECO); • Where domestic waste is collected by the relevant municipality itself, a collection receipt will be suitable proof of safe disposal; • No burning of waste will be permitted on site.					
Storage, removal and disposal of domestic waste	Domestic waste	Land pollution, unpleasant odours, decreased aesthetic integrity of the site.	**Objective(s)** • To ensure that waste is correctly stored and disposed of, decreasing the visual and possible environmental impact during the construction and post construction period. **Target:** • The Contractor must supply waste bins at the construction camp for the storage of domestic waste; • Personnel must be informed about the necessity of using the waste drums; • The Contractor must do site clean-ups of litter other than construction waste on a daily basis, and dispose of it in the designated refuse bins provided at the Contractor's Camp; • The contractor must ensure that general site-wide litter clean-up will occur at least once a week; and • The Contractor must dispose of all domestic refuse generated by his staff and Sub-Contractors on a weekly basis at a registered waste disposal facility. The Contractor must provide proof of this to the ECO in the form of a safe disposal certificate.	Evidence of domestic waste stored, removed and disposed of according to the requirements indicated in this EMP.	Contractor and CECO	The waste bins / skips must be available prior to construction. Removal of waste throughout the construction period.	ECO	The ECO will determine the frequency of waste removal from site.
Storage, removal and disposal of hazardous waste.	Hazardous waste	Soil pollution, groundwater contamination.	**Objective(s):** • To ensure that soil and the rest of the surrounding environment on site is protected from hazardous waste. **Target:** • The Contractor is required by the National Environmental Management: Waste Act (no 59 of 2008) and the globally harmonised system for the classification of waste to determine whether any substance (new or waste) stored on site is subject to controls contained within the act; • All hazardous waste must be stored in sealed and suitably marked containers for removal to a registered hazardous waste disposal facility; • Hazardous waste may only be stored on site for a period of 90 days, where after it must be disposed of at a registered hazardous waste disposal site;	All mitigation measures with regards to Hazardous waste mentioned in the EMP are implemented.	Contractor and CECO	Hazardous wastes must be collected in sealable, safe containers. Removal of hazardous waste throughout the construction	ECO	During the entire construction period.

Activity	Aspect	Potential Impact	Mitigation Measure (Objective and Target)	Performance Indicator	Implementation Responsibility	Time Schedule	Verification Responsibility	Frequency
			• Any oil spillage on site will be excavated to a depth determined between the CECO and ECO and disposed of for removal to a registered hazardous waste disposal site. Excavated areas are to be refilled with suitable replacement material. Alternative in-situ remediation techniques could be used, if approved by the ECO.			process.		
Dust								
Trenching and transport or soils	Dust, smoke and emission control	Air pollution	**Objective(s):** • To reduce the generation of dust on the construction site. **Target:** • Dust suppression is to be conducted during construction or as complaints are received; • The Contractor is to take appropriate measures to minimise the generation of dust as a result of excavation works. Such measures include frequent water spraying during low rainfall periods or by using chemical dust binding agents approved by the ECO; • Speed limits must be enforced in all areas to reduce the generation of dust; • Cover dump trucks before traveling on public roads; • Keep soil moist while loading into dump trucks to minimise fugitive dust; • Keep soil loads below the freeboard of the truck to minimise fugitive dust; • Minimise drop heights when loaders dump soil into trucks; • Revegetate disturbed areas as soon as possible after disturbance; • When feasible, shut down idling construction machinery; • Tighten gate seals on dump trucks; and • No burning on site and close to settlements.	Dust is kept at its lowest level on site.	Contractor and CECO	Throughout construction period	ECO	During periods of low rainfall or as required by the ECO.
General construction activities								
Construction activities	Construction vehicles, plant and machinery	Noise and vibration	**Objective(s):** • Noise on site kept to a minimum. **Target:** • Should construction have to continue after hours, all residents affected must be notified; and • All machinery and equipment must be maintained in good working order, and fitted with approved and specified muffler systems.	Construction vehicles and machinery fitted with mufflers silencers. Working hours are adhered to.	Contractor and CECO	Throughout the construction period.	ECO	Ongoing

Activity	Aspect	Potential Impact	Mitigation Measure (Objective and Target)	Performance Indicator	Implementation Responsibility	Time Schedule	Verification Responsibility	Frequency
Construction activities	Existing infrastructure	Disruption of services, damage to installations, damage or loss of plant.	**Objective(s):** • To have control over and prevent temporary or permanent damage to plant and installations; • To prevent interference with the normal operation of plant and installations; and • Securing the safe use of infrastructure, plant and installations have control over actions and activities in close proximity to inhabited areas. **Target:** • Where pipelines are found along the route, the depth of the pipes under the surface shall be determined to ensure that proper protection is afforded to such structures; • Any damage to pipelines shall be repaired immediately; • All existing private access roads used for construction purposes, shall be maintained at all times to ensure that the local people have free access to and from their properties; • Speed limits shall be enforced in such areas and all drivers shall be sensitised to this effect; • Upon completion of the project all roads directly damaged by construction activities shall be repaired to their original state; and • Power cuts to facilitate construction must be carefully planned. If possible, disruptions must be kept to a minimum and should be well advertised and communicated to the Landowners.	No unplanned disruptions of services. No damage to any plant or installations. No complaints from authorities or Landowners regarding disruption of services. No litigation due to losses of plant, installations and crops.	Contractor, CECO.	Throughout construction	ECO	During construction.
Concrete batching	Batching plants	Damage to vegetation. Damage to topsoil. Surface water contamination. Disturbance to area.	**Objective(s):** • To ensure all agreements with Landowners are adhered to; and • To prevent complaints from Landowners. Successful rehabilitation of disturbed areas. **Target:** • The siting of batching plants shall be done in conjunction with the engineer and ECO; • The batching plant area shall be operated in such a way as to prevent contaminated water from running off the site and polluting waterbodies; • Sibanye shall ensure that all agreements reached with the Landowner are fulfilled, and that such areas be rehabilitated once construction is completed; and • Should any claim be instituted against Sibanye, due to the actions of the Contractor at a batching plant site, Sibanye shall hold the Contractor fully responsible for the claim until such time that the Contractor can prove otherwise with the necessary	No complaints from Landowners. All disturbed areas successfully rehabilitated three months after completion of the Contract.	Contractor, CECO.	Throughout construction	ECO	During construction.

Activity	Aspect	Potential Impact	Mitigation Measure (Objective and Target)	Performance Indicator	Implementation Responsibility	Time Schedule	Verification Responsibility	Frequency
			documentation.					
Actions by site staff	Littering on site	Untidy and polluted site and surrounding land	**Objective(s):** • To maintain a neat and tidy workplace. **Target:** • Littering by the employees of the Contractor shall not be allowed; and • The ECO shall monitor the tidiness of the work sites as well as the campsite.	No visible sign of littering. No complaints from Landowners.	Contractor, CECO.	Throughout construction	ECO.	During construction.
Rehabilitation								
Rehabilitation of construction site	Rehabilitation	Fauna and flora	**Objective(s):** • To minimise damage to topsoil and environment at construction areas. • Successful rehabilitation of all damaged areas. • Prevention of erosion. **Target:** • All areas earmarked for construction shall have the topsoil removed separately and stored for later use during rehabilitation of such areas; • During backfilling operations, the Contractor shall take care not to dump the topsoil in the bottom of the foundation and then put spoil on top. Topsoil must also be replaced on top of the backfilled areas; • Re-seeding shall be done on disturbed areas as directed by the ECO, if this option is chosen above agriculture; • Maintenance of the re-seeded areas shall be conducted until an acceptable cover has been established, meaning 75% ground cover with no gaps exceeding 500mm. Maintenance includes watering, mowing and weeding as well as preventing the development of erosion channels; • To get the best results in a specific area, consult with a specialist or the local extension officer of the Dept. of Agriculture; • Re-seeding, as well as fencing in of badly damaged areas, will always be at the discretion of the ECO, unless specifically requested by the Landowner; • The removal of all construction facilities and materials from the construction camp will be required, and rehabilitation carried out including the removal of concrete and compacted earth platforms, fuel storage tanks and chemical toilets; • All access roads no longer in use shall be rehabilitated;	No loss of topsoil due to construction activities. All disturbed areas successfully rehabilitated after decommissioning the solar plant.	Contractor, CECO.	During decommissioning phase	ECO	Once-off

Activity	Aspect	Potential Impact	Mitigation Measure (Objective and Target)	Performance Indicator	Implementation Responsibility	Time Schedule	Verification Responsibility	Frequency
			• Any contaminated material or soil must be removed to a registered hazardous waste disposal facility and the prescribed re-vegetation process must then be followed thereafter; • Rehabilitation must be carried out as soon as possible after the construction is completed; and • All rehabilitation is to be done with approval of Sibanye's environmental management department.					

5. PHASE 1 MITIGATION MEASURES

This phase of the project will include a 50 MW solar PV plant, an on-site substation, access control gate and control buildings, and the first part of the stormwater drain on Portions 5 & 6 of Farm Uitval No. 280.

5.1 Substation Construction

The PV plant's substation will be developed as part of Phase 1. A generic EMPr for substations is attached as Appendix I in compliance with the requirements of Government Notice No. 435 of 2019, under the National Environmental Management Act, 1998. This EMPr addressed aspects identified for the development of substation infrastructure for the transmission and distribution of electricity. This notice legally identifies a set of prescribed impact management outcomes and associated impact management actions and must be complied with and implemented in addition to this EMPr.

5.2 Site Access

5.2.1 Gate Installation and Access Control

The proposed access control gate and the control gate buildings are located directly north to the R501 road, in an area that is currently traversed by traffic. The following access control management practices must be implemented during both the construction and operational phase:

- Properly install gates to allow access to the servitude;
- To minimise damage to fences and the extent of removal of vegetation, limit access to Sibanye and Contractor personnel with gate keys;
- Gate installation shall be according to Sibanye standards;
- All gates installed in electrified fencing shall be electrified as well;
- All gates shall be fitted with locks and be kept locked at all times during the construction phase. Gates shall only be left open on request of the Landowner if he accepts partial responsibility for such gates in writing once the Contractor has left site and the gates are fitted with Sibanye locks. Such gates shall be clearly marked by painting the posts green; and
- All claims arising from gates left open shall be investigated and settled in full by the Contractor.

5.2.2 Traffic Management

The site has good regional access via both national and provincial roads. The N12 is located to the east of the proposed development, the N14 to the north and the N1 further east. The provincial roads R501, R500 and R28 link the area to the national roads. Currently the site has no formal access to the R501, which is a provincial road. A review of the site on Google Earth indicates no formal access. However, there appears to be a number of gravel roads that intersect with the R501. The following traffic management practices must be implemented during both the construction and the operational phase:

- Adhere to existing roads and road rules associated with them (for instance speed limits);
- If abnormal loads need to be transported by road to the site, a permit will need to be applied for in terms of Section 81 of the National Road Traffic Act and authorisation needs to be obtained from the relevant road authorities to modify the road reserve to accommodate turning movements at intersections (if necessary);
- To ensure reduced speeds along the roads, implement speed control mechanisms on site by means of a stop and go system. Speed limits must be implemented by the placement of road signage for such speed limits;
- Suitable parking areas should be designated for construction trucks and vehicles on the construction site in order to minimize random parking and to improve site operations;

- Ensure that roadworthy and safety standards are implemented for construction vehicles;
- To the extent practicable within construction timelines, plan and stagger delivery trips so that they occur during the day and minimize construction vehicle movement and delivery trips on the provincial roads (R501, R500 and R28) during peak traffic periods (06:00-9:00 and 16:00-18:00);
- Implement clear and visible signage and signals indicating movement of vehicles at intersections and in the vicinity of the nearby farm steads. The farm steads should be treated as a no-go area;
- Maintain the pre-construction condition of public roads being utilised by construction vehicles. Pre-construction condition of roads should be supported by photographic evidence for record-keeping;
- Access to the proposed development will be from the R501 and agreement / approval of the access location will be required from the Gauteng Department of Roads and Transport;
- A Road Maintenance Plan should be developed by the Contractor for the external gravel access roads and the internal gravel access farm road that will be used. The plan should address requirements such as, but not limited to, grading, dust suppressant mechanisms, drainage (where required), signage, and speed limits. The Road Maintenance Plan must ensure regular maintenance of the gravel external access roads, as well as the upgrading of and regular maintenance of the internal farm access road;
- Well maintained vehicles should be used together with well-trained drivers during the construction phase. Vehicle maintenance and driver competency should be monitored. Proof of driver competency as well as the vehicle checks should be verified and undertaken to ensure that vehicles are roadworthy and hence, do not pose a safety risk. The Contractors must ensure that construction vehicles are roadworthy, properly serviced and maintained, and respect the vehicle safety standards implemented by the Project Developer; and
- The use of public transport (buses and/or minibus taxis) to convey construction personnel to the site should be encouraged.

5.3 Surface and water management plan

A stormwater management plan, approved as part of the EIA process, is included in Appendix E of this EMPr. This plan contains a range of measures designed to ensure that stormwater is managed to reduce erosion on the site and to manage the risk of subsidence, since poor surface water management is one of the main causes of subsidence (dolines and sinkholes) in areas with dolomitic geology such as this site.

The main objectives of the stormwater management plan are the following:

- Maintaining a free draining site, avoiding ponding within the solar PV array, in channels, stormwater structure inlets and outlets and around any buildings areas on site;
- The on-site drainage design (draining rainwater that falls on the site) will limit converging flow as far possible, with sheet flow over the minor interior roads within the solar PV array;
- The on-site drainage design will mainly be focused on limiting erosion and allowing free drainage, similar to the conditions that existed prior to construction;
- Any water that enters the site as overland flow will be drained off the site by minimising additional accumulation along the same drainage line, as far as practically possible;
- Maintaining sufficient low flow velocities in the stormwater drainage design to minimise erosion;
- Dissipation of the remaining energy in the stormwater runoff by widening the flow area and reducing the flow velocities to such an extent that erosion will not be induced beyond the site boundaries; and
- Meeting DWS's design requirements for water supply and waste water infrastructure for dolomitic areas, to minimise the risk of leaks on site and to enable early detection of potential concerns.

6. PHASE 2 MITIGATION MEASURES

Phase 2 of the project does not include any phase-specific mitigation measure since it will only contain PV panels (i.e. the 50 MW solar PV plant) and associated infrastructure similar to the other phases of the project. As such, please refer to Section 4 for construction mitigation measures.

7. PHASE 3 MITIGATION MEASURES

This phase will include a 50 MW solar PV plant and the next part of the stormwater drain.

7.1 Surface and water management plan

A stormwater management plan, approved as part of the EIA process, is included in Appendix E of this EMPr. This plan contains a range of measures designed to ensure that stormwater is managed to reduce erosion on the site and to manage the risk of subsidence, since poor surface water management is one of the main causes of subsidence (dolines and sinkholes) in areas with dolomitic geology such as this site.

The main objectives of the stormwater management plan are the following:

- Maintaining a free draining site, avoiding ponding within the solar PV array, in channels, stormwater structure inlets and outlets and around any buildings areas on site;
- The on-site drainage design (draining rainwater that falls on the site) will limit converging flow as far possible, with sheet flow over the minor interior roads within the solar PV array;
- The on-site drainage design will mainly be focused on limiting erosion and allowing free drainage, similar to the conditions that existed prior to construction;
- Any water that enters the site as overland flow will be drained off the site by minimising additional accumulation along the same drainage line, as far as practically possible;
- Maintaining sufficient low flow velocities in the stormwater drainage design to minimise erosion;
- Dissipation of the remaining energy in the stormwater runoff by widening the flow area and reducing the flow velocities to such an extent that erosion will not be induced beyond the site boundaries; and
- Meeting DWS's design requirements for water supply and waste water infrastructure for dolomitic areas, to minimise the risk of leaks on site and to enable early detection of potential concerns.

8 PHASE 4 MITIGATION MEASURES

This phase will include a 50 MW solar PV plant and the last portion of the stormwater drain.

8.1 Surface and water management plan

A stormwater management plan, approved as part of the EIA process, is included in Appendix E of this EMPr. This plan contains a range of measures designed to ensure that stormwater is managed to reduce erosion on the site and to manage the risk of subsidence, since poor surface water management is one of the main causes of subsidence (dolines and sinkholes) in areas with dolomitic geology such as this site.

The main objectives of the stormwater management plan are the following:

- Maintaining a free draining site, avoiding ponding within the solar PV array, in channels, stormwater structure inlets and outlets and around any buildings areas on site;
- The on-site drainage design (draining rainwater that falls on the site) will limit converging flow as far possible, with sheet flow over the minor interior roads within the solar PV array;
- The on-site drainage design will mainly be focused on limiting erosion and allowing free drainage, similar to the conditions that existed prior to construction;
- Any water that enters the site as overland flow will be drained off the site by minimising additional accumulation along the same drainage line, as far as practically possible;
- Maintaining sufficient low flow velocities in the stormwater drainage design to minimise erosion;
- Dissipation of the remaining energy in the stormwater runoff by widening the flow area and reducing the flow velocities to such an extent that erosion will not be induced beyond the site boundaries; and
- Meeting DWS's design requirements for water supply and waste water infrastructure for dolomitic areas, to minimise the risk of leaks on site and to enable early detection of potential concerns.

9 OPERATIONAL MITIGATION FOR AL PHASES

The operational phase commences when the proposed development is being used for its intended purposes i.e. renewable energy generation. There may be a period during which construction and operation will overlap. This is applicable to **all phases** of the project.

A written notification of operation must be given to the CA no later than 14 days prior to the commencement of the project's operational phase.

9.1 PV Panel Maintenance

9.1.1 Clean solar panels from the ground

For safety reasons, PV panels should be cleaned from the ground if possible. Make use of a good quality soft brush and a squeegee with a plastic blade on one side and a cloth covered sponge on the other coupled with a long extension – or as otherwise advised by the panel manufacturer.

9.1.2 Optimal time for cleaning of solar panels

To the extent possible and practical, cleaning of the solar panels should be done early in the morning or in the evening to prevent the water used in the cleaning process from evaporating too quickly.

9.1.3 Materials and methods for cleaning solar panels

Do not use metal objects or harsh abrasive products for removing caked on materials. Scratching the glass on a solar panel can affect its performance, as scratches will cast shadows. Avoid using detergents, if possible, as these may streak the glass of the panel. Use of abrasive powders also risks scratching the panels.

9.2 Fauna, Flora and Alien Invasive Plant Management

An Alien Invasive and Open Space management plan, approved as part of the EIA process, is included in Appendix G of this EMPr. Ongoing alien and invasive plant (AIP) monitoring and clearing/control should take place throughout the operational phase, and the project perimeters should be regularly checked for AIP establishment to prevent spread into surrounding natural areas.

Monitoring of rescued and relocated floral and faunal species of conservation concern (SCC) should continue during the operational and maintenance phase until it is evident that the species have successfully established;

As far as possible, no collection of floral SCC / protected or medicinal floral species within the focus area or adjacent natural habitat must be allowed during the operational and maintenance phase of the proposed development; and

Edge effect control needs to be implemented to prevent further degradation and potential loss of floral SCC / protected species or suitable habitat for such species outside of the proposed development footprint.

9.3 Erosion Control

The areas surrounding the sites, particularly the watercourses must be monitored for signs of erosion and remedial actions implemented where required. The erosion management specifications described under the construction phase EMPr must be implemented, where applicable.

9.4 Waste Management

The incorrect management of solid waste can result in the pollution of soil, groundwater and the general the environment. Windblown litter can contribute to negative visual impacts and if consumed by grazing animals could result in fatality. The following waste management practices must be implemented during the operational phase:

- Provide adequate scavenger proof waste bins at facility buildings;
- Set up a system for regular waste removal from approved facility – preferably weekly;
- All solid and liquid waste must be removed from the operational areas and not discarded in the natural vegetation/veld;
- Minimise waste by sorting wastes into recyclable and non-recyclable waste types (an independent contractor can be appointed to conduct this recycling if practical);
- No waste may be buried or burned under any circumstances;
- Hazardous waste must be removed from the site by an approved service provider e.g. used oil – certificates of disposal should be maintained on file;
- No hazardous waste may be spoiled at the facility;
- A housekeeping team should be appointed to regularly maintain the litter and rubble situation on the facility; and
- Littering by the employees shall not be allowed under any circumstances.

10 DECOMMISSIONG MITIGATION FOR ALL PHASES

The decommissioning phase commences when the project has reached the end of its lifespan and will therefore no longer be operational. This is applicable to **all phases** of the project.

Unless the PV plant is refurbished by replacement of the PV panels, the PV plant may be decommissioned after approximately 25 years from the date of commissioning. The possibility of upgrading the proposed facility to more advantageous technologies would be investigated at the end of this period. Should the facility undergo expansion or significant upgrading, an environmental process may be required at that time, in accordance with the prevailing legislation at the time.

Should decommissioning be the favourable option, it would potentially take between 6 to 12 months. Care should be taken during decommissioning of the facility by keeping in mind that this soil classification of this footprint is categorised with a moderate and moderately high agricultural potential. All effort should be made to restore the land back to arable land by implementing the following mitigation measures:

- After disconnecting the PV infrastructure from the network, module components should be removed and recycled / resold as far as possible. The structures should be dismantled, and the concrete foundations would be removed. All underground cables should be excavated and removed. The buildings should be demolished and removed.
- Any pole structures such as fences, sign boards, light poles et cetera should be removed with the concrete footing and may not be cut of above surface. Such structures cause serious damage to agricultural equipment.
- The footprint of structures such as foundations (usually partly below surface), roads, parking areas, paved or tarred surfaces should be cleaned properly, and waste material should be removed to a suitable disposal facility.
- The footprints should be ripped to alleviate compaction.
- After demolishing of the structures, the footprint may not be left abandoned and unproductive since weeds and aliens can be expected to immediately invade the area. The total footprint must immediately be reintroduced to crop farming or otherwise the soils should be ameliorated and seeded with a grass mixture such as *Digitaria eriantha, Cenchrus cilliaris* and other available local climax species or species recommended by an ecologist.
- Where materials and infrastructure are not resold or recycled, they would be disposed of at an approved landfill site. Any hazardous substances shall be removed and disposed of in terms of the requirements of the relevant legislation (e.g. Hazardous Substances Act, No. 15 of 1973) and SANS specifications.
- The rehabilitation of the disturbed areas would form part of the decommissioning phase and must take cognisance of the future proposed land use of the area. Since the PV facility comprises largely of recyclable or reusable materials, the residual risks associated with decommissioning would be minor. Should the need arise to decommission the PV facility, the foundations would need to be demolished and disposed of. Roads which are no longer required after decommissioning should be scarified and the areas rehabilitated with the assistance of a rehabilitation specialist.

A detailed decommissioning plan must be developed approximately 24 months before closure of the facility. The construction phase EMPr could be used as a guideline to facilitate the detailed decommission phase EMPr. Mitigation measures listed below are provisional mitigation measures:

- All PV structures, associated structures, fencing and cables should be removed, and resold or recycled, as far as possible.
- Building structures should be broken down (including foundations).
- The rubble should be managed according to National Environmental Management Waste Act (No. 59 of 2008) and deposited at a registered landfill if it cannot be recycled or reused.

- Monitoring for soil erosion should be undertaken on a bi-annual basis for a year following the completion of closure phase.
- Shape footprint area to reflect natural landscape.
- Wind-blown rubble and dust management needs to be implemented as required.
- After cessation of disturbance, re-spread topsoil over the surface and re-vegetate. Any additional overburden (uncontaminated) must be re-spread below the topsoil layer, not mixed with it.
- Dispose of any sub-surface spoils from excavations where they will not impact on agricultural land (for example use as road surfacing), or where they can't be effectively covered with topsoil.
- Control dust as per standard construction site measures.
- Disturbance of any stream channels should be limited to the designated access roads.
- Activities should as far as possible be limited to the delineated site for the proposed development.
- All disturbed areas should be rehabilitated and monitored to ensure that these areas do not become subject to erosion or invasive alien plant growth.
- The rehabilitated area must be monitored and must consider amongst others erosion, alien vegetation, re-establishment of indigenous vegetation and indigenous fauna moving back to the site; and
- Implement an effective system of stormwater run-off control where it is required.

11 NON-COMPLIANCE AND PENALTIES

The ECO must monitor compliance with this EMPr and report results in monthly ECO Reports. Non-compliance must be reported to the competent authority as per the requirements of the EA.

Penalties/fines must be issued at the discretion of the Engineer as per the penalties agreement between the Engineer and Contractor. The ECO to take up any non-compliance issues that may result in a fine/penalty with the Engineer.

The nature of the project activities may, even with the best of intentions, inevitably cause some form of environmental degradation. The costs of having to make good on such environmental degradation is usually sufficient punishment without the need to look to other punitive measures. The implementation of a penalty system therefore requires careful consideration. The following issues need to be considered in such a decision:

- Penalties would typically be warranted by persistent negligence on the part of the Contractor or failure to respond adequately to environmental considerations;
- Removal from site would typically be warranted where a particular staff member or piece of equipment is the cause of persistent environmental damage following previous warnings; and
- Suspension of the Works would only be warranted under rare circumstances where the Contractor's actions have caused or are likely to cause significant environmental degradation.

The type and extent of the corrective measures required to address non-compliance depend on the nature of the transgression and the Contractor's history of compliance with environmental obligations. When deciding on the nature of any punitive actions, it must be recognised that effective implementation of the Construction EMPr is dependent on the quality of the working relationships between the key role-players. Accordingly, an excessive response to non-compliance, particularly for a minor or unintentional transgression, may cause environmental degradation in the long term due to its effect in eroding the Contractor's commitment to meeting their environmental responsibilities. Other mechanisms, such as an expanded environmental induction programme, may prove more effective to control non-compliance in the long-term than purely punitive measures.

12 CONCLUSION

The EMPr should be regarded as a living document and changes should be made to the EMPr as required by project evolution, while retaining the underlying principles and objectives on which the document is based. Such changes need to be approved by the CA.

The compilation of the EMPr has incorporated impacts and mitigation measures from the EIA process as well as incorporating principles of best practice in terms of environmental management. This final EMPr further includes the additional conditions as set out in the EA, thereby ensuring compliance to the EA in terms of the EMPr.

By identifying the potential impacts, mitigation measures, performance indicators, responsibilities, available resources, potential schedule, and verification responsibility, the EMPr has provided a platform from which all phases of project development can be environmentally managed, and impacts can be managed.

It is the EAPs opinion that the implementation of this EMPr in its totality will reduce the negative environmental and social impacts of the project to an acceptable level, as approved by the EA. This EMPr is recommended to be approved as the final EMPr by the CA.

Appendix A: EAP CV

Appendix B: Environmental Authorisation

Appendix C: Amended Environmental Authorisation

Appendix D: Drawings

Appendix E: Stormwater Management Plan

Appendix F: Construction Environmental Management Plans

Appendix G: Management Plans

G1: Alien Invasive and Open Space Management Plan

G2: Revegetation and Rehabilitation Plan

G3: Erosion Management Plan

G4: Emergency Preparedness and Response Plan

Appendix H: Chance Find Protocol

Appendix I: Eskom Generic Substation EMPr

In diversity there is beauty and there is strength.

MAYA ANGELOU

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