

## Appendix F

# Environmental Management Programme

For the change in layout and footprint of the  
Mogalakwena 120MW Photovoltaic (PV) Solar  
Energy Facility (SEF) for the Mogalakwena Mine

### **Mogalakwena Mine Solar Power (Pty) Ltd**

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## Document prepared by:

Zutari (Pty) Ltd  
Reg No 1977/003711/07  
Riverwalk Office Park  
41 Matroosberg Road  
Ashlea Gardens  
Extension 6  
Pretoria  
South Africa  
PO Box 74381  
Lynnwood Ridge  
0040

**T** +27 12 427 2000  
**F** +27 86 556 0521  
**E** tshwane@zutari.com

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Author signature	 Candice Durr 07/09/2022 08:33:18(UTC+02:00) Signed by: Candice Durr candice.durr@zutari.com	Approver signature	 Natanya Whitehorn 07/09/2022 08:58:14(UTC+02:00) Signed by: Natanya Whitehorn Natanya.Whitehorn@zutari.com
Name	Candice Durr	Name	Natanya Whitehorn
Title	Environmental Consultant	Title	Manager and registered EAP

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**Table 1: Requirements of an Environmental Management Programme as detailed in Appendix 4 of the NEMA EIA Regulations**

<b>Requirement</b>	<b>Reference</b>
Details of the EAP who prepared the EMPr and the expertise of the EAP, including a CV.	Appendix A
A detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description.	Section 1, 2, 4 and 5.
A map at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that should be avoided, including buffers.	Appendix B for Layout and Sensitivity Plans. Sensitive areas are avoided in the layout.
A description of the impact management outcomes, including management statements, identifying the impacts and risks that need to be avoided, managed and mitigated as identified through the environmental impact assessment process for all phases of the development including: <ul style="list-style-type: none"> <li>(i) Planning and design</li> <li>(ii) Pre-construction activities</li> <li>(iii) Construction activities</li> <li>(iv) rehabilitation of the environment after construction and where applicable post closure</li> <li>(v) where relevant, operation activities</li> </ul>	Sections 5 through 15.
A description of proposed impact management actions, identifying the manner in which the impact management outcomes will be achieved, and must, where applicable, include actions to: <ul style="list-style-type: none"> <li>(i) avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation</li> <li>(ii) comply with any prescribed environmental management standards or practices</li> <li>(iii) comply with any applicable provisions of the Act regarding closure, where applicable</li> <li>(iv) comply with any provisions of the Act regarding financial provision for rehabilitation, where applicable</li> </ul>	Section 6 through 12.
The method of monitoring the implementation of the impact management actions.	Sections 6 through 12.
The frequency of monitoring the implementation of the impact management actions.	Sections 6 through 12.
An indication of the persons who will be responsible for the implementation of the impact management actions.	Sections 3 and 6 through 12.
The time periods within which the impact management actions must be implemented.	Sections 6 through 12.
The mechanism for monitoring compliance with the impact management actions.	Sections 6 through 12.
A program for reporting on compliance, taking into account the requirements as prescribed by the Regulations.	Section 3 and Section 6 to Section 12.
An environmental awareness plan describing the manner in which: <ul style="list-style-type: none"> <li>(i) the applicant intends to inform his or her employees of any environmental risk which may result from their work</li> <li>(ii) risks must be dealt with in order to avoid pollution or the degradation of the environment</li> </ul>	Section 3 and Section 6 to Section 12.

Requirement	Reference
Any specific information that may be required by the competent authority.	None to date.

# 1 INTRODUCTION AND OVERVIEW

This chapter provides a general overview of this Environmental Management Programme (EMPr), its relation to the current environmental authorisation application process and provides a summary of the purpose of this document and its structure. Relevant legislation pertaining to this document is also briefly discussed.

## 1.1 Introduction to the Environmental Authorisation Process

The Mogalakwena Mine solar photovoltaic (PV) project, initiated by Mogalakwena Mine Solar Power (Pty) Ltd, underwent an Environmental Impact Assessment (EIA) process in 2021 and was granted an environmental authorisation (EA) to construct a PV solar energy facility (SEF) and associated transmission lines in order to supply electricity to the Mogalakwena Mine. The EA was granted on 09 December 2021 (ref no. 12/1/9/2/-W89) and approved a project footprint of 273 ha for the development. The EA includes the approval of an EMPr that was compiled as part of the 2021 EIA process.

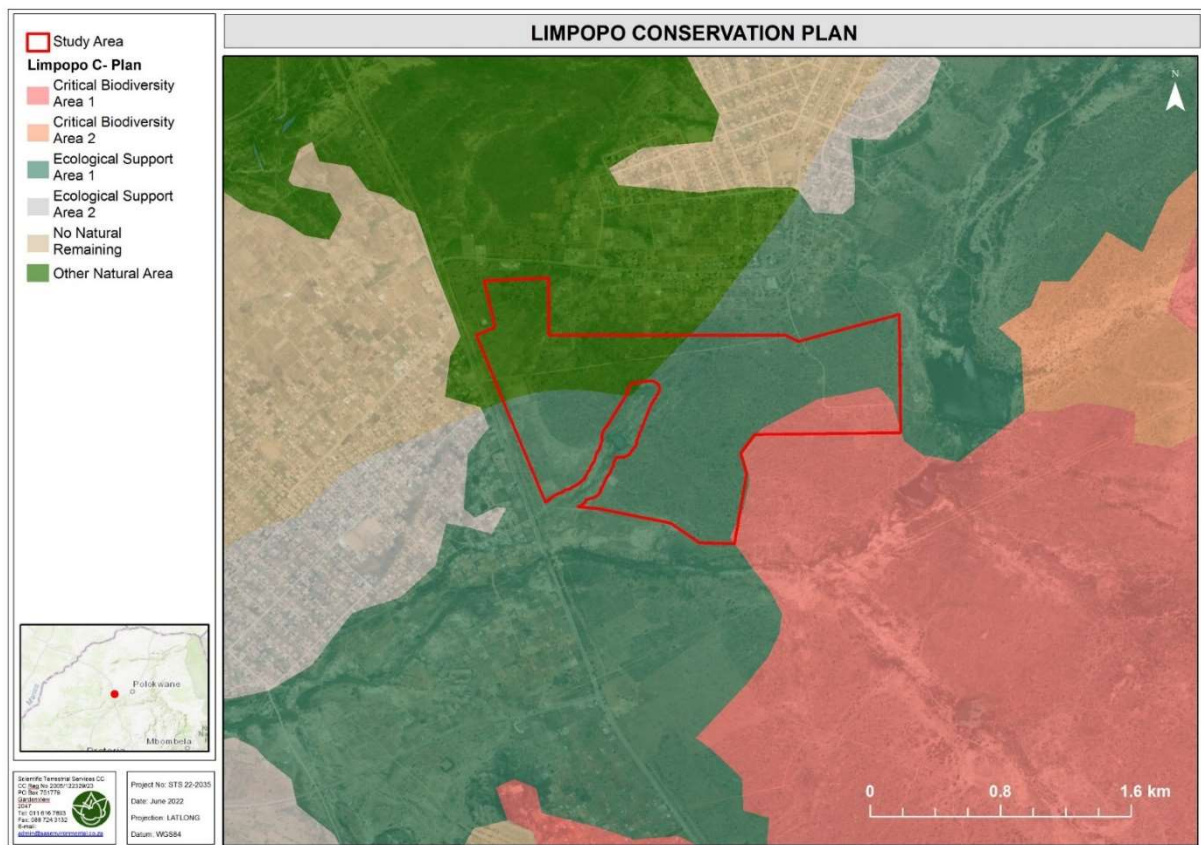
Subsequently, Mogalakwena Mine Solar Power appointed Pele Green Energy (PGE) and EDF Renewables, a consortium known as PGE-EDFR as the Independent Power Producer (IPP) to develop the proposed project. In order to meet the energy demand of the mine, PGE-EDFR has provided a design that changes the authorised project footprint for the development. The reasons for this are:

- The local community's expanding settlement footprint encroaches into the authorised area. This occurred after the initial EIA process was undertaken;
- The initial proposed footprint was split into three sections (north, central and south) to avoid drainage lines and other sensitivities. PGE-EDFR proposed to develop all project infrastructure only on the central section; and
- The remaining available footprint is not sufficient to accommodate a 120MW design.

The only technically suitable area available for the additional footprint is a Critical Biodiversity Area (CBA) 1 east of the authorised layout. This proposed area of expansion is approximately 32 ha, including 16 ha of the CBA (Figure 1). The new footprint size is expected to be approximately 205 ha.

Since the revised footprint proposes to develop a portion of a CBA, and since the development within a CBA triggers a listed activity in Listing Notice 3 of the EIA Regulations (2014), a new application for EA is required to authorise the proposed revised footprint.

Therefore, the approved EMPr has been updated to include this additional area that is not included in the existing EA along with all applicable mitigation measures recommended by the specialists. This EMPr can therefore be considered applicable to the entire new development footprint.



**Figure 1: The revised PV facility footprint in relation to the Limpopo Conservation Plan Version 2 (2018) categories. The red area indicates the CBA 1.**

## 1.2 Purpose of this EMPr

The purpose of this document is to provide environmental management practices and recommendations to ensure that the known and possible unknown impacts associated with the Mogalakwena PV SEF and Associated Infrastructure are avoided, managed, mitigated and kept to acceptable levels. The recommendations included herein are applicable to the following stages of the proposed development:

- Planning and design;
- Pre-construction and construction;
- Operation; and
- Closure and decommissioning.

A photovoltaic (PV) renewable energy facility with an anticipated life span of  $\pm 20 - 25$  years is being proposed. Therefore, it is possible that the facility could be decommissioned in future to make the land available for a different land use (should other options for continuation not be feasible). Thus, the decommissioning scenario for the facility is described in this EMPr.

This EMPr aims for alignment and optimisation of environmental management processes with conditions of authorisation that may arise. Any conditions of authorisation contained in the EA that contradict the recommendations made in this EMPr, will supersede the recommendations of this document. The EMPr will need to be updated to address conditions of the EA that are relevant to environmental management (should this be a condition of authorisation).

A hard copy of the EMPr must always be in the site office and made available to officials at request.



## 1.3 Legal Requirements for an EMPr

### 1.3.1 General requirements for EMPrs

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

The Department of Environmental Affairs & Development Planning (DEA&DP)'s<sup>1</sup> *Guideline for Environmental Management Plans* (2005) aims to inform and guide the preparation and implementation of EMPrs. The conditions of the guideline as well as the requirements specified in Appendix 4 of the EIA Regulations 2014 (as amended) (Table 1 above) have been considered in compiling this document. The DEA&DP guideline defines EMPrs as:

*“an environmental management tool used to ensure that undue or reasonably avoidable adverse impacts of the construction, operation and decommissioning of a project are prevented; and that the positive benefits of the project are enhanced”*

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

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

**Table 2: Section 24N (2) and (3) of the NEMA listing the requirements of an EMPr**

<b>24N.(2)</b> <i>the environmental management programme must contain-</i>	
(a)	<i>information on any proposed management, mitigation, protection or remedial measures that will be undertaken to address the environmental impacts that have been identified in a report contemplated in subsection 24(1A), including environmental impacts or objectives in respect of –</i>
	<i>(i) planning and design;</i>
	<i>(ii) pre-construction and construction activities;</i>
	<i>(iii) the operation or undertaking of the activity in question;</i>
	<i>(iv) the rehabilitation of the environment; and</i>
	<i>(v) closure, where relevant.</i>
(b)	<i>details of –</i>
	<i>(i) the person who prepared the environmental management programme; and</i>
	<i>(ii) the expertise of that person to prepare an environmental management programme</i>
(c)	<i>a detailed description of the aspects of the activity that are covered by the draft environmental management plan;</i>
(d)	<i>information identifying the persons who will be responsible for the implementation of the measures contemplated in paragraph (a);</i>
(e)	<i>information in respect of the mechanisms proposed for monitoring compliance with the environmental management programme and for reporting on the compliance.</i>
(f)	<i>as far as is reasonable practicable, measures to rehabilitate the environment affected by the undertaking of any listed activity or specified activity to its natural or predetermined state or to a land use which conforms to the generally accepted principle of sustainable development; and</i>
(g)	<i>a description of the manner in which it intends to-</i>
	<i>(i) modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation;</i>
	<i>(ii) remedy the cause of pollution or degradation and mitigation of pollutants; and</i>
	<i>(iii) comply with any prescribed environmental management standards or practices.</i>

<sup>1</sup> The DEA&DP's guideline is used even though the proposed project is based in the Limpopo, as DEA has not compiled a guideline on EMPr.

- |      |                                                                                                                                                                                                                                                                                                                                                         |
|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| (3)  | <i>the environmental management programme must, where appropriate-</i>                                                                                                                                                                                                                                                                                  |
| (a)  | <i>set out time periods within which the measures contemplated in the environmental management programme must be implemented;</i>                                                                                                                                                                                                                       |
| (b)  | <i>contain measures regulating responsibilities for any environmental damage, pollution, pumping and treatment of extraneous water or ecological degradation as a result of prospecting or mining operations or related mining activities which may occur inside and outside the boundaries of the prospecting area or mining area in question; and</i> |
| (c)  | <i>develop an environmental awareness plan describing the manner in which-</i>                                                                                                                                                                                                                                                                          |
| (i)  | <i>the applicant intends to inform his or her employees of any environmental risk which may result from their work; and</i>                                                                                                                                                                                                                             |
| (ii) | <i>risks must be dealt with in order to avoid pollution or the degradation of the environment.</i>                                                                                                                                                                                                                                                      |

The EMPr aims to meet the EMPr requirements as legislated by the NEMA Regulations (Table 2 above) as well as falling in line with the DEA&DP guideline document for Environmental Management Plans<sup>2</sup>. However, no guideline or guidance exists in terms of a best practice approach to EMPrs. This document should be seen in an iterative context, allowing for amendments throughout the life-cycle of the project and adjustments as new information is made available, unforeseen situations arise or conditions warrant adaptation.

### 1.3.2 Other EMPrs for this project

Besides this EMPr, which is focused only on the solar energy facility itself, there are two additional EMPrs for the project:

- ▶ One for the substation on the PV plant site; and
- ▶ One for the transmission lines that will transmit electricity to existing substations on the mine.

The reason for this is that the National Environmental Management Act (through Government Notice no. 435 of 2019), specifies standard EMPrs for substations and transmission lines.

These two standard EMPrs are also appendices to the Environmental Impact Report for the proposed SEF, and will be used in conjunction with this EMPr for the PV plant. If any changes are made to one of these documents, the need for similar changes to the other documents should be considered.

## 1.4 Expertise of the Environmental Assessment Practitioner

Section 33 of EIA Regulations and Section 24N (2) and (3) of the NEMA requires that an EMPr must include the details of the person(s) who prepared the EMPr, and the expertise of that person to prepare an EMPr. In this regard, the Curriculum Vitae of the Environmental Assessment Practitioner who compiled the EMPr is included in Appendix A.

## 1.5 Project Phasing

### 1.5.1 Planning and Design Phase

This phase includes applications for amongst others environmental and town planning authorisations. The planning and design phase investigate the possible impact of the proposed development on the receiving environment and recommend mitigation measures. This phase would have been concluded once the contractor views this document.

<sup>2</sup> Lochner, P. 2005. *Guideline for Environmental Management Plans*. CSIR Report No ENV-S-C 2005-053 H. Republic of South Africa, Provincial Government of the Western Cape, Department of Environmental Affairs & Development Planning, Cape Town.

### 1.5.2 Pre-Construction Phase

The pre-construction phase includes activities such as appointment of an ECO, pre-construction environmental workshop/induction training (conducted by the ECO), site demarcation, establishment of a site camp, demarcation of areas such as fuel storage and plant rescue (when applicable). Specifications for the aforementioned activities are included in this EMP.

### 1.5.3 Construction Phase

The construction phase commences with earthworks and thereafter includes all activities relating to the construction of the proposed development e.g. installation of services, construction of internal roads, PV arrays, auxiliary buildings etc.

This phase also includes the application processes to obtain permits for e.g. permits required to remove any protected tree or plant species.

### 1.5.4 Operational Phase

The operational phase commences when the proposed development is being used for its intended purposes i.e. providing power into the national grid. It is possible that there will be a period in the project life cycle where the construction and operational phase will overlap. This phase will include ongoing operation, monitoring and maintenance of the PV facility, as well as ongoing environmental management requirements (e.g. removal of alien vegetation).

### 1.5.5 Decommissioning Phase

The decommissioning phase refers to the discontinuation of the PV facility should the option to upgrade the facility not be favourable at the end of its life-cycle (20 - 25 years). This would entail disconnecting the facility from the national grid, removing module components to be recycled / resold as far as possible and dismantling of the facility with all its associated structures and infrastructure. Rehabilitation of the site would also form part of the decommissioning phase.

## 2 PROJECT BACKGROUND INFORMATION

This Chapter provides a description of the proposed activity and outlines how environmental considerations have informed and been incorporated into the planning and design phases of the proposed development.

### 2.1 Project Description

The proposed site for development is on the Farm Armoede 823 (Remainder of Portion 3) near the Mogalakwena Mine. The proposed site is located east of the N11 main road, 27 km outside of the town Mokopane in the Limpopo Province (Figure 2).

The proposed PV SEF will consist of the following (Figure 3):

- A solar farm, comprising of numerous rows of PV modules mounted on steel tracking mounts and footings (concrete or driven into the ground) with associated support infrastructure, including inverters, to generate up to 120 MW;
- Internal access roads for servicing and maintenance of the site;
- Buildings, including a connection building, control building, guard cabin;
- Weather stations within the fenced perimeter of the site;
- Perimeter fencing;
- Substation and/or switchyard located at the solar farm, covering an area of 1ha, to convert the power from solar farm voltage to transmission voltage; and
- A high voltage line route between the substation and the existing Eskom transmission lines

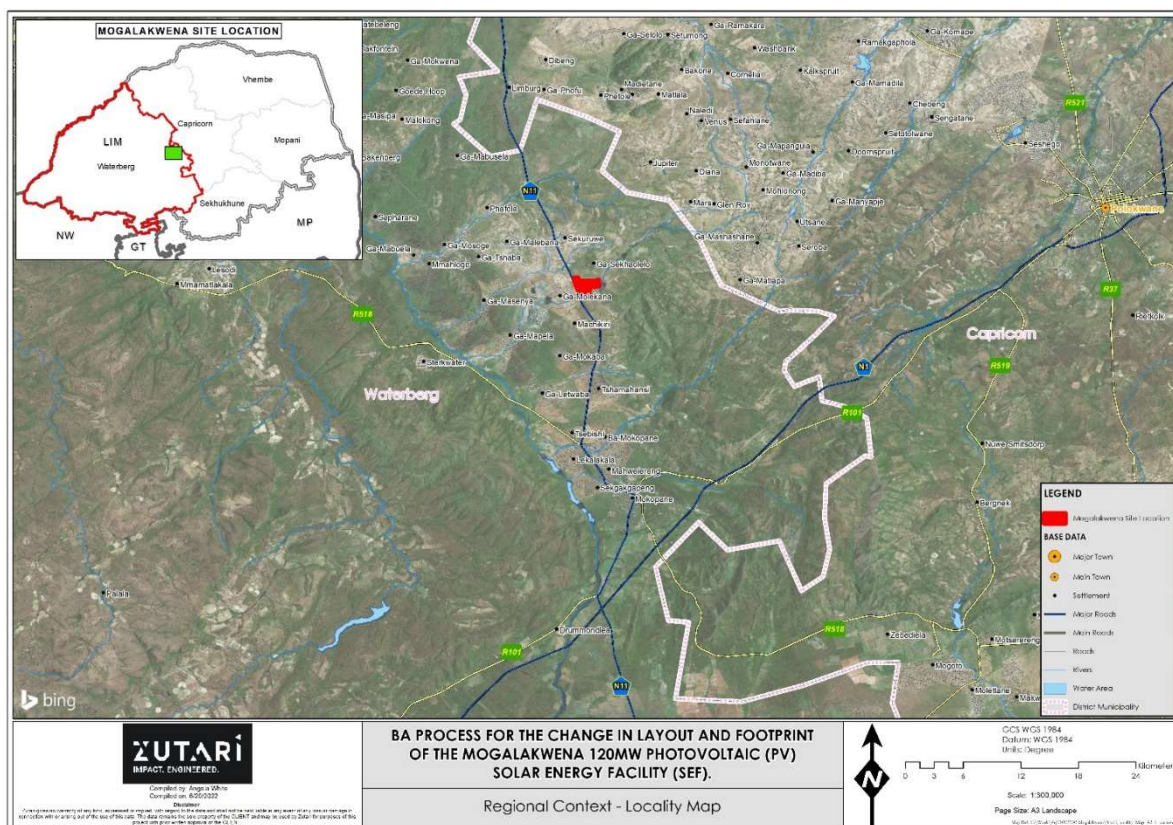
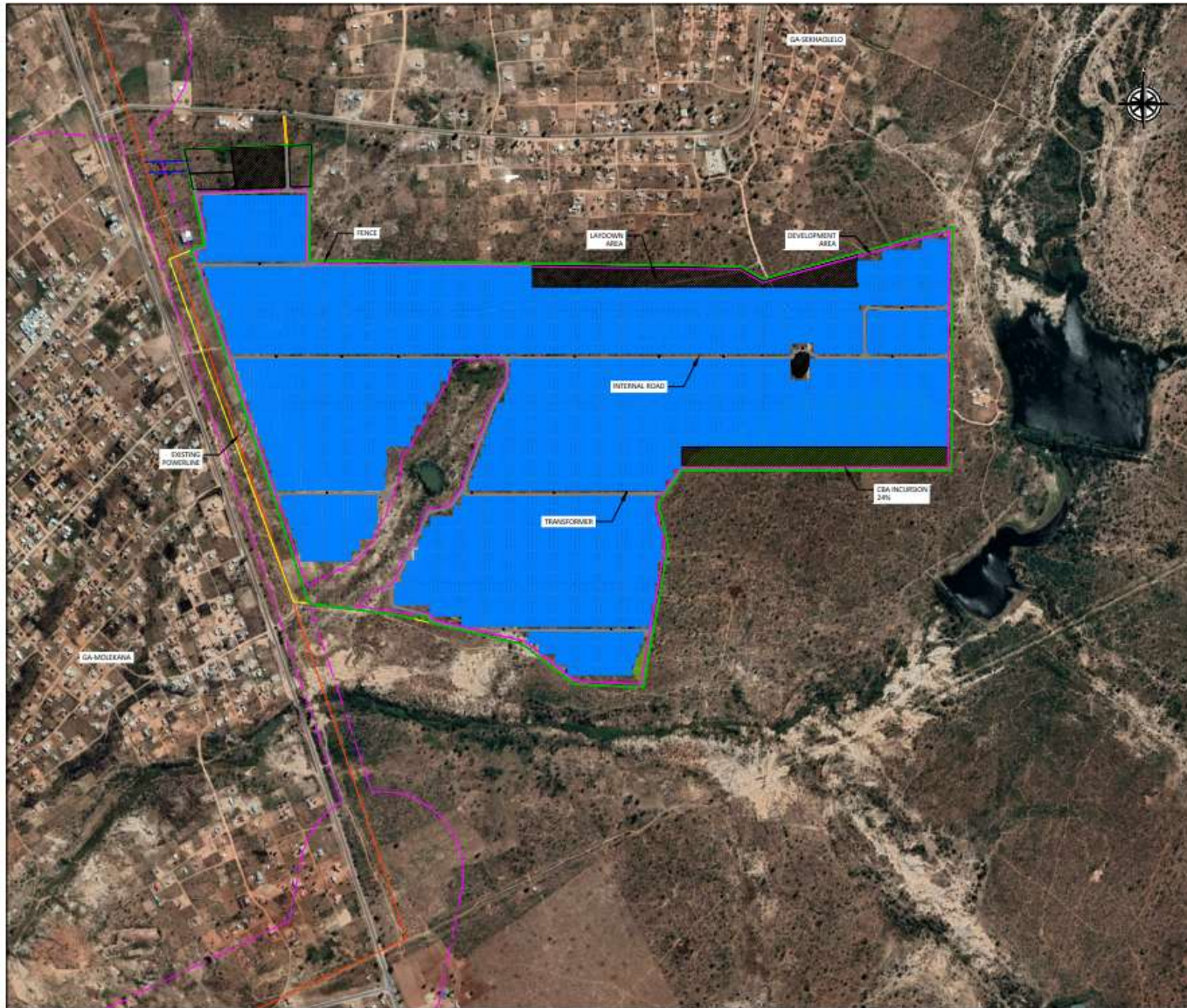


Figure 2: Locality map





**Figure 3: General development layout**

## 2.2 Legislative Framework

There are a host of legal and policy documents and guidelines to consider in undertaking such a project. These have been detailed in the following sections below.

### 2.2.1 Relevant Legislation

An overview of the relevant legislation is provided in Table 3.

**Table 3: Relevant legislation and the applicability thereof**

Legal Requirements		
Legislation considered	Relevant Organ of State / authority	Aspect of Project
The Republic of South Africa Constitution Act (Act No. 108 of 1996) ("the Constitution")	The Constitutional Court	The environmental right contained in Section 24 of the Constitution provides that everyone is entitled to an environment that is not harmful to his or her well-being.
National Environmental Management Act (Act No. 107 of 1998) (NEMA)	Competent Authority - Limpopo Department of Economic Affairs, Environment and Tourism (LEDET)	<p>NEMA establishes the principles for decision-making on matters affecting the environment. Section 2 of the Act sets out the National Environmental Management principles which apply to the actions of organs of state that may significantly affect the environment.</p> <p>Furthermore, Section 28(1) states that "every person who causes 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".</p> <p>If such pollution or degradation cannot be prevented, then appropriate measures must be taken to minimise or rectify such pollution or degradation.</p> <p>The applicant has the responsibility to ensure that the proposed activity and EIA process conform to the principles of NEMA. In developing the EIA process, Zutari has been cognisant of this need, and accordingly the EIA process has been undertaken in terms of NEMA and the EIA Regulations<sup>3</sup>. Several listed activities in these regulations are triggered, as indicated in Table 4.</p>
National Water Act, No. 36 of 1998 (NWA)	Department of Water and Sanitation (DWS)	The NWA provides for the sustainable and equitable use and protection of water resources. It is founded on the principle that the National Government has overall responsibility for and authority over water resource management, including the equitable allocation and beneficial use of water in the public interest, and that a person can only be entitled to use water if the use is permissible under the NWA.

<sup>3</sup>GN No. R 982, 983, 984, and 985 in Government Gazette No.38282 of 4 December 2014.

		<p>Section 21 of the NWA specifies the water uses which require authorisation from the DWS in terms of the NWA before they may commence. PGE-EDFR has applied for Water Use Licences or General Authorisation registrations required in terms of the Section 21 of the NWA itself.</p>
<p>National Heritage Resources Act, No. 25 of 1999 (NHRA)</p>	<p>South African Heritage Resources Agency (SAHRA)</p>	<p>In terms of the NHRA, any person who intends to undertake “any development which will change the character of a site exceeding 5,000 m<sup>2</sup> in extent, or involving three or more existing erven or subdivisions thereof”, “the construction of a road powerline, pipeline exceeding 300 m in length” or “the rezoning of site larger than 10,000 m<sup>2</sup> in extent...” must at the very earliest stages of initiating the development notify the responsible heritage resources authority, namely SAHRA or the relevant provincial heritage agency. These agencies would, in turn, indicate whether or not a full Heritage Impact Assessment (HIA) would need to be undertaken.</p> <p>Section 38(8) of the NHRA specifically excludes the need for a separate HIA where the evaluation of the impact of a development on heritage resources is required in terms of an EIA process. Accordingly, since the impact on heritage resources would be considered as part of the EIA process outlined here, no separate HIA would be required. SAHRA or the Limpopo Provincial Heritage Resources Authority (LIHRA), will review the heritage assessments and provide comments to the LEDET, which would consider these comments in their final environmental decision. However, should a permit be required for the damaging or removal of specific heritage resources such as palaeontological or archaeological objects, a separate application for such destruction would need to be submitted to the relevant heritage agency for approval.</p>
<p>Conservation of Agricultural Resources Act (Act No. 43 of 1983) (CARA)</p>	<p>Department of Agriculture</p>	<p>The CARA makes provision for the conservation of agricultural resources through limiting the sub-division of agricultural land, maintaining the production potential of land, combating and preventing erosion, preventing the weakening or destruction of water sources, protecting vegetation, and combating weeds and invader plants. As such, as part of the EIA process, recommendations should be made to ensure that measures are implemented to maintain the agricultural production of land (if possible).</p>
<p>South African National Roads Agency Limited and National Roads Act (Act No. 7 of 1998)</p>	<p>SANRAL</p>	<p>SANRAL, in terms of its authority under the National Roads Act, 1998 has the competence over planning of the N11 route which passes the site. SANRAL has planned upgrades of the N11, which is adjacent to the proposed site. Two interchanges have been proposed near the site at the existing N11/ Bakenberg Road intersection and of N11/ Ga-Sekhaolelo Access Road intersection. These two intersections are about 2.8 km apart and to comply with Class 1 intersection spacing standards, in-between intersection will have to be closed and no direct access to individual property would be allowed. Therefore, access to the site can only be obtained off the eastern legs of the proposed interchanges.</p>



		Provided that site access points comply with SANRAL requirements, it is not anticipated that any approvals will be needed from SANRAL.
National Environmental Management: Biodiversity Act (Act No. 10 of 2004) (NEM:BA)	Department of Fisheries, Forestry and Environment (DFFE) and LEDET	The NEM:BA aims to conserve and manage the country's biodiversity via protecting species and ecosystems, specifically those which are threatened or considered to be critically endangered. It also serves to regulate the management of alien vegetation. In terms of NEM:BA a list of endangered, critically endangered, vulnerable, and protected species has been promulgated (Section 6, Table 3 of the Act), which calls for an EIA process, should any of the listed species be identified on the site and need to be removed. An ecological impact assessment, comprising a wetland assessment, floral assessment and faunal assessment, has been undertaken to determine if any listed species are located on the proposed site.
The National Energy Act (Act No. 34 of 2008)	Department of Mineral Resources and Energy (DMRE)	One of the objectives of this Act is to promote sustainable development of renewable energy infrastructure. The proposed project will contribute to this objective and generate energy from a renewable resource.
Spatial Planning and Land Use Management Act, 2013 (SPLUMA)	Mogalakwena Local Municipality	The land parcels on which the proposed PV facility is planned will need appropriate zoning for the development of a solar PV plant according to the municipality's town planning scheme.
Electricity Regulation Act (Act No. 4 of 2006) (as amended)	National Energy Regulator of South Africa (NERSA)	The Act provides a national regulatory framework for the electricity supply industry.  The Act requires registration and licensing of anyone wanting to generate, transmit, reticulate, distribute, trade, or import and export electricity. PGE-EDFR is interacting directly with NERSA regarding the transmission line linkages with the proposed PV facility.
Occupational Health and Safety Act (No. 85 of 1993) (the OHS Act)	Department of Labour	The health and safety of all people involved in the project before and after construction will be protected.

## 2.2.2 Listed Activities in terms of NEMA

The National Environmental Management Act 107 of 1998 (NEMA) as amended, provides the framework for environmental decision-making in the country and specifically the EIA Regulations (GN No. R982 in the Government Gazette of 8 December 2014, as amended) serve as the instrument through which development decisions are made.

South Africa has rigorous and comprehensive environmental legislation aimed at preventing degradation of the environment. Section 28(1) of NEMA places a “*duty of care and remediation of environmental damage*” on every person who causes, has caused, or may cause, significant



environmental degradation. This is a far-reaching obligation, and accordingly, those parties responsible for the degradation of the environment have a legal duty to avoid, minimise or mitigate such impacts.

This has resulted in a set of Listed Activities that can be triggered by developments taking place in sensitive environments, e.g. watercourses. If a development triggers a Listed Activity, it is required to undergo an Environmental Impact Assessment (EIA) or BA process in terms of the EIA Regulations (GN R982, as amended).

As described in Section 1.1, this project holds a valid EA. Table 4 indicates the listed activities currently authorised by the EA.

**Table 4: Listed activities currently authorised by the EA**

Notice and description	Activity number and description	Related activity
Listing Notice 1: GN R. 983 of 2014	Activity 11(i) – “The development of facilities or infrastructure for the transmission and distribution of electricity –  (ii) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kV”.	Transmission lines will be required for distribution of electricity with a capacity of up to 132kV.
	Activity 12 (ii) - The development of- infrastructure or structures with a physical footprint of 100 square metres or more;  where such development occurs-  (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse;	Infrastructure to cross the watercourse on the site will be required.
	Activity 19 - The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from-  (i) a watercourse;	Infilling of drainage lines will be required as part of stormwater management.
	Activity 24 – The development of-  (ii) a road with a reserve wider than 13,5 metres, or where no reserve exists where the road is wider than 8 metres;	Internal roads

Listing Notice 2: GN R. 984 of 2014	Activity 1(a) - The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more.	The PV facility will be located outside an urban area and would have a generation capacity of up to 120MW.
	Activity 15 – The clearance of an area of 20 hectares or more of indigenous vegetation.	The original site, consisting of northern central and southern portions, extended over 766ha, with 273ha to be utilized for development.
Listing Notice 3: GN R. 985 of 2014	<p>Activity 4 - The development of a road wider than 4 metres with a reserve less than 13,5 metres.</p> <p>(e) In Limpopo:</p> <p>(ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;</p> <p>(gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core areas of a biosphere reserve, excluding disturbed areas.</p>	<p>Internal gravel roads will be constructed for servicing and maintenance of the facility. These gravel roads will be wider than 4 m.</p> <p>The site falls within portions of Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs).</p> <p>The Witvinger Nature Reserve is situated approximately 3.4km south east of the preferred site. This corresponds with the National Protected Areas Expansion Strategy (NPAES, 2009) and the Limpopo C-Plan, which includes buffers around protected areas. The buffer for a protected area is 5km from the proclaimed boundary of a nature reserve, implying that the site falls within this regulatory buffer.</p>
	<p>Activity 12 – The clearance of an area of 300m<sup>2</sup> 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. (e) In Limpopo.</p> <p>(ii) Within critical biodiversity areas identified in bioregional plans.</p>	Constructing the PV plant and associated infrastructure is expected to result in the clearance of more than 300m <sup>2</sup> of indigenous vegetation.

Listed activities currently being applied for in this Basic Assessment process are listed in Table.

Notice and description	Activity number and description	Related activity
GN R983	<p>Activity 1: The development of facilities or infrastructure for the generation of electricity from a renewable resource where-</p> <p>(i) the electricity output is more than 10 megawatts but less than 20 megawatts;</p> <p>This activity will occur outside of an urban area.</p>	The additional footprint of 32 ha required to approve the revised layout of the PV SEF is not expected to generate more than 20 megawatts of electricity.
GN R983	<p>Activity 12 The development of—</p> <p>(ii) infrastructure or structures with a physical footprint of 100 square metres or more:</p> <p>where such development occurs—</p> <p>(a) within a watercourse;</p> <p>(c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse.</p>	Parts of the expanded footprint area will be developed within 32m of a watercourse. Certain infrastructure, such as stormwater management infrastructure will occur within a watercourse.
GN R983	Activity 27: The clearance of an area of 1 hectare or more, but less than 20 hectares of indigenous vegetation.	Portions of the expansion footprint fall within a Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs) and includes less than 20 ha of indigenous vegetation.
GN R985	<p>Activity 4: The proposed access road is expected to have a width of between 4m (for most of the roads) and 12m (for the substation road).</p> <p>This will occur in the Limpopo Province within a critical biodiversity area and within 10 km from the Witvinger Nature Reserve.</p>	<p>A new access road will be constructed to access the site from the secondary provincial road located north of the PV facility.</p> <p>Internal gravel roads may be constructed to facilitate servicing and maintenance of the site. These gravel roads will be wider than 4m.</p> <p>The site falls within portions of CBAs and ESAs.</p> <p>The Witvinger Nature Reserve is situated approximately 3.4km south east of the preferred site. This corresponds with the National Protected Areas Expansion Strategy (NPAES, 2009) and the Limpopo C-Plan, which includes buffers around protected areas. The buffer for a protected area is</p>

		5km from the proclaimed boundary of a nature reserve, implying that the site falls within this regulatory buffer.
	Activity 12: Approximately 16ha of indigenous vegetation in Limpopo within a critical biodiversity area will be cleared.	Approximately 16 ha of a CBA will be used for the installation of PV panels and associated infrastructure for the project.
	Activity 14: Certain sections of the PV panels, associated infrastructure and stormwater outfall sewers are proposed to be placed within 32m of a watercourse. This will occur outside of an urban area, within a critical biodiversity area, within 10km of the Witvinger Nature Reserve and will cover an area of more than 10m <sup>2</sup> .	<p>Approximately 16 ha of a CBA will be used for the installation of PV panels and associated infrastructure for the project, some of which is proposed to be constructed within 32m of a watercourse.</p> <p>The proposed stormwater outfall sewers are within 32m of a watercourse.</p> <p>The site also falls within 5km from a protected area (Witvinger Nature Reserve).</p>

## 3 ROLES AND RESPONSIBILITIES

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

### 3.1 Contractor

The Contractor must ensure that all of its sub-contractors, employees, etc., are fully aware of the environmental issues detailed in this EMPr. The Contractor shall liaise closely with the Site Engineer (SE), Environmental Officer (EO) and the Environmental Control Officer (ECO) and must ensure that the works on site are conducted in an environmentally sensitive (prevent actions that may cause environmental harm) manner and fully in accordance with the requirements of the EMPr, at all times.

The contractor must ensure compliance of all site personnel/visitors to the EMPr and other conditions of approval where relevant.

### 3.2 Developer

PGE-EDFR will be the holder of the EA and will therefore assume overall responsibility for the administration and implementation of the EA and EMPr.

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

- Ensure that all conditions of approval as contained in the EA are adhered to;
- Ensure that the requirements as set out in this EMPr are adhered to and implemented;
- Ensure all authorisations, permits, consents are in place and any other legal requirements are settled before construction commences;
- Allocate the responsibilities assigned to the ECO to an independent suitably qualified individual prior to the start of construction activities on site;

Provide all principal contractors working on the project with a copy of this EMPr as part of tender contract documentation to allow the contractors to cost for its requirements within their respective construction contracts.

### 3.3 Site Engineer (SE)

The SE is responsible for ensuring that the contract is carried out to completion on time, in budget and that each Contractor fulfils his obligations in terms of conditions contained in the EA.

### 3.4 Environmental Control Officer (ECO)

The Developer shall appoint a suitably qualified ECO to monitor the Contractor's compliance in terms of this EMPr and the conditions contained in the EA, as well as address environmental site issues. The ECO shall work in close relation with the Contractor's appointed EO. The designation is reserved for a suitably qualified (National Diploma / Degree in Natural Science or an equivalent qualification), independent, environmental manager, with adequate environmental knowledge to understand and implement the EMPr.

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

- Liaison with the Developer, Project Manager and/or Engineer and DEA;
- Update the EMPr to include relevant conditions of approval contained in the EA (if applicable);

- Conduct environmental induction training with the contractor prior to commencement of work (3.4.1);
- Undertake ECO site inspections. The frequency of site inspections can be determined between the ECO, SE, Environmental Site Agent (ESA) or any specific conditions of authorisation contained in the EA. It is recommended that the ECO be supported by a full-time ESA during the initial construction period/activities (see section 3.5 below) and that the ECO undertake monthly ECO inspections with the ESA. The ECO must attend/arrange a site meeting with the engineer, contractor and other relevant project team members during his/her site inspection to discuss any environmental matters;
- Compilation of ECO Reports that must be submitted to the project team, DEA, developer and Eskom (or any other authority/body deemed necessary by the project team). The ECO must liaise with the ESA to ensure that action items are carried out;
- Review ESA weekly compliance monitoring reports and include information in monthly ECO Reports;
- Monitoring compliance with the various environmental conditions/requirements contained in the EA and EMPr;
- Assist the ESA in reviewing of the Contractor's method statements;
- Ensuring that the requisite remedial action is implemented in the event of non-compliance;
- Ensuring the proactive and effective implementation and management of environmental protection measures;
- Ensuring that a register of public complaints is maintained by the Contractor and that any and all public comments or issues are appropriately reported and addressed;
- Attend monthly site meetings; and
- Recording and reporting of environmental incidents.

### 3.4.1 Environmental Induction/Awareness Training

The ECO shall arrange with the Engineer and Contractor to conduct environmental induction training with personnel and must address, amongst others:

- Explanation of the environmental process that preceded the EA and why it was important to conduct the environmental process;
- Explanation of the conditions of authorisation contained in the EA;
- The sensitive environmental features located within and around the site;
- The reasons why mitigation measures are required and the benefits of implementing these measures;
- The EMPr and its contents (e.g. no-go areas, animals, littering etc.); and
- The role of the ECO.

### 3.4.2 Permits and Authorisation

There are no protected trees or other species of conservation concern in the Mogalakwena PV Energy Facility.

The ECO must be knowledgeable of all licencing and permitting requirements (issued and required) applicable to the site and can assist the contractor with obtaining such permits should any be outstanding.

### 3.5 Environmental Site Agent (ESA)

It is recommended that an independent ESA be appointed for the duration of construction period (appointment must take place prior to commencement of any construction activities). The ESA will assist the ECO with day to day on-site monitoring of construction activities, compliance with this EMPr and any specific conditions contained in the EA. The ESA's terms of reference include, but are not limited to:

- Day to day monitoring of implementation of this EMPr;
- It is recommended that the ESA be on site daily when work is being undertaken in sensitive environments e.g. watercourses and during the initial construction activities which include amongst others site demarcation, identification of no-go areas, vegetation clearance and site camp establishment;
- The ESA must assist the contractor with environmental training of any new staff members or staff which did not attend the ECO's environmental induction training. On-going environmental awareness also falls within the responsibilities of the ESA;
- Submit weekly compliance reports to the ECO;
- Attend contractor and engineering site meetings where relevant or where attendance is requested;
- Maintain a detailed photographic record of construction activities;
- Maintain a register of site instruction, non-compliances and action items and submit weekly to the ECO;
- Keep all method statements on record/file.
- Liaise with the public should there be any complaints, keep a register of any complaints and report to the ECO on weekly basis; and
- The ESA must immediately consult with the SE and ECO should any non-compliances meriting a 'stop-work' instruction be observed.

### 3.6 Environmental Authority - LEDET

The LEDET is the competent authority responsible for issuing the EA and compliance with the conditions of authorisation contained in the EA and relevant environmental legislation. Its responsibilities include amongst others:

- Overall enforcement of the EA and its conditions of authorisation;
- Review the EMPr and any required updates or revisions;
- May undertake compliance inspection site visits;
- Review ECO and audit reports;
- Review incident reports; and
- Enforce the applicable legal mechanisms should any contraventions of the EMPr or EA occur.

### 3.7 Working Area

The land and any other place on, under, over, in or through which the works are to be executed or carried out, and any other land or place made available by the developer in connection with the works. The Working Area shall include the site office, construction camp, stockpiles, batching areas, the construction area, all access routes and any additional areas to which the Engineer permits access. The construction footprint must be kept to a minimum.

The site needs to be clearly and appropriately demarcated and all no-go areas must be clearly identified with appropriate signage. The ECO must brief contractor staff regarding the requirements of no-go areas.

All works must be kept within the footprint of the site as far as practically possible. Areas disturbed outside of the site footprint must be rehabilitated through consultation with the ECO.

All areas outside of the approved development footprint are considered sensitive.



## 4 ENVIRONMENTAL IMPACTS AND SPECIALIST MITIGATIONS

During the assessment of the identified environmental impacts, various mitigatory measures were proposed where impacts were found to be significant. The outcome, and intent, of the impact management recommendations i.e. mitigation measures, is to reduce the level of an impact on the environment to acceptable levels. The preferred method would be to avoid impacts; however, this is not always possible.

Provided below is a short summary of the impacts that were assessed by the appointed specialists and their recommended mitigation measures. These mitigation measures must be implemented together with the mitigation measures as set out in the Construction, Operational and Decommissioning Environmental Management Chapters below.

Environmental sensitivity maps are appended to this EMPr.

### 4.1 Biodiversity

The biodiversity specialist reports included terrestrial (fauna and flora), aquatic and avifaunal assessments to determine the predicted impacts and subsequently provide specialist-recommended mitigation measures.

#### 4.1.1 Terrestrial assessments

The terrestrial assessments conducted for the PV SEF site included fauna and flora assessments. This section deals with a summary of the impacts per specialty and lists the recommended mitigation measures thereof. Certain mitigation, such as measures related to edge effects and AIPs is relevant to all terrestrial environments and are listed at the end of this section.

##### 4.1.1.1 Flora

Key ecological impacts on floral diversity are:

- Loss of floral habitat;
- Loss of floral diversity; and
- Impact on floral species of conservation concern (SCC) and medicinal flora.

Flora-specific mitigation during the construction phase:

- Removal of vegetation must be restricted to the approved development footprint;
- No collection of indigenous floral species must be allowed by construction personnel, especially with regards to floral SCC (if encountered);
- For the removal, destruction, or relocation of protected flora in terms of the LEMA (Schedules 11 and 12), a license is required from the LEDET. For the removal of nationally protected tree species, as per the NFA, permits will be required from the DFFE. Good record-keeping will be necessary to record this process and to document all successes and failures associated with the relocation;
- No collection of floral SCC by construction personnel is permitted;
- Edge effect control must be implemented to prevent further degradation and potential loss of floral SCC outside of the proposed development footprint area.

Flora specific mitigation during the operational phase:

- No additional habitat is to be disturbed during the operational phase of the development;

- No vehicles are permitted to indiscriminately drive through sensitive habitat and natural areas;
- No dumping of litter is be allowed on site;
- No dumping of litter or garden refuse is be allowed on site and, as such, vegetation cuttings from landscaped areas are to be carefully collected and disposed of at a separate waste facility;
- Edge effects arising from the proposed development, such as erosion and alien plant species proliferation, which may affect adjacent natural areas, must be strictly managed. Specific mention in this regard is made of Category 1b and 2 AIP species (as listed in the NEMBA Alien species lists, 2020), in line with the NEMBA Alien and Invasive Species Regulations (2014);
- Ongoing alien and invasive plant monitoring and clearing/control should take place throughout the operational phase, and the project perimeters should be regularly checked for AIP establishment to prevent spread into surrounding natural areas;
- Alien vegetation that is removed must not be allowed to lie on unprotected ground as seeds might disperse upon it. All cleared plant material must be disposed of at a licensed waste facility, that complies with legislated standards;
- Monitoring of rescued and relocated floral and faunal SCC should continue during the operational and maintenance phase until it is evident that the species have successfully established;
- As far as possible, no collection of floral SCC/protected or medicinal floral species within the focus area or adjacent natural habitat must be allowed during the operational and maintenance phase of the proposed development; and
- Edge effect control needs to be implemented to prevent further degradation and potential loss of floral SCC/protected species or suitable habitat for such species outside of the proposed development footprint.

#### 4.1.1.2 Fauna

Key ecological impacts on floral diversity are:

- Loss of faunal habitat;
- Loss of faunal diversity; and
- Impact on faunal SSC.

Fauna-specific mitigation during the construction phase:

- Faunal habitat beyond the demarcated area should not be altered or disturbed;
- All trenched pipes must be backfilled as soon as possible, and trenches should not be left exposed for extensive periods as faunal species could fall in and get injured/trapped;
- No fires are allowed by construction personnel as this will increase the risk of the surrounding veld catching fire and burning down not only the immediate faunal habitat but also that of the larger local areas;
- Following heavy rains, access roads and areas adjacent to the development footprints are to be inspected for signs of erosion, which if found must be immediately rectified through appropriate erosion control measures;
- During the site-pegging phase of surface infrastructure, should any faunal SCC be observed, the rescue and relocation plan must be effected;
- Smaller species such as scorpions and reptiles are likely to be less mobile during the colder periods of the year, as such should any be observed in the footprint sites during clearing and operational activities, they are to be carefully and safely moved to an area of similar habitat outside of the disturbance footprint. Construction personnel are to be educated about these

species and the need for their conservation. Smaller scorpion species and harmless reptiles should be carefully relocated by a suitably nominated construction person or staff member. For larger venomous snakes, a suitably trained official or specialist should be contacted to affect the relocation of the species, should it not move off on its own;

- All rescue and relocation plans for SCC should be overseen by a suitably qualified specialist;
- It is recommended that construction activities take place in a phased manner, so as to ensure that as far as possible faunal species can naturally disperse out of the area ahead of sequential construction activities;
- A rescue and relocation plan must be compiled prior to commencement of construction activities so all personnel are aware of the requirements should a SCC be encountered. This is of specific importance for *Ceratogyrus darlingi* (Horned Baboon Spider) that is confirmed to be within *Dichrostachys* Bushveld habitat;
- All relevant permits are to be obtained from LEDET and DFFE prior to the relocation of any faunal SCC and all rescue and relocation plans should be overseen by a suitably qualified specialist; and
- It is recommended that construction activities take place in a phased manner, so as to ensure that as far as possible faunal species can naturally disperse out of the area ahead of sequential construction activities;

#### Fauna-specific mitigation during the operational phase:

- No hunting/trapping or collecting of any faunal species is allowed;
- No fires are allowed by construction personnel as this will increase the risk of the surrounding veld catching fire and burning down not only the immediate faunal habitat but also that of the larger local areas;
- Any structures which may act as perching sites for birds should be installed with anti-perching spikes;
- Should any lights be installed they should face downwards to reduce the abundance of insects attracted to the night lights, this prey source may attract birds to the focus area;
- No collection or persecution of faunal SCC within the focus area is allowed; and
- Any faunal SCC that are observed should be logged (with a GPS position) and uploaded to the iNaturalist site. Such data can also be used as part of the projects long term monitoring programme.

### 4.1.1.3 Mitigation measures applicable to Fauna and Flora

#### Mitigation of edge-effects and AIPs:

Care should be taken during the construction and operation of the proposed development to manage AIPs and to limit edge effects to surrounding natural habitat. This can be achieved by implementing the following measures:

- The construction footprint must be kept as small as possible in order to minimise impact on the surrounding environment (edge effect management);
- Removal of vegetation must be restricted to what is absolutely necessary and should remain within the approved development footprint;
- Vehicles should be restricted to travelling only on designated roadways to limit the ecological footprint of the construction activities. Additional road construction should be limited to what is absolutely necessary, and the footprint thereof kept to a minimum;
- No illicit fires must be allowed during the construction of the proposed development;

- Demarcating all footprint areas during construction activities;
- No construction rubble or cleared alien invasive species are to be disposed of outside of demarcated areas, and should be taken to a registered waste disposal facility;
- All soils compacted as a result of construction activities should be ripped and profiled and reseeded;
- Alien vegetation within the focus area must be removed and controlled, in line with the National Environmental Management: Biodiversity Act: 2004 (NEMBA) Alien and Invasive Species Regulations (2020);
- The spread of alien invasive plant species, which may affect remaining natural habitat within surrounding areas, must be managed appropriately. Specific mention in this regard is made to Category 1b and 2 species identified within the development footprint areas;
- No dumping of litter, rubble or cleared vegetation on site should be allowed. Infrastructure and rubble removed as a result of the construction activities, must be disposed of at an appropriate registered dump site, away from the development footprint. No temporary dump sites are allowed in areas with natural vegetation. Waste disposal containers and bins are to be provided during the construction phase for all construction rubble and general waste. Vegetation cuttings must be carefully collected and disposed of at a separate waste facility;
- If any spills occur, they must immediately be cleaned up to avoid soil contamination that can hinder floral rehabilitation at a later stage. Spill kits should be kept on-site within workshops. In the event of a breakdown, maintenance of vehicles must take place with care, and the recollection of spillage should be undertaken, preventing the ingress of hydrocarbons into the topsoil;
- Upon completion of construction activities, it must be ensured that no bare areas remain, and that indigenous species be used to revegetate the disturbed areas;
- Prior to the commencement of construction activities, an AIP Management/Control Plan should be compiled for implementation: removal of AIPs should preferably commence during the pre-construction phase, and continue throughout the construction and operational phases. AIPs should be cleared within the focus area before any vegetation clearing activities commence, thereby ensuring that no AIP propagules are spread with construction rubble, and no soil contaminated with AIP seeds during the construction phase. The AIP Management/Control Plan should be implemented by a qualified professional. No use of uncertified chemicals may be used for chemical control of AIPs. Only trained personnel are to use chemical and mechanical control methods of AIPs. Chemical control may not be used within the Freshwater Habitat;
- Edge effects arising from the proposed development, such as erosion and alien plant species proliferation, which may affect adjacent natural areas, need to be strictly managed. Specific mention in this regard is made of Category 1b and 2 AIP species (as listed in the NEMBA Alien species lists, 2020), in line with the NEMBA Alien and Invasive Species Regulations (2014);
- Ongoing alien and invasive plant monitoring and clearing/control should take place throughout the construction and operational phase of the development, and a 30m buffer surrounding the focus area should be regularly checked for AIP proliferation and to prevent spread into surrounding natural areas; and
- Alien vegetation that is removed must not be allowed to lay on unprotected ground as seeds might disperse upon it. All cleared plant material to be disposed of at a licensed waste facility which complies with legal standards.

#### Rehabilitation requirements:

- A rehabilitation plan for natural vegetation should be drawn up. This rehabilitation plan should consider all phases of the project indicating rehabilitation actions to be undertaken during and once construction has been completed, as well as ongoing rehabilitation during the operational phase of the project and rehabilitation actions to be undertaken after operations have ceased;

- Disturbed and cleared areas need to be revegetated with indigenous grass species to help stabilise the soil surface. Where bare soils are left exposed because of construction activities, they should be immediately rehabilitated;
- Any natural areas beyond the direct footprint, which have been affected by the construction or operational activities, must be rehabilitated using indigenous species
- Floral monitoring should be done annually during operational activities;
- Rehabilitation must be implemented concurrently with the rehabilitation plan, and disturbed areas must be rehabilitated as soon as such areas become available. This will not only reduce the total disturbance footprint but will also reduce the overall rehabilitation effort and costs associated with it; and
- All soils compacted because of construction activities falling outside of the project area should be ripped and profiled. Special attention should be paid to alien and invasive control within these areas.

#### 4.1.1.4 Aquatic systems

Four key ecological impacts on freshwater ecosystems are anticipated:

- Changes to the ecosystems leading to the loss of habitat
- Modification of hydrological function and water quality of the ecosystems
- Changes to the freshwater geomorphological processes and sedimentation
- Impacts on the ecosystems that could lead to the loss of biota

**Specific recommendation:** construction activities nearest to the freshwater ecosystems must be undertaken during the drier winter months when surface flow is absent to very low within the freshwater ecosystems.

#### **General “good practice” mitigation measures**

- All development footprint areas must remain as small as possible and should only encroach into the freshwater ecosystem when considered absolutely unavoidable (motivation will need to be provided for this).
- The boundaries of footprint areas, including contractor laydown areas, are to be clearly defined and it must be ensured that all activities remain within defined footprint areas. Edge effects will need to be extremely carefully controlled.
- Temporary roads and access routes must avoid freshwater ecosystem areas and be restricted to existing roads along the tarred access road which traverses the freshwater ecosystem.
- Appropriate sanitary facilities must be provided for all phases of the development, including repair and maintenance activities, and all waste must be removed to an appropriate waste facility/
- All hazardous chemicals, as well as stockpiles, must be stored on bunded surfaces and have facilities constructed to control runoff from these areas.
- It must be ensured that all hazardous storage containers and storage areas comply with the relevant SABS standards to prevent leakage.
- No fires are permitted in or near the construction area.
- An adequate number of waste and “spill” bins are to be provided to prevent litter and to ensure the proper disposal of waste and spills.
- All vehicles must be regularly inspected for leaks. Refuelling must take place on a sealed surface area to prevent ingress of hydrocarbons into the topsoil.

- In the event of a vehicle breakdown, maintenance of vehicles must take place with care, and the recollection of spillage should be undertaken near the surface area to prevent ingress of hydrocarbons into topsoil and subsequent habitat loss.
- All spills, should they occur, must be immediately cleaned up, and treated appropriately.
- Proliferation of alien and invasive species is expected within any disturbed areas. Whilst not considered severe at the time of the EIA, the vegetation component within the freshwater ecosystem environment is already transformed. Alien invasive species are opportunistic, and where disturbances do occur, they will promulgate. Therefore, these species should be eradicated and controlled to prevent their spread beyond the project footprint. Alien plant seed dispersal within the top layers of the soil within footprint areas, that will have an impact on future rehabilitation, must be controlled.
- Removal of alien and weed species encountered within the freshwater ecosystem must take place in order to comply with existing legislation (amendments to the regulations under the Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983) and Section 28 of the National Environmental Management Act, 1998 (Act No. 107 of 1998).
  - Species-specific and area-specific eradication recommendations:
    - Footprint areas should be kept as small as possible when removing alien plant species; and
    - No vehicles are permitted to drive through designated sensitive freshwater ecosystems areas during the eradication of alien and weed species.
- Sheet runoff from compacted soil areas should be slowed down by the strategic placement of berms.
- Ideally, activities should occur within the low rainfall season to minimise impacts of sedimentation.
- As much vegetation growth as possible (of indigenous floral species) should be encouraged to protect soils.
- Temporary stockpiling of excavated material from trenches can be retained alongside trenches, as required for backfilling. Any soil to be stockpiled for longer than a month should be moved to a designated stockpile area, as approved by the Environmental Control Officer (ECO).
- All soils compacted during the repair and maintenance phase should be ripped and profiled.
- A monitoring plan for the development, and for the immediate zone of influence, should be implemented to prevent erosion and incision.
- During rehabilitation:
  - Construction rubble must be collected and disposed of at a suitable landfill site.
  - All alien vegetation in the footprint area, as well as in the immediate vicinity of the proposed work area, should be removed.

## 4.2 Heritage Archaeology and Palaeontology

The key impacts identified by the heritage and palaeontological specialists are:

- Impacts on known and unknown / unmarked burial grounds, graves and homesteads;
- Impact on Stone Age and Iron Age sites; and
- Loss of fossil heritage.

Construction and operational phase mitigation:

- The final layout must be examined by an archaeologist and any potentially sensitive areas must be checked on site prior to construction. This should be done in consultation with the local community to determine whether they are aware of the presence of graves, homesteads or burial sites;
- If any archaeological material or human burials are uncovered during the course of development, then work in the immediate area should be halted. The find would need to be reported to the heritage authorities and may require inspection by an archaeologist. Such heritage is the property of the state and may require excavation and curation in an approved institution.
- Should identified graves and/or burial sites be unavoidable within the PV SEL, then the grave relocation process must be undertaken by a qualified archaeologist.
- Any fossils found during construction must be protected, recorded and reported using the fossil finds procedure.

## 4.3 Landscape and Visual Environment

Key impacts identified during the landscape and visual assessment were:

- Impact on landscape character and sense of place;
- Impact on visual intrusion and visual absorption capacity (VAC);
- Visual exposure and visibility impacts; and
- Impacts due to night-time lighting.

Construction and decommissioning phase mitigations:

- Material stockpiles must not be higher than 3m;
- Construction signage should not be obtrusive and should not be seen against the skyline;
- Fences around construction camps should be black and of a robust mesh like material;
- Only the bigger tree species and/or individuals potentially causing problems with the transmission line/s should be removed. i.e., it is not necessary to clear/ fell the access route beneath the transmission line or the servitude;
- Vegetation clearance along the construction footprint of the servitude must be minimized by fencing off the work area and restricting vehicular access outside this area;
- A vegetation buffer (of approximately 10m) must be maintained between the proposed laydown area and the Ga Sekhaolelo access road;
- After the construction phase, the areas disturbed that are not earmarked for operational purposes (part of infrastructure footprint) must be suitably rehabilitated;
- Trees and shrubs must be planted in clumps, (mimicking natural vegetation openings) and not in rows or other geometric shapes;
- Construction activities should be restricted to daylight hours as far as possible, to limit the need to bright floodlighting and the potential for sky glow;
- The Contractor shall not deface, paint, damage or mark any natural feature (e.g., rocks, etc.) situated on or around the site for survey or any other purposes unless agreed beforehand.

Operational phase mitigation:

- Set the development back as far as practically possible from the main road and plant a buffer strip of indigenous low growing shrubs between the N11 and the proposed development to minimise the effects of glint and glare;
- If feasible, the development must be kept off the higher sections of the site where it would potentially be more visible;

- Maintaining as much of the natural vegetation on the ground within the development footprint as practically feasible;
- To ensure glint and glare do not have significant effects on motorists driving on the N11, nearby residences and commercial areas a glint and glare assessment, mitigation, and monitoring plan should be prepared that accurately assesses and quantifies potential glint and glare effects and determines the potential health, safety, and visual impacts associated with glint and glare. This can be conducted once the detailed layout and technical specifications have been confirmed.

## 4.4 Traffic

The traffic volumes associated with the Mogalakwena PV SEF, will have three different patterns, namely during the construction, operational and decommissioning phases. The construction phase represents the greatest traffic impact and the operational phase the least impact.

### Construction Phase

It is recommended that construction vehicles should be distributed throughout the day, where possible.

- The contractor should manage daily delivery volumes and times.
- Implement dust control measures during the construction phase with speed limits and regular watering for gravel roads.
- Delivery drivers should be licensed and competent, and vehicles should be in good road worthy condition.
- Construction vehicles must adhere to designated routes or access roads

### Operational Phase

Site-generated traffic during operation will be limited to operational and maintenance support, with only a few light vehicles per day. Consequently, the impact of the site-generated traffic on existing traffic patterns and road safety is expected to be negligible.

### Decommissioning phase

It is expected that traffic volumes during this phase will be very similar to that of the construction phase. The volumes may be quantifiable, however the impact on the existing roads, particularly the N11, cannot be accurately determined at this stage. The general traffic is expected to grow, but the impact of decommissioning a site, on the general traffic will be small, given no significant changes are made to the N11 or the surrounding erven.

## 4.5 Social

Positive impacts associated with the project could include:

- The creation of limited permanent and temporary semi-skilled and unskilled employment opportunities;
- Opportunities for local sourcing of goods and services during construction; and
- Local and regional economic benefits, such as leasing the land to the local community.

Negative impacts that might be associated with this project include:

- Social and cultural disruption and conflict due to unavailability of the land as a temporary relocation site;
- Construction-related health, safety and aesthetic impacts;
- Land use impacts and impacts on common property resources;



- Displacement; and
- Environmental issues such as water contamination, dust, noise pollution and blasting have been regularly raised by communities in the mine's zone of influence.

#### Mitigation measures

- Undertake additional site investigation/ stakeholder engagements during EIA phase stakeholder engagement to determine any sensitive socio-economic attributes in the area.
- Provide a detailed description of appropriate mitigation measures that can be adopted to reduce or avoid negative impacts and improve positive impacts for each phase of the project, where required, and the significance of impacts pre- and post-mitigation.
- Provide a summary of succinct and practical recommendations based on mitigation measures identified to form the basis of EA requirements, if the development is authorised.
- Specialist work conducted on behalf of the mine, should always be run past the Dikgoshi (chiefs) first, and they must be informed of the scheduled fieldwork. This will convey the message that they (communities) are as important as the client that's paying the specialists. If tasks are scheduled for certain dates (e.g. submission of EIA reports to a competent authority), communities must be aware of this as well. There seems to be a substantial need for being informed of dates for scheduled activities (activities which have little impact on stakeholders), without the need so much to have a say in when these tasks take place.

## 5 SUMMARY OF IMPACTS AND ASSOCIATED MITIGATION MEASURES

The following table covers the construction activities and associated environmental impacts that will occur during the proposed project.

The table considers the expected impacts on-site during the different phases of the project, as well as the mitigation measures and environmental management procedures required to manage the expected impacts. The following sections are dealt with in the table:

Section 6	:	Pre-construction and construction site environmental management
Section 7	:	Materials
Section 8	:	Waste
Section 9	:	Surrounding properties
Section 10	:	Flora, fauna, air quality, noise, water and other
Section 11	:	Rehabilitation
Section 12	:	Planning and engineering considerations

## 6 PRE-CONSTRUCTION AND CONSTRUCTION SITE ENVIRONMENTAL MANAGEMENT

ACTIVITY	ASPECT	POTENTIAL IMPACT	IMPLEMENTATION			MONITORING		
			RESPONSIBLE PERSON	MITIGATORY MEASURE (OBJECTIVES AND TARGET)	TIMEFRAME	RESPONSIBLE PERSON	FREQUENCY	PERFORMANCE INDICATOR
6.1 Engineering Design	All aspects listed in the EMPr	Incompatibility between the design and the receiving environment	Developer	<b>Objective:</b> To ensure the design of the PV SEL takes into account the environmental sensitivities.  <b>Target:</b> Assimilate requirements of the EMPr in the design and construction management giving special attention to the environmental sensitivities identified by the EIA specialists.	During tender, design and design review stages	PGE-EDFR in consultation with appointed specialists.	Throughout design phase	Design meets objectives and does not degrade the receiving environment.
6.2 Establishment of the construction site	Construction site	Construction activities infringing on no-go areas.	Developer, Contractor and ESA with the inputs from appointed specialists	<b>Objective:</b> To ensure the establishment of the construction site does not infringe on or damage/pollute the no-go (buffer zone) areas.  <b>Target:</b> <ul style="list-style-type: none"> <li>Adequately fence off all no-go areas according to the specialist reports conducted as part of the EIA process.</li> <li>Erect no-go signage on the fences of these areas.</li> <li>Ensure all appointed staff and visitors are aware of these areas.</li> </ul>	Pre-construction phase	Developer, Contractor and ECO in consultation with appointed specialists.	Throughout pre-construction phase until targets are met. Monitor during construction phase.	No trespassing within or damage to the no-go areas.
6.3 Establishment of the construction site	Construction site	Undue damage to or loss of vegetation	IPP, Contractor and ESA	<b>Objective:</b> To prevent and mitigate the undue damage or loss of natural vegetation outside the boundaries of the PV SEL footprint.  <b>Targets:</b> <ul style="list-style-type: none"> <li>Site establishment shall take place in an orderly manner and all amenities shall be installed or be available before the onset of</li> </ul>	Pre-construction phase	Engineer and ECO	Once off, unless the site area changes in which case the method statement and layout plan must be updated.	Establishment of construction site in compliance with objectives and no evidence of environmental degradation.

ACTIVITY	ASPECT	POTENTIAL IMPACT	IMPLEMENTATION			MONITORING		
			RESPONSIBLE PERSON	MITIGATORY MEASURE (OBJECTIVES AND TARGET)	TIMEFRAME	RESPONSIBLE PERSON	FREQUENCY	PERFORMANCE INDICATOR
				<p>construction. Where such amenities are not available, chemical toilets shall be provided.</p> <ul style="list-style-type: none"> <li>• A method statement is required from the Contractor that includes the layout of the site, management of facilities and wastewater management.</li> <li>• A site plan of the construction site must be provided indicating waste areas, storage areas and placement of facilities</li> <li>• The Contractor shall inform all site staff to the use of supplied ablution facilities and under no circumstances shall indiscriminate excretion and urinating be allowed other than in supplied facilities.</li> <li>• The Contractor shall supply sealable waste collection bins and all solid waste collected shall be disposed of at a registered waste facility.</li> <li>• Certificates of disposal shall be obtained by the Contractor and kept on file.</li> <li>• Where a registered waste site is not available close to the construction site, the Contractor shall provide a method statement with regard to waste management. Under no circumstances may solid waste be burned on site or illegally dumped.</li> <li>• Refuse bins will be emptied and secured.</li> <li>• The construction site office and other areas must be placed on already disturbed land as far as possible.</li> <li>• Fences and security access must be maintained, throughout the project.</li> <li>• Emergency and contact numbers of the contractors must be available and prominently displayed on a signage board that is clearly visible.</li> </ul>				

ACTIVITY	ASPECT	POTENTIAL IMPACT	IMPLEMENTATION			MONITORING		
			RESPONSIBLE PERSON	MITIGATORY MEASURE (OBJECTIVES AND TARGET)	TIMEFRAME	RESPONSIBLE PERSON	FREQUENCY	PERFORMANCE INDICATOR
6.4 Establishment of the construction site	Construction site	Loss of soil fertility	Contractor and ESA	<p><b>Objective:</b></p> <p>Whilst establishing the construction site the footprint of disturbance is to be minimised thereby preventing the undue degradation and loss of soil.</p> <p><b>Targets:</b></p> <ul style="list-style-type: none"> <li>Protect stockpiles of topsoil and subsoil material with silt fences that should be maintained during the entire construction phase on site.</li> <li>Locate stockpiles outside of any buffer zones as indicated in the specialist reports and not on slopes with a gradient greater than 1:3.</li> <li>Identify and clearly demarcate existing infrastructure within the study area in order to avoid damage throughout the construction phase.</li> </ul>	Design phase and site establishment	Engineer and ECO	Once-off	Established construction camp in compliance with objectives and no evidence of environmental degradation
6.5 Temporary closure of the construction site	Construction site	Potential impacts associated with the closure of the construction site.	Contractor and ESA	<p><b>Objective:</b></p> <p>To limit potential impacts on the environment for periods during which the construction site is closed.</p> <p><b>Targets:</b></p> <p>Should the construction site be closed for a period of more than one week, a report on compliance will be lodged with the Engineer and Project Manager confirming the following:</p> <ul style="list-style-type: none"> <li>No persons allowed other than project employees;</li> <li>Minimal materials kept stored.</li> <li>Materials will be stored in leak-proof, sealable containers or packaging.</li> <li>The store area is secure and locked.</li> <li>Fire extinguishers will be serviced and accessible.</li> </ul>	Closure of construction site (for example over holiday breaks)	Engineer and ECO	Whenever the construction camp is closed for longer than a week.	Closure of the construction camp in line with the requirements of the EMP.

ACTIVITY	ASPECT	POTENTIAL IMPACT	IMPLEMENTATION			MONITORING		
			RESPONSIBLE PERSON	MITIGATORY MEASURE (OBJECTIVES AND TARGET)	TIMEFRAME	RESPONSIBLE PERSON	FREQUENCY	PERFORMANCE INDICATOR
				<ul style="list-style-type: none"> <li>The area is secure from accidental damage through vehicle collision, etc.</li> <li>Emergency and contact numbers of the contractor will be available and prominently displayed.</li> <li>Chemical toilets are emptied, kept hygienically clean and secured.</li> <li>24 hour security will be on site during this period.</li> </ul>				
6.6 Construction of site buildings	Materials used to construct site buildings	Soil pollution and permanent alternation to the receiving environment	Contractor and ESA	<p><b>Objective:</b> To ensure the material for site buildings, used by the Contractor during the construction of the project, are removable and to minimise the impacts of the construction of the buildings on the environment.</p> <p><b>Targets:</b></p> <ul style="list-style-type: none"> <li>No permanent structures will be permitted at the construction site.</li> <li>Temporary structures shall be founded on a platform, either subsoil or screed slab.</li> <li>Buildings should preferably be prefabricated or constructed of re-usable/recyclable materials.</li> <li>All temporary structures must be soundly built and not pose a danger to workers.</li> <li>All structure footprints to be rehabilitated and landscaped after construction is complete.</li> </ul>	Pre-construction and site establishment	Engineer and ECO	Once off, unless the site area changes and/or new buildings are required, in which case additional inspections will be required.	On site buildings constructed according to the requirements of the EMPr.
6.7 Operation of sanitation systems	Sanitation systems	Unpleasant odours on site. Inadequate number of	Contractor and ESA	<p><b>Objective:</b> To ensure good sanitation systems and management throughout the construction period.</p> <p><b>Targets:</b></p>	Pre-construction and site establishment	Engineer and ECO	Once off, unless the site area changes and/or new buildings are required, in	Adequate toilets will be positioned at the right places as per the EMP and ECO.

ACTIVITY	ASPECT	POTENTIAL IMPACT	IMPLEMENTATION			MONITORING		
			RESPONSIBLE PERSON	MITIGATORY MEASURE (OBJECTIVES AND TARGET)	TIMEFRAME	RESPONSIBLE PERSON	FREQUENCY	PERFORMANCE INDICATOR
		latrines on site. Position of latrines. Mis-management of waste water.		<ul style="list-style-type: none"> <li>Adequate toilets must be provided for all staff.</li> <li>Chemical toilets must be emptied / serviced on a regular basis to prevent them overflowing. Proof of this must be provided to the ECO.</li> <li>A minimum of one toilet must be provided per 15 persons.</li> </ul>			which case additional inspections will be required.	Absence of odours, erosion and build-up of detergents.
6.8 Vehicle parking. Storage of equipment.	Vehicle parking and parking area(s). Storage of equipment.	Pollution of soils. Disturbance of soils due to parking of vehicles outside of designated areas.	Contractor and ESA	<b>Objective:</b> To ensure vehicles are parked according to the specifications in the EMPr and that equipment is handled appropriately.  <b>Targets:</b> <ul style="list-style-type: none"> <li>No storage of vehicles or equipment will be allowed outside of the designated area.</li> <li>Drip trays or any form of oil absorbent material must be placed underneath vehicles and equipment when not in use.</li> </ul>	Throughout the construction period.  Planning to be done during site establishment phase.	Engineer and ECO	Whenever there are stationary vehicles or equipment present on site.	No incidents of soil pollution due to spills from stationary vehicles and equipment.  No undue disturbance of soils.  No incidents of vehicles being parked outside the designated parking area.
6.9 Servicing and washing of vehicles and machinery	Workshop and equipment storage areas	Water contamination. Soil contamination. Noise pollution.	Contractor and ESA	<b>Objective:</b> To ensure that the environment is not polluted by ensuring that service areas and wash bays for vehicles and machinery are made available and utilised.  <b>Targets:</b> <ul style="list-style-type: none"> <li>No servicing of equipment on site.</li> <li>Leaking equipment shall be repaired immediately or be removed from site to facilitate repair</li> <li>All potentially hazardous and non-degradable waste shall be collected</li> <li>and removed to a registered waste site</li> </ul>	Whenever servicing or maintaining of vehicles or equipment throughout the construction period.	Engineer and ECO	Daily monitoring by CER and weekly inspections by ECO.	Evidence of prescribed servicing and washing services.  No incidents of soil or water contamination.  No complaints of noise pollution due to servicing and washing of vehicles.

ACTIVITY	ASPECT	POTENTIAL IMPACT	IMPLEMENTATION			MONITORING		
			RESPONSIBLE PERSON	MITIGATORY MEASURE (OBJECTIVES AND TARGET)	TIMEFRAME	RESPONSIBLE PERSON	FREQUENCY	PERFORMANCE INDICATOR
				<ul style="list-style-type: none"> <li>The Contractor shall be in possession of an emergency spill kit that must be complete and available at all times on site</li> <li>Only emergency repairs shall be allowed on site and a drip tray shall be used to prevent oil spills</li> <li>The contractor must ensure that delivery drivers and plant operators are informed of all relevant procedures and restrictions required ensuring compliance with this document</li> <li>All vehicles and equipment must be well maintained to ensure that there are no oil or fuel leakages.</li> <li>The following shall apply: <ul style="list-style-type: none"> <li>All contaminated soil / yard stone shall be removed and be placed in containers.</li> <li>Contaminated material can be taken to one central point where bioremediation can be done.</li> <li>A specialist Contractor shall be used for the bioremediation of contaminated soil where the required remediation material and expertise is not available on site.</li> <li>All spills of hazardous substances must be reported to the ECO.</li> </ul> </li> </ul>				
6.10 Personnel conduct	Personnel	Infringement of the EMP requirements by personnel on site.	Contractor, ESA and labourers.	<p><b>Objective:</b> To ensure that personnel are adhering to the EMP requirements.</p> <p><b>Targets:</b></p> <ul style="list-style-type: none"> <li>The Contractor will adhere to all requirements of the Occupational Health and Safety Act (Act 56 of 2004), including the drafting of a suitable Health and Safety Plan</li> </ul>	Approved PPE must be issued to all employees pre-construction but must be used for the duration the	Engineer and ECO	Daily monitoring by ESA and safety officers.	Personnel wearing proper safety uniform.  Absence of trespassers on site



ACTIVITY	ASPECT	POTENTIAL IMPACT	IMPLEMENTATION			MONITORING		
			RESPONSIBLE PERSON	MITIGATORY MEASURE (OBJECTIVES AND TARGET)	TIMEFRAME	RESPONSIBLE PERSON	FREQUENCY	PERFORMANCE INDICATOR
				<p>which will be implemented during the construction phase.</p> <ul style="list-style-type: none"> <li>• All personnel and contractors to undergo Environmental Awareness Training. A signed register of attendance must be kept for proof.</li> <li>• Toolbox talks to include aspects of the EMPr, especially specialist mitigation measures.</li> <li>• Warning signs must be placed on and around the site as per the Occupational, Health and Safety requirements.</li> <li>• Adequate first aid services must be provided by the contractor.</li> <li>• The contractor will be responsible for his own security arrangements and shall comply with all site security instructions.</li> <li>• Basic fire-fighting equipment must be available on site.</li> <li>• PPE to be provided and well maintained.</li> <li>• All incidents should be reported to ECO, investigated, documented and kept in safety file.</li> </ul>	construction phase			

## 7 MATERIALS

ACTIVITY	ASPECT	POTENTIAL IMPACT	IMPLEMENTATION			MONITORING		
			RESPONSIBLE PERSON	MITIGATORY MEASURE (OBJECTIVES AND TARGET)	TIMEFRAME	RESPONSIBLE PERSON	FREQUENCY	PERFORMANCE INDICATOR
7.1 Transportation of materials	Material transport	Traffic congestions. Production of dust during transportation. Excessive noise.	Contractor and ESA.	<p><b>Objective:</b> To ensure that whilst material is transported, it cannot be of negative influence to the surrounding environment.</p> <p><b>Target:</b></p> <ul style="list-style-type: none"> <li>The contractor should note that existing roads are sufficient to facilitate access to the new office site and that the following should be adhered to:</li> <li>Adequate and appropriate traffic warning signage must be erected where applicable, along transport routes and access roads.</li> <li>The Contractor shall take preventative measures e.g. screening, muffling (where possible), timing, pre-notification of affected parties to minimise complaints regarding noise and vibration nuisance from construction activity sources.</li> <li>Fine materials such as sand must be covered during transportation.</li> <li>Appropriate response plans must be prepared by the contractor to ensure the fastest possible reaction to spills or accidents.</li> <li>Deliveries must be scheduled for off-peak hour traffic times.</li> <li>All trucks and vehicles removing spoil from the site must have load areas and must be covered by a tarpaulin (plastic / synthetic sheets / covers) to prevent rocks and spoil falling onto the road surfaces.</li> </ul>	Targets to be implemented prior to start of construction and continually implemented throughout construction phase.	Engineer and ECO.	Throughout construction phase	<p>Covering of material during transportation.</p> <p>No complaints received.</p> <p>Emergency reaction plan (for spills/accidents) must always be readily available on site.</p>

ACTIVITY	ASPECT	POTENTIAL IMPACT	IMPLEMENTATION			MONITORING		
			RESPONSIBLE PERSON	MITIGATORY MEASURE (OBJECTIVES AND TARGET)	TIMEFRAME	RESPONSIBLE PERSON	FREQUENCY	PERFORMANCE INDICATOR
				<ul style="list-style-type: none"> <li>Vehicle speeds on site should not exceed 20 km/hr.</li> <li>All drivers are to have licences for driving and operating plant on site</li> <li>All road vehicles to be road worthy.</li> </ul>				
7.2 Storage and handling of hazardous materials.	Hazardous material handling and storage.	<p>Contamination of soil, water and groundwater by hazardous material.</p> <p>Inadequate remediation measures for spills.</p>	Contractor and ESA	<p><b>Objective:</b> To ensure adequate protection of soil and soil remediation measures in case of spills.</p> <p><b>Targets:</b></p> <ul style="list-style-type: none"> <li>Hazardous materials – such as paint, cement, fuels, bitumen, fuel, oil, herbicides, battery acid or detergents – must be stored in sealed, lockable containers when not in use.</li> <li>A register shall be kept of all substances and be available for inspection at all times. Areas shall be monitored for spills and any spills shall be contained, cleaned and rehabilitated immediately.</li> <li>No decantation into unmarked containers or containers with incorrect labels.</li> <li>No decanted fuel to be left unattended in the sun.</li> <li>When handling hazardous materials, manufacturer's specifications must be complied with. The 16 point Material Safety Data Sheet is available on site.</li> <li>Drip trays must be used when handling hazardous substances. No hazardous substance containers may be placed on soil.</li> <li>All spills (minor and major) must be cleaned and remediated to the satisfaction of the ECO and CER within 24 hours of occurrence.</li> <li>The contractor must ensure that there is a supply of absorbent material (e.g. Drizit) and</li> </ul>	Construction period	Engineer and ECO	For the duration of the construction period dependent on the presence of hazardous material on site.	<p>Storage of hazardous materials in sealed and lockable containers.</p> <p>No evidence of spills on site.</p> <p>Absorbent and clean-up material readily available on site.</p>

ACTIVITY	ASPECT	POTENTIAL IMPACT	IMPLEMENTATION			MONITORING		
			RESPONSIBLE PERSON	MITIGATORY MEASURE (OBJECTIVES AND TARGET)	TIMEFRAME	RESPONSIBLE PERSON	FREQUENCY	PERFORMANCE INDICATOR
				<p>clean-up materials readily available to absorb, breakdown and, where possible, encapsulate minor hazardous material spillages.</p> <ul style="list-style-type: none"> <li>• No material may be stacked higher than 2m.</li> <li>• All products are to be stored with compatibility in mind.</li> <li>• Storage areas shall display the required safety signs depicting "No smoking", "No naked lights" and "Danger". Containers shall be clearly marked to indicate contents as well as safety requirements.</li> <li>• The contractor shall supply a method statement to the engineer for approval for the storage of hazardous materials prior to site preparation.</li> <li>• Appoint appropriate contractors to remove any residue from spillages from site. Handling, storage and disposal of excess or containers of potentially hazardous materials shall be in accordance with the requirements of pertinent Regulations and Acts (e.g. Hazardous Substances Act, Number 15 of 1973; National Water Act, Number 36 of 1998).</li> </ul>				
7.3 Storage of fuel	Storage areas	Contamination of soil by fuel. Inadequate remediation measures for spills.	Contractor and ESA	<p><b>Objective:</b> To ensure that there is optimum environmental protection (especially soil) from fuel spills.</p> <p><b>Targets:</b></p> <ul style="list-style-type: none"> <li>• Fuel must be stored in above ground storage tanks or sealed containers, contained within a bunded area with sump drainage.</li> <li>• All bunds must be designed to contain at least 110% of the tank or drum storage capacity (this shall apply to above ground storage, and include fuels).</li> </ul>	Pre-construction phase and site establishment.	ECO	Once-off	Established fuel storage areas in compliance with the objectives of the EMP.

ACTIVITY	ASPECT	POTENTIAL IMPACT	IMPLEMENTATION			MONITORING		
			RESPONSIBLE PERSON	MITIGATORY MEASURE (OBJECTIVES AND TARGET)	TIMEFRAME	RESPONSIBLE PERSON	FREQUENCY	PERFORMANCE INDICATOR
				<ul style="list-style-type: none"> <li>No drainage from fuel storage areas shall be permitted.</li> <li>Any other hazardous substances stored in bulk will require bunding.</li> </ul>				
7.4 Use of cement	Cement	Contamination of soil and surrounding environment.  Decrease in ambient air quality.	Contractor and ESA	<p><b>Objective:</b> To ensure that the environment is protected from cement that will be used on site.</p> <p><b>Targets:</b></p> <ul style="list-style-type: none"> <li>Should cement must be delivered in sound and properly secured bags or in approved bulk containers.</li> <li>Cement products in bags must be stored in storage containers to be provided at the construction camp and should only be opened when needed.</li> <li>The storage facility and surrounding area must be swept and cleaned regularly as required to ensure that cement products do not the pollute the surrounding environment.</li> <li>Cement bags are not to be burnt on site but should be disposed of at a registered hazardous waste disposal site, as mandated by the manufacturer and the applicable legislation.</li> <li>No concrete batching on bare soil.</li> </ul>	As long as cement is in use on site.	ECO	Weekly ECO monitoring and monthly audits	Cement delivery, storage and use will be in line with the EMP requirements.

## 8 WASTE

ACTIVITY	ASPECT	POTENTIAL IMPACT	IMPLEMENTATION			MONITORING		
			RESPONSIBLE PERSON	MITIGATORY MEASURE (OBJECTIVES AND TARGET)	TIMEFRAME	RESPONSIBLE PERSON	FREQUENCY	PERFORMANCE INDICATOR
8.1 Storage, removal and disposal of construction waste	Construction waste	Land pollution.  Compaction of soil by rubble.  Decreased aesthetic integrity of the site.	Contractor and ESA.	<p><b>Objective:</b></p> <p>To ensure that waste is correctly stored and disposed of, decreasing the visual impact during the construction and post construction period. Disposal of rubble and refuse in an appropriate manner. Minimise litigation. Minimise public complaints.</p> <p><b>Target:</b></p> <ul style="list-style-type: none"> <li>Surplus concrete, sludge, silt, rubble or any other construction waste may not be dumped indiscriminately on site but shall be disposed of in a registered waste landfill site or recycled as per the approved contractor's <b>Waste Management Plan</b>.</li> <li>Concrete trucks shall not be washed on site after depositing concrete unless it is within an appropriate wash bay.</li> <li>Any spilled concrete shall be cleaned up immediately.</li> <li>Bins and containers/skips must be made available by the contractor for the storage of construction waste and the bins to be removed from site as required.</li> <li>Temporary storage of construction waste will take place within the site, and within areas designated by the ECO and the Contractor according to the approved site layout plan.</li> <li>The Contractor will be responsible to remove and transport all construction waste material off site to a registered waste disposal or recycling facility (proof of this as well as a copy of the sites Registration Permit, must be provided by the Contractor to the ECO).</li> </ul>	Waste bins/skips must be available prior to construction.  Removal of waste throughout the construction period.	ECO.	Throughout construction phase and at a frequency agreed upon in the approved waste management plan.	Construction waste stored, collected and disposed of as per the requirements of this EMP.

ACTIVITY	ASPECT	POTENTIAL IMPACT	IMPLEMENTATION			MONITORING		
			RESPONSIBLE PERSON	MITIGATORY MEASURE (OBJECTIVES AND TARGET)	TIMEFRAME	RESPONSIBLE PERSON	FREQUENCY	PERFORMANCE INDICATOR
				<ul style="list-style-type: none"> <li>No burning of waste is permitted on site.</li> <li>No waste is permitted to pollute the watercourses.</li> </ul>				
8.2 Storage, removal and disposal of domestic waste.	Domestic waste	Land pollution. Unpleasant odours. Decreased aesthetic integrity of the site.	Contractor and ESA	<p><b>Objective:</b> To ensure that waste is correctly stored and disposed of, decreasing the visual and possible environmental impact during the construction and post construction period.</p> <p><b>Targets:</b></p> <ul style="list-style-type: none"> <li>The Contractor must supply sealable waste bins at the construction camp for the storage of domestic waste.</li> <li>Clearly marked waste bins are to be provided for the separation of waste according to the WMP.</li> <li>Recyclable waste, including glass, paper and plastic must be separated at the construction camp, stored and recycled, where economically feasible.</li> <li>Personnel must be informed about the necessity of using the waste drums.</li> <li>The Contractor must do site clean-ups of litter other than construction waste on a daily basis, and dispose of it in the designated refuse bins provided.</li> <li>The contractor must ensure that general site-wide litter clean-up will occur at least once a week.</li> <li>The Contractor must dispose of all domestic refuse generated by his staff and Sub-Contractors on a weekly basis at a registered waste disposal facility. The Contractor must provide proof of this to the ECO in the form of a safe disposal certificate.</li> </ul>	<p>Waste bins/skips must be available prior to construction.</p> <p>Removal of waste throughout the construction period.</p> <p>Regular removal of waste from waste storage area to registered disposal site.</p>	Engineer and ECO	Waste bins/skips must be available prior to construction. Throughout construction phase and at a frequency agreed upon in the approved waste management plan.	Evidence of domestic waste stored, removed and disposed of according to the requirements indicated in this EMP.



ACTIVITY	ASPECT	POTENTIAL IMPACT	IMPLEMENTATION			MONITORING		
			RESPONSIBLE PERSON	MITIGATORY MEASURE (OBJECTIVES AND TARGET)	TIMEFRAME	RESPONSIBLE PERSON	FREQUENCY	PERFORMANCE INDICATOR
				<ul style="list-style-type: none"> <li>Sealable waste drums should be provided in close proximity to all working areas during the construction of the new office building.</li> <li>The waste storage area must not be allowed to overflow with waste.</li> </ul>				
8.3 Storage, removal and disposal of hazardous waste	Hazardous waste	Soil and water pollution	Contractor and ESA	<p><b>Objective:</b> To ensure that soil and the rest of the surrounding environment on site is protected from hazardous waste.</p> <p><b>Targets:</b></p> <ul style="list-style-type: none"> <li>The Contractor is required to refer to the Hazardous Substances Act No 15 of 1973 act to determine whether any substance (new or waste) stored on site is subject to controls contained within the act.</li> <li>All hazardous waste must be stored in sealed and suitably marked containers for removal to a registered hazardous waste disposal facility.</li> <li>Any oil spillage on site will be excavated to a depth of 150 mm and disposed of for removal to a registered hazardous waste disposal site. Excavated areas are to be refilled with suitable replacement material. Alternative in-situ remediation techniques could be used, if approved by the ECO.</li> <li>Contaminated water must be stored in sealable marked containers and disposed of with other waste water from the construction works.</li> <li>Refer and adhere to the approved Waste Management Plan as compiled by the Contractor and approved by the ECO.</li> </ul>	Throughout construction phase.	ECO	Old hydrocarbons and other hazardous materials must be removed on a regular basis (at least every 30 days).	All mitigation measures with regards to Hazardous waste mentioned in the EMP are implemented.

## 9 SURROUNDING PROPERTIES

ACTIVITY	ASPECT	POTENTIAL IMPACT	IMPLEMENTATION			MONITORING		
			RESPONSIBLE PERSON	MITIGATORY MEASURE (OBJECTIVES AND TARGET)	TIMEFRAME	RESPONSIBLE PERSON	FREQUENCY	PERFORMANCE INDICATOR
9.1 Use of existing roads	Access roads	Damage to access roads. Damage to environment Erosion.	Contractor and ESA.	<b>Objective:</b> To minimise damage to existing roads. <b>Target:</b> <ul style="list-style-type: none"> <li>Care to be taken to prevent damage to existing access roads.</li> <li>Adhere to traffic signs and road markings.</li> <li>Ensure that open trucks are covered with tarpaulins (plastic liners) to ensure no transported materials fall onto the road surface.</li> </ul>	Implement during site establishment and monitor throughout construction phase.	ECO.	Daily	No claims from Landowners due to further damage on existing access roads. No damage visible on access roads

## 10 FAUNA, FLORA, AIR QUALITY, NOISE, WATER AND OTHER ENVIRONMENTAL ASPECTS

ACTIVITY	ASPECT	POTENTIAL IMPACT	IMPLEMENTATION				MONITORING		
			RESPONSIBLE PERSON	MITIGATORY MEASURE (OBJECTIVES AND TARGET)	TIMEFRAME	RESPONSIBLE PERSON	FREQUENCY	PERFORMANCE INDICATOR	
10.1 Vegetation clearing	Vegetation	Damage to vegetation.  Erosion and sedimentation.	Contractor and ESA.	<b>Objective:</b> Minimise damage to vegetation. <b>Target:</b> <ul style="list-style-type: none"><li>The object of vegetation clearing is to trim, cut or clear the minimum number of trees and vegetation necessary for safe construction and operation of the PV SEF.</li><li>No vegetation shall be pushed into heaps or left lying on the site.</li><li>Where possible, do not clear vegetation in areas where construction activities are only planned for a later period (i.e. implement a phased approach).</li><li>All topsoil removed to be stored for future use during rehabilitation.</li></ul>	Plan vegetation clearing according to construction timeframes during pre-construction phase.  Clearing to be done during construction phase as required.	ECO.	Weekly monitoring	No unnecessary loss of vegetation.	
10.2 Vegetation clearing	Conservation and protection of flora	Unnecessary removal of flora.  Removal of vegetative matter for firewood.	Contractor and ESA.	<b>Objective:</b> Minimise extent of vegetation removal. <b>Target:</b> <ul style="list-style-type: none"><li>Only eradicated or trimmed-down vegetation matter may be removed from site.</li><li>No vegetative matter may be removed for firewood – this is strictly prohibited</li><li>No open fires are permitted.</li><li>No material storage or lay down is permitted under trees.</li></ul>	During the establishment of the construction site.		Weekly monitoring	No unnecessary loss of vegetation.	
10.3 Protection and handling of possible fauna on site.	Protection of fauna	Intentional or unintentional killing of fauna on site.	Contractor and ESA.	<b>Objective:</b> To ensure that fauna found on site are protected and not interfered with. <b>Target:</b>	Throughout the construction and post	ECO	Continuous	No evidence of domestic animals on site.	

ACTIVITY	ASPECT	POTENTIAL IMPACT	IMPLEMENTATION				MONITORING		
			RESPONSIBLE PERSON	MITIGATORY MEASURE (OBJECTIVES AND TARGET)	TIMEFRAME	RESPONSIBLE PERSON	FREQUENCY	PERFORMANCE INDICATOR	
		Loss of fauna due to habitat disturbance.		<ul style="list-style-type: none"><li>The contractor must ensure that the site is kept clean and free of rubbish that could potentially attract animal pests, and that rubbish bins are scavenger proof.</li><li>The contractor must report problem animals or vermin to the ECO.</li><li>Ensure that domesticated animals belonging to the local community are kept away from the construction works.</li><li>The contractor may under no circumstances make use of pesticide or poison to control unwanted animals.</li><li>Animals (incl. snakes, tortoises and lizards) must be removed from the site should they be directly threatened by the vegetation clearance or construction activities. The ESA or ECO must be contacted for assistance in this regard. Snake handling must be done by an appropriately trained individual.</li><li>Excavations and trenches must be inspected daily (first thing in the morning) to check whether any animals have been trapped. Any trapped animals must be removed and relocated to a safe location outside of the development footprint.</li><li>In terms of fencing and movement of fauna, the following must be implemented:<ul style="list-style-type: none"><li>Small ground level openings, 20-30 cm in height, should be kept clear in electrical fencing, at least at strategic places, to facilitate the movement of small mammals and reptiles to move through the site;</li><li>Fencing (e.g. palisade) must provide appropriate opening for animals to pass through – bars placed 20cm apart should provide sufficient space for the movement of small animals whilst deterring human; and</li></ul></li></ul>	construction period.			The site is kept clean and does not attract pests or local fauna.	

ACTIVITY	ASPECT	POTENTIAL IMPACT	IMPLEMENTATION				MONITORING		
			RESPONSIBLE PERSON	MITIGATORY MEASURE (OBJECTIVES AND TARGET)	TIMEFRAME	RESPONSIBLE PERSON	FREQUENCY	PERFORMANCE INDICATOR	
				- If not electrified, the bottom wire of perimeter fence must be at least 15cm from the ground, 20cm if electrified (tortoises retreat into shell when shocked).					
10.4 Earthworks	Dust control	Air pollution	Contractor and ESA.	<b>Objective:</b> To reduce the generation of dust on the construction site. <b>Target:</b> <ul style="list-style-type: none"><li>Dust suppression is to be conducted during construction, or as complaints are received.</li><li>The Contractor is to take appropriate measures to minimise the generation of dust as a result of excavation works (such measures include frequent spraying during low rainfall periods or by using chemical dust binding agents approved by the ECO).</li><li>Dust monitoring currently being conducted by the Mogalakwena Mine must be maintained and made available to the PV SEF site.</li></ul>	Throughout construction period.	ECO	During periods of low rainfall or as required by the ECO.	Dust is kept at its lowest level on site.	
10.5 Use of construction vehicles and equipment	Construction vehicles, plant and machinery.	Noise and vibration.	Contractor and ESA.	<b>Objective:</b> Noise levels are kept to a minimum on site. <b>Target:</b> <ul style="list-style-type: none"><li>Should construction have to continue after hours, all affected stakeholders must be notified.</li><li>All machinery and equipment must be maintained in good working order, and fitted with approved and specified muffler systems (where possible).</li><li>The contractor shall have an updated complaints register on site.</li></ul>	Throughout the construction period.	Engineer and ECO	Continuous	No complaints received from affected communities / stakeholders.	
10.6 Water use and protection of the watercourse	Water management	Water wastage. Pollution of the watercourse. Degradation of the downstream	Contractor and ESA.	<b>Objective:</b> To prevent the pollution of water, any long-term degradation of the area's watercourses and the unnecessary wastage of water. <b>Target:</b>	Construction phase	Engineer and ECO	Continuous when these activities are taking place.	Activities undertaken near watercourses must be in-line with and consider the specified	

ACTIVITY	ASPECT	POTENTIAL IMPACT	IMPLEMENTATION				MONITORING		
			RESPONSIBLE PERSON	MITIGATORY MEASURE (OBJECTIVES AND TARGET)	TIMEFRAME	RESPONSIBLE PERSON	FREQUENCY	PERFORMANCE INDICATOR	
		water resource.		<ul style="list-style-type: none"><li>Comply with all requirements of the approved WUL and aquatic assessments.</li><li>Maintain all required buffer zones as per specialist assessments.</li><li>During the execution of the works, appropriate measures to prevent pollution and contamination of the riparian environment must be implemented e.g. including ensuring that construction equipment is well maintained and drip trays must be used at all times.</li><li>The use of silt fences are more important during summer months (rainy seasons) and would require more regular maintenance during this time.</li><li>Where earthwork is being undertaken in close proximity to any watercourse, slopes must be stabilised using suitable materials, i.e. sandbags or geotextile fabric, to prevent sand and rock from entering the watercourses.</li><li>Appropriate rehabilitation and re-vegetation measures for the watercourse banks must be implemented timeously. In this regard, the banks should be appropriately and incrementally stabilised as soon as development allows.</li><li>All water used on site must be done so sparingly. Toolbox talks must include the conservation of water.</li><li>Avoid unnecessary vehicle crossings and access into the watercourse.</li><li>Any dewatering that needs to be done from excavated areas during the construction phase should be released into a silt bay that is maintained in order to trap and remove sediments before they enter watercourse habitat.</li></ul>				environmental controls	
10.7 Protection of heritage resources	Heritage resources	Damage to heritage resources on site.	Contractor and ESA.	<b>Objective:</b> To prevent any damage to heritage resources on site. <b>Target:</b> <ul style="list-style-type: none"><li>In the event that any sub-surface heritage resources or graves are unearthed all work has to be stopped until an assessment as to the</li></ul>	Continuous monitoring throughout the construction phase.	ECO	Daily monitoring by ESA and weekly inspections by ECO	No damage to heritage resources on site.	

ACTIVITY	ASPECT	POTENTIAL IMPACT	IMPLEMENTATION				MONITORING		
			RESPONSIBLE PERSON	MITIGATORY MEASURE (OBJECTIVES AND TARGET)	TIMEFRAME	RESPONSIBLE PERSON	FREQUENCY	PERFORMANCE INDICATOR	
				<p>significance of the site (or material) in question has been made by a heritage practitioner.</p> <ul style="list-style-type: none"><li>No archaeological material that has been uncovered may be removed. This applies to graves and cemeteries as well. In the event that any graves or burial places are located during the development, the procedures and requirements pertaining to graves and burials will apply. If human remains are uncovered, or previously unknown graves are discovered, a qualified archaeologist needs to be contacted and an evaluation of the finds made. If the remains are to be exhumed and relocated, the relocation procedures as accepted by SAHRA need to be followed.</li><li>If any archaeological material is uncovered during the course of development, then work in the immediate area should cease. The find will need to be reported to SAHRA or an archaeologist.</li><li>If any area that contains stone artefacts in reasonable numbers (e.g. more than 10 within a few metres of one another) or in high concentrations is noted during the proposed developments this should be inspected by an archaeologist prior to any disturbance.</li></ul>					



# 11 REHABILITATION

ACTIVITY	ASPECT	POTENTIAL IMPACT	IMPLEMENTATION			MONITORING		
			RESPONSIBLE PERSON	MITIGATORY MEASURE (OBJECTIVES AND TARGET)	TIMEFRAME	RESPONSIBLE PERSON	FREQUENCY	PERFORMANCE INDICATOR
11.1 Rehabilitation of disturbed areas	Rehabilitation	Visual impact of construction site due to poor or no rehabilitation.  Risks of erosion and sedimentation of watercourse due to poor or no rehabilitation.  Potential dust impact due to poor or no rehabilitation.	Contractor and ESA.	<b>Objective:</b> To ensure adequate rehabilitation of the entire construction site upon completion of construction activities.  <b>Target:</b> <ul style="list-style-type: none"> <li>Completed areas are to be rehabilitation as soon as possible by following a phased approach.</li> <li>Rehabilitated areas are to be fenced off to prevent further disturbance during the construction phase.</li> <li>Indigenous species are to be used where feasible, especially when considering the planting of new trees.</li> <li>Where indigenous species are not considered, the contractor shall ensure that, at a minimum, the area is rehabilitated back to its original state.</li> <li>All waste, storage areas, bunds, toilets, temporary roads, buildings, etc. shall be removed from site and legally and appropriately disposed of.</li> </ul>	Implement during construction phase as and when sections of the works are completed.	Engineer and ECO.	Daily	PV SEF area adequately rehabilitated after construction completion.  No complaints from the Employer or stakeholders.

## 12 PLANNING AND ENGINEERING CONSIDERATIONS

ACTIVITY	ASPECT	POTENTIAL IMPACT	IMPLEMENTATION			MONITORING		
			RESPONSIBLE PERSON	MITIGATORY MEASURE (OBJECTIVES AND TARGET)	TIMEFRAME	RESPONSIBLE PERSON	FREQUENCY	PERFORMANCE INDICATOR
12.1 Construction activities	Existing infrastructure	Disruption of services, damage to installations, damage or loss of plant.	Contractor and ESA.	<p><b>Objective:</b> To prevent disruption or damage to existing infrastructure or services.</p> <p><b>Target:</b></p> <ul style="list-style-type: none"> <li>• Telephone and power lines shall be identified during the construction operations.</li> <li>• Possible known pipelines must be considered during planning and construction.</li> <li>• Where pipelines are found, the depth of the pipes under the surface shall be determined to ensure that proper protection is afforded to such structures.</li> <li>• Any damage to pipelines shall be repaired immediately.</li> <li>• All existing access roads used for construction purposes, shall be maintained at all times to ensure that neighbours have free access to and from their properties.</li> <li>• Speed limits shall be enforced in such areas and all drivers shall be sensitised to this effect.</li> </ul>	Prior to construction and during construction.	Engineer and ECO.	Continuous	<p>No unplanned disruptions of services</p> <p>No damage to any plant or installations.</p> <p>No complaints from authorities or Landowners regarding disruption of services.</p> <p>No litigation due to losses of plant, or installations.</p>

## 13 NON-COMPLIANCE AND PENALTIES

Non-compliance with this EMPr must be monitored by the ECO and reported on in monthly ECO Reports. Any non-compliance must be reported to the competent authority.

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

It should however be noted that the nature of the activities associated with the project, even with the best of intentions, will inevitably cause some form of environmental degradation. The costs of having to make good on such environmental degradation is usually sufficient punishment without the need to look to other punitive measures. The implementation of a penalty system therefore requires careful consideration:

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

The type and extent of the corrective measures required to address non-compliance would depend on the nature of the transgression and the Contractor's history in terms of compliance with their environmental obligations. When deciding on the nature of any punitive actions, however, it is important to recognise that the effective implementation of the Construction EMPr is highly dependent on the quality of the working relationships that develop between the key role-players. Accordingly, an excessive response to non-compliance, particularly for a minor or unintentional transgression, may cause significant environmental degradation in the long term due to its effect in eroding the Contractor commitment to meeting their environmental responsibilities. Moreover, other mechanisms, such as an expanded environmental induction programme, may prove more effective than purely punitive measures in controlling non-compliance in the long-term. This is an important consideration that must be borne in mind by the Engineer and the Contractor when responding to non-compliances.

## 14 OPERATIONAL PHASE EMPR

**The operational phase commences when the proposed development is being used for its intended purposes i.e. renewable energy generation. It is possible that there will be a period in the project life cycle where the construction and operational phase will overlap**

The operational specifications detailed in this section must be updated to include any conditions of authorisation contained in the EA relating to the operational phase (if applicable). All conditions of the EA must be adhered to and measures to promote efficient use of resources like water must be put in place as far as possible (e.g. energy efficient lighting and re-use of wash water). Here we provide a general overview of the known operational requirements that has been identified during the environmental process and are also best practice environmental management recommendations during operation.

### 14.1 PV Panel Maintenance

#### **Clean solar panels from the ground**

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

#### **Optimal time for cleaning of solar panels**

Cleaning of the solar panels should be done on an overcast day, early in the morning or in the evening to prevent the water used in the cleaning process from evaporating too quickly.

#### **Materials and methods for cleaning solar panels**

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

### 14.2 Alien Plant Management Plan

An AIP management plan must be drafted for implementation, from construction phase through to rehabilitation and operational phase. Refer to Section 4.1.1 for further requirements.

### 14.3 Erosion Control

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

### 14.4 Waste Management

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

- Provide adequate scavenger proof waste bins at facility buildings;
- Set up a system for regular waste removal from approved facility – preferably weekly;

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

Littering by the employees shall not be allowed under any circumstances.

## 15 DECOMMISSIONING PHASE EMPR

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

Should decommissioning be the favourable option, it would potentially take between 6 to 12 months. After disconnecting the PV infrastructure from the network, module components would be removed and recycled / resold as far as possible. The structures would be dismantled, and the concrete foundations would be removed. All underground cables would be excavated and removed. The buildings would be demolished and removed. Where materials and infrastructure are not resold or recycled they would be disposed of at an approved landfill site. Any hazardous substances shall be removed and disposed of in terms of the requirements of the relevant legislation (e.g. Hazardous Substances Act, No. 15 of 1973) and SANS specifications.

The rehabilitation of the disturbed areas would form part of the decommissioning phase and must take cognisance of the future proposed land use of the area. Disturbed areas must be rehabilitated in accordance to the specifications of a suitably qualified rehabilitation specialist. The aim would be to restore the land to its original substratum characteristics (or as near as possible). If the land is to be used for an alternative land use the usefulness of existing infrastructure must be considered i.e. use of control buildings as office or working space or roads. The restoration activities would include the following:

- Removal of all foreign materials and debris;
- Reshaping of the land to conform with natural topography;
- Breaking up compaction (ripping / scarifying) where required and loosening the soil, redistribution of topsoil;
- Re-vegetation of the disturbed areas; and
- Removal of alien vegetation for a period of no less than 1 year, or as otherwise prescribed by a rehabilitation specialist.

Since the PV facility comprises largely of recyclable or reusable materials, the residual risks associated with decommissioning would be minor. Should the need arise to decommission the PV facility, the foundations would need to be demolished and disposed of. Roads which are no longer required after decommissioning should be scarified and the areas rehabilitated with the assistance of a rehabilitation specialist.

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

- All PV structures, associated structures, fencing and cables should be removed, and resold or recycled, as far as possible;
- Building structures should be broken down (including foundations);
- The rubble should be managed according to National Environmental Management Waste Act (No. 59 of 2008) and deposited at a registered landfill if it cannot be recycled or reused;
- All compacted areas should be rehabilitated according to a rehabilitation specialist;
- Monitoring for soil erosion should be undertaken on a bi-annual basis for a year following the completion of closure phase;
- Shape footprint area to reflect natural landscape;

- Wind-blown rubble and dust management needs to be implemented as required;
- Restoration of vegetation on any disturbed areas shall involve the following:
  - Re-vegetate with suitable native grass species (as determined by rehabilitation specialist); and
  - Allow low shrubs to colonise naturally amongst the grass.
    - Although time-consuming, this would be the most effective restoration process in the long-term.
- Maintain where possible all vegetation cover and facilitate re-vegetation of denuded areas to stabilise the soil against erosion;
- After cessation of disturbance, re-spread topsoil over the surface and re-vegetate. Any additional overburden (uncontaminated) must be re-spread below the topsoil layer, not mixed with it;
- Dispose of any sub-surface spoils from excavations where they will not impact on agricultural land (for example use as road surfacing), or where they can't be effectively covered with topsoil;
- Control dust as per standard construction site measures;
- Disturbance of any stream channels should be limited to the designated access roads;
- Activities should as far as possible be limited to the delineated site for the proposed development;
- All disturbed areas should be rehabilitated and monitored to ensure that these areas do not become subject to erosion or invasive alien plant growth;
- The rehabilitated area must be monitored as per the specification contained in the rehabilitation plan and must consider amongst others erosion, alien vegetation, re-establishment of indigenous vegetation and indigenous fauna moving back to the site; and
- Implement an effective system of stormwater run-off control where it is required.



## 16 CONCLUSION

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

The compilation of the EMPr has incorporated impacts and mitigation measures from the Impact Assessment Report (Appendix G of the BAR) and environmental specialist assessments. It also incorporates principles of best practice in terms of environmental management.



## Appendix A - CV

## Qualifications

BA (Hons) Geography

BA Geography and  
Environmental  
Management

## Professional registrations

Member, Geo-Information  
Society of South Africa  
(GISSA)

Member, International  
Association of Impact  
Assessment South Africa  
(IAIASa)

Environmental  
Assessment Practitioner  
(EAP), Environmental  
Assessment Practitioners  
Association of South  
Africa (EAPASA)

## Specialisation

Environmental  
management and  
geographic information  
systems (GIS)

# 18

years in industry

# Natanya Whitehorn

## Environmental Practitioner



Natanya is as an environmental assessment practitioner (EAP) at Zutari. She specialises in environmental auditing and her expertise consists of risk assessment, environmental monitoring and social impact assessments (SIAs), including the study of human interaction with one another and the natural environment. She has experience in fieldwork for impact assessments, environmental monitoring as well as the public participation process (PPP), where, she has facilitated and translated at various landowner, stakeholder and public meetings and also gained experience in environmental compliance monitoring by working on a large construction project. Further significant experience includes her role as Project Manager (Environmental Lead) on various integrated environmental management (IEM) processes such as environmental impact assessments (EIAs), basic assessment reports (BARs) and the development of environmental management plans (EMPs).

She has previous working experience in geo-informatics and geographic information systems (GIS). She has more than a decade of experience working with GIS, which she has gained whilst working on projects for the government, local authorities as well as the private sector. She has also gained skills in spatial representation and interpretation through her involvement in the engineering environment. Natanya has specialised in spatial analysis, data processing and mapping while her technical responsibilities include inter alia the evaluation of data, digitising, editing and converting spatial data and non-spatial data from various formats and manipulating data in Esri ArcMap with extension (XTools, ET Geowizards, ET Geotools), ArcView 3.2 and Planet GIS. She has research experience on biodiversity, natural resources management, and human developmental issues and tutoring experience at a tertiary institution in the field of Information Science (IS).

Natanya obtained a Bachelor's degree (Honours) in Geography, majoring in Geo-Informatics and Strategic Environmental Planning, from the University of Johannesburg, South Africa, in 2002. She has also completed a South African Auditor and Training Certification Authority (SAATCA) Certified ISO 14001 Lead Auditors Course. She is a member of the International Association for Impact Assessment South Africa (IAIASa) as well as the Geo-Information Society of South Africa (GISSA).

## Experience

**God's Window Skywalk, South Africa, Motsamay Tourism Group (Pty) Ltd,  
08/2021 - 12/2024, Project Manager/Environmental Lead**

Zutari was appointed to conduct an environmental impact assessment (EIA) and water use licence application (WULA) for the proposed construction of a skywalk and skybridge at God's Window in the Mpumalanga Province. These services are to ensure compliance with the National Environmental Management Act (Act No. 107 of 1998) (NEMA), National Water Act, 1998, as well as other associated or required environmental authorisations. Responsible for overall project management, including writing the inception, scoping, EIA and EMP reports. Also responsible for managing all specialists and sub-contractors as well as overall financial management of the environmental component of the project.

**Environmental impact assessment (EIA) and water use licence application (WULA) for the Seriti Kriel LifeX Project – beneficiation plant, opencast mining and dragline walk, South Africa, Seriti Coal (Pty) Ltd, 04/2021 - 12/2022, Project Manager/Environmental Lead**

Seriti Coal has a contract to supply Kriel Power Station with 8.5 Mtpa of coal through a contract which has been extended to 2039. To best service this contract Seriti commissioned a trade-off study into transporting coal by rail, overland conveyor and haul truck. This study was revisited with the exclusion of the rail option in the report mentioned above in which additional information such as the existence of a haul fleet and tip was included. Both Kriel Colliery and Kriel Power Station are situated near the town of Kriel in Mpumalanga. Zutari is the engineering consultants on the project reviewing the trade off study. Zutari was also appointed to conduct an environmental impact assessment (EIA) and water use licence application (WULA) for the proposed construction of a beneficiation plant at the Seriti Kriel opencast coal mine, proposed opencast mining of Pits 11 and 13 as well as the proposed dragline relocation walk at the Seriti Kriel opencast coal mine. These services are to ensure compliance with the National Environmental Management Act (Act No. 107 of 1998) (NEMA), National Water Act, 1998, as well as other associated or required environmental authorisations. Responsible for overall project management, including writing the inception, scoping, EIA and EMP reports. Also responsible for managing all specialists and sub-contractors as well as overall financial management of the environmental component of the project.

**Master plan of the feeder roads and bridges – Polihali reservoir, LHWP Phase II, Lesotho, Lesotho Highlands Development Authority (LHDA), 05/2021 - 10/2022, Environmental and Geospatial Lead**

In order to investigate the impact of the inundation of the Polihali reservoir, and plan for mitigation measures to ensure that accessibility is restored to the effected communities, the Lesotho Highlands Development Authority (LHDA) appointed Zutari to develop a master plan of the feeder roads and bridges for the Polihali reservoir. The impounding of the Polihali reservoir will inundate the valleys of the Senqu, Mabunyaneng, Khubelu, Sehonghong and Mokhotlong rivers over considerable distances. A number of existing roads and tracks will be permanently submerged and shops, schools, other community services and agricultural activities will no longer be accessible. Responsible for coordinating all inputs into the infrastructure inventory and final options to be considered during the final master plan. Also responsible for all mapping relating to natural and social environmental sensitivities and features and their relevance feeding into the master plan.

**Environmental impact assessment (EIA) and water use licence application (WULA) for Bierspruit Opencast Mining Project, South Africa, Anglo American Rustenburg Platinum Mines, 02/2019 - 05/2020, Project Manager/Environmental Specialist**

Zutari was appointed to conduct an environmental impact assessment (EIA) and water use licence application (WULA) for the proposed Bierspruit Opencast development at the Amandelbult Mine complex near Thabazimbi in the Limpopo Province. These services are to ensure compliance with the National Environmental Management Act (Act No. 107 of 1998) (NEMA), National Water Act, 1998, as well as other associated or required environmental authorisations. Responsible for overall project management, including writing the inception and ESIA reports. Also responsible for managing all specialists and sub-contractors as well as overall financial management of the project.

**Environmental and social impact assessment and resettlement action plan for Zones 2 and 3 of the Lesotho Lowlands Bulk Water Supply Scheme, Lesotho, Lesotho Water Commission, 06/2018 - 03/2019, Project Manager/Environmental Specialist**

Zutari was appointed as an independent consulting firm to undertake the environmental and social impact assessment (ESIA) and resettlement action plan (RAP) for the proposed Zone 2 and 3 of the Lesotho



Lowlands Bulk Water Supply (LLBWSS). Responsible for overall project management, including writing the inception and ESIA reports. Also responsible for managing all specialists and sub-contractors as well as overall financial management of the project.

**Scoping and environmental impact assessment (EIA) for the Brixton reservoir and tower, South Africa, Johannesburg Water (JW), 02/2017 - 12/2018, Senior Environmental Consultant**

Zutari was appointed to undertake an innovative, design-led thinking approach to the installation of a reservoir and tower in Brixton, Johannesburg. The project involves undertaking a scoping and environmental impact assessment (EIA) process, due to the preferred site's location on a ridge that was identified as highly sensitive by the Gauteng Department of Agriculture and Rural Development. The project also involved an extensive public consultation process. Responsible for overall project management of the environmental component, including writing the scoping and EIA reports, as well as compiling the environmental management programme.

**Design concept for South Dunes Beach, South Africa, Transnet National Ports Agency (TNPA), 08/2017 - 06/2018, Project Manager/Senior Environmental Consultant**

Zutari has been appointed for the provision of the design concept for South Dunes Beach at the Port of Richards Bay. Responsible for overall project management, coordination of specialist inputs and environmental inputs.

**Various overhead lines (OHL) for Mogalakwena Local Municipality, South Africa, Mogalakwena Local Municipality, 05/2015 - 06/2018, Geographic Information Systems (GIS) Support Expert**

Zutari was appointed for the detailed design and construction supervision of 11 kV and 33 kV overhead lines in the Mogalakwena municipal area due to difficulty accessing the existing lines for maintenance. Sensitive features in terms of the Limpopo conservation plan were identified on both the proposed alternative route and the existing route. Responsible for geographic information systems (GIS) support to the project team.

**Botswana-South Africa (BOSA) Transmission Interconnector Project, South Africa, Southern African Power Pool (SAPP), 04/2016 - 04/2018, Environmental Consultant**

The Botswana-South Africa (BOSA) Transmission Interconnector Project entails the construction of approximately 560 km of 400 kV transmission line between Botswana and South Africa to alleviate congestion on the Matimba-Phokojé-Insukamini line, increase the power transfers within the Southern African Power Pool (SAPP) network, increase stability in the power pool and improve system control, adequacy and reliability. Zutari was appointed to provide transaction advisory services, including a scoping study and a feasibility study up to the project implementation phase, which included procurement of an engineering, procurement and construction (EPC) firm and project financial close. Zutari's services focussed on the collection of data and information, techno-economic and financial analysis, market review and analysis, evaluation of analytical results, advice on institutional and legal framework, reporting and liaising with client and sponsor management committees. Responsible for providing environmental support to project team.

**Rooiwal photovoltaic (PV) facility, South Africa, New GX Metsena Joint Venture, 02/2017 - 02/2018, Project Manager/Environmental Consultant/Geographic Information Systems (GIS) Expert**

Zutari undertook a basic assessment process and the design of a 20 MW solar park in Tshwane. While conducting the basic assessment, the need for specialist investigations were discovered and hence a heritage impact assessment and ecological and wetland assessment were also included. Responsible for overall project management, review of reports and geographic information systems (GIS).

**Section 24G environmental application for Nkomazi Game Reserve, South Africa, Nkomazi Game Reserve, 08/2016 - 12/2017, Geographic Information Systems (GIS) Support Expert**

Zutari was appointed to assist the client in processing a Section 24G application for the construction of a luxury lodge consisting of 12 tents near the Komati River as well as the establishment of a waterhole and an airstrip in the Nkomazi Game Reserve. The application considers the effects of the tents on the surrounding



environment with the aim of determining issues, potential impacts and alternatives in terms of environmental impact. Responsible for providing geographic information systems (GIS) support to project team.

**Pre-feasibility study for the Mandela Gateway to Kruger, South Africa, Thebe Tourism Group, 09/2017 - 11/2017, Senior Environmental Consultant**

The proposed Mandela Gateway to Kruger Project is located on the 1 400 ha Lisbon Estate, which is a keystone property that links Sabi Sand Game Reserve and the Kruger National Park into an ecological corridor of wildlife movement. Lisbon citrus farm, which was one of the first land claims post 1994, had fallen into disrepair and no source of income was generated. Zutari was appointed for the project management, architectural, quantity surveying (QS), engineering, environmentally sustainable design (ESD), environmental and town and traffic planning for the pre-feasibility study, which can be used by the client to stimulate investor interest. Responsible for environmental screening and reporting.

**Merino photovoltaic (PV) power plant, South Africa, EAB-Astrum Energy (Pty) Ltd, 08/2011 - 11/2017, Project Manager/Geographic Information Systems (GIS) Support Expert**

The project entailed the construction of a photovoltaic (PV) power plant that will produce approximately 6 MW of electricity. In total, roughly 27 000 PV modules will be utilised to produce the approximately 6 MW of energy fed into the existing 22 kV power lines at the Merino Hydro Power Plant. The Merino Hydro Power Plant, which is the only generator on the existing line, generates a maximum capacity of 3.45 MW of energy, leaving sufficient capacity for the PV power plant. Responsible for obtaining environmental authorisation (EA), overall project management and providing geographic information systems (GIS) mapping requirements.

**Transaction management services for the Mauritius Light Rapid Transit (MLRT) system, Mauritius, Aurecon Singapore, 10/2012 - 08/2017, Environmental Consultant**

The Government of Mauritius is committed to build a light rapid transit (LRT) system serving the city areas between Port Louis and Curepipe in order to relieve the main road arteries and to review its existing bus network with the aim of achieving an efficient multi-modal public transport network. Zutari was appointed, as a partner to lead agency Singapore Cooperation Enterprise (SCE) and the Singapore Mass Transit Corporation (SMRT), to provide transaction management advisory services for the development of the Mauritius LRT system. This included advisory services for transport and traffic planning, engineering and business case/financial planning. Responsible for environmental specialist coordination and liaison.

**Design and construction supervision for the Mokolo Crocodile Water Augmentation Project (MCWAP), South Africa, Trans-Caledon Tunnel Authority (TCTA), 09/2009 - 08/2017, Geographic Information Systems (GIS) Support Expert**

Extensive augmentation of water supply in the Lephalale region is required for the development of the Medupi Power Station and related coal mining and industrial activities. The infrastructure is being developed in two phases. Phase 1 comprises a 4.5 MW pump station and 43 km of up to 1.1 m diameter pipeline, delivering approximately 40 Mm<sup>3</sup>/a at a rate of 1.6 m<sup>3</sup>/s from the Mokolo Dam. This will be constructed parallel to and tying in with infrastructure supplying Grooteegeluk Mine, Matimba and Medupi Power Stations and Lephalale Municipality. Phase 2 will comprise an abstraction weir in the Crocodile River, de-gritting channels with high and low lift pump stations, and a 160 km of pipeline with break pressure and balancing reservoirs. The abstraction weir has a capacity of 25.5 m<sup>3</sup>/s, and the estimated pump capacities for the low lift and high lift pumps will be 3.6 MW and 15 MW, based on an initial demand of 5.4 m<sup>3</sup>/s. The 160 km of pipeline consists of a 30 km rising main and a 120 km gravity main. Pipe diameters range from 1m to 2.3 m. The final configuration of Phase 2 is yet to be confirmed. Responsible for providing general geographic information systems (GIS) assistance to the project team and compiling maps specifically designed for the land acquisition process.

**Viljoenskroon substation transmission basic assessment (BA), South Africa, Eskom Free State Operating Unit, 08/2015 - 06/2017, Project Manager/Environmental Consultant/Geographic Information Systems (GIS) Expert**





Zutari was appointed to undertake a basic assessment (BA) and general authorisation for various small infrastructure improvements in the Viljoenskroon and Vierfontein areas. The improvements involved the construction of a new switching station, substations, distribution lines, and the decommissioning of distribution lines. Responsible for overall project management, public participation, review of reports and geographic information systems (GIS). Duties included the compilation of a basic assessment report (BAR) and environmental management programme (EMPr), addressing comments received from the public and landowners, requesting extension from competent authority, revision of specialist reports and commenting on authority and specialist interactions.

**Olifants River Water Resources Development Project, Phase 2 (ORWRDP-2), South Africa, Trans-Caledon Tunnel Authority (TCTA), 09/2009 - 06/2017, Geographic Information Systems (GIS) Support Expert**

The second phase of the Olifants River Water Resources Development Project (ORWRDP-2) is an extensive water resource development project to supply water for domestic and industrial (mining) use in Limpopo. The project was divided into two main schemes. The first scheme comprised a 70 km-long pumping main from the Flag Boshielo Dam to Mokopane, including three 6 MW pump stations en route. The second scheme consisted of the abstraction and distribution of water from the De Hoop Dam to various end points. Both schemes were monitored and controlled from a single remote control point with all elements linked via approximately 180 km of fibre optic cable. Zutari's scope included the tender design and documentation, detailed design, construction supervision, contract administration, preparation of an environmental management plan (EMP), environmental impact assessments (EIAs) and a water quality baseline study. Responsible for providing general geographic information systems (GIS) assistance to the project team and compiling maps specifically designed for the land acquisition process.

**Construction of Siphofaneni Bridge - St Phillips Road: Phases I, II, and III, Swaziland, Delegation of the European Union to the Kingdom of Swaziland, 06/2009 - 12/2016, Geographic Information Systems (GIS) Support Expert**

Zutari was appointed for the preliminary and detailed design, tender documentation and environmental impact assessment (EIA) for the construction of the Siphofaneni Bridge - St Phillips Road: Phases I, II, and III. The project entailed the construction of a new 300 m two lane bridge over the Usutu River, a 1 km link from the MR8 on the MR14 up to existing junction to St Phillips Road, a 23 km link from the MR14 junction to St Phillips Road as well as a 7.7 km link from St. Phillips Road to the MR8 over the Usutu River. These links were upgraded from the existing gravel roads to an appropriate standard that provides all weather access to the existing and new cane growers. This upgrading also provides improved access for the administrative centre at St. Phillips. Responsible for geographic information systems (GIS) assistance to the project team.

**Environmental authorisation (EA) for Khanyisa Power Station, South Africa, ACWA Power Africa Holdings, 01/2015 - 12/2016, Geographic Information System (GIS) Support Expert**

The project involved applying for the amendment of the environmental authorisation (EA) for the proposed Khanyisa Power Station and the amendment of authorisations for associated infrastructure, including a water supply pipeline, substation and transmission line. Zutari commissioned specialist studies, including air quality, stormwater, waste, noise and traffic, to address the potential environmental and social impacts of the project; compiled an amendment report summarising the change in these impacts; undertook the public participation/stakeholder engagement process and applied for the amendment of the water use licence application (WULA). Further applications included a scoping and environmental impact assessment (EIA) process for repositioning the substation and 400 kV transmission line and a basic assessment for repositioning a water supply pipeline. Responsible for geographic information systems (GIS) support to the project team.

**Exxaro Grootegeeluk roads building feasibility study, South Africa, Exxaro Coal, 04/2014 - 12/2016, Geographic Information Systems (GIS) Support Expert**

Exxaro Grootegeeluk Mine, in collaboration with the Lephalale Municipality and Eskom, agreed to upgrade three district roads that traverse the various communities of Lephalale and to provide for the development of various long-term economic and employment opportunities. The identified roads for the upgrade included



provincial roads D3102 and D3114. Zutari undertook feasibility study to investigate the implementation of labour intensive construction (LIC) methods during the upgrading as well as the implementation of entrepreneurial and local economic development initiatives. Responsible for geographic information systems (GIS) support to the social project team for the Exxaro Grootegeeluk Mine roads upgrade feasibility study and social baseline assessment.

**Waste management licence applications for Rooiberg landfill, South Africa, Department of Environmental Affairs (DEA), 01/2014 - 12/2016, Geographic Information Systems (GIS) Support Expert**

The Department of Environmental Affairs (DEA) undertook a study, commissioned in 2007, which identified unlicensed municipal waste disposal facilities in South Africa. From the 581 sites that were identified, 341 were disposal facilities that needed to be licensed. Zutari was appointed to conduct and manage the waste management licence applications on behalf of all affected municipalities. The scope involved solid waste management, transfer of skills to officials, legal compliance, environmental impact assessment (EIA) and environmental management. Responsible for geographic information systems (GIS) support to the project team.

**Basic assessment report (BAR) for the Ga-Rankuwa Cemetery, South Africa, City of Tshwane Metropolitan Municipality (CTMM), 01/2015 - 12/2016, Project Manager/Environmental Practitioner/Geographic Information Systems (GIS) Expert**

Zutari was appointed to conduct the environmental basic assessment process for the proposed expansion of the existing Ga-Rankuwa cemetery as it had reached full capacity. Responsible for overall project management, public participation, compilation of reports and geographic information systems (GIS).

**Technical feasibility study for the Botterkloof and Merino II Hydro Power Plants, South Africa, NuPlanet (Pty) Ltd, 01/2007 - 08/2016, Environmental Practitioner/Geographic Information Systems (GIS) Support**

NuPlanet appointed Zutari to undertake a technical feasibility study, preliminary geotechnical investigations and the preliminary design of hydropower stations near Bethlehem. These power stations would use the increased flow from the Lesotho Highlands Water Project (LHWP) and would be cascading schemes. Two of the power stations generate in the order of 4.2 MW each, whilst a third station generates 3.1 MW. All three stations are typical run-of-river installations with proposed 8 m-high diversion weirs, headrace canals and penstocks. Zutari also received a separate appointment to undertake the environmental studies required for the development of all three schemes and the provision of the necessary support to the client for the statutory water use licence applications (WULAs). Responsible for obtaining environmental authorisation (EA) and providing geographic information systems (GIS) support.

**Hatherley Cemetery expansion basic assessment, South Africa, City of Tshwane Metropolitan Municipality (CTMM), 01/2015 - 07/2016, Project Manager/Environmental Practitioner/Geographic Information System (GIS) Expert**

Zutari was appointed to conduct the environmental basic assessment process for the proposed expansion of the existing Hatherley cemetery in Mamelodi as it had reached full capacity. Responsible for overall project management, public participation, compilation of reports and geographic information systems (GIS).

**Basic assessment report (BAR) for the Mabopane Cemetery expansion, South Africa, City of Tshwane Metropolitan Municipality (CTMM), 01/2015 - 06/2016, Project Manager/Environmental Practitioner/Geographic Information Systems (GIS) Expert**

Zutari was appointed to conduct the environmental basic assessment process for the proposed expansion of the existing Mabopane cemetery as it had reached full capacity. Responsible for overall project management, public participation compilation of reports and geographic information systems (GIS).

**Klipplaats 400 kV line deviation, South Africa, Glencore Xstrata Coal South Africa (Glencore South Africa (Pty) Ltd, 05/2014 - 05/2016, Geographic Information Systems (GIS) Support Expert/Report Reviewer**



The project involved environmental studies, water use licence application (WULA) and preliminary design for the Klipplaats 400 kV line deviation at the Tweefontein Coal Mine. Responsible for geographic information systems (GIS) support to the project team as well as document review.

**Landau dragline relocation concept study, South Africa, Anglo American Coal South Africa, 03/2015 - 03/2016, Geographic Information Systems (GIS) Support Expert**

Zutari's environmental team conducted a desktop screening level assessment for the various route alignments against existing geographic information systems (GIS) databases/policies from relevant departments. Responsible for GIS support to the project team.

**Extension of the Sunderland Ridge wastewater treatment works (WWTW), South Africa, City of Tshwane Metropolitan Municipality (CTMM), 01/2007 - 03/2016, Environmental Control Officer (ECO)**

Zutari was appointed to provide the engineering services for the extension of the Sunderland Ridge wastewater treatment works (WWTW) to 95 Ml/d. The purpose of the project was to provide a feasibility study for the 30 Ml/d extension; licence applications; environmental impact assessments (EIAs) and the relevant authorisations for the 30 Ml/d extension and process design of the extension. Responsible for all environmental site inspections, the compilation of inspection and process reports, attending the monitoring and liaison committee's (MLC's) meetings and assisting with the compilation of an operational environmental management plan (EMP).

**Environmental impact assessment (EIA) at the Komati Mill, South Africa, TSB Sugar, 06/2014 - 12/2015, Geographic Information Systems (GIS) Support Expert**

Zutari was appointed to conduct a basic environmental assessment of an agricultural area for the proposed establishment of sugar cane fields at TSB Sugar's Komati Mill. Responsible for geographic information systems (GIS) support to the project team.

**Shisha River bridge basic assessment (BA), South Africa, Gibb Engineering and Science/South African National Parks (SANParks), 03/2014 - 12/2015, Project Manager/Geographic Information Systems (GIS) Expert**

Zutari was appointed to provide environmental services for the basic assessment (BA) of the proposed repair and upgrading of the Shisha River low level bridge located on the S57 near Sirheni Bushveld Camp in the northern section of the Kruger National Park. [Click or tap here to enter text.](#)

**Boston and Ouhout environmental impact assessment (EIA), South Africa, NuPlanet (Pty) Ltd, 04/2010 - 12/2015, Project Manager**

The project entailed an environmental impact assessment (EIA) class application for environmental authorisation (EA) for the construction of two hydropower schemes. Responsible for obtaining EA and providing geographic information systems (GIS) mapping requirements.

**Eskom Vaaldam basic assessment report (BAR), South Africa, Eskom, 04/2014 - 10/2015, Project Manager/Geographic Information Systems (GIS) Support Expert**

Zutari was appointed to conduct the basic assessment (BA) for the proposed Vaaldam 88 kV power line near Deneysville to the T-off near Clydesdale. [Click or tap here to enter text.](#)

**Environmental impact assessment (EIA) for Esiamia gas-fired generation plant, Ghana, Aggreko, 04/2015 - 07/2015, Environmental Practitioner**

Zutari was appointed for the updating and completion of the environmental impact assessment (EIA) process for the 140 MW gas-fired generation plant in Esiamia, including specialist studies for air quality, noise, ecology and waste. An environmental permit was granted by the Ghana Environmental Protection Agency (EPA). [Click or tap here to enter text.](#)

**Environmental impact assessment (EIA) for the Swaziland Rail Link Project, South Africa, Transnet Capital Project (TCP), 02/2013 - 06/2015, Geographic Information Systems (GIS) Support Expert**



Zutari was appointed to provide environmental services for the required environmental impact assessment (EIA) of the proposed Swaziland Rail Link, which runs from Davel to Nerston in Mpumalanga, through Swaziland, to Nsezi in Richards Bay, KwaZulu-Natal. The aim of the project is to unlock the potential of a multinational strategic rail corridor and divert general freight traffic off the dedicated heavy haul Richards Bay coal line. The project activities included the upgrading of existing railway sections, the construction of a new rail link from Lothair to Sidvokodvo in Swaziland and the construction of new rail yards. Responsible for all geographic information systems (GIS) functionalities on the project.

**Basic assessment (BA) for conference facilities and guest accommodation in Irene, South Africa, University of South Africa (UNISA), 02/2010 - 09/2014, Project Coordinator**

The project entailed engineering services for the basic environmental assessment of the construction of conference facilities and guest accommodation, including paved parking, at the UNISA Park in Irene. Responsible for geographic information systems (GIS) mapping requirements and project coordination.

**Environmental impact assessment (EIA) for the Sigma-Theta power line, South Africa, Eskom, 10/2010 - 08/2014, Geographic Information Systems (GIS) Support Expert**

The increased demand in load centres in KwaZulu-Natal necessitated the strengthening of the transmission network. Zutari was appointed as the independent environmental practitioner to undertake the environmental impact assessment (EIA) for the construction of the 400 kV line between the proposed Isundu substation near Pietermaritzburg to the proposed Mbewa substation near Epangeni. The project provided for the strengthening of the network and, in particular, to provide for the demand increase at load centres in Pietermaritzburg and Empangeni. [Click or tap here to enter text.](#)

**Nkomazi environmental management framework (EMF), South Africa, Nkomazi Local Municipality, 01/2014 - 07/2014, Geographic Information Systems (GIS) Support Expert**

The project entailed compiling an environmental management framework (EMF) for the Nkomazi Local Municipality, located south of the Kruger National Park. The environmental status quo, strengths, weaknesses, opportunities and threats (SWOT) analysis and EMF phases were done, delivering environmental management zones, each with a set of management guidelines. [Click or tap here to enter text.](#)

**Basic assessment (BA) for the 88 kV Pangaea/Kanga power lines, South Africa, Eskom, 05/2013 - 06/2014, Project Manager/Geographic Information Systems (GIS) Support Expert**

Eskom proposed the establishment of two 88 kV substations, Pangaea and Kanga, in conjunction with two 88 kV loop-in-loop-out lines from the existing 88 kV Erasmus-Arbor line in order to ensure electric supply for the upcoming Kusile Railway Line. The railway line will be constructed as a private siding, which is needed to transport limestone to the Kusile Power Station. Zutari was appointed to conduct a basic assessment (BA) as well as a Level 1 wetland assessment to determine the extent of wetland or wet areas that are related to the proposed routes chosen for the construction of the Pangaea and Kanga 88 kV power lines. Responsible for overall project management and geographic information systems (GIS) functionalities on the project.

**Monograph study for the Limpopo River Basin, South Africa, Limpopo Water Course Commission (LIMCOM)/Deutsche Gesellschaft für Internationale Zusammenarbeit, 02/2012 - 02/2014, Geographic Information Systems (GIS) Support to Social Team**

The project comprised the compilation of essential information regarding water resources, land use, environmental and water quality, infrastructural and climate change, on the Limpopo River Basin. The information is required for the development of Limpopo River Basin Integrated Water Resources Management (IWRM) strategy for the sustainable management of the basin. The study collects, collates and compiles key information that is necessary for scenario development and ultimately an IWRM plan. The data feeds to the Limpopo River Basin Management Information System (LIMIS) that is used for the long-term monitoring of the impacts of economic and social development of the water resources of the basin. [Click or tap here to enter text.](#)



**Upgrading and replacement of a bulk water pipeline along Simon Vermooten Road, South Africa, City of Tshwane Metropolitan Municipality (CTMM), 06/2006 - 02/2014, Geographic Information Systems (GIS) Support**

The project involved the upgrading of the Simon Vermooten Road to a two carriageway road in both directions, which required the relocation of the existing 625 mm nominal diameter steel pipeline. The scope of work involved the supply, delivery and installation of a new 700 mm nominal diameter steel pipeline between Lynnwood and Waltloo Roads as well as the supply, delivery and installation of a 400 mm nominal diameter steel pipeline Waltloo and Stormvoël Road. Zutari carried out the preliminary and detailed design, including a site survey, geotechnical investigations, tender documentation and adjudication, construction supervision and project management, contract administration and record drawings and environmental services. Responsible for all geographic information systems (GIS) support.

**Engineering services for a new Sasko bakery in Woodmead, South Africa, Pioneer Food Group, 04/2007 - 02/2014, Geographic Information Systems (GIS) Expert/Environmental Practitioner**

The project entailed the provision of full planning and engineering services for the development of Sasko's new bakery in Woodmead. Zutari provided architectural, project management, civil, structural, electrical, mechanical, fire and wet services engineering for the new bakery complex, including an ancillary administration block, a washbay and a workshop. [Click or tap here to enter text.](#)

**Vaal River Eastern Subsystem Augmentation Project (VRESAP), South Africa, Trans-Caledon Tunnel Authority (TCTA), 12/2004 - 12/2013, Environmental Practitioner/Geographic Information Systems (GIS) Support**

Zutari was appointed for the design and construction supervision of the Vaal River Eastern Sub-system Augmentation Project (VRESAP), an emergency water transfer scheme that abstracts water from the Vaal Dam and pumps it to the Knoppiesfontein division structure over a distance of 115 km. From the division structure the water is gravitated to the Bosjesspruit and Trichardtsfontein Dams. The project, with a design capacity of 5.4 m<sup>3</sup>/s, comprised abstraction works in the Vaal Dam, a low-lift pump station and a high-lift pump station as well as a rising main. It also included a 10 MI surge tank to control dynamic transients, a concrete division structure at Knoppiesfontein, a number of road and rail crossings and various pipeline appurtenances such as in-line isolation valves and air valve and scour installations. Cathodic protection of the pipeline and a sophisticated control and instrumentation (C&I) system were also provided. Responsible for geographic information systems (GIS) support, overseeing all environmental aspects of the project, and the compilation and submission of 28 borrow pit closure plans to the Department of Minerals and Energy (DME).

**Closure of a sludge dam and overflow facility for Rand Water, South Africa, Rand Water, 07/2007 - 07/2013, Environmental Practitioner/Geographic Information Systems (GIS) Support**

The embankment of the old sludge dam adjacent to the Zuikerbosch pumping station failed a couple of years ago and sludge was discharged into the Vaal River. Zutari was appointed to inspect and register the dam as a "dam with a safety risk" in the Category II as well as for the design of the closure and decommissioning of the sludge dam and overflow facility. The scope of works included surveying, geotechnical investigation, environmental impact assessment (EIA), design, reporting and supervision. Responsible for public participation, obtaining environmental authorisation (EA) for exemption application and providing general geographic information systems (GIS) support to the project team.

**Mokolo Crocodile (West) Water Augmentation Study, South Africa, Department of Water and Sanitation (DWS), 03/2007 - 07/2013, Geographic Information Systems (GIS) Support**

This Mokolo Crocodile River (West) Water Augmentation Scheme will provide water to strategic users in the Lephalale area, such as Sasol, Eskom and various coal mines. The client had a need to conduct a feasibility study to determine the best option for supplying the area with water. It included supply from Mokolo Dam and transferring water from the Crocodile River to the growth hot spots around Lephalale, 130 km to the north. The project also entailed a single 1.9 m diameter rising main covering a distance of 115 km. Responsible for providing general geographic information systems (GIS) assistance to the project team.





## **Basic assessment (BA) for the duplication of the Vlakfontein-Mamelodi water supply pipeline, Phase 2, South Africa, Rand Water, 07/2007 - 04/2013, Geographic Information Systems (GIS) Support**

The project entailed conducting a basic assessment (BA) and compiling an environmental management plan (EMP) to obtain the necessary environmental authorisation (EA) for the construction of a water supply pipeline for Phase 2 from Vlakfontein in Benoni to the southern boundary of the Rietvlei Nature Reserve.

[Click or tap here to enter text.](#)

## **Raising of North Boundary Dam, Carletonville, South Africa, AngloGold Ashanti, 02/2009 - 04/2013, Environmental Practitioner/Geographic Information Systems (GIS) Support**

The project entailed providing assistance to the client with the re-evaluation of the North Boundary Dam's capacity and making recommendations to reduce overflow, especially during rainy seasons to avoid polluting the downstream river system. Following the feasibility studies in 2008, Zutari was appointed to undertake the detailed design, tender process and construction supervision for the raising of the dam in Carletonville. Zutari also carried out the environmental impact assessment (EIA) for the raising of the dam in an advisory capacity. Responsible for obtaining environmental authorisation (EA) and providing general geographic information systems (GIS) support throughout the project team.

## **De Hoop Dam borrow pit closure, South Africa, Vela VKE/Department of Water and Sanitation (DWS), 01/2011 - 01/2013, Project Manager/Environmental Practitioner**

Zutari was appointed to conduct the closure of the De Hoop Dam borrow pit by means of formally requesting the Department of Mineral Resources (DMR) to authorise the closure of the subject borrow pit. Material for road construction was sourced from this borrow pit using an open cast method. [Click or tap here to enter text.](#)

## **Expansion of the iron ore line from Sishen to the Port of Saldanha, South Africa, Transnet Capital Projects, 09/2009 - 12/2012, Geographic Information Systems (GIS) Support Expert**

The Sishen-Saldanha ore line is an 861 km-long, single, heavy-haul railway line used for exporting iron ore from the mines in the Sishen area to the Port of Saldanha. The project involved the upgrading of the iron ore line from 38 Mtpa to 47 Mtpa (Phases 1A and 1B), and a further expansion from 47 Mtpa to 60 Mtpa by 2012 (Phase 1C). The rail upgrade plans included an increase in rolling stock (wagons and locomotives), the upgrading of electricity infrastructure, the construction of additional train passing loops and a 32 km rail link to service the new Sishen South mine. Infrastructure at the bulk terminal at the Port of Saldanha comprises two rotary tipplers, four stacker-reclaimers, two shiploaders and 25 conveying systems, providing the terminal with a capacity to offload 10 000 t/h onto a ship. The infrastructure is expected to be expanded to accommodate the expansion to 83 Mtpa. Environmental impact studies (EISs) were also needed for the establishment of new infrastructure. The plan was to reclaim an additional 50 ha within Saldanha Bay. The shipping channel would be deepened and the material recovered would be used for the construction of new shipping berths. Responsible for geographic information system (GIS) support to the project team.

## **Environmental management system (EMS) for Automotive Supplier Park (ASP) in Rosslyn, South Africa, Supplier Park Development Company (SPDC), 02/2007 - 06/2011, Environmental Practitioner/Geographic Information Systems (GIS) Support**

This project entailed the implementation of an environmental management system (EMS) at the Automotive Supplier Park (ASP) in Rosslyn, Pretoria. The project was one of the Gauteng Provincial Government's Blue IQ initiatives aimed at delivering strategic infrastructure in the South African automotive industry to stimulate sustainable economic growth and job creation in the province. Responsible for all geographic information systems (GIS) support.

## **Laudium-Iliso pipeline environmental support, South Africa, Iliso Consulting, 05/2008 - 06/2011, Environmental Practitioner/Geographic Information Systems (GIS) Support**

The project entailed a basic assessment (BA) in terms of the National Environmental Management Act's (NEMA's) environmental impact assessment (EIA) regulations for the installation of a 700 mm internal diameter potable water pipeline over a distance of 600 m. Responsible for public participation, obtaining



environmental authorisation (EA), fulfilling the environmental control officer (ECO) function and providing general geographic information system (GIS) support to the project team.

**Basic assessment (BA) for the upgrading of the Valhalla reservoir, South Africa, City of Tshwane Metropolitan Municipality (CTMM), 10/2006 - 11/2010, Environmental Practitioner**

The project entailed a basic environmental assessment for the authorisation of the construction of a new reservoir adjacent to an existing reservoir in Valhalla, Pretoria. Responsible for obtaining environmental authorisation (EA) and providing geographic information systems (GIS) support.

**Laudium and Waterkloof pipelines, South Africa, City of Tshwane Metropolitan Municipality (CTMM), 10/2006 - 07/2010, Environmental Practitioner**

The project consisted of a basic assessment (BA) in terms of the National Environmental Management Act's (NEMA's) environmental impact assessment (EIA) regulations for the removal of the existing 700 mm diameter pipeline and the replacement thereof with a new pipeline, over a distance of 1.5 km. Responsible for all the environmental control officer (ECO) duties during construction.

**Basic assessment (BA) for the Rand Water R5 pipeline between Rietvlei Dam and Mamelodi, Phase 2, South Africa, Rand Water, 01/2009 - 01/2010, Geographic Information Systems (GIS) Support Expert**

The project entailed conducting a basic assessment (BA) and compiling an environmental management plan (EMP) to obtain the necessary environmental authorisation (EA) for the construction of a water supply pipeline for Phase 2 from the Rietvlei Nature Reserve to Mamelodi. [Click or tap here to enter text.](#)

**Upgrading of Riverview wastewater treatment works (WWTW), South Africa, Emalahleni Local Municipality, 10/2008 - 10/2009, Environmental Practitioner/Geographic Information Systems (GIS) Support**

The effluent from the Riverview wastewater treatment works (WWTW) has to comply with the special limit discharge standards applicable to the upper Olifants River. It was recommended that the existing WWTW be retrofitted and the reliable treatment capacity of the facility be improved to increase the present design capacity of 11 MI/d to 14 MI/d to make provision for the higher organic loading received and the expected increase in flow due to future growth. The project scope included work on the inlet screen, primary settling tanks (PSTs), sludge pump station, aerators, bio-filters, final clarifiers, return pump station and humus pump station. Responsible for public participation, obtaining environmental authorisation (EA) for exemption application and providing general geographic information systems (GIS) support to the project team.

**Overhead power line from Ha Lejone to Lihobong Mine, Lesotho, Lihobong Mining Development Company (LMDC), 09/2006 - 08/2008, Environmental Practitioner**

The project entailed the environmental impact assessment (EIA) for a 40 km 132 kV overhead power line from the Ha Lejone substation to the Lihobong Diamond Mine to supply electricity to the mine. The mine operated on power supplied from generators, which was costly since it is dependent on the fuel price. The preferred alternative was the design and construction of an overhead supply, seen against the projections on extension of the life of the mine. Responsible for providing geographic information systems (GIS) support for the EIA process, report compilation and submission for final authorisation.

**Basic assessment (BA) for the upgrading of the Jericho Bridge 4062, South Africa, Department of Water and Sanitation (DWS), 01/2007 - 01/2008, Environmental Practitioner/Geographic Information Systems (GIS) Support**

The project entailed a basic environmental assessment and report compilation for authorisation of the construction for the Jericho Bridge in Ermelo, which was to accommodate a 1:50 year flood. Responsible for obtaining environmental authorisation (EA) and the compilation of reports.

**Rietfontein weir environmental management plan (EMP), South Africa, Department of Water and Sanitation (DWS), 04/2006 - 12/2007, Environmental Practitioner**

The project consisted of the re-instatement of storage capacity by means of dredging and landfilling 25 000 m<sup>2</sup> of silt to provide an approach canal at the outlet pipes. The scope entailed a plan of study for scoping, the



compilation of the scoping reports and an environmental management plan (EMP). Responsible for obtaining environmental authorisation (EA) and providing geographic information systems (GIS) support.

**Upgrading of Rietfontein Nature Reserve, South Africa, Johannesburg City Parks (JCP), 06/2007 - 09/2007, Environmental Control Officer (ECO)**

The Rietfontein Nature Reserve in Paulshof is recognised as a developed park in northern Johannesburg and is known for its indigenous green space. The existing infrastructure on site is largely used as an educational centre to teach school children about the conservation of ecosystems. With the focus on conservation and outdoor recreation, eco-tourism opportunities do exist to generate income from the facilities and activities offered at the Rietfontein Nature Reserve. The proposed developments are seen to further draw on such opportunities for both Johannesburg City Parks (JCP) and the community it serves. Responsible for the communication of environmental management plan (EMP) components and requirements to the contractors and sub-contractor as well as EMP planning, implementation and inspection during the construction phase.

**Basic assessment (BA) for the McHardy stream diversion, South Africa, De Beers Group, Cullinan Diamond Mine, 07/2006 - 09/2007, Environmental Practitioner**

The project consisted of a basic assessment (BA) in terms of the National Environmental Management Act's (NEMA's) environmental impact assessment (EIA) regulations for the diversion of the McHardy stream through the Cullinan Diamond Mine grounds to establish separation of polluted runoff from mining activities and unpolluted natural stormwater flow. Responsible for obtaining environmental authorisation (EA) and geographic information systems (GIS) support.

**Proposed new coal-fired power station in the northern Free State, South Africa, Eskom Generation, 03/2006 - 09/2007, Environmental Practitioner**

The project comprised the construction of a 4 200 MW greenfield, which was previously undeveloped, and a coal-fired power station as well as the construction and operation of associated infrastructure, including a high-voltage (HV) yard, water treatment and supply facilities, an ash management system, coal transportation, storage and handling facilities and service roads. Responsible for providing assistance with the public participation process (PPP).

**Basic assessment (BA) for the upgrading of the Khutala pump station, South Africa, Department of Water and Sanitation (DWS), 03/2007 - 08/2007, Geographic Information Systems (GIS) Support**

The project entailed a basic environmental assessment for the authorisation of the upgrading and replacement of water mains at the Khutala pump station in Kriel to ensure increased capacity and reduced operating costs of the facility. Responsible for providing geographic information systems (GIS) support to the project team.

**Proposed new coal-fired power station in the Witbank area, South Africa, Eskom Generation, 01/2005 - 01/2006, Environmental Practitioner**

Zutari was appointed as lead consultants for a comprehensive environmental impact assessment (EIA) for the construction and operation of a coal-fired power station and its associated infrastructure in Witbank. The power station would comprise six generating units fuelled by coal, with a total nominal electricity generation capacity of approximately 5 400 MW. Various ancillary infrastructure was also present, including a high-voltage (HV) yard within the power station precinct; water supply pipelines; water and wastewater treatment facilities; temporary electricity supply during construction; ash disposal systems; coal stockyard and handling facilities; storage and handling facilities; conveying systems for ash and coal; rail and/or road transport of sorbent; access roads and storage dams. Responsible for providing assistance with the public participation process (PPP).

**Due diligence assessment for the development of Bishop's Glen into a residential golf estate, South Africa, Golf Data, 01/2008 - Click or tap to enter a date., Geographic Information Systems (GIS) Support**





The project entailed a due diligence assessment for Golf Data (a leading South African company in the field of golf course design) to obtain part of the Bishops Glen RE/273 property near Bloemfontein to develop a residential golf estate of approximately 600 units. Responsible for environmental sensitivity mapping.

**Upgrading of the Muela Hydropower Station, Lesotho, Lesotho Highlands Water Commission (LHWC), 01/2009 - [Click or tap to enter a date.](#), Environmental Practitioner/Geographic Information Systems (GIS) Support**

The project consisted of a social and resettlement study focussing particularly on the social impacts of the anticipated construction and related resettlement, including the compilation of an HIV/Aids management programme that could be implemented during the project implementation phase. Responsible for assistance in terms of the environmental impact assessment (EIA) and general geographic information systems (GIS) support.

**Thune Dam examination for the possible construction of dams, Botswana, Government of Botswana, 01/2009 - [Click or tap to enter a date.](#), Geographic Information Systems (GIS) Support**

Many towns, villages and settlements throughout Botswana were experiencing water shortage problems as the growing demand placed an increasing burden on groundwater resources, which are of limited extent, with recharge that cannot keep up with abstraction. The Government of Botswana responded to this by examining the possibility of constructing dams for conjunctive use by means of groundwater resources. Responsible for providing geographic information systems (GIS) support.

**Relocation and protection of Petronet utility, South Africa, Transnet, 01/2007 - [Click or tap to enter a date.](#), Environmental Practitioner**

The project consisted of an environmental impact assessment (EIA) for the relocation and protection of an existing Petronet utility, which would be affected by the Gautrain Rapid Rail Link (GRRL). Responsible for liaising with the Department of Agriculture and Environmental Affairs (DAEA), bio-physical and socio-economic data gathering, public participation process (PPP), the compilation of an environmental impact report (EIR) and the environmental management plan (EMP) and site inspections.

**Anheuser-Busch InBev (AB InBev) greenfields brewery, Ghana, Anheuser-Busch InBev (AB InBev), 01/2018 - [Click or tap to enter a date.](#), Senior Environmental Consultant**

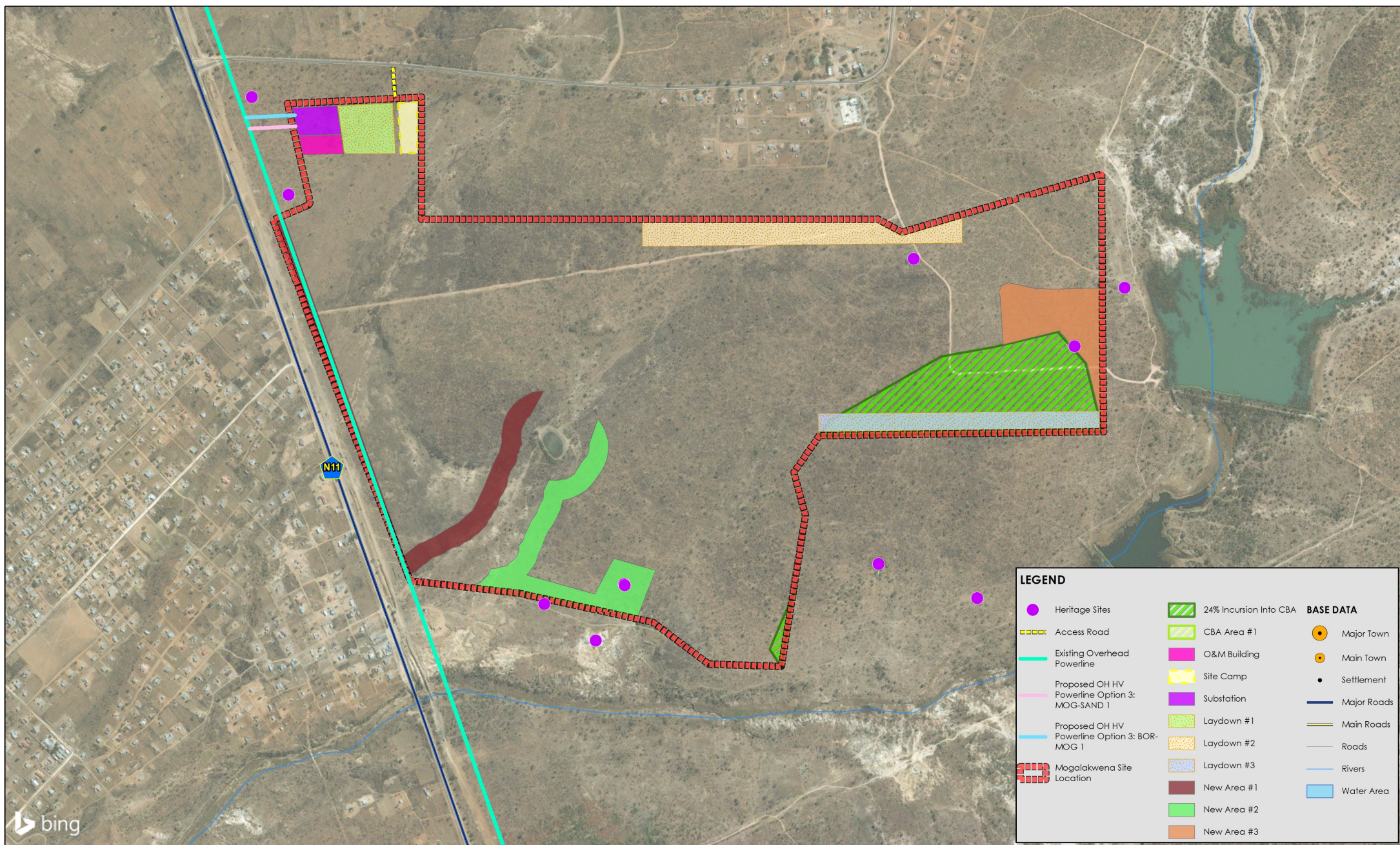
Zutari has been appointed to conduct a geotechnical investigation and fatal flaw analysis to inform the decision of purchasing a greenfields site in Ghana for the new Accra brewery. Responsible for environmental inputs and review of the fatal flaw analysis.

**Basic assessment (BA) of dams in Benoni, South Africa, Ekurhuleni Metropolitan Municipality (EMM), 01/2009 - [Click or tap to enter a date.](#), Project Manager**

The project involved a basic assessment (BA) for the widening of the Kleinfontein Dam spillway in Benoni. Responsible for geographic information systems (GIS) mapping requirements and project management.

## APPENDIX B - MAP





**ZUTARI**  
IMPACT. ENGINEERED.

Compiled by: Angela White  
Compiled on: 6/21/2022

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## BA PROCESS FOR THE CHANGE IN LAYOUT AND FOOTPRINT OF THE MOGALAKWENA 120MW PHOTOVOLTAIC (PV) SOLAR ENERGY FACILITY (SEF).

Proposed Updated Layout



0 0.1 0.2 0.4 0.6 0.8 Kilometers

Scale: 1:10,000

Page Size: A3 Landscape

Map Ref: C:\Work\Proj\1002100 Mogalakwena\Map\Proposed\_Updated\_Layent\_Map\_A3\_L\_w\_vr2.mxd

Transverse Mercator LO29 WGS84  
Projection: Transverse Mercator  
Datum: WGS 1984



# In diversity there is beauty and there is strength.

MAYA ANGELOU

**Document prepared by:**

Zutari (Pty) Ltd

Reg No 1977/003711/07

Riverwalk Office Park

41 Matroosberg Road

Ashlea Gardens

Extension 6

Pretoria

South Africa

PO Box 74381

Lynnwood Ridge

0040

**T** +27 12 427 2000

**F** +27 86 556 0521

**E** [tshwane@zutari.com](mailto:tshwane@zutari.com)



**ZUTARI**  
IMPACT. ENGINEERED.