Draft EMPr

14/12/16/3/3/2/2294

PROPOSED RENEWABLE ENERGY GENERATION PROJECT ON PORTION 12 OF THE FARM BLAAUWBANK 125 IQ, MERAFONG CITY LOCAL MUNICIPALITY, WEST RAND DISTRICT MUNICIPALITY, GAUTENG PROVINCE

Short Name: MOPANE SOLAR PV 3

June 2023

Commissioned by: Voltalia South Africa (Pty) Ltd

Document version 1.0 – Draft

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Short Name: MOPANE SOLAR PV 3

June 2023

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REPORT DISTRIBUTION LIST

Name	Institution
Mr. Armandt Joubert	Voltalia South Africa (Pty) Ltd
	National Department of Forestry, Fisheries and the Environment (DFFE)
	Department of Water and Sanitation (DWS)
	Department of Agriculture, Land Reform and Rural Development (DALRRD)
	Gauteng Department of Agriculture and Rural Development (GDARD)
Municipal Manager	West Rand District Municipality
Municipal Manager	Merafong City Local Municipality
	South African Heritage Resources Agency (SAHRA)
	Eskom Land & Rights
	Registered Interested and Affected Parties (I&AP's)

DOCUMENT HISTORY

Report No	Date	Version	Status
14/12/16/3/3/2/2294	June 2023	1.0	Draft EIA Report

TABLE OF CONTENTS

LIST OF TABLES

LIST OF ANNEXURES

1 DETAILS OF THE ENVIRONMENTAL ASSESSMENT PRACTITIONER (EAP)

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Curriculum Vitae of EAP is included in Annexure 7.

2 GENERAL PROJECT INFORMATION

VOLTALIA SOUTH AFRICA (PTY) **LTD** is proposing the development of a renewable solar energy facility in a key strategic location in terms of the connection to the Eskom grid and in terms of the favourable solar irradiation on:

- Portion 12 of the Farm Blaauwbank 125 IQ

located within the Merafong City Local Municipality, West Rand District Municipality, Gauteng Province.

Surveyor-general 21-digit site codes:

T	0	I	Q	0	0	0	0	0	0	0	0	0	1	2	5	0	0	0	1	2
1	**2**			**3**				**4**								**5**				

The renewable energy generation facility will be a **Photovoltaic (PV) Power Plant** with a **maximum generation capacity up to 120 MW** at the point of connection (**Export Capacity**).

The name of the facility will be MOPANE SOLAR PV 3**.**

The **footprint (fenced area)** of the proposed development is approximately **245 ha in extent**, as detailed in the table below:

Table 1. List of properties forming part of the Project Site and Project footprint

Site location and Property details	
Farm	Blaauwbank 125 IQ
Portion	Portion 12
LPI code	T0IQ00000000012500012
Overall Extent	1902.3300 hectares
Landowner	Vaaldam Prop (Pty) Ltd
Diagram deed number	CC28580/962
Title deed number	T28580/1962
Registration date	1962/12/14
Current land use	Grazing, cattle farming

Access to the Mopane Solar PV 3 will be from both the D859 (Preferred) and R501 (alternative).

In order to develop the facility, Voltalia South Africa (Pty) Ltd must undertake an Environmental Impact Assessment (EIA) process and acquire environmental authorisation from the *National Department of Forestry, Fisheries and the Environment (DFFE)*, in consultation with the *Gauteng Department of Agriculture and Rural Development (GDARD)*, in terms of the EIA Regulations, 2014 published on 4 December 2014, as amended under section 24(5) and 44 of the National Environmental Management Act (NEMA, Act No. 107 of 1998).

Voltalia South Africa (Pty) Ltd is the applicant for the Mopane Solar PV 3 (the proposed project) which will be connected to the Eskom **Carmel Substation (MTS)** which is located approximately 15km south-east of the project site.

The independent Environmental Assessment Practitioners (EAP's) which have been appointed for the undertaking of the detailed environmental studies in compliance with the 2014 EIA Regulations as amended, are **AGES Limpopo (Pty) Ltd** (AGES)**.**

With the aim of identifying and assessing all potential environmental impacts related to the development as well as suggesting possible mitigation measures and alternatives, AGES has appointed specialist sub-consultants to compile detailed reports and to study the activities necessary for the assessment of the specific impacts related to their field of expertise.

AGES and the other specialist consultants are in a position of independency from Voltalia South Africa (Pty) Ltd and not subsidiaries or affiliated to the latter. AGES and the specialist consultants have no secondary interest connected with the development of this project or of other projects which may originate from the authorization of the project.

3 PROJECT OBJECTIVE

This Environmental Management Programme (EMPr) is an environmental management tool used to prevent or mitigate avoidable adverse impacts of the construction, operation and decommissioning of the proposed Mopane Solar PV 3. This EMPr can also be considered a tool useful for the enhancement of the positive benefits of the project and is compiled with the objective to supply the Department of Forestry, Fisheries and the Environment, (DFFE) with an updated EMPr to make a decision regarding the approval of the EMPr.

To comply with the Environmental Impact Assessment Regulations 2014, as amended in terms of Section 24(2) and 24D of the National Environmental Management Act, 1998 (Act No. 107 of 1998), the EIA report must contain an Environmental Management Programme.

4 PURPOSE AND OBJECTIVES OF THE EMPR

This Environmental Management Programme (EMPr) is compiled with reference to the requirements included in Appendix 4 of the EIA Regulations, 2014, as amended.

The purpose of this EMPr is to ensure that all potentially identified impacts identified during the Environmental Impact Assessment (EIA) process are managed effectively during the phases of the project. The EMPr indicates the mitigation measures to be implemented on site to ensure compliance with the said regulations.

The decommissioning phase is similar to the construction phase, but all possible care must be considered for the recycling of the materials and for the re-establishment of the site as it was the *status quo – ex ante* the development.

All the phases have been carefully examined in relation to the PV plant and the connection infrastructure (preferred connection solution), to the Eskom grid.

The mitigation and management measures in the EIA process are systematically addressed in this EMPr which ensures the minimisation of adverse environmental impacts to an acceptable level.

In particular, the objectives of this EMPr are:

- to outline mitigation measures and environmental specifications required for the three phases of the project to manage and minimise the potential environmental impacts associated with the solar park.

- to ensure that the three phases have not adverse environmental impacts and that any potential environmental benefits are improved.
- to detect the responsible people/entities for the implementation of the measures, outlining functions and responsibilities.
- to state mechanisms and frequency for preventing long term or permanent environmental degradation.
- to facilitate responses to unforeseen events or changes in the project implementation not considered in the EIA process.

This EMPr once authorised, becomes a legally binding document and contravention with this document constitutes a contravention with the Environmental Authorisation.

The EMPr may however require amendment at certain stages through the lifespan of the project. The incidences which may require the amendment of this document include:

- Incorporation of conditions of approval contained in the Environmental Authorisation;
- Changes in environmental legislation;
- Results of post-construction monitoring and audit;
- Per instruction from the competent authority; and
- Changes in technology and best practice principles.

The relevant sections of this EMP have been updated to separately reflect the environmental outcomes and environmental actions.

Must amendment of any of the EMPr objectives be required, an application for this must be submitted to the competent authority and approved before such changes are implemented. Changes to the EMPr actions may be affected without the need for an amendment process, subject to approval by the ECO and future amendment as part of the first environmental audit report.

To achieve the goal of good and correct environmental management, the role of the on-site contractor is very important. The contractor must be aware of the responsibilities of the relevant environmental legislation and specific contents of the EMPr. Contractors must ensure that employees have a basic understanding of the environmental features of the site and the surrounding environment and are familiar with the requirements of the EMPr having also attended an environmental awareness training course. A copy of the EMPr must be available to all on-site staff and officials that may request to read the document.

5 AUTHORITIES, LEGAL CONTEXT AND ADMINISTRATIVE REQUIREMENTS

The legislative and regulatory framework of reference for the solar power plant project includes statutory and non-statutory instruments by which National, Provincial and Local authorities exercise control throughout the development of the same project. The development and the environmental assessment process of a solar power plant project involve various authorities dealing with the different issues related to the project (economic, social, cultural, biophysical *etc*.).

5.1 REGULATORY AUTHORITIES

5.1.1 National Authorities

At national level, the main regulatory authorities and agencies are:

- *Department of Energy (DoE):* Department is competent and responsible for all policies related to energy, including renewable energy.
- *Department of Forestry, Fisheries and the Environment (DFFE):* The Department is competent and responsible for all environmental policies and is the controlling authority under the terms of NEMA and EIA Regulations. The DFFE is also the competent authority for the proposed project and is entrusted with granting the relevant environmental authorisation.
- *National Energy Regulator of South Africa (NERSA):* The Regulator is competent and responsible for regulating all aspects dealing with the electricity sector and issues the licence for independent power producers.
- *South African Heritage resources Agency (SAHRA):* The Agency is responsible for the protection and the survey, in association with provincial authorities of listed or proclaimed sites, such as urban conservation areas, nature reserves and proclaimed scenic routes under the terms of the National Heritages Resources Act (Act no. 25 of 1999).
- *South African National Roads Agency Limited (SANRAL):* the Agency is responsible for all National road routes.

5.1.2 Provincial Authorities

At provincial level, the main regulatory authority is the *Gauteng Department of Agriculture and Rural Development (GDARD);* this Department is responsible for environmental policies and is the Provincial authority in terms of NEMA and the EIA Regulations and is also the commenting authority for the proposed project.

5.1.3 Local Authorities

At a local level, the local and municipal authorities are the principal regulatory authorities responsible for planning, land use and the environment. In the Gauteng Province, Municipalities and District Municipalities are involved in various aspects of planning and the environment related to solar energy facilities development. The Local Municipality is the *Merafong City Local Municipality* which is part of the *West Rand District Municipality*.

Under the terms of the Municipal System Act (Act no. 32 of 2000), all municipalities are deemed to go

through an Integrated Development Planning (IDP) process in order to devise a five-year strategic development plan for the area of reference. The identification of priority areas for conservation and their positioning within a planning framework of core, buffer, and transition areas is the subject of bioregional planning. Priority areas are individuated and defined with reference to visual and scenic resources and their identification and protection is granted through visual guidelines drafted for the area included in bioregional plans. Local authorities also provide specific by-laws and policies in order to protect visual and aesthetic resources with reference to urban edge lines, scenic drives, special areas, signage, communication masts *etc*.

Finally, there are also various non-statutory bodies and environmental groups, who are involved in the definition of various aspects of planning and the protection of the environment, which may influence in the development of the proposed project. The Lichtenburg Solar Park will comply with the international standards and regulations for photovoltaic power plants.

5.2 LEGISLATION, REGULATIONS AND GUIDELINES

A review of relevant legislation related to the proposed development is detailed in table 2.

Table 2: Review of relevant legislation

National Legislation	Sections applicable to the proposed project
Constitution of the Republic of South Africa (Act no. 108 of 1996)	• Bill of Rights (S2) • Rights to freedom of movement and residence (S22) • Environmental Rights (S24) • Property Rights (S25) • Access to information (S32) • Right to just administrative action (S33)
Fencing Act (Act no. 31 of 1963)	• Notice in respect of erection of a boundary fence (S7) • Clearing bush for boundary fencing (S17) • Access to land for purpose of boundary fencing (S18)
Conservation of Agricultural Resources Act (Act no. 43 of 1983)	• Prohibition of the spreading of weeds (S5) • Classification of categories of weeds & invader plants and restrictions in terms of where these species may occur (Regulation 15 of GN R0148) • Requirement and methods to implement control measures for alien and invasive plant species (Regulation 15E of GN R0148)
Environment Conservation Act (Act no. 73 of 1989)	• National Noise Control Regulations (GN R154 dated 10 January 1992)
National Water Act (Act no. 36 of 1998)	• Entrustment of the National Government to the protection of water resources (S3)

	• Entitlement to use water (S4) - Schedule 1 provides the purposes which entitle a person to use water (reasonable domestic use, domestic gardening, animal watering, firefighting and recreational use) • Duty of Care to prevent and remedy effects of water pollution (S19) • Procedures to be followed in the event of an emergency incident which may impact on water resources (S20) • Definition of water use (S21) • Requirements for registration of water use (S26 and S34) • Definition of offences in terms of the Act (S151)
National Forests Act (Act no. 84 of 1998)	• Protected trees
National Environmental Management Act (Act no. 107 of 1998)	• Definition of National environmental principles (S2): strategic environmental management goals and objectives of the government applicable within the entire Republic of South Africa to the actions of all organs of state, which may significantly affect the environment • NEMA EIA Regulations, 2010 and 2014, as amended. • Requirement for potential impact on the environment of listed activities to be considered, investigated, assessed, and reported on to the competent authority (S24 - Environmental Authorisations) • Duty of Care (S28): requirement that all reasonable measures be taken to prevent pollution or degradation from occurring, continuing and recurring, or, where this is not possible, to minimise and rectify pollution or degradation of the environment • Procedures to be followed in the event of an emergency incident which may impact on the environment (S30)
National Heritage Resources Act (Act no. 25 of 1999)	• SAHRA, in consultation with the Minister and the MEC must establish a system of grading places and objects which form part of the national estate (S7) • Provision for the protection of all archaeological objects, paleontological sites, material and meteorites entrusted to the provincial heritage resources authority (S35) • Provision for the conservation and care of cemeteries and graves by SAHRA, (S36) • List of activities which require notification from the developer to the responsible heritage resources authority, with details regarding location, nature, extent of the proposed development (S38) • Requirement for compilation of a Conservation Management Plan and permit from SAHRA for the presentation of archaeological sites for tourism (S44) promotion
National Environmental Management: Biodiversity Act (Act no. 10 of 2004)	• Provision for the MEC for Environmental Affairs/Minister to publish a list of threatened ecosystems in need of protection (S52)

	• Provision for the MEC for Environmental Affairs/Minister to identify any process or activity which may threaten a listed ecosystem (S53) Provision for the MEC for Environmental Affairs/Minister to publish a list of critical endangered species, endangered species, vulnerable species and protected species (S56(1) - see Government Gazette 29657) • Three government notices were published: GN R150 (Commencement of Threatened and Protected Species Regulations, 2007), GN R151 (Lists of critically endangered, vulnerable, and protected species) and GN R152 (Threatened Protected Species Regulations)
National Environmental Management: Air Quality Act (Act no. 39 of 2004)	• Provision for measures in respect of dust control (S32) • Provision for measures to control noise (S34)
National Environmental Management: Waste Management Act (Act no. 59 of 2008)	• Waste management measures • Regulations and schedules • Listed activities which require a waste licence
Occupational Health and Safety Act (Act No. 85 of 1993)	• Health and safety of all involved before and after construction must be protected.

Guideline Documents	**Sections applicable to the proposed project**
South African National Standard (SANS) 10328, Methods for environmental noise impact assessments in terms of NEMA no. 107 of 1998	• Impact of noise emanating from a proposed development may have on occupants of surrounding land by determining rating level • Noise limits are based on the acceptable rating levels of ambient noise contained in SANS 10103
Draft Guidelines for Granting of Exemption Permits for the Conveyance of Abnormal Loads and for other Events on Public Roads	• The Guidelines outline rules and conditions related to transport of abnormal loads and vehicles on public roads and detailed procedures to be followed for the grant of exemption permits

Policies and White Papers	**Sections applicable to the proposed project**
The White Paper on the Energy Policy of the Republic of South Africa (December 1998)	• The White Paper supports investment in renewable energy initiatives, such as the proposed solar power plant project
The White Paper on Renewable Energy (November 2003)	• The White Paper outlines the Government's vision, policy, principles, strategic goals and objectives for the promotion and the implementation of renewable energy in South Africa
Integrated Resource Plan (IRP1) Integrated Resources Plan 2010-2030 (IRP 2010) and updated IRP.	• The first Integrated Resource Plan (IRP1) was released late 2009. Subsequently the DoE decided to undertake a detailed process

	to determine South Africa's 20-year electricity plan, the Integrated Resources Plan 2010-2030 (IRP 2010). • The IRP1. IRP 2010 and IRP 2019 outline the Government's vision, policy and strategy in matter of the use of energy resources and the current status of energy policies in South Africa. • In the **IRP 2019**, published in October 2019, provision has been made to procure an additional **6 000 MW** of solar PV and 14 400 MW of wind between **2022** and **2030**.
Renewable Energy IPP Procurement Programme (REIPPPP)	• The IPP Procurement Programme, issued on 3rd August 2011 by the DoE, envisages the commissioning of **3 725 MW** of renewable projects (**1 450 MW with Solar photovoltaic technology**) **capable of beginning commercial operation before the end of 2020**.
Equator Principles (July 2006)	• The Equator Principles provide that future developments with total project capital costs of US$10 million or more shall be financed only if socially and environmentally sustainable.

5.3 LISTED ACTIVITIES IN TERMS OF NEMA

The application was submitted in terms of the EIA Regulations, 2014, as amended and listed activities involved in the proposed development are listed in table 3.

Table 3: Listed Activities in terms of sections 24 and 24D of NEMA approved for the proposed development

GN R.327 Item 11 (i) **The development of facilities or infrastructure for the transmission and distribution of electricity -** **(i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts.**	A 132 kV powerline will of 3,4 km will be constructed from the onsite substation to the collector substation which is also located on Portion 12 of the farm Blaauwbank 125 IQ.
GN R.327, Item 24 (ii) **The development of -** **(ii) a road with a reserve wider than 13,5m, or where no reserve exists where the road is wider than 8m.**	Access to Mopane Solar PV 3 will be from D859 and R501. During construction, the access road will be wider than 8 m to allow the transportation of abnormal goods (*e.g.*, power transformers, turbines).
GN R.327, Item 28 Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture or afforestation on or after 01 April 1998 and where such development: (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare; excluding where such land has already been developed for residential, mixed, retail, commercial, industrial or institutional purposes.	The construction of the Mopane Solar PV 3 facility will require clearance of indigenous, where the total area to be transformed (footprint of the plant) will be up to 245 ha.

GN R.325 Item 1 **The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 MW or more, excluding where such development of facilities or infrastructure is for photovoltaic installations and occurs within a urban area.**	The Mopane Solar PV 3 facility consisting of the construction, operation and maintenance of a Photovoltaic (PV) Power Plant with a maximum generation capacity up to 120 MW. The proposed substation will be located on Portion 12 of the farm Blaauwbank 125 IQ.
GN R.325 Item 15 **The clearance of an area of 20 ha or more of indigenous vegetation**	The construction of the Mopane Solar PV 3 facility will require clearance of indigenous, where the total area to be transformed (footprint of the plant) will be up to 245 ha. The required footprint should be cleared from the existing vegetation.
GN R.324 Item 12(c)ii The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan.	The construction of the Mopane Solar PV 3 facility will require clearance of indigenous, where the total area to be transformed (footprint of the plant) will be up to 245 ha in a critical biodiversity area in Gauteng province.

5.4 All recommendations and mitigation measures recorded in the EIA report.

In section 7 of this report, there is a summary table which constitutes the actual Environmental Management Program to be implemented, on site, during the construction, operation, and decommissioning phases. The first column of this table lists the recommendations and mitigation measures as recorded in the EIA report.

Despite all the management actions and mitigation measures to be implemented the applicant must adhere to the "duty of care" principle as included in section 28 of the National Environmental Management Act, 1998 (Act No. 107 of 1998) which states the following:

Every person who causes, has caused or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring, or, in so far as such harm to the environment is authorised by law or cannot reasonably be avoided or stopped, to minimise and rectify such pollution or degradation of the environment.

5.5 All mitigation measures as listed in the specialist reports

The mitigation measures included in the specialist's reports (obtained during the EIA process) are included in the EMPr in table format in Section 7 of this report.

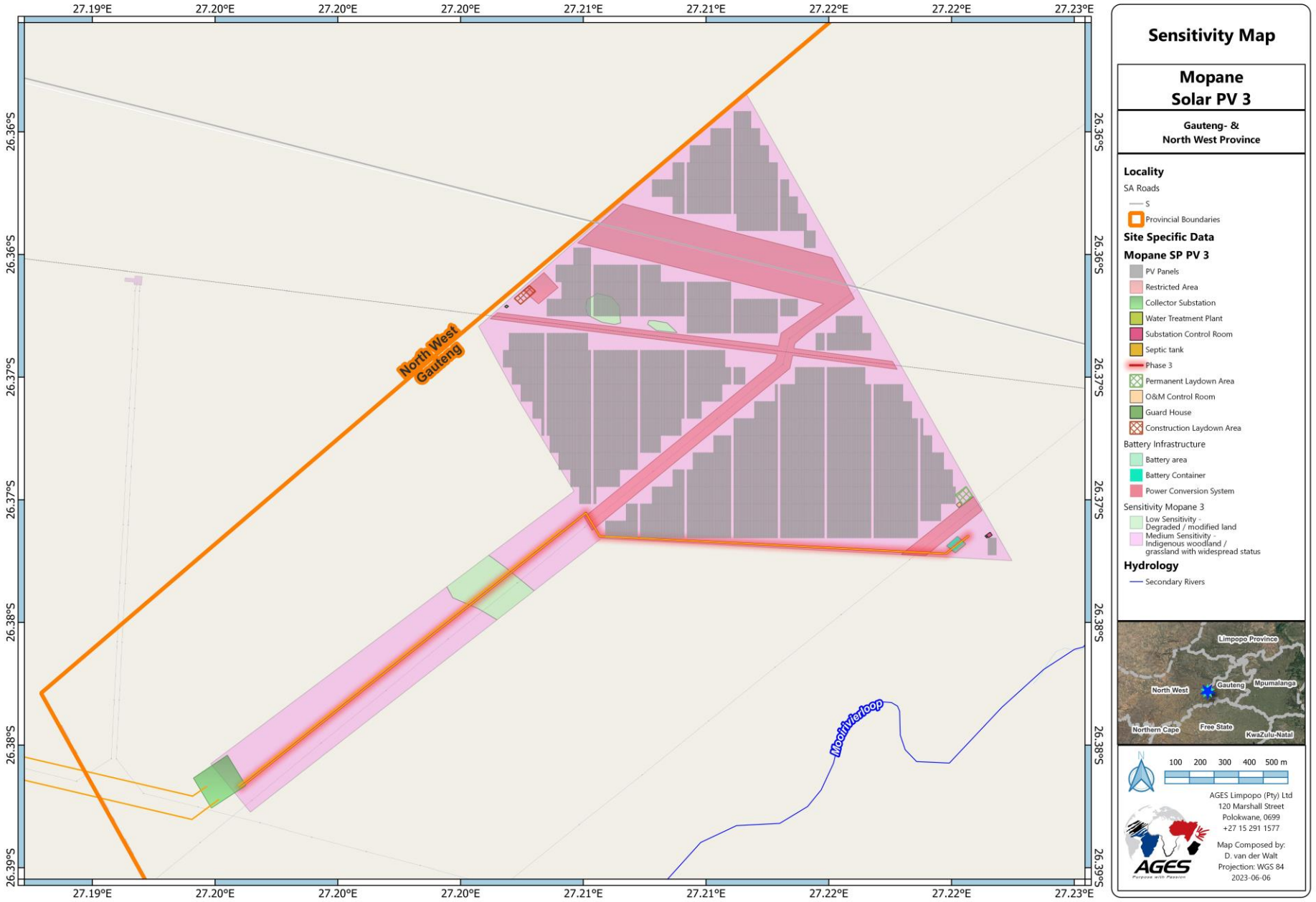

Figure 1. Proposed Draft Layout Plan of the Mopane Solar PV 3

5.7 Alien Invasive Management Plan

The construction phase of developments in the area will almost certainly carry the greatest risk of Invasive Alien Species being imported to the site, and the high levels of habitat disturbance also provide the greatest opportunities for such species to establish themselves, since most indigenous species are less tolerant of disturbance. Continued movement of personnel and vehicles on and off the development sites, as well as occasional delivery of materials will result in a risk of importation of alien species throughout the life of the project. The biggest risk is that invasive alien species such as the seeds of noxious plants may be carried onto the site along with materials that have been stockpiled elsewhere at already invaded sites.

According to the National Environmental Management: Biodiversity Act, 2004 (Act No.10 of 2004), (NEMBA) it is stated that landowners are under legal obligation to control invasive alien plants occurring on their properties. Landowners must then identify all invasive alien plants on their property and make use of the correct methods to control or remove these plants. The Alien and Invasive Species Regulations (GNR 599 of 2014) are stipulated as part of NEMBA.

The control methods of alien invasive plants are listed and included in the Alien Invasive Management Plan, as included in Annexure 1. A specific table is included in the Alien Invasive Management Plan, which lists the alien invader species found on the proposed development site and specific methods of control of these species (see Annexure 1). The aim of the Alien Invasive Management Plan is to reduce the invasion of alien species and ensure the continuous monitoring and removal of alien species.

5.8 Plant Rescue and Protection Plan

Plant species are also protected in the Gauteng Province according to the Gauteng Nature Conservation Bill, 2014. According to this Bill, no person may pick, import, export, transport, possess, cultivate or trade in a specimen of a specially protected or protected plant species. Appendices to the Act provide extensive lists of species that are protected, comprising a significant component of flora expected to occur on site. After a detailed survey was conducted during November 2022, the listed species *Boophane disticha* confirmed for the site. No eradication should be allowed without a permit.

5.9 Revegetation & Habitat Rehabilitation

Rehabilitation can be defined as the return of disturbed areas to a safe, stable, productive, and self-sustaining state that promotes biodiverse land use. Land rehabilitation techniques are used to speed up the time required to restore the impacted area back to its original, or better, state. To re-create and maintain a sustainable environment it is important to plan how the areas to be impacted by the construction of Mopane Solar PV 3 will be rehabilitated and revegetated. The purpose of rehabilitation planning is to promote the ecological integrity of the site and surrounding landscapes.

At site level, emphasis is placed on rehabilitation techniques such as land-form replication and planting species that will promote site stability and sustainability. Re-vegetation must use indigenous species that contribute most to the compatibility of the local ecology and increase biodiversity.

The final goal of the rehabilitation planning process is a practical, achievable, and adequately resourced rehabilitation programme. Rehabilitation of the disturbed areas must be done in such a way to ensure that the rehabilitation and revegetation on the site for the Mopane Solar PV 3 will be sustainable in the long term. The Re-vegetation and Habitat Rehabilitation Plan must be implemented during the construction and operation of the facility. Restoration must be undertaken as soon as possible after completion of construction activities to reduce the amount of habitat converted at any one time and to speed up the recovery to natural habitats.

The main actions to be implemented as part of the Re-vegetation and Habitat Rehabilitation Plan include the following.

- Identification and Protection of Environmentally Sensitive Areas
- Comprehensive Photographic Record
- Search and Rescue Activities
- Removal of Overburden
- Stormwater Management
- Compaction Rehabilitation Measures (ripping and / or scarifying)
- Erosion control and rehabilitation
- Erosion prevention
- Prevention of sedimentation
- Pollution prevention
- Littering prevention
- Building activity associated impacts
- Plant species management principles
- Fire Hazard
- Fauna
- Rehabilitation Areas and Site Specifications

A rehabilitation plan was compiled for Mopane Solar PV 3 and is included in Annexure 3.

5.10 Traffic Management

A traffic management plan must be in place, specifically for the site access roads to ensure that no hazards would result from the increase truck traffic and that traffic flow would not be adversely impacted. This plan must include measures to minimize impacts on local commuters *e.g*. limiting construction vehicles travelling on public roadways during the morning and late afternoon commute time and avoid using roads through densely populated built-up areas to not disturb existing retail and commercial operations.

The construction timeframe is estimated to be approximately **12-15 months.**

Traffic to and from the work site will be approximately 3 800 medium/heavy vehicle trips during the construction phase. The average number of medium and heavy trucks to and from the site will be 11.5 trucks per working day. The average daily trips of medium and heavy vehicles during the construction phase are indicated and discussed in the Traffic Impact Assessment Report as included in Annexure J of the EIA Report. Due to the anticipated number of vehicle trips to be generated by the proposed project during the construction and operational phases, it is expected that the vehicle traffic anticipated to be generated by the proposed project will have a negligible impact on the existing road network vehicle capacity and existing intersection performance.

Access to and from the proposed project site is discussed in the Traffic Impact Assessment Report as included in Annexure M of the EIA Report and safety factors at existing intersections at or near the development site.

5.11 STORM WATER MANAGEMENT

A storm water management plan must be implemented during the construction and operation phases of the project. The plan must ensure compliance with applicable regulations and prevent off-site migration of contaminated storm water of increase soil erosion. The plan must include the construction of appropriate design measures that allow surface and subsurface movement of water along drainage lines so as not to impede natural surface and subsurface flows. Drainage measures must promote the dissipation of storm water run-off. The purpose of the Storm Water Management Plan (SWMP) is the following:

- To provide guidance to align all phases of development and the eventual operation to the relevant legislation.
- To minimise risk of on site and / or downstream damage due to hydrological impact. This includes exposure to runoff associated with normal rain, as well as during more extreme flood events.
- To minimise the risk to on site and / or downstream contamination through storm water due to waste on site.
- It needs to consider the impact of rain on the site, the impact of water entering the site from higher ground and the impact of water leaving the site.
- This is not a design report; guidance is given in it for compliance by the eventual design-, implementation- and operational teams.

Diligence in stormwater management is essential and a full-time task, even during dry periods, as the lack of it may lead to slow degrading of the site, rendering it susceptible to serious damage in the event of unexpected flooding, and subsequent potential damage to equipment on site due to gradual erosion after normal rainfall events. Given the low rainfall, flat topography and low flow speed of run-off, no formal storm water structures are required as the proposed gravel roads will be developed at ground level so as not to disturb the natural flow of storm water. This means that run-off will not be concentrated, and the existing drainage patterns will be left undisturbed.

Because of the proximity of the development footprint to the drainage lines and rivers running through the farm it was deemed necessary to conduct a surface water survey which relates to the potential stormwater, on site and a Storm Water Management Plan was compiled.

CONSTRUCTION PHASE STORM WATER MANAGEMENT

- It is recommended that access and service roads, as well as stormwater systems are constructed at the commencement of the construction phase to ensure that suitable stormwater management measures are in place at the least additional cost.
- These permanent routes must be used also for construction purposes. In order to preserve the natural state of the surface and vegetation as far as practically possible, off-road driving must be restricted to the absolute essential.
- Space for lay-down areas for construction material and for construction facilities is restricted on site. It is not possible to give clear directions in terms of positioning it. The following must however be considered:
    - Temporary or permanent soil stockpiles must be placed in such a way to minimize the impact on surface flow.
    - High resolution site survey data must be used to design stormwater ditches to direct surface flood water past any stockpiles.
- Site clearing must be limited to the essential.
- Construction waste, including possible broken and damaged panels must be collected and stored safely for disposal in accordance with the relevant waste regulations, protocols, and product specifications. Care must be taken not to leave any waste on site that can lead to future contamination of the site or the downstream area.
- Training with regards to stormwater management of construction personnel must be undertaken as part of their induction.

OPERATIONAL PHASE STORM WATER MANAGEMENT

- Training with regards to stormwater management of site personnel must be undertaken as part of their induction. Refreshment training must be undertaken periodically.
- Regular conditional inspections of all storm water infrastructure are required. Inspection data must be recorded and accumulated for tracking purposes. Regular reporting must be a scheduled management task.
- Any item that may be found to be out of order, for instance accumulation of settled sand in a trench, or erosion, must be addressed and corrected without delay to keep the storm water system in a good and fully functional condition. Record must be kept on all repairs.
- Specific attention must be given to inspection during and after any rain and/or flood event to kerb any damage that may occur.
- If any structures have to be erected in the 1:100-year flood line zones, Water Use Licencing is compulsory (in terms of section 21(c)) of the National Water Act. Any such licence will contain various conditions about monitoring, maintenance, repair and reporting that must be complied with. It is essential to make this a key responsibility of the relevant manager.

WAY FORWARD

A detailed stormwater management plan will be compiled at the final design stage. Prior to the detailed design stage and implementation, a physical survey needs to be conducted. Based on this:

- The flood line determination must be reviewed.
- The site drainage needs to be designed on this elevation basis, with the full consideration of:
    - Final infrastructural layout on site. The final infrastructural layout and drainage design mutually impact on each other and will therefore be an iterative process.
    - Final flood line alignment that may require either or both of limited infrastructural re-arrangement of ground work to mitigate any exceedance of infrastructural development in the 1:100-year flood zones.

5.12 EROSION MANAGEMENT PLAN

A major component of construction at solar PV sites is the clearing and grading of land, which exposes, disturbs, and moves the soil. This inevitably increases an area's susceptibility to erosion. Since in these situations it is not feasible to eliminate all erosion risk factors and, thus, all erosion, the goal of implementing erosion control measures is primarily to minimize erosion. Therefore, an erosion management plan for monitoring and rehabilitation erosion events associated with the facility is required and appropriate erosion mitigation must form part of the EMPr to prevent and reduce the risk of any potential erosion.

A separate Erosion Management Plan was not compiled, as erosion management is discussed here. Erosion, by the action of water and wind, is a natural process in which soil and rock material is loosened and removed.

There are two major classifications of erosion:
(1) Geological erosion, and
(2) Man-made erosion.

Geological erosion, which includes soil-forming as well as soil-removing, has contributed to the formation of soils and their distribution on the surface of the earth.

Man-made erosion, which can greatly accelerate the natural erosion process, includes the breakdown of soil aggregates and the increased removal of organic and mineral particles; it is caused by clearing, grading, or otherwise altering the land. Erosion of soils that occurs at construction sites is **man-made erosion**.

Human activities can cause compaction of the soil, or disturbance of the soil. This hardening of the soil prevents water from effectively infiltrating the soil. This then results in larger volumes of water which moves quickly across a site carrying sediment to streams and rivers away from the site. The main factor causing or helping erosion on is erosion by water. This is the loosening and removal of soil and rock particles from a piece of land by running water, mostly caused by rainstorms. There are a number of factors influencing or affecting erosion namely soil characteristics, climate, rainfall intensity and duration, vegetation or other surface cover and topography.

5.12.1 Problems Caused by Erosion

The most important effect of erosion is the permanent loss of valuable topsoil at a site. If it is not controlled from the onset of a project and through the duration of the project, it will cause a loss of topsoil and can degrade the area permanently. The sediment that is transported by the rainwater can end up in surface streams and drainage lines and other water bodies.

5.12.2 Actions to stop or minimize erosion on a site

The affected area must be stabilised as soon as possible during or after construction. Preserving of existing vegetation or re-vegetation of disturbed soil as soon as possible after construction is usually the most effective way of controlling erosion. Vegetation cover acts in the following ways to reduce erosion:

- Shielding the soil against the direct impact of rain drops falling on the ground.
- It improves the soil water storage porosity, and more water filters into the ground.
- It slows down runoff so that the sediment can settle on the land.
- It holds the soil in place through the plant root system.

Areas which cannot be re-vegetated must be shaped or changed to effectively slow down the speed of the water over the area or by preventing the water to flow over such an area by diverting it away from the site. Mechanical ways can also be used to minimise or control erosion on a site.

5.12.3 Preserving of Natural Vegetation

By preserving natural vegetation, especially grasses, on the site that does not interfere with the construction process, must be left undisturbed or maintained to minimize damage. It will minimise erosion potential and aesthetically is pleasing which beneficial. The more vegetation area that is preserved the less area exposed to erosion. This is important to the areas between the panels where reseeding of the area afterwards is difficult. This must be planned still before the construction activities on site starts. The trees and shrubs in the area between the panels will unfortunately have to be removed.

- Do not grade the area to a "clean" state before constructing the panel supports and panels. Only remove the rocks and vegetation that will be in the way of the panels. Grass cover can be slashed or sprayed with an herbicide to slow down the regrowth of the grasses during construction.
- Don't let vehicles drive around where the panels must be constructed apart from a few designated driveways. This will prevent compaction of soil and destruction of vegetation in those areas.

5.12.4 Advantages of preserving natural vegetation

- Can handle higher volumes of storm water runoff than newly seeded areas.
- Does not require time to establish and increases filtering capacity because the vegetation and root structure are usually denser in preserved natural vegetation than in newly seeded or base areas.
- Enhances aesthetics.
- Provides areas for infiltration, reducing volume and velocity of storm water runoff.
- Usually requires less maintenance (e.g., irrigation, fertilizer) than planting new vegetation.

It requires good planning to be able to preserve natural vegetation.

5.12.5 Planting of new vegetation

It is important to establish permanent vegetation to minimize soil exposure to water and wind erosion. Vegetation/plants that have fibrous root system with fast establishment of roots and ground cover are good options. The grass cover can be sown by hand or machine sowing after scarifying the soil. Keep the planted area moist if possible so that the seeds can germinate quickly. Do not move over these areas again until a grass cover has been established.

5.12.6 Mulching

Similar to seeding, mulching is a method of applying plant or non-plant materials on the surface of the land to cover bare soil surface. Materials used are grass, hay, woodchips, wood fibres, straw, or gravel that is placed on the soil surface. The main goal of mulching is to protect the surface of the soil from the impact of erosive forces like the falling raindrops. In construction sites, mulch can be placed to minimize wind and water erosion.

However, the type of mulching selection depends on the land (i.e., slope). Heavy and large sized mulch would be more appropriate for a steep slope. In steep or gentle slopes, matting can be done to hold the mulch in place and reduce its movement by wind or water.

When used together with seeding or planting, mulching can aid in plant growth by holding the seeds, fertilizers, and topsoil in place, by helping to retain moisture(conserve moisture), and by insulating against extreme temperatures. If the mulch is plant-based or organic, it also increases the soil fertility. Mulching can provide immediate, effective, and inexpensive erosion control.

Advantages of mulching

- Provides immediate protection to soils that are exposed and that are subject to heavy erosion
- Retains moisture, which may minimize the need for watering
- Requires no removal because of natural deterioration of mulching

Disadvantages of mulching

- It can delay germination of some seeds because cover reduces the soil surface temperature
- Mulch can be easily blown or washed away by runoff if not secured
- Mulch may absorb nutrients necessary for plant growth

5.12.7 Structural measures to control erosion

Berms

Berms can be constructed around a site on especially the upstream side to keep extra water out of the site. This will minimise the volume of water flowing over a site which limits the erosion on the site. Berms can also be constructed on road surfaces with a gradient to slow down the velocity of the water and to divert the water off the road into storm water drains on the site.

Storm water drains

The storm water drains can be packed with rocks on short intervals and art the end to slow down the velocity of the flowing water and to dissipate the energy of the water where it leaves the site.

Gabions

Gabions of wire packed with rocks and lined with geotextile can slow down the water especially where the slope is steep. The geotextiles can also aid in trapping the sediment. This can be used in storm water drains next to roads by installing flat gabions on the drain surface to prevent unnecessary scouring of the soil surface in the drains if it is not constructed of concrete.

5.12.8 Monitoring of erosion on site

Before construction commences, the site manager must appoint a person to be on site for the construction phase. He/she will have the responsibility to monitor the risk and actual erosion arising from activities on site. His/her responsibilities will include:

- Monitoring the movements of vehicles and construction equipment on site to ensure that there is minimal movement off the normal roads and agreed drive lanes between the solar PV panels.
- Monitor the preservation of the vegetation in open spaces to ensure the integrity of the vegetation and soil is kept intact.
- Ensure that only areas are cleared of vegetation according to the site plans
- Ensure that only the planned roads are graded on the site.
- Ensure that gravel roads are kept moist during dry times to prevent the wind from blowing dust away and thus causing erosion in this manner.
- Regular monitoring for erosion to ensure that no erosion problems are occurring at the site as a result of the roads and other infrastructure. All erosion problems observed must be rectified as soon as possible.
- Monitor any erosion damage after rains events so that repairs to damaged areas can be done before the next rain event.
- Oversee the re-vegetation/mulching of cleared areas as soon possible to prevent unnecessary re-entry or movement in these areas.

5.13 Effective Monitoring System

An Effective Monitoring System must be in place to detect any leakage or spillage of all hazardous substances during transportation, handling, use and storage. This must include precautionary measures to limit the possibility of oil and other toxic liquids from entering the soil or storm water systems and will prove that environmental degradation and biological diversity have been mitigated and restored where it has been negatively impacted upon. Good record keeping is essential. All illegal invader plants and weeds must be eradicated as required in terms of Sections 119 to 126 of the National Environmental Management Act, 1998 (Act No. 107 of 1998).

Monitoring must take place at regular intervals to establish if the revegetation strategy was successful. The site must be monitored for at least two years to observe any possible invasion by alien species and, if they appear, they must be controlled as is appropriate. Also, to monitor and correct possible erosion, storm water and siltation problems. Soil sampling and analysis must be done every two years to monitor the development of the soil and need for supplementary fertilization.

Construction at solar PV sites will use equipment and vehicles that contain hazardous substances or has the potential to spill hazardous substances on site. There will also be chemicals and other hazardous substances which are used on site, which needs to be stored. This creates the potential for possible spillages and these substances can pollute soil and water systems and it needs to be handled with care. Strict control needs to be exercised regarding the handling and use of such substances.

5.13.1 Possible sources of hazardous substances

The following substances are potentially stored or used on site:

- Most construction vehicles and equipment used on site runs on diesel. The diesel is stored either in stationary tanks or in mobile fuel trailers or bowsers on site.
- The oils needed for lubrication of the equipment and vehicles.
- Hydraulic oils used in drills and equipment like cranes, TLB's and graders.
- Paints used on site.
- Petrol cans for supplying fuel to four-wheeler motorcycles used on site.
- Other chemicals and detergents used on site.

5.13.2 Measures to store hazardous substances on site

All hazardous substances on site must be handled in the following ways:

- All access to these substances must be controlled and must be locked away.
- All containers or storerooms where these substances are kept must have an impermeable floor and must be able to contain the substance in the room/store where it may be cleaned up.
- Where the floor is not impermeable, the substances will be stored in a drip tray capable of containing any spills from these containers.
- Material Safety Data Sheets (MSDS) for the specific substances must be available in a central file where the substances are stored.
- All substances will only be issued against a signature - records will be kept.
- Stationary diesel tanks will be kept in a concrete bunding able to contain at least 110% of the tank volume. A tap to drain storm water inside the bunding must run through an oil/water separator. All oils and fuel from the separator must be taken to an oil recycling company. Records of all oil/fuel removed must be kept.
- Fuel trailers must be parked either with sufficient drip trays underneath or it must be parked on an area where there is plastic sheeting underneath the soil to prevent ingress of the fuel/oil into the subsoil or groundwater. Polluted soil must be removed from time to time to a site registered to accept this material.

5.13.3 Handling of spills

Small spills on the ground

- Pick up the soil to a depth where it is clean from the substance and store it in a closed container from where it cannot leak and closed to rain.
- Have these soils removed by a registered contractor and keep records of volumes and details of each removal.

Large spills on the ground

- Keep spill kits available on site.
- Contain the spill by either using a spill absorbent sock from the spill kit or by making a soil berm around the spill.
- Scoop or pump out as much as possible of the pollutant into a closed container.
- Remove the polluted soil to a depth below the pollutant and place on a large sail to prevent any leaching of the pollutant to the soil and groundwater.
- Close the sails to prevent the ingress rainwater.
- Have the soil removed form site by a company registered to do that to a permitted waste site or let the company treat the soil on site until the pollutant levels are low enough to dispose of the soil on site again.
- If there is a possibility of pollution of groundwater or surface water, samples must be taken to be analysed to ensure that pollution can be treated if necessary.

5.13.4 Transportation of hazardous substances

- It is the responsibility of the transportation company to train their drivers and crews to handle packaging and transportation of hazardous substances safely and environmentally responsible.
- All vehicles transporting hazardous substances to the PV solar site must carry spill kits as first line treatment of spillages of hazardous substances.
- Material Safety Data Sheets (MSDS) for the substances transported must be available in the vehicle used for transportation.

5.13.5 Training of staff

- All staff working on site and responsible for a specific area must be trained in the detection of incidents, and the reporting there-of.
- All staff on site must be trained in the using of the spill response kit.
- All staff must be trained in the using of MSDS's and first aid kits must it be necessary during any spill incident.
- The staff must undergo an environmental consciousness course.

5.13.6 General

All spill incidents must be reported to the environmental control officer who must then report it to the authorities as required by law. Each pollution incident must be entered into a register on site. All details about the spill, the emergency measures taken, and the clean-up done must also be part of the entry in the register. Preventative measures must be drawn up to prevent recurring of the incident. The incident register must be available for scrutiny by IAP's must it be requested.

5.14 Protection of Hydrological Features

Measures must be in place for the protection of hydrological features such as streams, rivers, pans, wetlands, dans and their catchments, and other environmental sensitive areas from construction impacts including the direct or indirect spillage of pollutants.

In section 6.11 an Effective Monitoring System, is discussed, which must be in place to detect any leakage or spillage of all hazardous substances during their transportation, handling, use and storage. This includes the protection of hydrological features and other environmental sensitive areas from construction activities and its' impacts. Precautionary measures to limit the possibility of oil and other toxic liquids from entering the soil or storm water systems are discussed and if these measures are implemented it will also lead to the protection of hydrological and other environmentally sensitive features at the proposed development site.

5.15 Fire Management

In case of an unplanned fire, a management plan needs to be in order, which must include management protocols to ensure that the surrounding natural environment will not be affected by an unplanned fire sourcing from the facility. The main objective of the fire management plan is to prevent fires on site, and not to extinguish fires. The project area has historically been prone to fires and does have sufficient fuel to sustain a fire. Thus, a Fire Management Plan will have to be in place to prevent and/or contain fires from spreading that may start at the proposed development site. Fires caused by PV systems are regarded as rare, they do however still happen. Main causes for these fires include:

- Installation mistakes;
- Production failures;
- External influence; and
- Planning failure.

The correct management of these fires are crucial as they not only pose a major risk to the plant but also the surrounding environment and the firefighters (electrocution).

One of the objectives of the recent Request for Proposals (RFP) for the Risk Mitigation Independent Power Producers Procurement Programme (RMIPPPP), is to procure 2000 MW from a range of energy sources and technologies. Proposed technical solutions will have to be dispatchable and be able to provide a range of support services. This led to the inclusion of a Battery Energy Storage System (BESS) at the facility.

There are several scenarios which could lead to a fire event with the BESS. One of these scenarios could lead to an event which is known as a "thermal runaway" which is a chain reaction leading to a decomposition reaction of the cell that spreads to adjacent cells which could consequently lead to an exothermic reaction with heat release, release of flammable and toxic gases which are generated within the cell enclosure before venting and an intense fire due to the fact that the cells are constructed primarily of plastic, it is crucial to note that re-ignition can occur long after the fire is fully extinguished and must be considered a risk long after. Recommendations to reduce potential for BESS fires and the effects it may have on the PV solar park include *inter alia*:

- Batteries installed must have passed the non-thermal runaway propagation tests UL9540A to minimize scaling of a fire and will be contained in one rack.
- BESS enclosures are 60 min fire resistant.
- BESS have an aerosol extinguishing system triggered by temperature.

The continued maintenance of proper fire breaks is very important, as it serves to prevent external fires from entering a farm property and obstruct internal fires from spreading to neighbouring areas.

5.15.1 HIGH LEVEL RISK ASSESSMENT FOR BESS TECHNOLOGY

Batteries store electrical energy in chemical form. The range of electrochemical technologies include:
a) batteries with solid electrolyte, as Lithium-ion battery;
b) batteries with liquid electrolyte, as Na–S battery, Lead–Acid (PbA) battery, nickel - cadmium (Ni–Cd) battery or other types of liquid metal battery.

The preferred technology for the Battery Energy Storage System ("BESS") is **Lithium-ion battery cells**, which will be pre-assembled at the supplier factory and installed in the containers prior to delivery to the site. Lithium-ion cells technology offers the highest energy density (compared to the other cell technologies), does not suffer from memory effect and is low maintenance. Typical lithium-ion cells used for BESS hold a solid rechargeable electrolyte (the energy accumulator), therefore they don't hold any liquid or gas. The main benefit of solid ceramic electrolytes is that there is no risk of leaks, which is a serious safety issue for batteries with liquid electrolytes.

A BESS does not emit any gas to the atmosphere during construction and/or normal operation. The containers of the batteries are equipped with a firefighting system conceived to effectively detect smoke and high temperatures and automatically activate the extinguishers to prevent fire. Furthermore, the external metallic surface of the cells is conceived to resist to fire.

The preferred technology is therefore Lithium-ion battery cells with solid rechargeable electrolyte.

Batteries with liquid electrolytes are not preferred for the risk of leakage and consequent potential impacts on environment.

RISK

The primary focus is on the **fire hazards** associated with Li-ion batteries and potential for a condition known as "thermal runaway". Thermal runaway results from **internal shorts** inside a battery cell which occur due to a variety of reasons and **can ultimately lead to the battery catching fire.**

The following measures will reduce the fire risk to an acceptable level:

- The Battery Management System must include an approved device to preclude, detect, and control thermal runaway.
- The BESS must incorporate appropriately certified inverters/inverter systems and must comply with other recognised safety standards which address risk assessment and controls.
- The BESS must be well away from critical buildings or equipment and located in a non-combustible enclosure. Sufficient clearance must be maintained around the installation to provide for fire service access.
- Clear signage must be visible to include warnings of a possible fire hazard.
- An approved, monitored, automatic smoke detection system must be installed at the BESS. A fire suppression system must be designed and installed at the BESS.
- Regular inspections must be undertaken to ensure the battery systems are not overheating.
- Portable fire extinguishers must be provided at the BESS.
- Installations must have emergency power disconnects to ensure manual, remote, and local disconnect is possible adjacent to the BESS.
- The BESS must have an online condition monitoring system. The system must be fitted with temperature monitoring which incorporates a high temperature alarm for the battery room and container. Temperatures must be monitored at a constantly attended location.

Additional general recommendations to prevent and manage potential contamination of water resources:

- Compilation and adherence to a procedure for the safe handling of battery cells;
- Lithium-ion batteries must have battery management systems (containment, automatic alarms and shut-off systems) to monitor and protect cells from overcharging or damaging conditions, such as temperature extremes;
- Compilation of an Emergency Response Plan for implementation in the event of a spill of electrolyte from the batteries;
- Provision of spill kits on-site for clean-up of spills and leaks;
- Immediate clean-up of spills and disposal of contaminated absorbents and materials or soil at a licensed hazardous waste disposal facility;
- Recording and reporting of all significant electrolyte spills so that appropriate clean-up measures can be implemented. A copy of these records must be made available to authorities on request throughout the project lifecycle;
- Frequent and appropriate disposal of any hazardous waste to prevent pollution of soil and groundwater;

- On-site battery maintenance must only be undertaken on impermeable surfaces with secondary containment measures. Any resulting hazardous substances must be disposed of appropriately; and
- Provision of suitable emergency and safety signage on-site, and demarcation of any areas which may pose a safety risk (including hazardous substances). Emergency numbers for the local police, fire department, Eskom and the Local Municipality must be placed in a prominent clearly visible area on the site.
- Dispose of waste batteries in accordance with national legislation. When collected waste batteries must undergo recycling to comply with national regulations. Batteries must not be disposed of into the environment.

Safe handling advice

- When handling the batteries (cells), use personal protective equipment (non-conductive gloves), specifically to avoid short-circuits between the battery poles.

Technical measures/precautions:

- Follow the instructions reported in the user's manual prepared by the manufacturer.
- Do not short (+) or (-) battery terminals with conductors, do not allow battery terminals to contact each other.
- Do not use unadapted charging systems.
- Do not reverse the polarity,
- Do not mix different types of batteries or mix new and old ones together e.g. in a power pack,
- Do not open the battery system or modules,
- Do not use the unit without its electronic management system,
- Do not submit to static electricity risks to avoid damages to the protecting electronic circuit,
- Do not submit to excessive mechanical stress,
- Do not expose the battery to water or humidity (avoid water condensation),
- Do not expose to heat, solder or throw into fire. Such unsuitable use can cause leakage or evacuate through a safety valve gaseous electrolyte fumes that may cause fire,
- Immediately disconnect the batteries and isolate in a safe place if, during operation, they emit an unusual smell, develop heat, change shape/geometry, or behave abnormally. Contact the manufacturer if any of these problems are observed.

Storage

- Keep in a dry, cool and well-ventilated place, check the recommended storage temperature usually reported in the user's manual prepared by the manufacturer, (e.g. 35°C),
- Keep away from heat sources (max 60°C) and sources of ignition. Protect from direct exposure to sunlight.
- Keep away from water and condensation.
- Store in closed container and packaging, in such a way to prevent short circuits and damages during storage/transportation. Packaging qualified for transport is generally suitable for storage.

- In case of risk of thermal runaway during storage or transport, it is necessary to use strong outer packaging as recommended by the UN Special Provision 376 in order to restrict the potential ejection of cells constituents and battery parts during fire.
- In case of mixed storage of goods and articles, organize separate storage area for lithium-ion batteries. *E.g*. by maintaining a distance of 2.5 meters between the Lithium-ion batteries storage area and other goods.
- Store in limited quantities and in isolated area under external surveillance, unless specifically designed storage building (detectors and/or sprinklers protection systems).
- Infra-Red cameras may be used to detect any excessive temperature raise in stored quantities, *e.g*. > 85°C

The potential hazard offered by damaged lithium batteries *in absence of fire* is mainly the release of an electrolyte containing a corrosive salt. Measures must also be taken to protect operators from inhalation of volatile organic substances. Reaction of the electrolyte with water/humidity may generate hydrofluoric acid and irritate the eyes, nose, throat and skin.

Personal precautions

- Use personal protective equipment.
- Avoid contact with skin and eyes.
- Ventilate the area.
- Position yourself in the wind direction.

Environmental precautions

- Eliminate all possible sources of heat or ignition.
- Prevent further leakage or spillage if safe to do so (use absorbent cloth or other inert absorbent non-conductive mineral such as sand, sodium bicarbonate, alumina or vermiculite).
- Dry clothes can also be used as a absorbent material in absence of fire.
- Do not allow material to contaminate ground water system.

The information below refers to exposure to the substances contained in the battery.

Call for emergency services. Consider and decide about the adapted intervention plan (ACTIVE/PASSIVE Response, proximity or distance response).

In active response, (with Fire)

- Large flow of water can be used to **reduce the temperature of the batteries** and stop the fire reactions inside the batteries. Specific care must be taken for large and compact batteries, where cooling may require more time.
- Foam and specialized products can be used to reduce access of oxygen to the fire and stop flames, but are generally less efficient than cooling down the batteries. Be aware of the risk of re-ignition until the batteries have been cooled down below 100°C.

In passive response, control extension of fire to neighbours materials and buildings:

- Use abundant flow of water to cool down cells or batteries adjacent to the ones that have caught fire (maintain low temperature) whatever the type of batteries at the origin of the fire.
- The first responders need to be informed that in case of fire there is a risk of ejection of projectiles from the battery.

Suitable extinguishing media:

- Water (see below)
- Specialized products, liquid foam, carbon dioxide (CO2), sand, vermiculite.

Warning/risk for the use of water:

- If water is used on active batteries, caution must be taken to avoid the electrical hazard that may be present (in case of high voltage battery, > 36 Volts).
- The decision to use large amount of water is depending on the local circumstances (water retentions systems, environment risks, etc.).
- In case of fire including large Lithium metal or Lithium metal polymer batteries, the use of water may increase the energy /heat release.
- In such case, stop the use of water and allow the energetic fire of the battery during 15 minutes.
- Protect or cool with water the surrounding to avoid propagation of the fire.

Treatment of Wastewater:

- Confine the effluent or the contaminated material and collect it further as hazardous waste (water) for appropriate treatment.
- Pick up and transfer to properly labelled containers.
- Dispose of in accordance with local waste management legislation and emissions regulations.

5.16 Open Space Management Plan

This was not a requirement listed in the EA but is deemed important to manage areas at the development site, which are not going to be utilized but must be managed. An Open Space is any open piece of land that is undeveloped (has no buildings or other built structures) and is accessible to the public. Open space can include a green space, which is land that is partly or completely covered with grass, trees, shrubs, or other vegetation. At a PV plant, the space is defined as green space as it is usually covered by vegetation, but it **is not accessible by the public**.

In the development of a solar PV plant a large proportion of the site will remain in a natural to near-natural condition. Also, a large proportion of the areas disturbed during the construction phase will be re-vegetated with locally occurring species. There must not be a long-term negative impact on the local environment.

5.16.1 Risks and Management on site

The open spaces present certain risks to the site and must be operated and maintained for the safe and effective operation of the facility.

5.16.2 Fire risk on site

The vegetation on the site and specifically on the open areas needs to be managed to have a low fire risk.

- Tall woody plants and any other plants that may pose a risk will have to be cut on a regular basis and removed to minimise the fire risk.
- The grass cover will also have to be kept short to minimise the fire risk.
- NO fires will be allowed within the site, unless at designated areas.
- Fire breaks must be maintained and a road network in the facility must act as fire breaks.

5.16.3 Erosion risk on site

An open area where vegetation is removed during construction is prone to erosion by wind or by water and erosion has to be prevented and minimised as far as possible.

- Demarcate clearance areas and minimise surface disturbance. Do not remove vegetation on areas where panels will not be constructed, and which will be used as open spaces.
- Rehabilitate cleared sites as soon as possible.
- Minimise erosion risks. Do not drive through areas designated as open spaces except on roads constructed for driving.
- Monitor the site regularly for erosion especially after rain events.
- Follow the measures in the erosion management plan.
- Implement dust suppression measures.

5.16.4 Alien vegetation

Open areas can get infested by alien invasive plants as the plants can spread easily in an area in different ways. Open areas as well as the areas between the panels need to be regularly monitored for alien invasive vegetation and this vegetation must be controlled at a young stage according to the alien invasive management plan.

5.16.5 Littering

There is the risk that an open space can get polluted by littering which could come from workers inside the site, or which can be windblown from outside the site. Control littering through good housekeeping and by minimising waste on site.

5.16.6 Summary

Soil is a very valuable resource that needs to be conserved. Construction site managers need to plan well and make sure that measures are in place for managing the impacts of the construction process on aspects like erosion.

Conserving the soil on a construction site is far less expensive than mitigation of the damage afterwards. It is also far more efficient to maintain exiting vegetation cover to limit erosion than planting of new vegetation on the site afterwards.

All pollution incidents, especially regarding leakages or spillages of hazardous substances, are important and must be reported and investigated to prevent recurrence of such incidents. It is the duty of each worker and staff member to take the responsibility to monitor their work surroundings for spill incidents and to report it must it happen. This will ensure continual improvement in the environmental performance of the construction and operations teams on the site.

Open spaces must be kept clean and well managed so that if forms part of the visual appeal of the site. It must be managed in such a way as to preserve biological integrity of the site as well as to limit fire risk on the site.

6 AUDITING OF THE EA AND EMPR

Compliance with the conditions of the EA and EMPr for the construction and post-construction monitoring phases must be monitored monthly. Compliance reports must be submitted to the competent authority monthly.

The results of the audit must be recorded in an environmental audit report and any noncompliance must be formally recorded, along with the response-action required or undertaken. Each non-compliance incident report must be issued to the relevant person(s), so that the appropriate corrective and preventative action is taken within an agreed upon timeframe.

Appendix 7 of Regulation 326 of the 2014 EIA Regulations, as amended, contains the required contents of an Environmental Audit Report. The table below shows the legislated requirements of an audit reports, and all relevant environmental audits undertaken as part of this development (during construction and operation) must comply with these requirements.

Table 4: Contents of an audit report

1) An Environmental audit report prepared in terms of these Regulations must contain:
(a) Details of – (i) The independent person who prepared the environmental audit report; and (ii) The expertise of independent person that compiled the environmental audit report.
(b)Details of – (i) The independent person who prepared the environmental audit report; and (ii) The expertise of independent person that compiled the environmental audit report.
(c) A declaration that the independent auditor is independent in a form as may be specified by the competent authority.
(d) An indication of the scope of, and the purpose for which, the environmental audit report was prepared.
(e) A description of the methodology adopted in preparing the environmental audit report.

(f) An indication of the ability of the EMPr, and where applicable the closure plan to – (i) Sufficiently provide for the avoidance, management and mitigation of environmental impacts associated with the undertaking of the activity on an on-going basis; (ii) Sufficiently provide for the avoidance, management and mitigation of environmental impacts associated with the closure of the facility; and (iii) Ensure compliance with the provisions of environmental authorisation, EMPr, and where applicable, the closure plan.
(g) A description of any assumptions made, and any uncertainties or gaps in knowledge.
(h) A description of a consultation process that was undertaken during the course of carrying out the environmental audit report.
(i) A summary and copies of any comments that were received during any consultation process.
(j) Any other information requested by the competent authority.

Throughout the lifespan of this project, several individuals and entities will fulfil various roles and responsibilities to ensure the effective implementation of this EMPr. The key roles and responsibilities are detailed in the table below.

Table 5: Roles and responsibilities regarding the implementation of this EMPr

Responsible Parties	**Role and responsibilities**
Environmental Authority – Department of Forestry, Fisheries and the Environment.	Role: The Department of Forestry, Fisheries and the Environment (DFFE) is the competent authority responsible for compliance with the relevant environmental legislation, namely the National Environmental Management Act and other Specific Environmental Management Acts (SEMA's) Responsibilities: • Ensure overall compliance with the Environmental Authorisation (EA) & EMPr. • Review this document and any revisions thereof. • Undertake site audits at their discretion. • Review ECO Reports. • Review Audit Reports • Review Incident Reports. • Enforce legal mechanisms for contraventions of this EMPr and EA.
Holder of the Authorisation – Voltalia South Africa (Pty) Ltd.	Role: The holder of the Authorisation is ultimately responsible and legally liable for ensuring compliance with all statutory requirements relating to the Solar facility. Responsibilities: • Ensuring compliance with the conditions set out in the Environmental Authorisation issued in terms of the NEMA, as well as those prescribed by other relevant legislation and guidelines. • Compliance with the requirements set out in this EMPr. • Ensuring all other permits, permissions and licences from all other statutory departments are in place.

Environmental Control Officer (ECO) – To be appointed	Role: The ECO fulfils an advisory role to monitor, guide and report compliance with the EMPr. Responsibilities: • Revise, update and amend the EMPr if necessary and submit the amendments to the competent authority for consideration. • Ensure all relevant persons have a copy of the EMPr and any amendments thereof. • Advise the employer's representative on any additional environmental authorisations and permits that may be required. • Facilitate the Environmental Education / Induction Training with the contract staff. • Review and comment on Method Statements relevant to environmental management and make recommendations to the employer's representative. • Report any non-compliance with the EMPr or EA to the employer's representative and competent authority if necessary. • Undertake regular site inspections in compliance with this EMPr. • Monitor, audit and verify that all works comply with the EA and the EMPr. • Keep record of EMPr implementation, monitoring and audits, including a full photographic record of works. • Comply and submit regular Environmental Control Reports to the competent authority, as well as employer's representative &/ holder of the authorisation. • Report any environmental incidents or environmental impacts immediately to the employer's representative and the competent authority if necessary. • Report any environmental incidents or environmental impacts immediately to the employer's representative and the competent authority if necessary. • Assist the contractor and employer's representative planning for and implementing environmentally sensitive problem solving. • Advise the employer's representative on suggested "stop work" orders.
Environmental Site Agent (ESA) – To be appointed	Role: To assist the ECO with the day to day implementation and monitoring of the environmental management actions that are taking place on site. Responsibilities: • Day to day environmental control of contractors on site during the construction phase. • Monitoring of construction management activities during the construction phase. • Weekly reporting to the ECO.
Employers Representative – To be appointed	Role: The Employer's representative role is likely to be fulfilled by the project engineer and assumes overall delegated responsibility for compliance with this EMPr, the EA, the conditions of the Planning Approval, Conditions of the WULA and all applicable legislation for the duration of the construction phase.

	Responsibilities: • Issue site instructions to the contractor based on the advice of the ECO. • Ensure that all detailed design incorporates the requirements of the EMPr and EA. • Ensure that the EMPr is included in all tender documents issued to prospective contractors and sub-contractors. • Ensure the EMPr is included in final contract documents. • Ensure that the Tenderers/Contractors adequately provide for compliance with the EMPr in their submissions. • Ensure that the EMPr is fully implemented by the relevant persons. • Ensure the contractor provides the necessary method statements. • Be accountable, to the competent authority for any contravention or non-compliance by the Contractor. • Assist the contractor with input from the ECO in finding environmentally responsible solutions to problems. • Undertake regular site audits, site visits and inspections to ensure that the requirements of the EMPr are implemented • Give instructions on any procedures and corrective actions on advice from the ECO. • Report environmental incidents or non-compliance with the EA or EMPr to the environmental authority. • Issue spot fines, penalties or 'stop-work' orders for contravention of the EMPr and give instructions regarding corrective action.
Landowner – Vaaldam Prop (Pty) Ltd	Role: The landowner is responsible for compliance with legislation applicable to the management of the remainder of the property. Responsibilities: *E.g.*: In terms of the National Veld & Forest Fires Act (101 of 1998) - an owner on whose land is subject to a risk of veldfire or whose land or part of it coincides with the border of the Republic, must prepare, and maintain a firebreak on his or her land as close as possible to the border.

ENVIRONMENTAL MANAGEMENT PROGRAMME

7 ENVIRONMENTAL MANAGEMENT PROGRAMME - PV POWER PLANT AND CONNECTION INFRASTRUCTURE

PLANNING & DESIGN PHASE						
PLANNING & DESIGN PHASE						
Impact Management Outcome: Minimise impact to the environment by adhering to planning and design principles and relevant legislation						
Impact Management actions (mitigation measures)	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe: implementation	Responsible person	Frequency	Evidence: compliance
• Environmental Management Program (EMPr) must be compiled for clearance of indigenous vegetation and approved by DFFE.	Environmental Consultant	Compile EMPr	During EIA phase	ECO	When EA is issued	Approval of EMPr
• A full Environmental Impact Assessment must be conducted, and Environmental Authorisation obtained from DFFE.	Environmental Consultant	Conduct EIA process, obtain EA	During EIA phase	ECO	When EA is issued	Environmental Authorisation

CLEARANCE PHASE						
AIR QUALITY/NOISE - CLEARANCE PHASE						
Impact Management Outcome: Minimise impact to the environment and people through the control/mitigation of air quality impacts						
Impact Management actions (mitigation measures)	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe: implementation	Responsible person	Frequency	Evidence: compliance
Earthworks and vegetation clearance - dust						
• Construction areas must be dampened to prevent excessive dust formation when applicable during clearance and site preparation. • The use of a product like Eco-bond is recommended as opposed to water. It must be an inert product with no pollution risk.	Contractor	Water spray. Dust abatement program	During dry windy conditions	Site manager ECO	Daily	Visual & check records

CLEARANCE PHASE						
AIR QUALITY/NOISE - CLEARANCE PHASE						
Impact Management Outcome: Minimise impact to the environment and people through the control/mitigation of air quality impacts						
Impact Management actions (mitigation measures)	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe: implementation	Responsible person	Frequency	Evidence: compliance
• Clearing of the construction sites must be done in phases as the construction progresses. • Cleared topsoil must be stockpiled in such a way that transportation by wind or rain is limited. Restrict height of stockpiles, cover it and/or sandbag it.	Contractor	Clearance schedule	During construction	Site manager ECO	Weekly	Visual & check records
Movement of vehicles and construction equipment-fumes/smoke						
• Vehicles and construction equipment must be well serviced so that it does not produce excessive smoke. • The construction machinery must be maintained properly.	Contractor	Regular services	According to Maintenance schedule	Site Manager ECO	Weekly	Service records
Movement of vehicles and construction equipment-Dust						
• Main roads must be gravelled or sprayed with water especially during the dry months for dust suppression. • The use of a product like Ecobond is recommended as opposed to water. However, it must be inert with no pollution risk. • Internal roads must be maintained on a regular basis during construction.	Contractor	Spray with water truck	When need in construction	Project manager ECO	Daily	Visual check
• A speed limit must be enforced on dirt roads (30km/h). • All vehicles must adhere to all road signage within the site. • Vehicles are only allowed in designated areas.	Contractor	Road signs	During construction	Project manager Contractor	Weekly	Visual check
Burning of cleared vegetation and solid waste or fires for cooking and heating – smoke						
• Cleared vegetation waste will not be burned on site but removed to an authorised waste disposal site in the Merafong City Local Municipality on a regular basis. • No open fires are allowed at construction sites. Plant material can be used as mulch or for compost. Thicker branches can be used for firewood by the workers and community.	Contractor	Instruction to workers Visual checks Supply waste containers & remove waste	During construction	Project manager ECO	Daily for fires Monthly for disposal	Visual check & disposal records

CLEARANCE PHASE						
AIR QUALITY/NOISE - CLEARANCE PHASE						
Impact Management Outcome: Minimise impact to the environment and people through the control/mitigation of air quality impacts						
Impact Management actions (mitigation measures)	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe: implementation	Responsible person	Frequency	Evidence: compliance
• Solid waste will not be allowed to be burnt on site. Solid waste must be kept in scavenger and weatherproof bins from where it must be removed to Merafong City Local Municipality landfill site weekly. • Fires for cooking must be restricted to designated areas and must never be left unsupervised. • Fire belts must be made around the development. • Fire extinguishers must be placed strategically for easy access. • Smoking only allowed at designated areas per on-site signage. Workers must dispose of cigarette butts in designated containers. • Firebreaks must be maintained to decrease risk of accidental fires.		weekly				
• A waste management and recycling plan must be compiled for the construction phase of the development. The aim of the plan must ensure that the construction materials/debris generated on site be reduced, reused and recycled. The plan must be compiled in consultation with contractors and engineers.	Contractor	Implement plan	Daily during Construction	Project manager ECO	Weekly	Visual Records of disposal.
NOISE - CLEARANCE PHASE						
Impact Management outcome: Minimise impact to animals and people through the control/mitigation of noise impacts						
Impact Management actions (mitigation measures)	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe: implementation	Responsible person	Frequency	Evidence: compliance
Movement and operation of vehicles and machinery						

CLEARANCE PHASE						
AIR QUALITY/NOISE - CLEARANCE PHASE						
Impact Management Outcome: Minimise impact to the environment and people through the control/mitigation of air quality impacts						
Impact Management actions (mitigation measures)	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe: implementation	Responsible person	Frequency	Evidence: compliance
• Contractors must comply with all noise regulations. • It must be ensured that the construction personnel comply with speed restriction of 30 km per hour within the site boundaries to reduce the generation of noise. • Construction vehicles must be serviced regularly to ensure that they do not make excessive noise. The construction machinery must be fitted with noise mufflers and be maintained properly. • Construction of the PV plant and connection must be limited to take place between sunrise and sunset from Monday to Saturday. • Construction activities must only be allowed to take place on Sundays and after hours in case of serious time constraints. Surrounding property owners must be informed immediately if construction is going to take place after hours and/or on Sundays. • A verbal agreement, with adjacent landowners, must be in place before actions are taken outside normal daylight hours and on Sundays and Public Holidays. • Construction activities that is required to be conducted after hours must be done with minimal noise and disturbance.	Contractor / On-site safety officer	Vehicle maintenance	Continuous in construction according to schedule	Project manager Contractor / on-site safety office	Weekly	Records of compliance and incident register in Safety file
• All employees working in a noisy environment must be given the necessary ear protection gear.	Contractor	Physical handout of ear plugs	Daily	Project manager ECO	Weekly	Check use of ear protection by workers

CONSTRUCTION PHASE						
GROUND- AND SURFACE WATER POLLUTION - CONSTRUCTION PHASE						
Impact Management outcome: Minimise impact to the environment and people through the minimisation and control of groundwater and surface water pollution						
Impact Management actions (mitigation measures)	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe: implementation	Responsible person	Frequency	Evidence: compliance
Sanitation seepage and spillage from temporary chemical toilets.						
• Chemical sanitation facilities must be used on site and regularly (weekly) serviced by registered companies to ensure that no spills or leaks from toilets to groundwater or surface water take place. • The temporary sanitation system must be regularly inspected to ensure that no spills or leaks from sanitation system to groundwater take place.	Contractor	Appoint service contractor for weekly service of toilets Inspect toilets weekly	Weekly	Project manager ECO	Weekly	Records
• Chemical sanitation facilities must not be positioned closer than 100m from surface water resources. The ratio of one toilet for every 15 workers on site must be maintained.	Contractor	Positioning of toilets	Once off at beginning of each phase	Project manager ECO	Monthly	Visual inspection
Spillage of fuel and lubricants from construction vehicles and machinery						
• Construction vehicles must be serviced regularly to prevent or minimize the risk of spills or leakages of fuel and oil. • If servicing of vehicles is done on site, it must be done at designated areas. • All construction vehicles must be inspected for oil and fuel leaks regularly and frquently. • Vehicles must be parked with spill pans underneath the vehicles. • The storage of fuel, oils and lubricants must only take place where spillages can be controlled, in bunded areas.	Contractor	Service records, instructions/training to drivers and visual checks. Maintenance at service centre or on site (emergency) as required.	Daily	Project manager ECO	Monthly	Visual check Records check
• When a spill incident occurs all possible measures must be taken to ensure that spilled fuel or oil do not reach any drainage line. Water falling on areas polluted with oil/diesel or other hazardous substances must be contained.	Contractor	Handle the spill correctly	When spill takes place	Project manager ECO	Monthly	Check spill records

CONSTRUCTION PHASE						
GROUND- AND SURFACE WATER POLLUTION - CONSTRUCTION PHASE						
Impact Management outcome: Minimise impact to the environment and people through the minimisation and control of groundwater and surface water pollution						
Impact Management actions (mitigation measures)	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe: implementation	Responsible person	Frequency	Evidence: compliance
• Any excess or waste material or chemicals must be removed from the site and discarded in an environmental friendly way. • Spill incidents must be reported to DFFE and Gauteng Department of Agriculture and Rural Development (GDARD) in terms of Section 30(5) of NEMA.						
Solid and domestic waste removal						
• Domestic waste must be kept in adequate wind-, water- and animal proof waste bins or storage cages and must be disposed of weekly at a registered municipal landfill site. • Waste must be sorted and recycled as far as practically possible.	Contractor	Continuous	Weekly removal	Project manager/ECO	Daily checking Weekly removal	Disposal records
• Ensure strict compliance that no foreign matter is deposited in trenches. Any foreign matter must be removed immediately.	Contractor	Visual inspection before closure	Continuous	Project manager ECO	Weekly	Spot checks
Spillage as a result of BESS and potential contamination of water resources.						
• Compilation and adherence to a procedure for the safe handling of battery cells. • Lithium-ion batteries must have battery management systems (containment, automatic alarms and shut-off systems) to monitor and protect cells from overcharging or damaging conditions, such as temperature extremes. • Compilation of an Emergency Response Plan for implementation in the event of a spill or leakage. • Provision of spill kits on-site for clean-up of spills and leaks.	Contractor	Visual inspection before closure	Continuous	Project manager ECO	Weekly	Spot checks

CONSTRUCTION PHASE						
GROUND- AND SURFACE WATER POLLUTION - CONSTRUCTION PHASE						
Impact Management outcome: Minimise impact to the environment and people through the minimisation and control of groundwater and surface water pollution						
Impact Management actions (mitigation measures)	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe: implementation	Responsible person	Frequency	Evidence: compliance
• Immediate clean-up of spills and disposal of contaminated absorbents and materials or soil at a licensed hazardous waste disposal facility. • Recording and reporting of all significant fuel, oil, hydraulic fluid or electrolyte spills or leaks so that appropriate clean-up measures can be implemented. A copy of these records must be made available to authorities on request throughout the project lifecycle. • Frequent and appropriate disposal of both general and hazardous waste to prevent pollution of soil and groundwater. • Installation of leak detection monitoring systems where possible. • On-site battery maintenance must only be undertaken on impermeable surfaces with secondary containment measures. Any resulting hazardous substances must be disposed of appropriately. • Provision of suitable emergency and safety signage on-site, and demarcation of any areas which may pose a safety risk (including hazardous substances). Emergency numbers for the local police, fire department, Eskom and the Local Municipality must be placed in a prominent clearly visible area on the site. • Both the DFFE and the Gauteng Department of Agriculture and Rural Development (GDARD) must be notified immediately of any incident, where the incident constitutes an unexpected, sudden, and uncontrolled release of a						

CONSTRUCTION PHASE						
GROUND- AND SURFACE WATER POLLUTION - CONSTRUCTION PHASE						
Impact Management outcome: Minimise impact to the environment and people through the minimisation and control of groundwater and surface water pollution						
Impact Management actions (mitigation measures)	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe: implementation	Responsible person	Frequency	Evidence: compliance
hazardous substance, including from a major emission, fire or explosion, that causes, has caused or may cause significant harm to the environment, human life or property.						
Spillage/use of fuel in temporary fuel tanks as well as construction activities (*e.g.*, mixing of concrete, cement, paints etc.)						
• Diesel storage must be **less** than 80 000 litres at construction camps (higher volume will require Environmental Authorisation). • A bund wall must be constructed around the fuel tank structures and the run-off diverted to a conservancy tank. • The constructed bund must be able to hole 110% of the maximum allowable volume of the fuel tank. • Fuel tank must be covered with a roof to minimise rainwater ingress. • Drip pans must be used during re-fuelling and servicing of construction vehicles. Drip pans can also be placed underneath stationary construction vehicles and equipment. • Spilled fuel must be disposed of at the nearest approved fuel recycling collection point. Alternatively , an approved contractor can collect fuel waste and old oil to be taken to a licensed hazardous waste landfill site.	Contractor	Supply and erect surface tanks <30 000 litres	When required	Project manager	Weekly	Inspection log sheet Spot checks/photos
• Provision must be made for refuelling at the storage area by protecting the soil with an impermeable groundcover. Where dispensing equipment is used, a drip tray must be used to ensure small spills are contained.	Contractor	Supply drip trays and sheeting	Prior to any refuelling	Project manager ECO	Weekly	Photos
• Where refuelling away from the dedicated refuelling station is required, a mobile refuelling unit must be used. Appropriate ground protection such as drip trays must be used.	Contractor	Supply drip trays and sheeting	Prior to any refuelling	Project manager ECO	Weekly	Photos

CONSTRUCTION PHASE						
GROUND- AND SURFACE WATER POLLUTION - CONSTRUCTION PHASE						
Impact Management outcome: Minimise impact to the environment and people through the minimisation and control of groundwater and surface water pollution						
Impact Management actions (mitigation measures)	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe: implementation	Responsible person	Frequency	Evidence: compliance
• Mixing of cement, concrete, paints etc. must be done at designated areas in concrete aprons or on protected plastic linings to contain possible spillages into surface / groundwater resources.	Contractor	Supply protective material	When needed in construction	Project manager ECO	Weekly	Spot checks/photos
• Accidental spillages must be contained and cleaned up promptly. • Spill kits must be on-hand to deal with spills immediately.	Contractor	Have spill kits available	When spills take place	Project manager ECO	Monthly	Spill records
• Spillages or leakages must be treated according to an applicable procedure as determined by a plan of action for the specific type of disturbance.	Contractor	Spills procedure available on site and communicate to workforce		Project manager ECO	Monthly	Spill records
• The temporary vehicle maintenance yard and storage area must be fenced off.	Contractor	Fence off yard	Beginning of construction	Project manager	Weekly	Once off check
• Hazardous waste such as bitumen, oils, oily rags, paint tins and other used parts like filters must be contained and disposed of at an approved waste landfill site licensed to accept such waste.	Contractor	Appoint contractor for disposal of parts	Beginning of construction Disposal when needed	Project manager ECO	Monthly	Disposal records / Invoices and or receipts
Leakage of oil from the power transformers of the on-site HV substation						
• The on-site HV substation and switching station must be built according to the Eskom standards and guidelines.	Contractor	Build according to standards and guidelines	Construction phase	Project Manager	Weekly	Construction site meetings and records
• According to the Eskom *Oil Clean-Up And Rehabilitation Standards*, containment of spillages must involve action that will either prevent or stop a spill from spreading. It's vital to prevent oil spills from entering site's stormwater systems. Containment of oil pollution can be done using one or more of the following:	Contractor	Clean up according to standards and guidelines	When needed	Project manager ECO	Monthly	Checking of spillage records

CONSTRUCTION PHASE						
GROUND- AND SURFACE WATER POLLUTION - CONSTRUCTION PHASE						
Impact Management outcome: Minimise impact to the environment and people through the minimisation and control of groundwater and surface water pollution						
Impact Management actions (mitigation measures)	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe: implementation	Responsible person	Frequency	Evidence: compliance
○ soil barriers; ○ sand bags; ○ bund walls; and ○ absorbent materials. • Polluted soils must be removed to a waste site where it is authorized.						
Storage and disposal of waste and littering on site						
• Solid waste generated by the construction teams will not be burned on site or the surrounding areas. Solid waste must be kept in animal and weatherproof bins at the construction site. • Solid waste must be removed and taken to the Merafong City Local Municipality landfill site regularly, together with building rubble as the development progresses. • Regular clean-up programs must be put into effect throughout the premises to limit the impact of littering caused by construction activities.	Contractor	Supply waste containers Dispose of waste at the correct site Clean up site regularly	Continuously during construction Daily cleaning	Project manager ECO	Monthly	Check disposal records
• A comprehensive waste and recycling management plan must be compiled for the construction phase. The aim of the plan must be to ensure that the construction materials/debris generated on site be reduced, reused and recycled. • This plan must be compiled in consultation with the contractors and engineers and must be implented as indicated.	Contractor	Get waste plan from Project Manager	Start of construction	Project manager ECO	Once off	Waste and recycling management plan records

CONSTRUCTION PHASE						
GROUND- AND SURFACE WATER POLLUTION - CONSTRUCTION PHASE						
Impact Management outcome: Minimise impact to the environment and people through the minimisation and control of groundwater and surface water pollution						
Impact Management actions (mitigation measures)	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe: implementation	Responsible person	Frequency	Evidence: compliance
Storage of chemicals						
• Chemicals must be stored on an impervious surface protected from rainfall and storm water run-off. • Safety data sheets (MSDS) must be visible where chemicals are stored.	Contractor	Correct storage of the chemicals	Continuously during construction	Project manager ECO	Once off	Spot checking
Storm water across cleared areas						
• Clearance of vegetation must be restricted to 245ha development footprint, and a 132 kV powerline of 3,4 km will be constructed from the onsite substation to the collector substation which is also located on Portion 12 of the farm Blaauwbank 125 IQ. • Construction activities must be restricted to the 245ha footprint.	Contractor	Construction according to plans	During construction phase	Project manager ECO	Weekly	Check construction against plan
• Cleared areas must be rehabilitated by reintroducing a grass layer as soon as possible to limit the occurrence of water/wind erosion.	Contractor	Vegetate area with grass layer	During construction	Project manager ECO	Monthly	Checking Photo records
• Slopes produced by removing of soil must be kept to a minimum to reduce the chances of erosion damage to the area.	Contractor	Construction according to plans	Construction phase	Project manager ECO	Monthly	Checking Photo records
• Trenches for pipes or cables must follow the shortest and most efficient possible route to connect plant components (PV strings, MV stations, HV substation, *etc*.). • Where possible, construction of trenches must be dug next to roads where it will have the smallest impact. Any trenches dug for services to various buildings of PV plant must be filled up	Contractor	Construction according to plans	During construction phase	Project manager ECO	Monthly	Checking Photo records

CONSTRUCTION PHASE						
GROUND- AND SURFACE WATER POLLUTION - CONSTRUCTION PHASE						
Impact Management outcome: Minimise impact to the environment and people through the minimisation and control of groundwater and surface water pollution						
Impact Management actions (mitigation measures)	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe: implementation	Responsible person	Frequency	Evidence: compliance
and compacted well and slightly higher than the areas around it. • Construct sufficient outflow drains from roads to prevent soil erosion.						
• Monitor and repair any signs of erosion after heavy downpours.	Contractor	Visual checks	After rainstorms	Project manager ECO	Monthly	Visual checks
The use of herbicides to control exotic invasive vegetation species						
• Alien Invasive Management plan (cluded in EMPr) is applicable.	Project Manager	Compile rehabilitation plan	Prior to construction	Project manager/ECO	Once off	Eradication and rehabilitation plan
• Use of eco-friendly products to control pests vermin and invasive plants must be promoted and an ecologist be consulted before use.	Contractor	Check type of products to use	Prior to use in construction phase	Project manager ECO	During site meetings	Records of products used.

WATER SUPPLY MANAGEMENT - CONSTRUCTION PHASE						
Impact Management outcome: Implement responsible water usage						
Impact Management actions (mitigation measures)	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe: implementation	Responsible person	Frequency	Evidence: compliance
Construction activities and dust abatement along internal roads and at construction sites						
• Water must be used sparingly and it must be ensured that no water is wasted. • Roads must be treated with dust abatement chemicals to reduce the use of water. The use of a product like Eco-bond	Contractor	Keep water use records	Continuous	Project manager ECO	Monthly	Visual checks

WATER SUPPLY MANAGEMENT - CONSTRUCTION PHASE						
Impact Management outcome: Implement responsible water usage						
Impact Management actions (mitigation measures)	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe: implementation	Responsible person	Frequency	Evidence: compliance
is recommended as opposed to water. However, it must be an inert product with no pollution risk. • Washing of construction vehicles must be limited and done with high pressure sprayers to reduce water consumption. • Water tanks must be inspected to ensure no leaks occur. • Construction workers must be educated on the importance and ways to use water sparingly.		Training of workers in water saving				
Water use by exotic invasive plant species						
• Current exotic weed species must be eradicated, increasing water seepage towards the surface and groundwater resources.	Contractor	Program of eradication of weeds	Continuous during construction	Project manager ECO	Monthly	Spot checks

SOIL POLLUTION AND DEGRADATION (Geology, Soils & Wetlands) - CONSTRUCTION PHASE						
Impact Management outcome: Minimise impact to the environment and people through the minimisation and control of soil pollution and degradation						
Impact Management actions (mitigation measures)	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe: implementation	Responsible person	Frequency	Evidence: compliance
Operation of construction vehicles and machinery & Fuel storage (leakages)						
• Construction vehicles must be well serviced and maintained regularly according to manufaturers' specifications to prevent oil and fuel leaks. • All construction vehicles must be inspected for oil and fuel leaks regularly and frequently. • Temporary vehicle maintenance yard and storage area must be fenced off.	Contractor	Maintenance of vehicles	According to schedule	Project manager ECO	Monthly	Records

SOIL POLLUTION AND DEGRADATION (Geology, Soils & Wetlands) - CONSTRUCTION PHASE						
Impact Management outcome: Minimise impact to the environment and people through the minimisation and control of soil pollution and degradation						
Impact Management actions (mitigation measures)	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe: implementation	Responsible person	Frequency	Evidence: compliance
• Used parts like filters must be contained and disposed of at a site licensed for dumping of these waste products.	Contractor	Disposal at correct site	As maintenance is done	Project manager ECO	Monthly at site meetings	Records
• Machinery must be serviced and re-fuelled at existing facilities as far as is possible.	Contractor	Instructions to drivers	Continuously	Project manager ECO	Monthly	Records
• Prevent spillage of fuel or oil onto the soil, and put in place measures to ensure that any accidental spillages can be contained and cleaned up promptly. • Any spills must be treated and removed by a qualified agent/company.	Contractor	Clean-up	When applicable	Project manager ECO	Monthly	Records
• Diesel storage must be **less** than 30 000 litres at construction camps. • A bund wall must be constructed around the fuel tank structures and the run-off diverted to a conservancy tank. • The spilled fuel must be disposed of at the nearest approved fuel recycling collection point. Alternatively drip pans can be placed underneath temporary fuel tanks. • Drip pans must be used when refuelling and servicing construction vehicles or equipment. • Drip pans must be placed underneath stationary vehicles. • Used or spilled oil must be taken to the nearest oil refiner or recycling plant for recycling.	Contractor	Supply and erect surface tanks <30 000 litre	When required	Project manager ECO	Weekly	Inspection log sheet Spot checks/photos Disposal records
• Spill kits must be at-hand to deal with spills immediately.	Contractor	Keep spill kits on site	When required	Project manager / ECO	Weekly	Inspection log sheet. Spot checks/photos

SOIL POLLUTION AND DEGRADATION (Geology, Soils & Wetlands) - CONSTRUCTION PHASE						
Impact Management outcome: Minimise impact to the environment and people through the minimisation and control of soil pollution and degradation						
Impact Management actions (mitigation measures)	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe: implementation	Responsible person	Frequency	Evidence: compliance
Leakage of oil from the power transformers of the on-site HV substation						
• The on-site HV substation and switching station must be built according to the Eskom standards and guidelines.	Contractor	Build according to plans	Construction phase	Project manager	Weekly	Inspection Reporting at Site meetings.
• According to the *Eskom Oil Clean-Up And Rehabilitation Standards*, the containment of spillage must involve an action that will either prevent or stop a spill from spreading. It is vital to prevent any oil spill from entering the stormwater system. • Containment of the oil near the source will minimize pollution and will enable easy clean-up and/or remediation. This shall be done using one or more of the following: o soil barriers; o sand bags; o bund walls; and o absorbent materials. • Polluted soils must be removed to a waste site which is authorised to accept it.	Contractor	Treat spillage as prescribed in standards	When applicable in construction phase	Project manager ECO	When applicable	Incident logs and reports. Photo records
Spillage from temporary chemical toilets						
• Chemical sanitation facilities must be used on site and regularly serviced by registered companies to ensure that no spills or leaks from toilets to groundwater or surface water take place. The ratio of one toilet for every 15 workers on site must be maintained. • The temporary sanitation system in the construction site must be regularly inspected to ensure that no spills or leaks from sanitation system to groundwater take place. • For the private wastewater treatment works, the applicant must obtain approval in terms of the National Water Act, 1998	Contractor	Appoint service contractor	Weekly	Project manager	Monthly	Spot checks

SOIL POLLUTION AND DEGRADATION (Geology, Soils & Wetlands) - CONSTRUCTION PHASE						
Impact Management outcome: Minimise impact to the environment and people through the minimisation and control of soil pollution and degradation						
Impact Management actions (mitigation measures)	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe: implementation	Responsible person	Frequency	Evidence: compliance
(Act No. 36 of 1998) (NWA) for the water and sewer uses of the proposed development. • Plan and execute groundwater management plan around the selected site to protect the already vulnerable aquifer. (Must be submitted with WULA for approval)						
Increase in storm water run-off - soil erosion						
• Cleared areas must be re-vegetated allowing a grass layer to re-establish as soon as possible to limit erosion. • Minimize land disturbance. • Ensure that exposed bare soil is minimized by staging earthworks in phases and leaving as much ground cover intact as possible during construction. • Develop and implement stringent erosion and dust control practices. • The clearing of the site must be done in phases as the construction progresses. An efficient erosion control and slope-stabilizing program must be designed and implemented along the steep slopes of the site to reduce the risk of erosion. • Conservation of topsoil must be prioritized on site. • Slopes produced by removing of soil must be kept to a minimum to reduce the chances of erosion damage to the area.	Contractor	Construction according to plans. Follow revegetation plans	Construction phase. Continuous rehabilitation	Project manager ECO	Weekly	Check construction against plan
• Monitor and repair any signs of erosion after heavy downpours. • Repair erosion damage as soon as possible to allow for sufficient rehabilitation growth.	Contractor	Visual checks Repair erosion	After rainstorms	Project manager/ECO	Monthly	Visual checks
• Institute a storm water management plan.	Contractor	Institute stormwater plans	Prior to Construction	Project manager	Monthly	Visual Checks

SOIL POLLUTION AND DEGRADATION (Geology, Soils & Wetlands) - CONSTRUCTION PHASE						
Impact Management outcome: Minimise impact to the environment and people through the minimisation and control of soil pollution and degradation						
Impact Management actions (mitigation measures)	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe: implementation	Responsible person	Frequency	Evidence: compliance
• Have both temporary (during construction) and permanent erosion control plans.				ECO		
• Sufficient drainage must be provided along access roads to prevent erosion and pollution of adjacent watercourses or wetlands. • Natural storm water runoff not contaminated during the development and clean water can be discharged directly to watercourses and water bodies, subject to the Project Manager's approval and support by ECO.	Contractor	Construct roads with drainage according to plans	During construction phase	Project manager ECO	Monthly	Visual checks
• Training with regards to stormwater management of construction personnel must be undertaken as part of their induction.	Contractor	Training and induction program	Prior to working on site	Project manager ECO	Weekly	Check records
Solid waste accumulation on/in soil. Storage and disposal of building rubble, waste and littering on site						
• Solid waste must be kept in adequate animal-proof waste bins (scavenger and weatherproof) at the construction camp and at the construction sites. Building rubble and waste must be removed on a regular basis to the Merafong City Local Municipality's landfill site. • A suitably positioned and clearly demarcated waste collection site must be identified and provided. • The waste collection site must be maintained in a clean and orderly manner. • Waste must be sorted into separate bins and clearly marked for each waste type for recycling and safe disposal; • Staff must be trained in sorting of waste. • A comprehensive waste management plan must be compiled for the construction phase to ensure that construction waste on site be reduced, reused and recycled.	Contractor	Continuous implementation of waste management plan	Weekly removal	Project manager ECO	Monthly	Records of waste disposal to be kept.

SOIL POLLUTION AND DEGRADATION (Geology, Soils & Wetlands) - CONSTRUCTION PHASE						
Impact Management outcome: Minimise impact to the environment and people through the minimisation and control of soil pollution and degradation						
Impact Management actions (mitigation measures)	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe: implementation	Responsible person	Frequency	Evidence: compliance
• Regular clean-up programs must be put into effect throughout the premises to limit the impact of littering caused by construction activities.						
Handling/use/storage of dangerous substances (spillages)-Storage of chemicals/fuels on site						
• Chemicals to be stored on an impervious surface protected from rainfall and storm water run-off. (If necessary in a bunding)	Contractor	Supply safe, protected storage for chemicals and drip trays and sheeting	When required	Project manager ECO	Monthly	Inspection log sheet
Excavation for cabling and pipes laying						
• Trenches for pipes or cables will be constructed following the shortest and the most efficient possible route in order to connect all plant components (PV strings, MV substations, HV substation, *etc.*), where possible the construction of this trenches will be dug next to the roads where it will have the smallest impact. • Any trenches dug for the supply of services to buildings of the PV plant must be filled up and compacted well and slightly higher than the areas around it. This would allow for settling of the soil without trenches or erosion gullies forming again. • Repair all erosion damage as soon as possible no later than six months before the termination of the Maintenance Period to allow for sufficient rehabilitation growth. • Sufficient drainage must be provided along access roads to prevent erosion and pollution.	Contractor	Follow construction plans	Construction phase	Project manager ECO	Weekly	Visual checks Photo records

SOIL POLLUTION AND DEGRADATION (Geology, Soils & Wetlands) - CONSTRUCTION PHASE						
Impact Management outcome: Minimise impact to the environment and people through the minimisation and control of soil pollution and degradation						
Impact Management actions (mitigation measures)	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe: implementation	Responsible person	Frequency	Evidence: compliance
Assembly and installation of towers						
• Prior to installation, assembled towers and tower sections must be stored on elevated surface (suggest wooden blocks) to minimise damage to the underlying vegetation. • In sensitive areas, tower assembly must take place off-site or away from sensitive positions. • The crane used for tower assembly must be operated in a manner which minimises impact to the environment. • The number of crane trips to each site must be minimised. • Wheeled cranes must be utilised in preference to tracked cranes. • Access to tower positions to be done in accordance with access requirements. • Vegetation clearance to be undertaken in accordance with general vegetation clearance requirements specified in Section: Vegetation clearing. • No levelling at tower sites must be permitted unless approved by Site Manager. • Topsoil must be removed separately from subsoil material and stored for later use during rehabilitation of such tower sites. • Topsoil must be stored in heaps not higher than 2m to prevent destruction of the seed bank within the topsoil. • Excavated slopes must be no greater that 1:3, but where unavoidable, slopes must be stabilised. • Fly rock from blasting must be minimised and pieces greater than 150 mm falling beyond the site, must be collected and removed. • Only existing disturbed areas must be utilised as spoil areas.	Contractor	Follow construction plans	Construction phase	Project manager ECO	Weekly	Visual checks Photo records

SOIL POLLUTION AND DEGRADATION (Geology, Soils & Wetlands) - CONSTRUCTION PHASE						
Impact Management outcome: Minimise impact to the environment and people through the minimisation and control of soil pollution and degradation						
Impact Management actions (mitigation measures)	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe: implementation	Responsible person	Frequency	Evidence: compliance
• Surface water runoff is appropriately channeled through or around spoil areas. • During backfilling operations, care must be taken not to dump topsoil at the bottom of a foundation and then put spoil on top. • The surface of the spoil must be rehabilitated in accordance with the requirements specified in this EMPr. • Retained topsoil must be spread evenly over rehabilitation areas and compacted to effect re-vegetation of areas and prevent erosion as soon as construction activities are complete. Spreading of topsoil must not be done, beginning of the dry season.						
Stringing						
• Where possible, previously disturbed areas must be used for the siting of winch and tensioner stations. In all other instances, the siting of the winch and tensioner must avoid access restricted areas and other sensitive areas. • The winch and tensioner station must be equipped with drip trays in order to contain any fuel, hydraulic fuel or oil spills and leaks. • In the case of the development of overhead transmission and distribution infrastructure, a one metre “trace-line” may be cut through vegetation for stringing purposes only and no vehicle access must be cleared along ”trace-lines”. Vegetation clearing must be undertaken by hand, using chainsaws and handheld implements, with vegetation being cut off at ground level. No tracked or wheeled mechanised equipment must be used.	Contractor	Visual Checks	Prior to construction/ During construction	ECO/ PM	Daily	Visual checks and photographic evidence where applicable

SOIL POLLUTION AND DEGRADATION (Geology, Soils & Wetlands) - CONSTRUCTION PHASE						
Impact Management outcome: Minimise impact to the environment and people through the minimisation and control of soil pollution and degradation						
Impact Management actions (mitigation measures)	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe: implementation	Responsible person	Frequency	Evidence: compliance
• Alternative methods of stringing which limit impact to the environment must always be considered e.g. by hand or using a helicopter (in case the terrain is difficult and not accessable). • Where stringing operation crosses a public or private road or necessary scaffolding / protection measures must be installed to facilitate access. • If access has to be closed for a period during development, the persons affected must be given reasonable notice, in writing. • No services (electrical distribution lines, telephone lines, roads, railways lines, pipelines fences etc.) must be damaged because of stringing operations. Where disruption to services is unavoidable, persons affected must be given reasonable notice, in writing. • Necessary scaffolding protection measures must be installed to prevent damage to the structures supporting certain high value agricultural areas such as vineyards, orchards, nurseries.						
Handling of soils						
• Soil must be handled when dry during removal and placement to reduce the risk of compaction. • During construction, sensitive soils with high risk of compaction (e.g. clayey soils) must be avoided by construction vehicles and equipment, wherever possible, to reduce potential impacts. • Topsoil must not be compacted in any way, nor must any object be placed or stockpiled upon it. • Stockpile topsoil for a minimum time period *i.e*. strip just before the activity commences and replace as soon as completed. • Stockpile topsoil separately from subsoil.	Contractor	Handle according to Procedure	Construction phase	Project manager ECO	Monthly	Visual Checks

SOIL POLLUTION AND DEGRADATION (Geology, Soils & Wetlands) - CONSTRUCTION PHASE						
Impact Management outcome: Minimise impact to the environment and people through the minimisation and control of soil pollution and degradation						
Impact Management actions (mitigation measures)	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe: implementation	Responsible person	Frequency	Evidence: compliance
• Stockpile in an area protected from storm water runoff and wind. • Topsoil stockpiles must not exceed 2.0 m in height and must be protected by a mulch cover where possible. • Maintain topsoil stockpiles in a weed free condition. • Direct storm water past stockpiles by designing stormwater ditches.						
Geo-technical characteristics of soils at sites						
• The recommendations with regard to the geo-technical characteristics of the underlying soils must be adhered to.	Contractor	Handle soils according to Geotechnical report	Construction phase	Project Manager	Monthly	Check development according to layout plans

ECOLOGY - CONSTRUCTION PHASE						
Impact Management outcome: Minimise and control impact to the ecological aspects during construction.						
Impact Management actions (mitigation measures)	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe: implementation	Responsible person	Frequency	Evidence: compliance
Earthworks and vegetation clearance-loss of protected plants/other vegetation						
• The herbaceous layer must not be cleared prior to the construction of the plant but slashed. Once erected, the herbaceous layer could be kept short through slashing, which will also allow grazing in the area by small livestock and game species. • Clearance of vegetation and construction activities must be restricted to the proposed 245ha footprint, new section of	Contractor	Demarcate/ fence development and no-go areas	Before construction phase	Project manager ECO	Weekly	Visual inspection

ECOLOGY - CONSTRUCTION PHASE						
Impact Management outcome: Minimise and control impact to the ecological aspects during construction.						
Impact Management actions (mitigation measures)	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe: implementation	Responsible person	Frequency	Evidence: compliance
access road **and** the connection infrastructure site - from the on site substation to the Theseus substation. • No-go areas must apply must the walk over reveal red data species. • For the Eskom connection and development of new overhead powerlines a one metre "trace-line" must be cut through the vegetation for stringing purposes only and no vehicle access must be cleared along the "trace-line". Alternative methods of stringing which limit impact to the environment must always be considered. • Care must be taken that unnecessary clearance of natural vegetation does not take place. Restrict it to the footprint area. • During construction, sensitive habitats (prestine grassland) must be avoided by construction vehicles and equipment, wherever possible, in order to reduce potential impacts. • Trenches pose a risk to ground-living animals and must be cordoned off and backfilled as soon as possible during construction to prevent animals from falling into trenches. • Clearly demarcate the entire development footprint prior to initial site clearance and prevent construction personnel from leaving the demarcated area. • During construction, sensitive habitats must be avoided by construction vehicles and equipment, wherever possible, to reduce potential impacts. Only necessary damage must be caused and, for example, unnecessary driving around in the veld or bulldozing natural habitat must not take place.						
• Cleared areas must be re-vegetated allowing a grass layer to re-establish as soon as possible to limit erosion.	Contractor	Rehabilitation with grass layer	After each clearing phase and	Project manager ECO	Weekly	Visual inspection

ECOLOGY - CONSTRUCTION PHASE						
Impact Management outcome: Minimise and control impact to the ecological aspects during construction.						
Impact Management actions (mitigation measures)	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe: implementation	Responsible person	Frequency	Evidence: compliance
• Unnecessary driving around in the veld or bulldozing natural habitat must not take place. • The herbaceous layer must be revived after clearance of vegetation and actively managed through slashing during its lifetime of the project to help prevent fires in the panel area.			construction			
• Clearance of vegetation must be done in phases and concurrent rehabilitation of impacted areas surrounding the site could also be implemented to ensure areas are kept as natural as possible. • At the end of construction all equipment and infrastructure used for construction purposes must be removed.	Contractor	Schedule clearance and rehabilitation roster	Prior to each clearing phase	Project manager ECO	Weekly/daily	Visual inspection
• A monitoring plan is recommended for the construction phase to ensure minimal impacts on ecology. • Bird nests found in this phase must be reported to the ECO.	Project Manager	Compile monitoring plan	During construction phase	Project manager ECO	Weekly/daily	Visual inspection
• No protected plants must be removed without authorisation from Gauteng Nature Conservation. • Project must comply with the Gauteng Nature Conservation Laws.	Project Manager	Apply for permits.	Prior to construction	Project Manager ECO	Weekly/Daily	Visual inspection.
• The ECO must advise the construction team in relevant matters to ensure minimum destruction and damage to the environment. • ECO must enforce measures that he/she deem necessary. Regular environmental training must be provided to workers to ensure protection of habitat, fauna and flora.	ECO	ECO site visits and training sessions	Prior to and ongoing during construction phase	Project manager & ECO	Monthly	Visual inspection & monitoring reports
Vegetation clearance and the use of herbicides to control re-growth-Inappropriate use of herbicides and pesticides						
• Herbicides used to control invasive plants must be chosen in consultation with an ecologist.	Contractor	Liaison with Ecologist	Construction phase	Project manager & ECO	Weekly	Herbicide application Records

ECOLOGY - CONSTRUCTION PHASE						
Impact Management outcome: Minimise and control impact to the ecological aspects during construction.						
Impact Management actions (mitigation measures)	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe: implementation	Responsible person	Frequency	Evidence: compliance
• Exotic and invasive plants must be eradicated as construction progresses. • Rehabilitate disturbed areas as quickly as possible to reduce the area where invasive species would be at a strong advantage and most easily able to establish. • Institute a monitoring programme to detect alien invasive species early, before they become established and, in the case of weeds, before the release of seeds • Institute strict control over materials brought onto site, which must be inspected for potential invasive invertebrate species and steps taken to eradicate these before transport to the site. • Institute an eradication/control programme for early intervention if invasive species are detected, so that their spread to surrounding natural ecosystems can be prevented. • The ECO must regularly inspect the site, including storage facilities and compounds and eradicate any invasive or exotic plants and animals.	Contractor	Eradication and rehabilitation plan must be implemented	During construction phase	Project Manager ECO	Weekly/Daily	Photo records Site inspection records
Impact on avifauna population						
• All construction and maintenance activities must be carried out according to generally accepted environmental best practice and the temporal and spatial footprint of the development must be kept to a minimum. • The boundaries of the development footprint areas are to be clearly demarcated and it must be ensured that all activities remain within the demarcated footprint area. • The appointment of a competent Environmental Control Officer (ECO) is imperative.	Contractor	Construction of infrastructure according to approved plans. Poisons must be according to specialists' instructions	When applicable Only when there is no other way of getting rid of the problem animals	Project manager ECO	Monthly	Check plans Check poisons used

ECOLOGY - CONSTRUCTION PHASE						
Impact Management outcome: Minimise and control impact to the ecological aspects during construction.						
Impact Management actions (mitigation measures)	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe: implementation	Responsible person	Frequency	Evidence: compliance
• It is strongly suggested that construction be carried out after the breeding season. • Construction workers must not be accommodated on site and when on site contactors and working staff must stay within development footprint and movement outside these demarcated areas must be restricted. • Provide adequate briefing for site personnel. • The impact of collision of birds must be mitigated by placing the on-site high voltage substation close to the existing and planned Eskom's high-voltage power lines. • Speed limit of 30 km/h on site to avoid collissions with night birds and twilight active birds. • Poisons for control of problem animals must be avoided since the wrong use thereof can have disastrous consequences for the raptors in the area. The use of poisons for the control of rats, mice or other vermin can only be used after approval from an ecologist. • The breeding sites of raptors and other wild birds species must be taken into consideration during the construction phase. • If present at connection infrastructure site, breeding sites must be kept intact and disturbance to breeding birds must be avoided. Care must be taken where nestlings or fledglings are present. • Nesting sites on site must be documented.						
• For Eskom connection infrastructure power lines must be marked with suitable anti-collision marking devices on the earth wires as well as bird guards and diverters as per the Eskom guidelines	Contractor	Fit devices as per plans	When power lines are constructed	Project manager	When power lines are constructed	Check according to plans.

ECOLOGY - CONSTRUCTION PHASE						
Impact Management outcome: Minimise and control impact to the ecological aspects during construction.						
Impact Management actions (mitigation measures)	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe: implementation	Responsible person	Frequency	Evidence: compliance
• Use of owl boxes and bat hotels as biological pest control measures is recommended as an alternative to poisons and would serve to prevent owls and other birds from perching on solar panels. • Apply perch managing techniques such as conspicuous objects and support roosting sites along the power line that would allow large raptors and bustards to safely roost. • All probable and high risk perching surfaces must be fitted with bird guards and perch guards as deterrents. • Where possible the installation of artificial bird space perches or platforms at a safe distance from energised is advised. • Only power lines structures that are considered safe for birds must be erected to avoid the electrocution of birds (particularly large raptors) perching or attempting to perch. • The route internal power lines will follow must be the shortest distance possible or follow existing power lines. • Overhead transmission cables will be marked with bird diverters to make lines as visible as possible to collision-susceptible species. • Recommended bird diverters such as brightly coloured 'aviation' balls or flapping devices must be installed and luminescent light emission reflector devices or solar powered night deterrents for nocturnal birds or night-flying diurnal species.	Contractor	Construct in logical positions and protect from human activities	When applicable	Project manager ECO	Monthly	Inspection log sheet
Control of animals on site. Killing, poisoning, or hunting of animals						
• No animals will be allowed to be killed, captured or hunted or fed on site by construction workers. No poison must be used to control any animals without the input of an ecologist/zoologist.	Contractor Health and Safety Officer	Fine for transgressors Apply according	When applicable	Project manager ECO	Weekly	Incident logs

ECOLOGY - CONSTRUCTION PHASE						
Impact Management outcome: Minimise and control impact to the ecological aspects during construction.						
Impact Management actions (mitigation measures)	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe: implementation	Responsible person	Frequency	Evidence: compliance
• Limit pesticide use to non-persistent, immobile pesticides and apply in accordance with label and application permit directions and stipulations. The wrong use thereof can have disastrous consequences for the raptors occurring in the area. • The use of poisons for the control of rats, mice or other vermin must only be used after approval from an ecologist. • Instruct employees, contractors, and site visitors to avoid harassment and disturbance of wildlife. • No pets must be allowed on the site. • If a dangerous animal and/or venomous snake is encountered, the safety officer on site must always be consulted to ensure the safety and well-being of all employees. Procedure to follow during such an encounter must be addressed during the induction done for every person entering the site.		to label Training of work force				Check pesticides log Training records
• Where trenches pose a risk to animal safety, they must be adequately cordoned off to prevent animals falling in and being trapped and/or injured. This could be prevented by the constant excavating and backfilling of trenches during construction.	Contractor	Close trenches	When work in trench is done	Project manager ECO	Weekly	Visual checks
• A register must be kept of all relevant details of herbicide and pesticide usage.	Contractor	Draw up register	When applicable	Project manager/ECO	Monthly	Inspection log sheet
Occurrence of veld fires on site						
• Cleared vegetation will not be burned on site and must be stockpiled and taken to closest available landfill site. • Educate construction workers regarding risks and correct disposal of cigarettes. • Designated smoking area in project area must be provided, where the fire hazard and risk is insignificant and must have a	Contractor	Training & keep site clean of cleared vegetation	Weekly	Project manager ECO Health & Safety Officer	Monthly	Training records & visual inspection records.

ECOLOGY - CONSTRUCTION PHASE						
Impact Management outcome: Minimise and control impact to the ecological aspects during construction.						
Impact Management actions (mitigation measures)	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe: implementation	Responsible person	Frequency	Evidence: compliance
fireproof sand filled container for extinguishing cigarettes. Smoking is prohibited across the site and work areas. • Fires will only be allowed in designated places. No open fires are allowed but small fires for cooking must be restricted to designated areas, care must be taken to ensure prevention of veld fires from occurring. Cooking facilities within a designated area needs to be provided. • A fire hydrant system must be designed and installed.		Check incidence of open fires and cooking within designated areas	Daily		Daily	
• Portable firefighting equipment must be provided at strategic locations on site, in line with the building Code of SA and relevant provincial building codes. All emergency equipment including portable fire extinguishers, hose reels and hydrants must be maintained and inspected by a qualified person according to relevant legislation and national standards.	Contractor	Training on using firefighting equipment	At start of construction	Health & Safety Officer	As per the standards	Monitoring records
• Each employee, subcontractor or any other visitor must be made aware of the provisions of the fire management plan and is made familiar of the location and proper use of firefighting equipment as well as the location of assembly points.	Health & Safety Officer	Fires safety awareness and training	Ongoing	Health & Safety Officer	Ongoing	Training and induction records
• Fire Management training for all staff about the correct steps to take in case of an accidental fire, including the report of a fire as well as the use of the available equipment. • Contact numbers for the Fire Protection Agency (FPA), if in place and emergency services must be communicated in training programmes and displayed at a central location on site.	Health & Safety Officer	Fires safety awareness and training.	Monthly	Health & Safety Officer	Monthly	Training records
• Fire occurrence emergency protocol training. • The local FPA must be informed of construction activities.	Project manager ECO	Fire emergency drill tests	From April until October, every two months	Project manager ECO	From April until October, every two months	Records of training

ECOLOGY - CONSTRUCTION PHASE						
Impact Management outcome: Minimise and control impact to the ecological aspects during construction.						
Impact Management actions (mitigation measures)	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe: implementation	Responsible person	Frequency	Evidence: compliance
• Make and maintain proper firebreaks wide enough to prevent fires from crossing and monitoring of fire breaks around development footprint. Firebreaks must comply with National Veld and Forest Fire Act, 1998 (Chapter 4).	Contractor	Make fire breaks according to standards	Once-off Maintain as necessary	Project manager ECO	Monthly	Visual inspection
• The establishment and proliferation of Alien Invasive Plants (AIP) at the firebreaks must be monitored.	Contractor	Assess fire break and establishment of alien vegetation	Quarterly, especially during the dry season	ECO	Quarterly, especially during the dry season	Records of Monitoring
• Fire risk must be reduced by removing dry vegetation and combustible materials from hazardous material storage areas, cooking areas, smoking areas or equipment that may create a spark. Grass must be slashed under and around the PV plant.	Contractor	Removal of dry vegetation or combustible material	Daily	ECO	Daily	Records of Monitoring
• Local firefighting/fire protection agencies must be contacted in order to establish a relationship and shall have access to the solar park and the access road must allow any relevant fire fighting vehicle/truck to travel without hinder.	Contractor	Provide access to the solar park	Ongoing when needed	ECO	Ongoing	Entry records
• Adjacent landowners must be informed in the case of any fire.	Contractor ECO	Inform the landowners	In case of fire	Site Manager	In case of fire	Incident records
• A Fire Prevention and Fire Emergency Method must be in order and limited to the following: o Fire Fighting training for designated site staff; o Sources of fire risk and hazards, especially the BESS; o How to comply with equirements of local fire departments; o How to minimise the risk of accidental fires; o How to control accidental fires; and o Appropriate distance to stand away from PV system to avoid electrocution.	Contractor Health and Safety officer	Compile, make available and training of the Fire Prevention and Fire Emergency Method	Ongoing	Health and Safety officer	Ongoing	Training records.
• The solar park must be part of or form a Fire Protection Association (FPA). (https://www.fpasa.co.za/)	Contractor	Apply for membership of	Ongoing	ECO	Ongoing	

ECOLOGY - CONSTRUCTION PHASE						
Impact Management outcome: Minimise and control impact to the ecological aspects during construction.						
Impact Management actions (mitigation measures)	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe: implementation	Responsible person	Frequency	Evidence: compliance
		FPA				
• Routine checking of all the connections and panels.	Contractor Electrician	Physical testing and checking of equipment.	Ongoing	Electrician	Ongoing Yearly check of connections	Monitoring records
• Mobile electrostatic equipment must be used to ensure the system is grounded correctly.	Contractor Technician	Ground equipment as per standards		Technician	Monthly	Monitoring records Presence of electrostatic reading
• Check for animals and nests in the PV system and in/around the BESS.				ECO	Bi-Weekly	Monitoring records
• Lightning rods must be installed as per national guidelines.	Contractor	Install rods as per guidelines	Ongoing	Contractor	Ongoing	
Increase in traffic on the site						
• Speed of construction vehicles on internal roads must be kept as low as possible (30 km/h) to reduce incidence of road kill. • Use existing roads to minimise new disturbance in the area. • Construction activities must remain within defined construction areas and the road servitudes.	Contractor	Speed checks Fines to transgressors	Construction phase	Project manager ECO	Monthly	Visual inspection
Construction of roads with a kerb & Fragmentation of available habitat & restriction of movement of small mammals, reptiles and amphibians						
• Internal roads must be constructed without a kerb or with an angle of approximately 45º. This will allow for the free movement of small faunal species throughout the development area.	Contractor	Construction of roads according to plans	Construction phase	Project manager	Monthly	Visual check against plans
• Ensure protection of important resources by establishing protective buffers to exclude unintentional disturbance.	Contractor	Construction according to plans to stay out	Beginning and during Construction	Project manager ECO	Monthly	Visual check against plans

ECOLOGY - CONSTRUCTION PHASE						
Impact Management outcome: Minimise and control impact to the ecological aspects during construction.						
Impact Management actions (mitigation measures)	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe: implementation	Responsible person	Frequency	Evidence: compliance
• Use existing facilities (e.g., access roads, degraded areas) to the extent possible to minimize the amount of new disturbance. • Sensitive habitats must be avoided by construction vehicles and equipment, where possible, in order to reduce potential impacts.		of sensitive areas. Demarcate sensitive areas.	phase			
Materials brought onto site-Spreading of invasive animal species						
• Institute strict control over materials brought onto site, which must be inspected for potential invasive invertebrate species and steps taken to eradicate these before transport to the site.	Contractor ECO	Check materials during off loading	In construction phase	ECO	During offloading.	Visual Check of materials
• Institute an eradication/control programme for early intervention if invasive species are detected, so that their spread to surrounding natural ecosystems can be prevented.	Contractor	Implement Eradication programme	Beginning of construction phase	Project Manager ECO	Beginning of construction Monthly	Visual checks
• Monitor alien invasive species monthly during the rainy season. • ECO must regularly inspect the site, including storage facilities and eradicate any invasive or exotic plants and animals. • The ECO must be in attendance with every delivery at the construction site. The ECO must also sign the delivery register to indicate attendance and inspection of delivered goods.	Contractor	Walk over monitoring	Monthly – during rainy season	Project manager ECO	Monthly	Visual inspection
Littering (*e.g.* cans & plastics) along access road & at construction sites						
• Solid waste must be kept in adequate animal and weatherproof waste bins at the construction camp and construction sites. • Building rubble and various wastes must be removed on a regular basis to the Merafong City Local Municipality's landfill site.	Contractor	Removal of waste to licensed disposal site Regular site	During construction phase	Project Manager ECO	Daily Weekly	Disposal records

ECOLOGY - CONSTRUCTION PHASE						
Impact Management outcome: Minimise and control impact to the ecological aspects during construction.						
Impact Management actions (mitigation measures)	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe: implementation	Responsible person	Frequency	Evidence: compliance
• A recycling program must be designed in order to minimise production of solid waste (e.g. organic waste made into compost, the rest will be sorted and taken to various recycling stations in the Merafong City Local Municipality, if available). • Regular clean-up programs must be put into effect along access road and throughout the premises to limit impact of littering.		clean-up programs				

VISUAL DISTURBANCE - CONSTRUCTION PHASE						
Impact Management outcome: Prevent unnecessary negative visual impact by ensuring that visual impacts are mitigated.						
Impact Management actions (mitigation measures)	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe: implementation	Responsible person	Frequency	Evidence: compliance
Construction activities and temporary structures-visual impact.						
• Earth works must be executed in such a way that only the footprint and a small 'construction buffer zone' are exposed. In all other areas, natural occurring vegetation, and indigenous vegetation must be retained.	Contractor	Walk over monitoring	Monthly	Project manager ECO	Monthly	Visual inspection
• Materials and colours used in construction of structures and infrastructure must give preference to natural and eco-friendly choices, to minimize visual impact on aesthetic character of area.	Contractor	Walk over monitoring	Monthly	Project manager ECO	Monthly	Visual inspection
• No waste will be allowed to be burned on site.	Contractor	Instruction to personnel	Daily	Project manager ECO	Monthly	Visual inspection
• Minimum amount of existing vegetation and topsoil must be removed. Specifically, large trees must be saved were possible.	Contractor	Instruction to personnel	Daily	Project manager ECO	Monthly	Visual inspection

VISUAL DISTURBANCE - CONSTRUCTION PHASE						
Impact Management outcome: Prevent unnecessary negative visual impact by ensuring that visual impacts are mitigated.						
Impact Management actions (mitigation measures)	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe: implementation	Responsible person	Frequency	Evidence: compliance
• Stockpiled topsoil must be used during rehabilitation phase of disturbed areas and re-vegetation of the earth berm. The presence of degraded areas and disused construction roads, which are not rehabilitated, will increase the overall visual impact. • Construction camp, waste and storage areas and placement of ablution facilities, must be screened or positioned in areas less visible from human settlements and main roads. • Construction activities must be limited to 08:00 and 17:00 • Construction activities must be restricted to specifically demarcated areas. • Building or waste material discarded must be undertaken at an authorised location, which must not be within any sensitive areas. • Pole mounted CCTV facilities must be located 'in rhythm' with other project components. • All cut and fill slopes and areas affected by construction work must be top soiled and re-vegetated as soon as possible. • Soil exposure must be for the minimum time possible once cleared of vegetation to avoid prolonged exposure to wind and water erosion and to minimise dust generation. • The establishment of the proposed berm must occur immediately when construction activities star. • Progressive rehabilitation of all construction areas must be carried out immediately after they have been established. • Paint structures with colours that reflect and compliment colours of surrounding landscape. To reduce potential glare, external surfaces of structures must be articulated or textured to create interplay of light and shade. Avoid pure whites and blacks.						

VISUAL DISTURBANCE - CONSTRUCTION PHASE						
Impact Management outcome: Prevent unnecessary negative visual impact by ensuring that visual impacts are mitigated.						
Impact Management actions (mitigation measures)	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe: implementation	Responsible person	Frequency	Evidence: compliance
• Ensure the perimeter fence, is 'see through' and that its colour blends with the environment. • "Housekeeping" procedures must be developed to ensure the project site and lands adjacent to the project site are kept clean of debris, garbage, graffiti, fugitive trash, or waste generated onsite. • Plant clumps of indigenous evergreen trees (*Searsia sp.* and *olea europaea subsp. africana*) in the proposed tree buffer zone, which is to be a minimum of 20m wide. A tree screen will only become effective after 5 – 10 years of growth, when the impact of the PV arrays can be reduced over time. • During construction, temporary fences surrounding the material storage yards and laydown areas must be covered with cloth (khaki coloured). • Install light fixtures that provide precisely directed illumination to reduce light "spillage" beyond immediate surrounds of the site. • Avoid high pole top security lighting along the periphery of the site and use only lights that are activated on illegal entry to site. • Minimise the number of light fixtures including security lighting to the minimum.						

HERITAGE RESOURCES - CONSTRUCTION PHASE						
Impact Management outcome: Prevent/minimise negative impacts on heritage resources						
Impact Management actions (mitigation measures)	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe: implementation	Responsible person	Frequency	Evidence: compliance
Earthworks and excavations						

HERITAGE RESOURCES - CONSTRUCTION PHASE						
Impact Management outcome: Prevent/minimise negative impacts on heritage resources						
Impact Management actions (mitigation measures)	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe: implementation	Responsible person	Frequency	Evidence: compliance
• Before construction commences an archaeologist must be appointed to do a final walk over survey to confirm that there are no archaeological finds and or areas of archaeological significance on site. • Implement chance find procedures in case possible heritage finds are uncovered. • Halt construction and notify the archaeologist or SAHRA whenever anything of potential heritage value is discovered. • The area must be cordoned off and no access must be allowed to the site until the archaeologist has indicated that it is in order to do so.	Contractor	Halt construction Call Archaeologist	When required	Project manager ECO	When required	Incident log sheet

SAFETY, SECURITY, SOCIO-ECONOMICS, AND FIRE HAZARDS - CONSTRUCTION PHASE						
Impact Management outcome: Ensuring a safe/secure construction environment, enhanced socio-economic development and prevention of fires.						
Impact Management actions (mitigation measures)	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe: implementation	Responsible person	Frequency	Evidence: compliance
Construction activities - safety of employees						
• The Contractor shall conform to all the stipulations of the Occupational Health and Safety act, 1993 (Act No. 85 of 1993) and any Regulation applicable at the time of starting of construction. The Act requires the designation of a Health and Safety representative when more than 20 employees are employed.	Contractor	Apply Act	Continuous	Project manager	Monthly	Check number of employees on site Safety File records
• A person trained and accredited to administer first aid must be present on site and a first aid kit must be available at the office.	Contractor	Appoint trained safety officer. Supply first aid kit	Daily	Project manager	Monthly	Visual inspection Safety file records

SAFETY, SECURITY, SOCIO-ECONOMICS, AND FIRE HAZARDS - CONSTRUCTION PHASE						
Impact Management outcome: Ensuring a safe/secure construction environment, enhanced socio-economic development and prevention of fires.						
Impact Management actions (mitigation measures)	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe: implementation	Responsible person	Frequency	Evidence: compliance
• All personnel must be informed of emergency procedures and contact numbers must be displayed prominently.	Contractor	Training talks Display emergency numbers.	Weekly	Project manager	Monthly	Training records
• Personal Protective Equipment (PPE) and safety gear must be provided to all site personnel (hard hats, safety boots, masks *etc.*).	Contractor	Supply PPE	When required	Project manager	Monthly	Check: workers must use PPE
Fires caused by the negligence of construction workers						
• The development must comply with the requirements of the National Veld and Forest Fire Act, 1998 (Chapter 2: Fire Protection Associations and Chapter 4: Duty to Prepare and maintain firebreaks). • An emergency plan must be in place so that any fire can be combatted in the most efficient manner. An emergency response plan that is aligned with the local Fire Department must be in place.	Contractor	Ensure compliance with Act. Training on Emergency plan	At onset of construction phase Monthly	Project manager	Monthly	Training records
• No solid waste or vegetation will be allowed to be burned on the premises or surrounding areas. No fires will be allowed outside designated areas (construction camp).	Contractor	Instruction to employees	Weekly	Project manager ECO	Monthly	Incident log sheet
• All employees must be properly trained in the use of firefighting equipment and the emergency procedures in case of a fire.	Contractor	Training cessions	Monthly	Project manager	Monthly	Training records
• Firefighting equipment must be available and must be checked regularly to ensure it is in working order and easily accessible.	Contractor	Supply & check firefighting equipment	Weekly	Project manager Contractor	Monthly	Inspection log sheet
Construction activities - socio-economic impact- Long and short-term Employment of workers						
• Adherence to the Local and District Municipality's guidelines, principles and policies is imperative.	Contractor	Ensure adherence to policies. Implement	Daily during construction phase	Project Manager	Monthly	Follow up during site meetings

SAFETY, SECURITY, SOCIO-ECONOMICS, AND FIRE HAZARDS - CONSTRUCTION PHASE						
Impact Management outcome: Ensuring a safe/secure construction environment, enhanced socio-economic development and prevention of fires.						
Impact Management actions (mitigation measures)	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe: implementation	Responsible person	Frequency	Evidence: compliance
		standards				
• During the construction and operational phases, jobs must be created for unemployed local people and skills must be transferred to them. Where viable, the work must be executed in a labour intensive manner to create as many jobs possible.	Contractor	Appoint local people	Construction phase	Project manager	Monthly	Staff records
• Contribute 1.5% of turnover to community development in the vicinity of the project.	Developer	Community projects and development	Construction and operation	Developer	Annual	Record and proof of contributions
Security Issues- Unauthorized entrance to construction areas and construction workers staying overnight at construction site						
• All personnel must be informed of emergency procedures and emergency contact numbers must be displayed prominently. • Proper access control (I.D. cards) must be enforced at entrance gate to ensure that no unauthorised persons enter the site. Security personnel must be appointed to enforce strict access control.	Contractor	Training sessions on security issues- induction	Start of construction	Project manager	Monthly	Training records
• No staff will be allowed to overnight on the site. Transportation must be arranged for construction workers to ensure that workers have daily transportation available to and from the site. • For Eskom connection infrastructure, access to servitude and tower positions must be negotiated with relevant landowner (if not the same as the authorised access point) and must fall within the assessed and authorised area. • The access roads to tower positions must be signposted after access has been negotiated and before the commencement of the activities. • All private roads used for access to the servitude must be maintained and upon completion of the works, be left in at least the original condition.	Contractor	Arrange transport for the workers	Start of construction phase	Project manager	Monthly	Transport records

SAFETY, SECURITY, SOCIO-ECONOMICS, AND FIRE HAZARDS - CONSTRUCTION PHASE						
Impact Management outcome: Ensuring a safe/secure construction environment, enhanced socio-economic development and prevention of fires.						
Impact Management actions (mitigation measures)	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe: implementation	Responsible person	Frequency	Evidence: compliance
• Any access route deviation from that in the written agreement must be closed and re-vegetated immediately, at contractor's expense. • Maximum use of existing servitudes and roads must be made to minimize further disturbance with the development of new roads. • Access roads in flattish areas must follow fence lines and tree belts to avoid fragmentation of vegetated areas. • Access roads must only be developed on pre-planned and approved roads.						
• A boundary fence can be constructed around the site, which will act as a security barrier. A temporary fence must be erected around the construction camp and storage area.	Contractor	Construct fences	Start of construction phase	Project manager	Monthly	Visual checks
• Security lights and infra-red video surveillance will be installed at the construction camp and storage area in such a manner that it does not become a nuisance to the surrounding properties. • Security lights must shine directly down and directed towards the site away from the surrounding properties. • A video-surveillance system using infrared or microwave video cameras, which do not need a switched on lighting system, is recommended. • Adherence to the Visual Impact Assessment mitigation measures.	Contractor	Install security lighting and video surveillance system	Start of construction phase	Project manager ECO	Monthly	Visual checks

TRAFFIC IMPACT MANAGEMENT - CONSTRUCTION PHASE						
Impact Management outcome: Prevent/minimise negative impacts on heritage resources						
Impact Management actions (mitigation measures)	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe: implementation	Responsible person	Frequency	Evidence: compliance
Construction vehicles and increase in traffic						
• All road safety regulations must be adhered to – on and off-site. • Vehicles must be roadworthy. • Speed limits to be ahered at all times. • Dust suppression to done to avoid visibility problems. • The use of a product like Ecobond is recommended as opposed to water. It must be an inert product with no pollution risk. • Provide a dedicated loading and off-loading area on site as part of the Proposed Development and ensure that contractors make use of the dedicated area.	Contractor	Visual checks	When required	Site Manager	When required	Incident log sheet
Road Safety						
• It would be required to repair the roadway at the intersection of Roads D859 and D331 (**Point A**) as it is in a very poor condition, as determined by a visual inspection, due to an excess of potholes. A pavement design engineer needs to be appointed in order to assess the intersection from a pavement design point of view and to implement improvements in collaboration with Gautrans. • Provide reflective road studs as part of the intersection to improve visibility of the intersection geometry when it is dark. • Provide relevant road traffic signs and road markings. • Provide 60 metres dedicated right-turn lane on the northern approach of Road D331. • Provide 60 metres dedicated left-turn lane on the eastern approach of Road D859. • During construction phase, ensure that contractors load and off-load pedestrians on site and not at the access intersection.	Roads Authority	Construction of mentioned changes and aspects	Prior to construction of the solar park.	Site Manager	Prior to and during construction of solar park.	Incident log sheet

OPERATIONAL PHASE						
AIR QUALITY – OPERATIONAL PHASE						
Impact Management outcome: Prevent/minimise negative impacts on safety of employees						
Impact Management actions (mitigation measures)	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe: implementation	Responsible person	Frequency	Evidence: compliance
Movement of vehicles and construction equipment-fumes/smoke						
• Vehicles and construction equipment must be well serviced so that it does not produce excessive smoke. • The construction machinery must be maintained properly.	Site Manager	Regular services	According to Maintenance schedule	Project manager ECO	According to service plan	Service records
Movement of vehicles and construction equipment-Dust						
• Main roads must be sprayed with water during the dry months or a product like Eco-bond which is recommended as opposed to using potable water. It must be an inert product with no pollution risk. • Internal roads must be maintained during operational phase.	Site Manager	Spray with water truck	During lifetime of project	Site Manager	Daily	Visual check
• Speed limit must be enforced on roads (preferably 20 - 30km/h).	Site Manager	Road signs	Project lifetime	Site Manager	Weekly	Visual check
NOISE - OPERATIONAL PHASE						
Impact Management outcome: Prevent/minimise negative impacts on safety of employees						
Movement and operation of vehicles						
• On site personell must comply with all noise regulations. • On site personnel mustcomply with speed restriction of 30 km/h within the site boundaries to reduce the generation of noise. • All vehicles must be serviced regularly to limit excessive noise.	Site Manager	Regular services	According to Maintenance schedule	Site Manager	According to service plan	Service records

VISUAL IMPACT - OPERATIONAL PHASE						
Impact Management outcome: Prevent/minimise negative impacts on safety of employees						
Impact Management actions (mitigation measures)	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe: implementation	Responsible person	Frequency	Evidence: compliance
Visual impact.						
• All lights must shine directly down, directed towards PV plant. • Adherence to the Visual Impact Assessment mitigation measures. • Soft lighting and only where needed is permitted. • Use lighting that relies on infrared sensors to swithch on the lights.	Site Manager	Visual Check during the night	Life of the project	Site Manager	Daily	Management reports
• No waste will be burned on site.	Site Manager	Visual check	Daily	Site Manager	Daily	Management reports

ECOLOGY - OPERATIONAL PHASE						
Impact Management outcome: Minimise and control impact to the natural ecology						
Impact Management actions (mitigation measures)	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe: implementation	Responsible person	Frequency	Evidence: compliance
Spreading and propagation of Alien Invasive Species						
• The site manager must be assisted by an ecologist to be able to identify AIS, on site. • If detected early, the entire population must be eradicated. • Implement Control Methods as indicated in Table 1 of the AIS Management Plan.	Site Manager	Walk through site. Early detection of AIS. Mechanical, Chemical or Biological Control	Continues during operational phase, but important during the rainy season	Site Manager	Bi-annually (After the first rainfall and near the end of the rainfall season)	Visual inspection – Site walk-through

ECOLOGY - OPERATIONAL PHASE						
Impact Management outcome: Minimise and control impact to the natural ecology						
Impact Management actions (mitigation measures)	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe: implementation	Responsible person	Frequency	Evidence: compliance
Revegetation and Habitat Rehabilitation						
• Identify and Protect Environmentally Sensitive Areas.	Site Manager / Ecologist / ECO	Consult Re-vegetation and Rehabilitation Plan - liaise with Ecologist	Throughout the project lifetime	Site Manager	Annually	Monitoring Report
• Keep Photographic Record.	Site Manager / Ecologist / ECO	Take Photographs smart phone/camera	Throughout the project lifetime	Site Manager	Annually at the same time, each year	Report – Photographic Record
• Search and Rescue Activities by keeping transplantable plant species in a temporary nursery (no exotic plant species will be allowed to be planted).	Site Manager / Ecologist / ECO	Create and maintain temporary nursery of indigenous plants	During Rehabilitation, after construction	Site Manager	Annually same time, each year	Monitoring Report
• Cleared Indigenous plant to be used in erosion prone areas and mulching in rehabilitated areas.	Site Manager / Ecologist / ECO	Brush Packing and mulching in erosion areas	During Rehabilitation, after construction	Site Manager	Annually at the same time, each year	Monitoring Report
• Revegetate or stabilize disturbed areas for erosion control and rehabilitation.	Site Manager / Ecologist / ECO	Re-seeding, replanting and brush packing	During Rehabilitation, after construction	Site Manager	Annually at the same time, each year	Monitoring Report
• Littering prevention by providing rubbish bins for staff at designated areas, particularly where food is consumed.	Site Manager / Ecologist / ECO	Provide bins for waste with signage.	Throughout the project lifetime	Site Manager	Monthly	Monitoring Report
• Plants kept in temporary nursery to be re-planted for re-vegetation.	Site Manager / Ecologist / ECO	Planting and seeding on sited	Immediately after topsoil reinstatement	Site Manager	Monthly until 80% vegetation cover is established	Monitoring Report

ECOLOGY - OPERATIONAL PHASE						
Impact Management outcome: Minimise and control impact to the natural ecology						
Impact Management actions (mitigation measures)	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe: implementation	Responsible person	Frequency	Evidence: compliance
• To limit fire hazard on site the grass cover along boundary must be kept short (30cm).	Site Manager	Grass cutting when vegetation cover is higher than 30cm	Throughout the project lifetime	Site Manager	Bi-annually, after rainy and before winter season	Monitoring Report
• Monitoring system to be designed based on EMPr, according to development company requirements for general maintenance and monitoring.	Site Manager / Ecologist / ECO	Design effective and appropriate monitoring system.	Throughout the project lifetime	Site Manager	According to different aspects to be monitored	Monitoring Report
Impact on avifauna population						
• Lighting of the solar farm (for example security lights) must be kept to a minimum. Lights must be directed downwards (using low-UV type lights) to prevent night birds such as owls from becoming confused during flight and colliding with solar panels and infrastructure.	Site Manager	Install effective	Throughout the project lifetime	Site Manager	Daily	Monitoring Report
• Regular cleaning and maintenance activities must prevent defecation on the panels from becoming a problem. Eco-friendly bird deterring devices could also prevent large birds from perching on the panel structures. • All incidents of collision with panels must be recorded as meticulously as possible using good scientific protocols. • If birds are nesting on the infrastructure of the facility and cannot be tolerated, birds must be prevented from accessing nesting sites by using mesh or other manner of excluding them. • If there are persistent problems with avifauna, then an avifaunal specialist must be consulted for advice on further mitigation. • Panels must be tilted towards the vertical when not in use.	Site Manager	Construct in logical positions and protect from human activities	When applicable	Site Manager	Monthly	Inspection log sheet

ECOLOGY - OPERATIONAL PHASE						
Impact Management outcome: Minimise and control impact to the natural ecology						
Impact Management actions (mitigation measures)	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe: implementation	Responsible person	Frequency	Evidence: compliance
• Overhead transmission cables should be marked with enough bird diverters and as close as possible to each other to make the lines visible to collision-susceptible species. • An area conducive to raptors being present will aid in the containment of snakes occurring in the area. • ECO's must be trained in collecting information w.r.t bird collision cases and avian research institutions must be commissioned to carry out ongoing monitoring. • Regular monitoring of power lines must be undertaken to detect bird carcasses, to enable the identification of any areas of high impact to be marked with bird diverters.						
Sanitation seepage and spillage from private wastewater treatment works						
• A private wastewater treatment works will be designed and installed on site for the development. • Treated effluent will be available as irrigation water. • Water quality according to General Limits specified by DWS. • The applicant must obtain approval in terms of the NWA for the water and sewer uses of the proposed development. • Groundwater management plan must be implemented to protect aquifer.	Site Manager / Ecologist / ECO	Install effective and appropriate WWT system.	Throughout the project lifetime	Site Manager	Bi-Annually	Monitoring Report
Storm Water Management						
• Regular conditional inspections of all storm water infrastructure are required. Inspection data must be recorded and accumulated for tracking purposes. Regular reporting must be a scheduled management task.	Site manager	Compile inspection plan	Scheduled inspections as well as during and after rainfall events	Site manager	Monthly and ad hoc	Inspection report
• Storm Water Infrastructure must be clear from debris, waste etc.	Site Manager	Visual inspection of stormwater	During and after rain and flood	Site Manager	During and after rain and flood	Monitoring Report

ECOLOGY - OPERATIONAL PHASE						
Impact Management outcome: Minimise and control impact to the natural ecology						
Impact Management actions (mitigation measures)	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe: implementation	Responsible person	Frequency	Evidence: compliance
		infrastructure as well as correction of problems	events		events	
• Waste to be safely stored and disposed of off-site.	Site Manager	Storing facilities and waste removal schedule	Monthly	Site Manager	Monthly	Monitoring Report
• Site personnel to be trained as part of induction – maintenance of stormwater systems.	Site Manager	Training program as part of induction	At induction	Site Manager	Monthly	Monitoring Report
Fire Management Minimise Fire Risk on developed site						
• Tall woody plants to be cut and removed. • Grass cover to be kept short. • No fires allowed on site (signage to be put up). • Firebreaks to be maintained.	Site Manager	Slashing and cutting of tall trees and grass (avoid the use of herbicides)	Annually	Site Manager	Annually	Monitoring and Photographic Report
• Appointed personnel on site must attend a fire-fighting training program and be able to use fire-fighting equipment, on site.	Site Manager and Health & Safety Officer	Personnel to attend relevant courses	Lifetime of the project	Site Manager and Health & Safety Officer	Annual refresher courses	Health and Safety records
Fire Management - Minimise Fire Risk as a result of BESS						
• Liaise with local fire department (Virginia/Welkom Fire Brigade).	Site Manager and Safety Officer	Arrange meeting with local fire department	Start of Operational Phase	Site Manager	Annually	Monitoring Report
• Standard Operating Procedures (SOPs) and Standard Operating Guidelines (SOGs) must be in place for use of staff on site.	Developing Company	SOPs and SOGs to be compiled	Start of Operational Phase	Site Manager	Annually	Updated SOPs and SOGs
• Adequate temperature control by ensuring that ventilation and air conditioning systems are in working order.	Site Manager	Check all components	Lifetime of the project	Site Manager	Daily	Separate record keeping for BESS

ECOLOGY - OPERATIONAL PHASE						
Impact Management outcome: Minimise and control impact to the natural ecology						
Impact Management actions (mitigation measures)	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe: implementation	Responsible person	Frequency	Evidence: compliance
• Gas and smoke detection system must be in working order.	Site Manager	Check all components	Lifetime of the project	Site Manager	Daily	Separate record keeping for BESS
• Water for fire fighting must always be available.	Site Manager	Check water levels in water tanks	Lifetime of the project	Site Manager	Daily	Separate record keeping for BESS
• Aerosol extinguishjng system must be in working order.	Site Manager	Check extinguishing system	Lifetime of the project	Site Manager	Daily	Separate record keeping for BESS
• Equipment must be maintained. • Intenal resistance of cells must be measured.	Site Manager	Inspections and, testing	Lifetime of the project	Site Manager	Daily	Separate record keeping - BESS
• Testing of equipment.	Site Manager	infrared scans	Annually	Site Manager	Annually	Separate record keeping - BESS
• Module-level shutdown devices to be maintained.	Site Manager	Inspections and, testing	Lifetime of the project	Site Manager	Daily	Separate record keeping - BESS
• Maintenance of PV Modules and connections.	Site Manager / Electrician	Visual inspections	Lifetime of the project	Site Manager	Daily	Monitoring Record
• BESS must continuoysly be grounded properly.	Site Manager	Mobile electrostatic equipment	Lifetime of the project	Site Manager	Annually	Separate record keeping - BESS
• Water used for extinguishing a fire or thermal runaway at BESS must be contained and disposed of or treated at a Hazardous waste facility.	Site Manager	Work according to SOP and legislation	When applicable	Site Manager	Daily	Separate record keeping - BESS
Groundwater Management - Minimise Groundwater Pollution as a result of BESS						
• Compilation and adherence to a procedure for the safe handling of battery cells. • Lithium-ion batteries must have battery management systems (containment, automatic alarms and shut-off systems) to monitor and protect cells from overcharging or damaging conditions, such as temperature extremes.						

ECOLOGY - OPERATIONAL PHASE						
Impact Management outcome: Minimise and control impact to the natural ecology						
Impact Management actions (mitigation measures)	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe: implementation	Responsible person	Frequency	Evidence: compliance
• Compilation of an Emergency Response Plan for implementation in the event of a spill or leakage. • Provision of spill kits on-site for clean-up of spills and leaks. • Immediate clean-up of spills and disposal of contaminated absorbents and materials or soil at a licensed hazardous waste disposal facility. • Recording and reporting of all significant fuel, oil, hydraulic fluid or electrolyte spills or leaks so that clean-up measures can be implemented. A copy of records must be made available to authorities on request through project lifecycle. • Frequent and appropriate disposal of both general and hazardous waste to prevent pollution of soil and groundwater. • Installation of leak detection monitoring systems. • On-site battery maintenance must be done on impermeable surfaces with secondary containment measures. • Hazardous substances must be disposed of appropriately. • Provision of suitable emergency and safety signage on-site, and demarcation of any areas which may pose a safety risk (incl. hazardous substances). Emergency numbers for the local police, fire department, Eskom and the Local Municipality must be placed in a prominent clearly visible area on the site. • Both the DFFE and the Gauteng GDARD must be notified immediately of any incident, where the incident constitutes an unexpected, sudden, and uncontrolled release of a hazardous substance, including from a major emission, fire or explosion, that causes, has caused or may cause significant harm to the environment, human life or property.						

ECOLOGY - OPERATIONAL PHASE						
Impact Management outcome: Minimise and control impact to the natural ecology						
Impact Management actions (mitigation measures)	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe: implementation	Responsible person	Frequency	Evidence: compliance
• Water used for extinguishing a fire or thermal runaway at BESS must be contained and disposed of or treated at a Hazardous waste facility.						
Waste Management – Reduce, Re-Use and Recycle						
• A management system for waste must be implemented with the aim to reduce, re-use and recycle. • Household waste must stored in closed containers. • A service provided must be appointed to collect household waste to be taken to a licensed landfill site. • An approved contractor must be appointed to collect fuel waste and old oil to be taken to a licensed hazardous waste landfill site. • Spent Batteries must be dispoed of/recycled according to National legislation.	Site Manager and Health & Safety Officer	Applying sound household / domestic and health practices	Lifetime of the project	Site Manager and Health & Safety Officer	Monthly	Health and Safety records

TRAFFIC IMPACT MANAGEMENT - OPERATIONAL PHASE						
Impact Management outcome: Prevent/minimise negative impacts on safety of employees						
Impact Management actions (mitigation measures)	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe: implementation	Responsible person	Frequency	Evidence: compliance
Road Safety						
• Road safety training to be part of general training for employees. • Speed limit (30km/h) on-site indicated on signage.	Contractor	Visual checks	When required	Site Manager	When required	Incident log sheet

SAFETY, SECURITY, AND FIRE HAZARDS - OPERATIONAL PHASE						
Impact Management outcome: Ensuring a safe/secure construction environment, enhanced socio-economic development and prevention of fires.						
Impact Management actions (mitigation measures)	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe: implementation	Responsible person	Frequency	Evidence: compliance
Fires caused by the BESS						
• Fire extinguishers and fire-fighting equipment must be available especially to be able to combat fires at the BESS. • An emergency plan must be in place so that any fire can be combatted in the most efficient manner. An emergency response plan aligned with the local Fire Department must be in place.	Contractor	Ensure compliance with Act. Training on Emergency plan	At onset of construction phase Monthly	Project manager	Monthly	Training records
• No solid waste or vegetation will be allowed to be burned on the premises or surrounding areas.	Contractor	Instruction to employees	Weekly	Project manager ECO	Monthly	Incident log sheet
• All employees must be properly trained in the use of firefighting equipment and the emergency procedures in case of a fire.	Contractor	Training cessions	Monthly	Project manager	Monthly	Training records
• Firefighting equipment must be available and must be checked regularly to ensure it is in proper working order and accessible.	Contractor	Supply & check firefighting equipment	Weekly	Project manager Contractor	Monthly	Inspection log sheet
• Personal Protective Equipment (PPE) and safety gear must be provided to all site personnel: hard hats, safety boots, masks etc.	Contractor	Supply PPE	When required	Project manager	Monthly	Check if workers are using PPE
Security Issues- Unauthorized entrance to facility areas						
• The Contractor shall conform to all the stipulations of the Occupational Health and Safety act (Act 85 of 1993) and any Regulation applicable at the time of starting of decommissioning. • Proper access control (I.D. cards) must be enforced at the entrance gate to ensure that no unauthorised persons enter the site. Security personnel must be appointed to enforce strict access control.	Contractor	Apply Act	Continuous	Project manager	Monthly	Check number of employees on site Safety File records

DECOMMISSIONING PHASE						
AIR QUALITY – DECOMMISSIONING PHASE						
Impact Management Outcome: Minimise impact to the environment and people through the control/mitigation of air quality impacts						
Impact Management actions (mitigation measures)	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe: implementation	Responsible person	Frequency	Evidence: compliance
Earthworks and vegetation clearance - dust						
Movement of vehicles and construction equipment-fumes/smoke						
• Vehicles and construction equipment must be well serviced so that it does not produce excessive smoke. • The construction machinery must be maintained properly.	Contractor	Regular services	According to Maintenance schedule	Project manager ECO	Weekly	Service records
Movement of vehicles and construction equipment-Dust						
• Main roads must be gravelled or sprayed with water especially during the dry months. • The use of a product like Eco-bond is recommended as opposed to water. However, it must be an inert product with no pollution risk. • Internal roads must be maintained on a regular basis during construction.	Contractor	Spray with water truck	When need in construction	Project manager ECO	Daily	Visual check
• A speed limit must be enforced on dirt roads (preferably 30km/h).	Contractor	Road signs	During construction	Project manager Contractor	Weekly	Visual check
Burning of cleared vegetation and solid waste or fires for cooking and heating – smoke						
• Solid waste will not be allowed to be burnt on site. Solid waste must be kept in animal proof bins from where they will be removed to the Merafong City Local Municipality's landfill site on a regular basis e.g. weekly. • No open fires are allowed at construction sites. • Fires for cooking must be restricted to designated areas, extra care must be taken to ensure to prevent veld fires from occurring. Fire belts must be made around the development according to regulations of the Veld and Forest Fire Act.	Contractor	Instruction to workers Visual checks Supply waste containers & remove waste weekly	During construction	Project manager ECO	Daily for fires Monthly for disposal	Visual check & disposal records

DECOMMISSIONING PHASE

AIR QUALITY – DECOMMISSIONING PHASE

Impact Management Outcome: Minimise impact to the environment and people through the control/mitigation of air quality impacts

Impact Management actions (mitigation measures)	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe: implementation	Responsible person	Frequency	Evidence: compliance
• Cigarette butts must be disposed of in designated containers only. • Firebreaks must be maintained to decrease risk of accidental fires.						
• Waste management and recycling plan must be compiled for decommissioning phase of development. Aim of the plan must be to ensure that the construction materials/debris generated on site be reduced, reused and recycled. This plan must be compiled in consultation with the contractors and engineers.	Contractor	Implement plan	Daily during Construction	Project manager ECO	Weekly	Visual Records of disposal.

NOISE - DECOMMISSIONING PHASE

Impact Management outcome: Minimise impact to animals and people through the control/mitigation of noise impacts

Impact Management actions (mitigation measures)	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe: implementation	Responsible person	Frequency	Evidence: compliance
Movement and operation of vehicles and machinery						
• Contractors must comply with all noise regulations. • Construction personnel must comply with speed restriction of 30 km per hour within site boundaries to reduce generation of noise. • Construction vehicles are to be serviced on a regular basis to ensure they do not make excessive noise. Construction machinery must be fitted with noise mufflers and be maintained properly. • Decommission activities must only take place between sunrise and sunset from Monday to Saturday. No decommissioning activities must be allowed to take place on Sunday, unless an	Contractor	Vehicle maintenance	Continuous in construction according to schedule	Project manager Contractor	Weekly	Records and noise levels measurements

NOISE - DECOMMISSIONING PHASE						
Impact Management outcome: Minimise impact to animals and people through the control/mitigation of noise impacts						
Impact Management actions (mitigation measures)	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe: implementation	Responsible person	Frequency	Evidence: compliance
agreement has been reached with surrounding property owners.						
• All employees working in a noisy environment must be given the necessary ear protection gear.	Contractor	Physical handout of ear plugs	Daily	Project manager ECO	Weekly	Check use of ear protection by workers

GROUND- AND SURFACE WATER POLLUTION - DECOMMISSIONING PHASE						
Impact Management outcome: Minimise impact to the environment and people through the minimisation and control of groundwater and surface water pollution						
Impact Management actions (mitigation measures)	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe: implementation	Responsible person	Frequency	Evidence: compliance
Sanitation seepage and spillage from temporary chemical toilets.						
• Chemical sanitation facilities must be used on site and regularly (at least weekly) serviced by registered companies to ensure that no spills or leaks from toilets to groundwater or surface water take place. • The temporary sanitation system must be regularly inspected to ensure that no spills or leaks from sanitation system to groundwater take place.	Contractor	Appoint service contractor for weekly service of toilets Inspect toilets weekly	Weekly	Project manager ECO	Weekly	Records
• Chemical sanitation facilities must not be positioned closer than 100m from surface water resources. The ratio of one toilet for every 15 workers on site must be maintained.	Contractor	Positioning of toilets	Once off at beginning of each phase of construction	Project manager ECO	Monthly	Visual inspection
Spillage of fuel and lubricants from construction vehicles and machinery						

GROUND- AND SURFACE WATER POLLUTION - DECOMMISSIONING PHASE						
Impact Management outcome: Minimise impact to the environment and people through the minimisation and control of groundwater and surface water pollution						
Impact Management actions (mitigation measures)	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe: implementation	Responsible person	Frequency	Evidence: compliance
• Construction vehicles must be serviced on a regular basis to prevent or minimize the risk of spills or leakages of fuel and oil. • All construction vehicles must be inspected for oil and fuel leaks regularly. • Vehicles must be parked with spill pans underneath the vehicles. • The storage of fuel, oils and lubricants must only take place where spillages can be controlled. • Maintenance must also be done at the temporary maintenance workshop on the site.	Contractor	Service records, instructions / training to drivers and visual checks	Daily	Project manager ECO	Monthly	Visual check Records check
• When a spill incident occurs all possible measures must be taken to ensure that spilled fuel or oil do not reach any drainage line. • Spill incidents must be reported to DFFE in terms of Section 30(5) of NEMA.	Contractor	Handle the spill correctly	When spill takes place	Project manager ECO	Monthly	Check spill records
Spillage/use of fuel in temporary fuel tanks as well as construction activities (e.g., mixing of concrete, cement, paints etc.)						
• Diesel storage must be **less** than 80 000 litres at construction decommissioning camps. • A bund wall must be constructed around the fuel tank structures and the run-off diverted to a conservancy tank. • Drip pans must be used during re-fuelling and servicing of construction vehicles. Drip pans can also be placed underneath stationary construction vehicles and equipment. • Spilled fuel must be disposed of at the nearest approved fuel recycling collection point. Alternatively drip pans can be placed underneath temporary fuel tanks.	Contractor	Supply and erect surface tanks <30 000 litres Supply drip pans	When required	Project manager	Weekly	Inspection log sheet Spot checks/photos

GROUND- AND SURFACE WATER POLLUTION - DECOMMISSIONING PHASE						
Impact Management outcome: Minimise impact to the environment and people through the minimisation and control of groundwater and surface water pollution						
Impact Management actions (mitigation measures)	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe: implementation	Responsible person	Frequency	Evidence: compliance
• Provision must be made for refuelling at the storage area by protecting the soil with an impermeable groundcover. Where dispensing equipment is used, a drip tray must be used to ensure small spills are contained.	Contractor	Supply drip trays and sheeting	Prior to any refuelling	Project manager ECO	Weekly	Photos
• Where refuelling away from the dedicated refuelling station is required, a mobile refuelling unit must be used. Appropriate ground protection such as drip trays must be used.	Contractor	Supply drip trays and sheeting	Prior to any refuelling	Project manager ECO	Weekly	Photos
• Accidental spillages must be contained and cleaned up promptly. • Spill kits must be on-hand to deal with spills immediately.	Contractor	Have spill kits available	When spills take place	Project manager ECO	Monthly	Spill records
• Spillages or leakages must be treated according to an applicable procedure as determined by a plan of action for the specific type of disturbance.	Contractor	Have spills procedure available on site and communicate to workforce		Project manager ECO	Monthly	Spill records
• The temporary vehicle maintenance yard and storage area must be fenced off.	Contractor	Fence off yard	Beginning of construction	Project manager	Weekly	Once off check
• Used parts like filters must be contained and disposed of at a site licensed for dumping of these waste products.	Contractor	Appoint contractor for disposal of parts	Beginning of construction Disposal when needed	Project manager ECO	Monthly	Disposal records
Leakage of oil from the power transformers of the on-site HV substation						
• The on-site HV substation and switching station must be decommissioned according to the Eskom standards and guidelines.	Contractor	Decommission according to standards and guidelines	Construction phase	Project Manager	Weekly	Construction site meetings and records

GROUND- AND SURFACE WATER POLLUTION - DECOMMISSIONING PHASE						
Impact Management outcome: Minimise impact to the environment and people through the minimisation and control of groundwater and surface water pollution						
Impact Management actions (mitigation measures)	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe: implementation	Responsible person	Frequency	Evidence: compliance
• According to the Eskom Oil Clean-Up And Rehabilitation Standards, the containment of a spillage must involve an action that will either prevent or stop a spill from spreading. It is vital to prevent any oil spill from entering the development site's stormwater systems. Containment of oil pollution can be done using one or more of the following: o soil barriers; o sand bags; o bund walls; and o absorbent materials. • Polluted soils must be removed to a waste site where it is authorized.	Contractor	Clean up according to standards and guidelines	When needed	Project manager ECO	Monthly	Checking of spillage records
Storage and disposal of waste, littering and disassembled components on site						
• Solid waste generated by decommissioning teams will not be burned on site or the surrounding areas. Solid waste must be kept in animal proof bins at construction sites and be removed to the Merafong City Local Municipality's landfill site on a regular basis. Building rubble must be removed to the Merafong City Local Municipality's landfill site as the development progresses. • All components will be disassembled. Silicon of PV modules will be recycled, as well as mounting structures (aluminium or zinced steel frames and piles), the cables (copper and/or aluminium conductor) and the connection structures. • Non-recyclable components of inverter, transformers and electrical devices will be disposed in appropriate way, in	Contractor	Supply waste containers Dispose of waste at the correct site Clean up site regularly Supply material to recyclers	Continuously during construction Daily cleaning	Project manager ECO	Monthly	Check disposal records

GROUND- AND SURFACE WATER POLLUTION - DECOMMISSIONING PHASE						
Impact Management outcome: Minimise impact to the environment and people through the minimisation and control of groundwater and surface water pollution						
Impact Management actions (mitigation measures)	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe: implementation	Responsible person	Frequency	Evidence: compliance
compliance with applicable laws and international standards. • Regular clean-up programs must be put into effect throughout the premises to limit the impact of littering caused by decommissioning activities.						
• A comprehensive waste and recycling management plan must be compiled for the decommissioning phase. The aim of the plan must be to ensure that the decomissioned materials/debris generated on site be reduced, reused and recycled. This plan must be compiled in consultation with the contractors and engineers.	Contractor	Get waste plan from Project Manager	Start of construction	Project manager ECO	Once off	Waste and recycling management plan records
• Ensure strict compliance that no foreign matter is deposited in trenches. Any foreign matter must be removed immediately.	Contractor	Visual inspection before closure	Continuous	Project manager ECO	Weekly	Spot checks
Storm water across cleared areas						
• Cleared areas must be rehabilitated by reintroducing a grass layer and indigenous plant species as soon as possible to limit the occurrence of erosion.	Contractor	Vegetate area with grass layer	As soon as possible during construction	Project manager ECO	Monthly	Checking Photo records
• Monitor and repair any signs of erosion after heavy downpours.	Contractor	Visual checks	After rainstorms	Project manager ECO	Monthly	Visual checks

WATER SUPPLY MANAGEMENT - DECOMMISSIONING PHASE						
Impact Management outcome: Implement responsible water usage						
Impact Management actions (mitigation measures)	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe: implementation	Responsible person	Frequency	Evidence: compliance
Decommissioning activities and dust abatement along internal roads and at decommissioning sites						
• Water must be used sparingly and it must be ensured that no water is wasted. • Roads must be treated with dust abatement chemicals to reduce the use of water. • Washing of construction vehicles must be limited to once or twice a month and must be done with high pressure sprayers to reduce water consumption. • Water tanks must be regularly inspected to ensure that no leaks occur. • Decommissioning workers must be educated on the importance and ways to use water sparingly.	Contractor	Keep water use records. Train workers in water saving	Continuous	Project manager ECO	Monthly	Visual checks

SOIL POLLUTION AND DEGRADATION (Geology, Soils & Wetlands) - DECOMMISSIONING PHASE						
Impact Management outcome: Minimise impact to the environment and people through the minimisation and control of soil pollution and degradation						
Impact Management actions (mitigation measures)	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe: implementation	Responsible person	Frequency	Evidence: compliance
Operation of construction vehicles and machinery &Fuel storage (leakages)						
• Construction vehicles must be well serviced and maintained regularly according to manufaturer.s specifications to prevent oil and fuel leaks. Vehicle maintenance will not be done on site except in emergency situations in which case mobile. • All construction vehicles must be inspected for oil and fuel leaks regularly and frequently. • The temporary vehicle maintenance yard and storage area must be fenced off.	Contractor	Maintenance of vehicles	According to schedule	Project manager ECO	Monthly	Records

SOIL POLLUTION AND DEGRADATION (Geology, Soils & Wetlands) - DECOMMISSIONING PHASE						
Impact Management outcome: Minimise impact to the environment and people through the minimisation and control of soil pollution and degradation						
Impact Management actions (mitigation measures)	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe: implementation	Responsible person	Frequency	Evidence: compliance
• Used parts like filters must be contained and disposed of at a site licensed for dumping of these waste products.	Contractor	Disposal at correct site	When maintenance is done	Project manager ECO	Monthly at site meetings	Records
• Machinery must be serviced and re-fuelled at existing facilities as far as is possible.	Contractor	Instructions to drivers	Continuously	Project manager ECO	Monthly	Records
• Prevent spillage of fuel or oil onto the soil, and put in place measures to ensure that any accidental spillages can be contained and cleaned up promptly. • Any spills must be treated and removed by a qualified agent/company.	Contractor	Clean-up	When applicable	Project manager ECO	Monthly	Records
• Diesel storage must be **less** than 80 000 litres at decommissioning camps. • A bund wall must be constructed around the fuel tank structures and the run-off diverted to a conservancy tank. • The spilled fuel must be disposed of at the nearest approved fuel recycling collection point. Alternatively drip pans can be placed underneath temporary fuel tanks. • Drip pans must be used when refuelling and servicing construction vehicles or equipment. Drip pans can also be placed underneath stationary construction vehicles and equipment. Used or spilled oil must be taken to the nearest oil refiner or recycling plant for recycling.	Contractor	Supply and erect surface tanks <30 000 litre Procedures for handling of spills Supply drip pans	When required	Project manager ECO	Weekly	Inspection log sheet Spot checks/photos Disposal records
• Spill kits must be on-hand to deal with spills immediately.	Contractor	Keep spill kits on site	When required	Project manager ECO	Weekly	Inspection log sheet Spot checks/photos

SOIL POLLUTION AND DEGRADATION (Geology, Soils & Wetlands) - DECOMMISSIONING PHASE						
Impact Management outcome: Minimise impact to the environment and people through the minimisation and control of soil pollution and degradation						
Impact Management actions (mitigation measures)	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe: implementation	Responsible person	Frequency	Evidence: compliance
Leakage of oil from the power transformers of the on-site HV substation						
• The on-site HV substation and switching station must be built according to the Eskom standards and guidelines.	Contractor	Build according to plans	Construction phase	Project manager	Weekly	Inspection Reporting at Site meetings.
• According to the Eskom Oil Clean-Up And Rehabilitation Standards, the containment of spillage must involve an action that will either prevent or stop a spill from spreading. It is vital to prevent any oil spill from entering the stormwater system. • Containment of the oil near the source will minimize pollution and will enable easy clean-up and/or remediation. This shall be done using one or more of the following: o soil barriers; o sand bags; o bund walls; and o absorbent materials. • Polluted soils must be removed to a waste site where it is authorised.	Contractor	Treat spillage as prescribed in standards	When applicable in construction phase	Project manager ECO	When applicable	Incident logs and reports. Photo records
Groundwater Management - Minimise Groundwater Pollution as a result of BESS						
• Compilation and adherence to a procedure for the safe handling of battery cells. • Lithium-ion batteries must have battery management systems (containment, automatic alarms and shut-off systems) to monitor and protect cells from overcharging or damaging conditions, such as temperature extremes. • Compilation of an Emergency Response Plan for implementation in the event of a spill or leakage. • Provision of spill kits on-site for clean-up of spills and leaks.						

SOIL POLLUTION AND DEGRADATION (Geology, Soils & Wetlands) - DECOMMISSIONING PHASE						
Impact Management outcome: Minimise impact to the environment and people through the minimisation and control of soil pollution and degradation						
Impact Management actions (mitigation measures)	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe: implementation	Responsible person	Frequency	Evidence: compliance
• Immediate clean-up of spills and disposal of contaminated absorbents and materials or soil at a licensed hazardous waste disposal facility. • Recording and reporting of all significant fuel, oil, hydraulic fluid or electrolyte spills or leaks so that appropriate clean-up measures can be implemented. A copy of records must be made available to authorities on request. • Frequent and appropriate disposal of both general and hazardous waste to prevent soil and groundwater pollution. • Installation of leak detection monitoring systems. • On-site battery maintenance must only be undertaken on impermeable surfaces with secondary containment measures. • Any resulting hazardous substances must be disposed of appropriately. • Provision of emergency and safety signage on-site, and demarcation of areas which may pose a safety risk (incl. hazardous substances). Emergency numbers for local police, fire department, Eskom and Local Municipality must be in a prominent clearly visible area on site. • Both the DFFE and the Gauteng Department of Agriculture and Rural Development (GDARD); must be notified immediately of any incident, where the incident constitutes an unexpected, sudden, and uncontrolled release of a hazardous substance, including from a major emission, fire or explosion, that causes, has caused or may cause significant harm to the environment, human life or property.						

SOIL POLLUTION AND DEGRADATION (Geology, Soils & Wetlands) - DECOMMISSIONING PHASE						
Impact Management outcome: Minimise impact to the environment and people through the minimisation and control of soil pollution and degradation						
Impact Management actions (mitigation measures)	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe: implementation	Responsible person	Frequency	Evidence: compliance
Spillage from temporary chemical toilets						
• Chemical sanitation facilities must be used on site and regularly serviced by registered companies to ensure that no spills or leaks from toilets to groundwater or surface water take place. The ratio of one toilet for every 15 workers on site must be maintained. • Temporary sanitation system on construction site must be regularly inspected to ensure no spills or leaks from sanitation system to groundwater take place.	Contractor	Appoint service contractor	Weekly	Project manager	Monthly	Spot checks
Increase in storm water run-of - soil erosion						
• Cleared areas must be re-vegetated allowing a grass layer to re-establish as soon as possible to limit erosion. • Minimize the amount of land disturbance. • Develop and implement stringent erosion and dust control practices. • Slopes produced by removing of soil must be kept to a minimum to reduce the chances of erosion damage to the area.	Contractor	Construction according to plans Follow revegetation plans	During construction phase Continuous rehabilitation	Project manager ECO	Weekly	Check construction against plan
• Monitor and repair any signs of erosion after heavy downpours.	Contractor	Repair erosion	After rainstorms	Project manager ECO	Monthly	Visual checks
Solid waste accumulation on/in soil. Storage and disposal of building rubble, waste and littering on site						
• Solid waste must be kept in adequate animal and weatherproof waste bins at the decommissioning camp and at the construction sites. Building rubble and waste must be removed on a regular basis to the Merafong City Local Municipality's landfill site. • Comprehensive waste management plan must be compiled for decommissioning phase of the development. Aim of the plan is	Contractor	Continuous implementation of actions according to waste management plan	Weekly removal	Project manager ECO	Monthly	Records of waste disposal to be kept.

SOIL POLLUTION AND DEGRADATION (Geology, Soils & Wetlands) - DECOMMISSIONING PHASE						
Impact Management outcome: Minimise impact to the environment and people through the minimisation and control of soil pollution and degradation						
Impact Management actions (mitigation measures)	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe: implementation	Responsible person	Frequency	Evidence: compliance
to ensure that the decommissioned materials/debris generated on site be reduced, reused and recycled. • Regular clean-up programs must be in effect on the premises to limit impact of littering caused by construction activities.						

ECOLOGY - DECOMMISSIONING PHASE						
Impact Management outcome: Minimise and control impact to the ecological aspects during decommissioning.						
Impact Management actions (mitigation measures)	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe: implementation	Responsible person	Frequency	Evidence: compliance
Control of animals on site. Killing, poisoning, or hunting of animals						
• No animals will be allowed to be killed, captured or hunted or fed on site by construction workers. No poison must be used to control any animals without the input of an ecologist/zoologist. • Limit pesticide use to no-persistent, immobile pesticides and apply according to label and application directions and stipulations for terrestrial and aquatic applications since the wrong use thereof can have disastrous consequences for the raptors occurring in the area. • Instruct employees, contractors, and site visitors to avoid harassment and disturbance of wildlife.	Contractor	Fine for transgressors Apply according to label Training of work force	When applicable	Project manager ECO	Weekly	Incident logs Check pesticides log Training records
• A register must be kept of all relevant details of herbicide and pesticide usage.	Contractor	Draw up register	When applicable	Project manager/ECO	Monthly	Inspection log sheet

ECOLOGY - DECOMMISSIONING PHASE						
Impact Management outcome: Minimise and control impact to the ecological aspects during decommissioning.						
Impact Management actions (mitigation measures)	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe: implementation	Responsible person	Frequency	Evidence: compliance
Occurrence of veld fires on site						
• Educate construction workers regarding risks and correct disposal of cigarettes. • Fires must only be allowed in designated places within the decommissioning camp and extra care must be taken to prevent veld fires from occurring.	Contractor	Training & keep site clean of cleared vegetation Site instruction	Weekly	Project manager ECO	Monthly	Training records & visual inspection
• Maintain proper firebreaks around entire development footprint. Firebreaks must comply with the National Veld and Forest Fire Act, 1998 (Chapter 4: Duty to Prepare and maintain firebreaks).	Contractor	Make fire breaks	Once-off Maintain as necessary	Project manager ECO	Monthly	Visual inspection
Increase in traffic on the site						
• The speed of construction vehicles on internal roads must be kept as low as possible (30 km/h) to reduce incidence of road kill. • Decommissioning activities must remain within defined construction areas and the road servitudes.	Contractor	Speed checks Fines to transgressors	Decommissioning phase	Project manager ECO	Monthly	Visual inspection
Littering (e.g. cans & plastics) along access road & at construction sites						
• Solid waste must be kept in adequate animal proof waste bins at the construction camp and construction sites. • Building rubble and various wastes must be removed to Merafong City Local Municipality landfill site. A recycling program must be designed to minimise production of solid waste (e.g. organic waste into compost, the rest will be sorted and taken to various recycling stations in the Merafong City Local Municipality).	Contractor	Removal of waste to licensed disposal site	During decommissioning phase	Project Manager ECO	Daily Weekly	Disposal records

ECOLOGY - DECOMMISSIONING PHASE						
Impact Management outcome: Minimise and control impact to the ecological aspects during decommissioning.						
Impact Management actions (mitigation measures)	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe: implementation	Responsible person	Frequency	Evidence: compliance
• Regular clean-up programs must be put into effect along the access road and throughout the premises to limit the impact of littering caused by decommissioning activities.		Regular site clean-up programs				
Rehabilitation of site						
• Open areas, where infrastructure was removed must be re-vegetated allowing a grass layer to re-establish soonest. • Area must be safe for workers and staff and after rehablitation, it must provide a safe environment for both animals and people. • Revegetate / re-seed or stabilize disturbed areas for erosion control and rehabilitation. • Follow-up actions to check if re-vegetation was successful.	ECO	According to Rehabilitation plan included in EMPr	Decommissioning phase	ECO	Once off after decommissioning is concluded	Monitoring report

VISUAL DISTURBANCE - DECOMMISSIONING PHASE						
Impact Management outcome: Prevent unnecessary negative visual impact by ensuring that visual impacts are mitigated.						
Impact Management actions (mitigation measures)	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe: implementation	Responsible person	Frequency	Evidence: compliance
Construction activities and temporary structures-visual impact.						
• Security lights at the temporary maintenance yard and storage area must shine directly down and directed towards the site. • Adherence to the Visual Impact Assessment mitigation measures.	Contractor	Walk over monitoring	Monthly	Project manager ECO	Monthly	Visual inspection
• No waste will be allowed to be burned on site.	Contractor	Instruction to personnel	Daily	Project manager/ECO	Monthly	Visual inspection

HERITAGE RESOURCES - DECOMMISSIONING PHASE						
Impact Management outcome: Prevent/minimise negative impacts on heritage resources						
Impact Management actions (mitigation measures)	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe: implementation	Responsible person	Frequency	Evidence: compliance
Earthworks and buildings & structures removing						
• Halt decommissioning and notify the archaeologist or SAHRA whenever anything of potential heritage value is discovered.	Contractor	Halt construction Call Archaeologist	When required	Project manager ECO	When required	Incident log sheet

SAFETY, SECURITY, SOCIO-ECONOMICS, AND FIRE HAZARDS - DECOMMISSIONING PHASE						
Impact Management outcome: Ensuring a safe/secure construction environment, enhanced socio-economic development and prevention of fires.						
Impact Management actions (mitigation measures)	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe: implementation	Responsible person	Frequency	Evidence: compliance
Decommissioning activities - safety of employees						
• The Contractor shall conform to all the stipulations of the Occupational, Health and Safety Act, 1993 (Act 85 of 1993) and any Regulation applicable at the time of starting of decommissioning. • The Act requires designation of a Health and Safety representative if more than 20 employees are employed.	Contractor	Apply Act	Continuous	Project manager	Monthly	Check number of employees on site Safety File records
• A person trained and accredited to administer first aid must be present on site and a first aid kit must be available at the site office.	Contractor	Appoint trained safety representative Supply first aid kit	Daily	Project manager	Monthly	Visual inspection Safety file records
• All personnel must be informed of emergency procedures and contact numbers must be displayed prominently.	Contractor	Training talks Display emergency numbers.	Weekly	Project manager	Monthly	Training records
• Personal Protective Equipment (PPE) and safety gear must be provided to all site personnel.	Contractor	Supply PPE	When required	Project manager	Monthly	Check if workers are using PPE

SAFETY, SECURITY, SOCIO-ECONOMICS, AND FIRE HAZARDS - DECOMMISSIONING PHASE						
Impact Management outcome: Ensuring a safe/secure construction environment, enhanced socio-economic development and prevention of fires.						
Impact Management actions (mitigation measures)	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe: implementation	Responsible person	Frequency	Evidence: compliance
Fires caused by the negligence of decommissioning workers						
• Development must comply with the requirements of the National Veld and Forest Fire Act, 1998 (Chapter 2 and Chapter 4). • An emergency plan must be in place so that any fire can be combatted in the most efficient manner. An emergency response plan aligned with the local Fire Department must be in place.	Contractor	Ensure compliance with Act. Training on Emergency plan	At onset of construction phase Monthly	Project manager	Monthly	Training records
• **No** solid waste or vegetation will be burned on the premises or surrounding areas. No fires will be allowed outside designated areas (construction camp).	Contractor	Instruction to employees	Weekly	Project manager ECO	Monthly	Incident log sheet
• All employees must be properly trained in the use of firefighting equipment and the emergency procedures in case of a fire.	Contractor	Training cessions	Monthly	Project manager	Monthly	Training records
• Firefighting equipment must be available and must be checked regularly to ensure it is in proper working order and accessible.	Contractor	Supply & check firefighting equipment	Weekly	Project manager Contractor	Monthly	Inspection log sheet
Decommissioning activities - socio-economic impact- Employment of workers						
• Adherence to the Local and District Municipality's guidelines, principles and policies is imperative.	Contractor	Ensure adherence to policies. Implement work procedures and standards	Daily during construction phase	Project Manager	Monthly	Follow up during site meetings
• During the decommissioning phase, if and where possible, jobs must be created for unemployed local people and skills must be transferred to them. Where viable, the work must be executed in a labour intensive manner to create as many jobs possible.	Contractor	Appoint local people	Construction phase	Project manager	Monthly	Staff records

SAFETY, SECURITY, SOCIO-ECONOMICS, AND FIRE HAZARDS - DECOMMISSIONING PHASE						
Impact Management outcome: Ensuring a safe/secure construction environment, enhanced socio-economic development and prevention of fires.						
Impact Management actions (mitigation measures)	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe: implementation	Responsible person	Frequency	Evidence: compliance
Security Issues- Unauthorized entrance to construction areas and construction workers staying overnight at construction site						
• All personnel must be informed of emergency procedures and emergency contact numbers must be displayed prominently. • No staff / personnel will be allowed to overnight on the site. • Proper access control (I.D. cards) must be enforced at entrance gate to ensure that no unauthorised persons enter the site. Security personnel will be appointed to enforce access control.	Contractor	Training sessions on security issues-induction	Start of construction	Project manager	Monthly	Training records
• No staff / personnel will be allowed to overnight on the site. Transportation must be pre-arranged for the decommissioning workers to ensure that the workers from the surrounding local communities have daily transportation available to and from the site.	Contractor	Arrange transport for the workers	Start of construction phase	Project manager	Monthly	Transport records
• A temporary fence must be erected around the decommissioning camp and storage area.	Contractor	Construct fences	Start of construction phase	Project manager	Monthly	Visual checks
• The security lights at the temporary maintenance yard and storage area must shine directly down and directed towards the site away from the surrounding properties. • Adherence to the Visual Impact Assessment mitigation measures.	Contractor	Install security lighting and video surveillance system	Start of construction phase	Project manager ECO	Monthly	Visual checks