DWARSRUG ACCESS ROAD FOR THE DWARSRUG WIND ENERGY FACILITY, NORTHERN CAPE PROVINCE

ENVIRONMENTAL MANAGEMENT PROGRAMME

April 2019

Prepared for:

Mainstream Renewable Power South Africa
4th Floor, Mariendahl House
Newlands on Main
Main Road & Campground Roads
Claremont, Cape Town
7708

Prepared by:

Savannah Environmental (Pty) Ltd
First Floor, Block 2, 5 Woodlands Drive Office Park
Woodmead
Johannesburg, 2191
Tel: +27 (0)11 656 3237
Fax: +27 (0)86 684 0547
E-mail: info@savannahsa.com
www.savannahsa.com

PROJECT DETAILS

Title	:	Draft Environmental Management Programme: Dwarsrug Access Road, Northern Cape Province
Authors	:	Savannah Environmental (Pty) Ltd Hermien Slabbert Gideon Raath
Client	:	Mainstream Renewable Power Developments (Pty) Ltd South Africa
Report Status	:	Draft Environmental Management Programme (EMPr) for approval by the Department of Environment and Nature Conservation, Northern Cape
Date	:	April 2019

When used as a reference this report should be cited as: Savannah Environmental (2019) Draft Environmental Management Programme: Dwarsrug Access Road, Northern Cape Province

DEFINITIONS AND TERMINOLOGY

Alien species: A species that is not indigenous to the area or out of its natural distribution range.

Alternatives: Alternatives are different means of meeting the general purpose and need of a proposed activity. Alternatives may include location or site alternatives, activity alternatives, process, or technology alternatives, temporal alternatives or the 'do nothing' alternative.

Assessment: The process or collecting, organising, analysing, interpreting and communicating information which is relevant.

Biological diversity: The variables among living organisms from all sources including, terrestrial, marine and other aquatic ecosystems and the ecological complexes they belong to.

Commence: The start of any physical activity, including site preparation and any other activity on site furtherance of a listed activity or specified activity, but does not include any activity required for the purposes of an investigation or feasibility study as long as such investigation or feasibility study does not constitute a listed activity or specified activity.

Construction: Construction means the building, erection or establishment of a facility, structure or infrastructure that is necessary for the undertaking of a listed or specified activity as per the EIA Regulations. Construction begins with any activity which requires Environmental Authorisation.

Cumulative impacts: Impacts that result from the incremental impact of the proposed activity on a common resource when added to the impacts of other past, present or reasonably foreseeable future activities (e.g. discharges of nutrients and heated water to a river that combine to cause algal bloom and subsequent loss of dissolved oxygen that is greater than the additive impacts of each pollutant). Cumulative impacts can occur from the collective impacts of individual minor actions over a period and can include both direct and indirect impacts.

Decommissioning: To take out of active service permanently or dismantle partly or wholly, or closure of a facility to the extent that it cannot be readily re-commissioned. This usually occurs at the end of the life of a facility.

Direct impacts: Impacts that are caused directly by the activity and generally occur at the same time and at the place of the activity (e.g. noise generated by blasting operations on the site of the activity). These impacts are usually associated with the construction, operation, or maintenance of an activity and are generally obvious and quantifiable.

Disturbing noise: A noise level that exceeds the ambient sound level measured continuously at the same measuring point by 7 dB or more.

'Do nothing' alternative: The 'do nothing' alternative is the option of not undertaking the proposed activity or any of its alternatives. The 'do nothing' alternative also provides the baseline against which the impacts of other alternatives should be compared.

Ecosystem: A dynamic system of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit.

Endangered species: Taxa in danger of extinction and whose survival is unlikely if the causal factors continue operating. Included here are taxa whose numbers of individuals have been reduced to a critical level or whose habitats have been so drastically reduced that they are deemed to be in immediate danger of extinction.

Endemic: An "endemic" is a species that grows/occur in a particular area (is endemic to that region) and has a restricted distribution. It is only found in a particular place. Whether something is endemic or not depends on the geographical boundaries of the area in question and the area can be defined at different scales.

Environment: the surroundings within which humans exist and that are made up of:
(i) The land, water and atmosphere of the earth;
(ii) Micro-organisms, plant and animal life;
(iii) Any part or combination of (i) and (ii) and the interrelationships among and between them; and
(iv) The physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being.

Environmental assessment practitioner: An individual responsible for the planning, management and coordinating of environmental management plan or any other appropriate environmental instruments introduced by legislation.

Environmental Impact: An action or series of actions that have an effect on the environment.

Environmental impact assessment: Environmental Impact Assessment, as defined in the NEMA EIA Regulations, is a systematic process of identifying, assessing and reporting environmental impacts associated with an activity.

Environmental management: Ensuring that environmental concerns are included in all stages of development, so that development is sustainable and does not exceed the carrying capacity of the environment.

Environmental management programme: A plan that organises and co-ordinates mitigation, rehabilitation and monitoring measures in order to guide the implementation of a proposal and its on-going maintenance after implementation.

Habitat: The place in which a species or ecological community occurs naturally.

Hazardous waste: Any waste that contains organic or inorganic elements or compounds that may, owing to the inherent physical, chemical or toxicological characteristics of that waste, have a detrimental impact on health and the environment.

Incident: Section 30 of NEMA defines an 'incident' as "an unexpected sudden occurrence, including a major emission, fire or explosion leading to serious danger to the public or potentially serious pollution of or detriment to the environment, whether immediate or delayed."

Indigenous: All biological organisms that occurred naturally within the study area prior to 1800.

Indirect impacts: Indirect or induced changes that may occur because of the activity (e.g. the reduction of water in a stream that supply water to a reservoir that supply water to the activity). These types of impacts include all the potential impacts that do not manifest immediately when the activity is undertaken or which occur at a different place because of the activity.

Interested and affected party: Individuals or groups concerned with or affected by an activity and its consequences. These include the authorities, local communities, investors, work force, consumers, environmental interest groups, and the public.

Pollution: A change in the environment caused by substances (radio-active or other waves, noise, odours, dust or heat emitted from any activity, including the storage or treatment or waste or substances.

Pre-construction: The period prior to the commencement of construction, which may include activities which do not require Environmental Authorisation (e.g. geotechnical surveys).

Rare species: Taxa with small world populations that are not at present Endangered or Vulnerable, but are at risk as some unexpected threat could easily cause a critical decline. These taxa are usually localised within restricted geographical areas or habitats or are thinly scattered over a more extensive range. This category was termed Critically Rare by Hall and Veldhuis (1985) to distinguish it from the more generally used word "rare."

Red data species: Species listed in terms of the International Union for Conservation of Nature and Natural Resources (IUCN) Red List of Threatened Species, and/or in terms of the South African Red Data list. In terms of the South African Red Data list, species are classified as being extinct, endangered, vulnerable, rare, indeterminate, insufficiently known or not threatened (see other definitions within this glossary).

Significant impact: An impact that by its magnitude, duration, intensity, or probability of occurrence may have a notable effect on one or more aspects of the environment.

Waste: Any substance, material or object, that is unwanted, rejected, abandoned, discarded or disposed of, or that is intended or required to be discarded or disposed of, by the holder of that substance, material or object, whether or not such substance, material or object can be re-used, recycled or recovered and includes all wastes as defined in Schedule 3 to the Waste Amendment Act (as amended on June 2014); or any other substance, material or object that is not included in Schedule 3 that may be defined as a waste by the Minister.

ABBREVIATIONS AND ACRONYMS

AIA	Archaeological Impact Assessment
ASAPA	Association of South African Professional Archaeologists
BA	Basic Assessment
DAFF	Department of Forestry and Fishery
DME	Department of Minerals and Energy
DOT	Department of Transport
DWS	Department of Water and Sanitation
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EM	Environmental Manager
EO	Environmental Officer
EMPr	Environmental Management Programme
GIS	Geographical Information Systems
GG	Government Gazette
GN	Government Notice
Ha	Hectare
HIA	Heritage Impact Assessment
I&AP	Interested and Affected Party
IDP	Integrated Development Plan
IEP	Integrated Energy Planning
km^2	Square kilometres
km	Kilometres
m^2	Square meters
m^3	Cubic meters
MW	Mega Watt
NDM	Namakwa District Municipality
NEMA	National Environmental Management Act (Act No 107 of 1998)
NERSA	National Energy Regulator of South Africa
NHRA	National Heritage Resources Act (Act No 25 of 1999)
NGOs	Non-Governmental Organisations
NIRP	National Integrated Resource Planning
NWA	National Water Act (Act No 36 of 1998)
PM	Project Manager
SAHRA	South African Heritage Resources Agency
SANBI	South African National Biodiversity Institute
SANRAL	South African National Roads Agency Limited
SDF	Spatial Development Framework

TABLE OF CONTENTS

APPENDICES

Appendix A: A3 Layout and Sensitivity Maps
Appendix B: Grievance Mechanism for Public Complaints and Issues
Appendix C: Waste Management Plan
Appendix D: Alien Management Plan
Appendix E: Rehabilitation Plan
Appendix F: Erosion and Stormwater Management Plan
Appendix G: Curriculum Vitae of the Project Team

LEGAL REQUIREMENTS IN TERMS OF THE EIA REGULATIONS

An overview of the contents of the Environmental Management Programme, as prescribed by Appendix 4 of the 2014 EIA Regulations (GNR 326) as amended, and where the corresponding information can be found within the reported is provided in **Table 1.1**

Table 1.1: Legal requirements in terms of the EIA regulations

EIA REGULATIONS 2014 (as amended) GNR 326: Appendix 1 CONTENT OF THE ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPr)	Cross-reference in this Environmental Management Programme
Content of environmental management programme (EMPr)	
(1) (a) An EMPr must comply with section 24N of the Act and include: i. Details of the EAP who prepared the EMPr; and ii. the expertise of that EAP to prepare an EMPr, including a curriculum vitae.	Chapter 4, Section 4.1 Appendix A
(b) a detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description.	Chapter 2, Section 2.1 Chapter 3
(c) a map at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that should be avoided, including buffers.	Chapter 2, Section 2.1 Appendix C
(d) a description of the impact management outcomes, including management statements, identifying the impacts and risks that need to be avoided, managed and mitigated as identified through environmental impact assessment process for all phases of the development including- (i) planning and design (ii) pre-construction activities (iii) construction activities (iv) rehabilitation of the environment after construction and where applicable post closure; and where relevant, operation activities;	Chapter 5, 6 and 7
(f) a description of proposed mitigation management actions, identifying the manner in which the impact management outcomes contemplated in paragraph (d) will be achieved, and must, where applicable, include actions to- (i) avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation; (ii) comply with any prescribed environmental management standards or practices; (iii) comply with any applicable provisions of the Act regarding closure, where applicable; and (iv) comply with any provisions of the Act regarding financial provision for rehabilitation	Chapter 5, 6 and 7
(g) the method of monitoring the implementation of the impact management actions contemplated in paragraph (f)	Chapter 5 Section 5.2.1-5.2.8 Chapter 6 Section 6.1 Chapter 7 Section 7.1
(i) the frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f);	Chapter 5, 6 and 7
(j) an indication of the persons who will be responsible for the implementation of the impact management actions;	Chapter 5 Section 5.1
(k) the time periods within which the impact management actions contemplated in paragraph (f) must be implemented;	Chapter 2 Section 2.5.3

EIA REGULATIONS 2014 (as amended) GNR 326: Appendix 1 CONTENT OF THE ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPr)	Cross-reference in this Environmental Management Programme
(l) a program for reporting on compliance, taking into account the requirements as prescribed by the Regulations;	Section 5.2.6, 5.2.7 and 5.2.8
(m) an environmental awareness plan describing the manner in which- i. the applicant intends to inform his or her employees of any environmental risk which may result from their work; and ii. risks must be dealt with in order to avoid pollution or the degradation of the environment; and.	Chapter 6
(n) any specific information that may be required by the Competent Authority	
(2) where a government notice gazetted by the Minister provides for a generic EMPr, such generic EMPR as indicated in such notice will apply.	

CHAPTER 1: INTRODUCTION

This Environmental Management Programme has been compiled for the Dwarsrug Access Road Basic Assessment Project. The proposed access road is approximately 60km north of Loeriesfontein, in the Northern Cape Province, and falls within the jurisdiction of the Hantam Local Municipality and within the greater Namakwa District Municipality, in the Northern Cape Province.

The EMPr has been developed on the basis of the findings of the Basic Assessment (BA), and must be implemented to protect on-site and off-site features through controlling construction, operation and decommissioning activities that could have a detrimental effect on the environment, and through avoiding or minimising potential impacts. This EMPr is applicable to all Dwarsrug Access road employees and contractors working on the pre-construction, construction, operation, and decommissioning of the Dwarsrug Access road, and forms a binding contract with those parties involved. The document must be adhered to and updated as relevant throughout the project life cycle. This document fulfils the requirement of the EIA Regulations, 2014 (as amended) and forms part of the BA report of the project.

In terms of the Duty of Care provision in S28(1) of the NEMA, the project proponent must ensure that reasonable measures are taken throughout the life cycle of this project to ensure that any pollution or degradation of the environment associated with this project is avoided, stopped or minimised. In terms of the NEMA, it has become the legal duty of a project proponent to consider a project holistically, and to consider the cumulative effect of a variety of impacts. While no permitting or licensing requirements arise directly by virtue of the Dwarsrug Access road this section will find application throughout the life cycle of the project.

CHAPTER 2: PROJECT DETAILS

South African Mainstream Renewable Power Developments (Pty) Ltd is proposing the construction of an Access Road for the Dwarsrug Wind Energy Facility near Loeriesfontein, Northern Cape Province. At present, untarred roads are planned for a maximum of 12m width, which will be rehabilitated to approximately 6 to 8m wide road following construction (and the agricultural use and zoning thereof restored following decommissioning). The planned power purchasing agreement and project life cycle (unless extended at a later point in time), will most likely be 20-25 years, for the entirety of which the proposed access road will be actively used (i.e. operational lifetime of approximately 20-25 years).

Two alternative access roads which will be assessed are proposed, including:
» Alternative 1 - Gravel road from Granaatboskolk to the project site (approx. 11km); (PREFERRED ALTERNATIVE)
» Alternative 2 - Gravel road from Granaatboskolk to the project site (approx. 8km).

The proposed Dwarsrug Access road will be located on the following properties:
» Remainder of the Farm Brakpan No. 212;
» Portion 1 of the Farm Aan de Karee Doorn Pan No. 213;
» Remainder of the Farm Sous No. 226; and
» Narosies No. 228

Laydown areas required for the project will be identical to those for the already approved Dwarsrug WEF, and as such no additional laydown, storage or site camp facilities will be employed or required for this component of the project – i.e. the only novel infrastructure proposed is the actual road itself. Alternative 1, the preferred alternative, is approximately 11km long, while alternative 2 is approximately 8km long.

The construction period for the proposed access road is approximately 3 months, which will need to be wholly completed to enable access provision for the construction of the associated Dwarsrug WEF. The WEF has a proposed, approved, 132kV steel monopole evacuation power line that would be connecting the onsite substation at the Dwarsrug WEF to the Helios Substation, for connection and further distribution into the national grid. The preferred road alternative occurs along that route, which coincides partially with the existing Eskom 400kV lines to and from Helios Substation. The proposed access road will thus be adjacent this Eskom service road for a moderate portion of the proposed road length.

The proposed access road will service the construction phase traffic for the associated Dwarsrug WEF. Thereafter it will be reduced to an approximately 6 to 8m wide road which will be utilised during the operation phase. Topsoil material will be removed and stockpiled in an appropriate manner adjacent the road, where it is sufficiently far away from the road to not prove an obstacle during operation of the road, or hampers the road safety. This topsoil will, as far as possible, be utilised for the rehabilitation of the road at both at the end of construction and decommissioning. Solid wastes produced during the construction phase of the road will be either utilised in the construction phase of the associated Dwarsrug WEF, or collected on site and disposed of at a licenced disposal facility. Should the amount of available construction fill material be insufficient, commercially sourced material may be utilised to make up the shortfall, or a separate, approved borrow pit will be utilised (to be authorised under a separate process).

The precise method statements for the development of the road will be determined prior to construction following the completion of engineering assessments and design, and contractor appointment, however the following general activities may be involved:

i. Staking;
ii. Clearing and grubbing;
iii. Subgrade development;
iv. Fill and cut operations (if necessary);
v. Compaction;
vi. Levelling and grading; and
vii. Signage or markings (if necessary).

The following machinery may likely be employed during construction:

i. Bulldozers;
ii. Front end Loader;
iii. Hydraulic excavators;
iv. Dump trucks or scrapers; and
v. Farm tractors.

» The road will be suitably maintained, in line with municipal/provincial requirements or approvals, during both the construction and operation phase. Any waste material from the road construction will firstly be reused, where possible, in the larger construction of the Dwarsrug WEF, or alternatively disposed to the nearest licensed waste disposal site.

Based on the above set of factors taken into consideration, Mainstream identified two possible access roads (refer to **Figure 2 and 3**) as the most suitable from a technical and environmental perspective for the proposed Dwarsrug Access road.

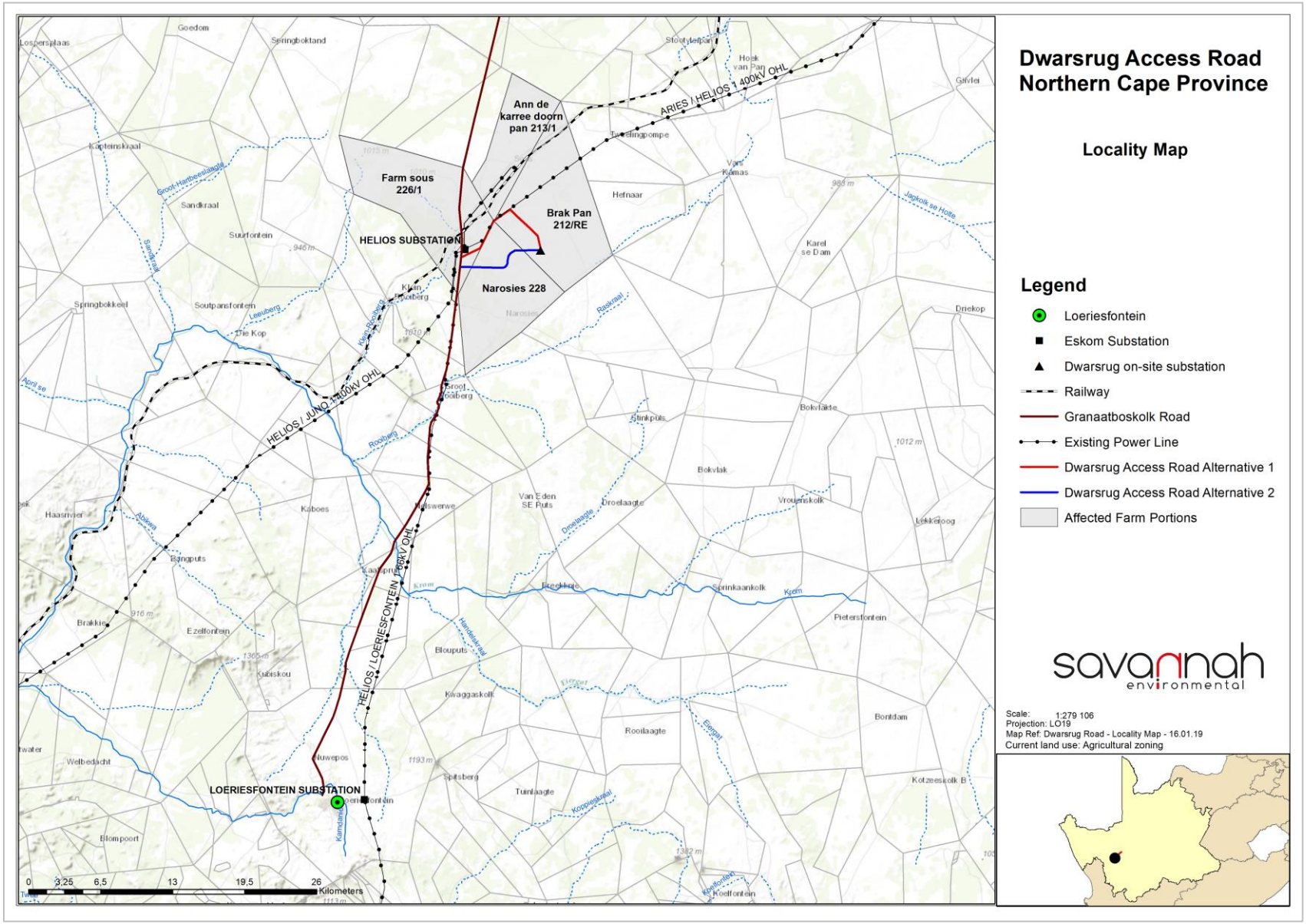


Figure 1: Locality map showing the location of the proposed Dwarsrug Access Road.

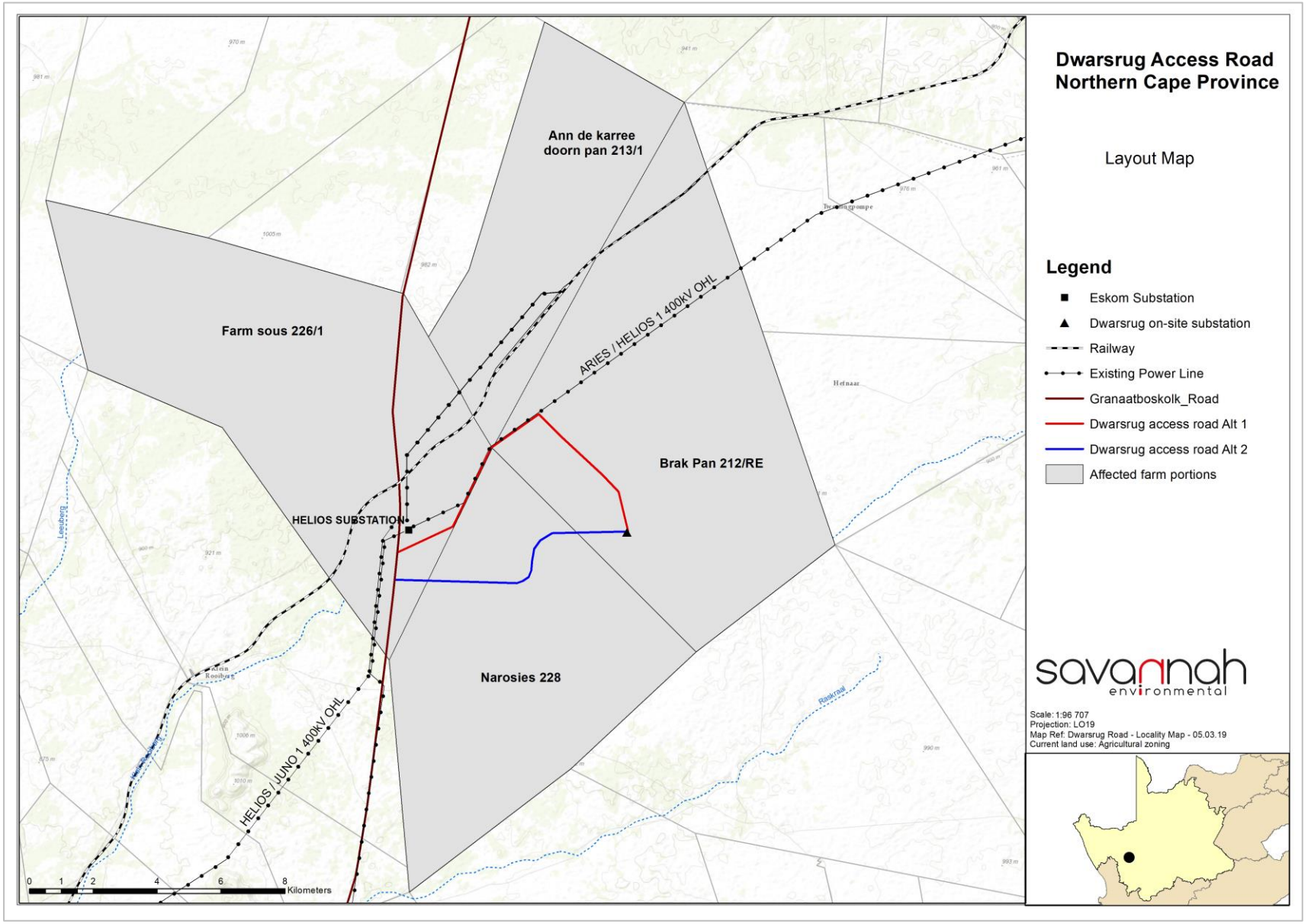


Figure 2 : Layout map showing the location of the project site.

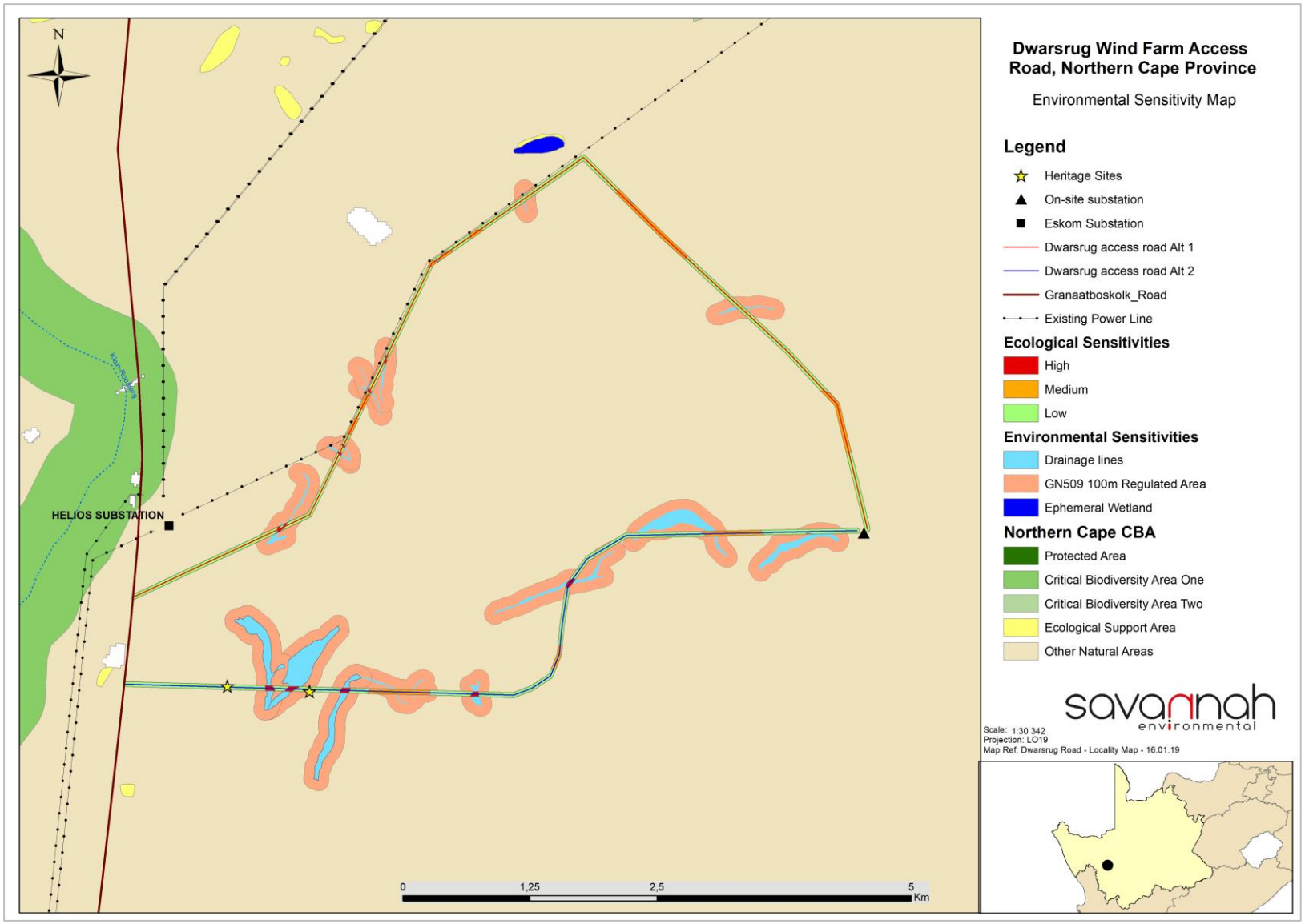


Figure 3: A map illustrating the sensitivity areas within the Dwarsrug Access Road as well as Critical Biodiversity Areas (CBAs).

Table 1.2: A detailed description of the Dwarsrug Access Road

Province	Northern Cape Province	
District Municipality	Namakwa District Municipality	
Local Municipality	Hantam Local Municipality	
Ward number(s)	5	
Nearest town(s)	Loeriesfontein	
Affected Properties: Farm name(s), number(s) and portion numbers	- Remainder of the Farm Brakpan No. 212; - Portion 1 of the Farm Sous No. 226; - Narosies No. 228 - Stink puts 229; and - Portion 1 of the Farm Aan de Karee Doorn Pan No. 213	
SG 21 Digit Code (s)	- C01500000000021200000 - C01500000000022600001 - C01500000000022800000 - C01500000000022900000 - C01500000000021300001	
Current zoning	Agriculture	
Site co-ordinates (centre of affected properties)	**Latitude**	**Longitude**
Alternative 1	30°29'59.15"S (start) 30°28'1.13"S (middle) 30°30'21.98"S (end)	19°37'55.57"E (start) 19°36'10.08"E (middle) 19°33'25.21"E (end)
Alternative 2	30°29'59.61"S (start) 30°30'39.70"S (middle) 30°30'49.88"S (end)	19°37'51.74"E (start) 19°36'2.15"E (middle) 19°33'22.18"E (end)

2.1. Findings of the Environmental Impact Assessment

The findings of the BA report provide a detailed assessment of the potential impacts that may result from the development of the Access road. This section provides a conclusion to the environmental assessment of the proposed development by providing a summary of the conclusions of the assessment of the project site and development footprint for the Dwarsrug Access Road. In so doing, it draws on the information gathered as part of the BA process and the knowledge gained by the environmental assessment practitioner (EAP), Specialists and presents an informed opinion of the environmental impacts associated with the proposed development.

From the conclusions of the detailed BA process undertaken no environmental fatal flaws were identified and associated with the Dwarsrug Access road provided that the recommended mitigation measures are implemented, specifically in terms of avoidance of sensitive features within the development footprint and the undertaking of the construction and operational monitoring as specified by the EAP and Specialists. The development footprint was designed by the Developer in order to respond to and avoid any sensitive environmental and social features located within the project site. This approach ensured the application of the mitigation hierarchy (i.e. avoid, minimise and offset) to the Dwarsrug Access road project which ultimately ensures that the development is appropriate from an environmental perspective and is suitable for development within the project site and its environmental challenges. The application of the mitigation hierarchy was undertaken by the developer prior to the commencement of the BA process for

Environmental Authorisation, as detailed in the BA report. Therefore, it is concluded that the development footprint is suitable and appropriate from an environmental perspective for the access road and will not have a detrimental impact on any sensitive features present.

The potential environmental impacts associated with the Dwarsrug Access Road identified and assessed through the BA process include:

- Impacts on vegetation;
- Impacts on the Ecology;
- Soil compaction and erosion impacts;
- Heritage and Palaeontological Impacts;
- Drainage Systems Impacts; and
- Traffic impacts.

2.1.1 Impacts on the Ecology

Short term impacts (vegetation clearing, dust and vibration and noise) are likely to have a short term increase in negative impacts. In terms of ecological features, the majority of the Dwarsrug Access Road routes traverse low or medium sensitivity and where the impact of the road on fauna and flora would be low or very low and of a local nature only. The overall diversity of the vegetation is low and the abundance of listed plant species is also very low. Apart from the low ridges, the only other significant feature of the site are the poorly developed drainage lines of the area. Overall the ecological impact is therefore likely to be of low significance and, from an ecological point of view, no fatal flaws are associated with the road realignment within the identified corridor. All impacts that may to occur project can be mitigated to an acceptable level.

Please refer to the Appendix D of the associated Basic Assessment Report for a complete account of the Ecological impact and sensitivity of the project.

2.1.2 Soil compaction and erosion impacts

Site clearing activities such as earthworks on site will create soil compaction and erosion impacts during the construction and decommissioning phases of the project. In the view of the above, the anticipated impacts on soil due to the compaction of surfaces and erosion are considered negligible, provided the mitigation measures included in this EMPr are implemented. Therefore, it is the view of the EAP that impacts of the Dwarsrug Access road can be mitigated to an acceptable level.

2.1.3 Heritage and Palaeontological Impacts

The destructive impacts that are possible in terms of heritage resources would tend to be direct, once-off events occurring during the initial construction period. Taking into consideration the extremely localised nature of the proposed access road, the study has identified that the activities will have a low impact on heritage resources. There are therefore no fatal flaws are associated with the access road and all impacts that may to occur project can be mitigated to an acceptable level.

Please refer to the Appendix D of the associated Basic Assessment Report for a complete account of the Heritage impact and sensitivity of the project.

2.1.4 Drainage Systems Impacts

The impact on the hydrological nature of the area will be localised and there is already an existing impact for a section of the proposed access road which traverses the north western boundary of the farm Narosies 228, where an existing farm road is present. In addition, only minor drainage lines are affected. The present ecological state of the ephemeral depression wetland north of the access road assessed to be a Class C (moderately modified) ephemeral depression wetland system. Taking into consideration the mitigation measures included in this EMPr , the EAP is of the view that the Dwarsrug Access road be authorised provided the mitigation measures included in the report are implemented.

Please refer to the Appendix D of the associated Basic Assessment Report for a complete account of the freshwater impact and sensitivity of the project.

2.1.5 Impacts on Traffic

During the construction phase, Contractors will make use of the Granaatboskolk road to gain access to the project site. This will have localised impacts on the Granaatboskolk road and the surrounding areas, these impacts are considered to be low. The operational phase of the Dwarsrug access road will generate limited vehicle trips by the staff of the Dwarsrug WEF, therefore these impacts are considered to be low. Taking into consideration the location of the project site, the scale of the development and the road infrastructure already in place, the project presents low traffic impacts no fatal flaws from a traffic perspective.

2.1.6 Overall Impact

Overall, the impacts associated with the Dwarsrug Access road are considered to be of an acceptable significance and can be mitigated successfully in order to ensure that the development will not create any detrimental environmental impacts that will be long-term and unacceptable. Therefore, through the undertaking of the Basic Assessment process, the EAP and Specialists identified areas of high and low sensitivity to be associated with the development. In the view of the above, refer to **Figure 4** for a sensitivity map of the Dwarsrug Access Road.

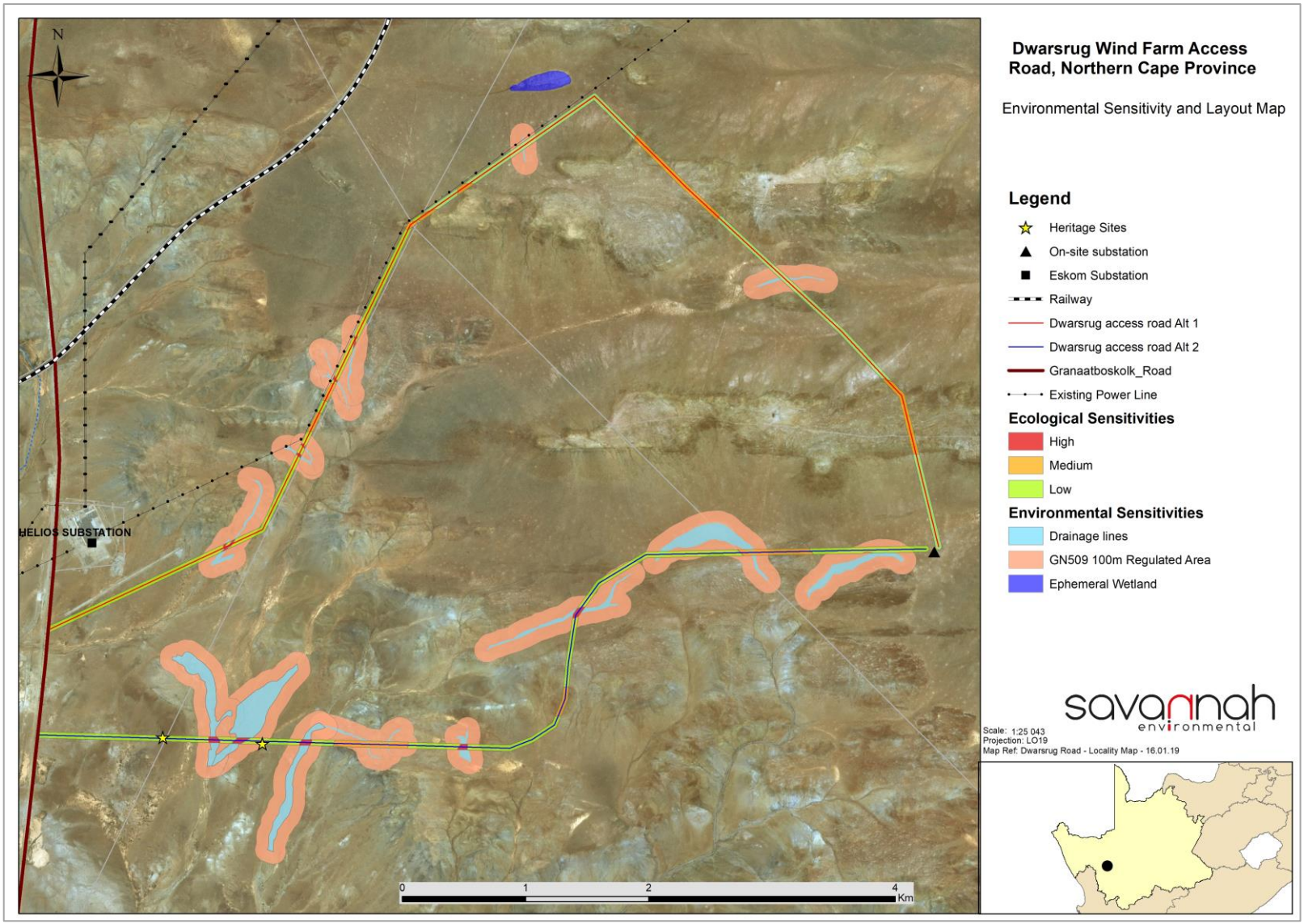


Figure 4: Map illustrating the ecological sensitivity of the proposed Dwarsrug Access road.

Table 1.4: Activities Associated with Planning, Construction, Operation and Decommissioning phase of the Access road

Design and Planning Phase	
Requirements	» Conduct technical surveys prior to initiating construction.
Activities to be undertaken	
Conduct surveys	Prior to initiating construction, a number of detailed surveys will be required including, but not limited to: » *Geotechnical survey* – The geotechnical study will look at the availability of natural construction materials. This study will serve to inform the extent of earthworks and compaction required. » *Site survey* - in order to finalise the design layout of the road. The finalisation will need to be confirmed in line with the Environmental Authorisation issued for the road realignment.
Construction Phase	
Requirements	Site preparation activities will include: * Clearance of vegetation within the footprint of the road realignment * Levelling of site (as necessary) * The development of stormwater control management systems which will divert water from construction areas and can be used during the operation phase of the road. » These activities will require the stripping of topsoil which will be needed for future rehabilitation. » Waste removal and sanitation will be undertaken in accordance with the Dwarsrug Wind Energy Facility Waste Management Procedure » Create direct construction employment opportunities for a 3 month period.
Establishment of the road	» Construction of a 11km long and 12 m wide access road (which will be reduced to 6 to 8m wide during the operation phase).
Undertake site rehabilitation and the establishment of the stormwater management plan	» Areas requiring rehabilitation will include those areas disturbed during the construction phase which are not required for operation. Rehabilitation should be undertaken in an area as soon as possible after the completion of construction activities within that area. » Re-vegetated areas may have to be protected from wind erosion and maintained until an acceptable plant cover has been achieved. » All temporary facilities, temporary equipment, and waste materials must be removed from site. » Erosion control measures (i.e. drainage works and anti-erosion measures) should be used in sensitive areas (i.e. steep slopes, hills, and drainage lines) to minimise loss of topsoil and control erosion. » All temporary facilities, temporary equipment, and waste materials must be removed from site. » Any access points and/or access roads which are not required during the operational phase must be closed as part of the post-construction rehabilitation.
Operation Phase	
Requirements	» Duration will be 20-25 years. » Technical staff of the Dwarsrug WEF will undertake maintenance activities as and when required.

Activities to be undertaken	
Operation and Maintenance	» Areas which were disturbed during the construction phase to be rehabilitated during operation phase of the access road.
<u>Decommissioning Phase</u>	
Requirements	» Decommissioning of the Access road at the end of the economic life of the Dwarsrug WEF (after 20-25 years). » Decommissioning activities to comply with the legislation relevant at the time.
Activities to be undertaken	
Undertake site rehabilitation and the establishment of the stormwater management plan	» Areas requiring rehabilitation will include those areas disturbed during the operation phase. Rehabilitation should be undertaken in an area as soon as possible after the completion of the operation phase. » Re-vegetated areas may have to be protected from wind erosion and maintained until an acceptable plant cover has been achieved.

CHAPTER 3: PURPOSE AND OBJECTIVES OF THE EMPR

An Environmental Management Programme (EMPr) is defined 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 or mitigated, and that the positive benefits of the projects are enhanced". The objective of this EMPr is to provide consistent information and guidance for implementing the management and monitoring measures established in the permitting process and help achieve environmental policy goals. The purpose of an EMPr is to help ensure continuous improvement of environmental performance, reducing negative impacts and enhancing positive effects during the construction and operation of the access road. An effective EMPr is concerned with both the immediate outcome as well as the long-term impacts of the project.

The EMPr provides specific environmental guidance for the construction and operation phases of a project, and is intended to manage and mitigate activities so that unnecessary or preventable environmental impacts do not result. The impacts considered by the EMPr during construction and operation/maintenance of the road relate to loss of floral biodiversity, loss of heritage resources, stormwater management, soil erosion and siltation of water resources, waste management, and invasion by alien species.

This EMPr is applicable to all employees and contractors working on the pre-construction, construction, and operation and maintenance phases of the project. The document will be adhered to, updated as relevant throughout the project life cycle.

This EMPr has been compiled in accordance with Appendix 4 of the EIA Regulations ,2014 (as amended). This is a dynamic document and will be further developed in terms of specific requirements listed in any authorisations issued for the Dwarsrug Access Road and/or as the project develops. The EMPr has been developed as a set of environmental specifications (i.e. principles of environmental management), which are appropriately contextualised to provide clear guidance in terms of the on-site implementation of these specifications (i.e. on-site contextualisation is provided through the inclusion of various monitoring and implementation tools).

The EMPr has the following objectives:

- Outline mitigation measures and environmental specifications which are required to be implemented for the planning, construction, rehabilitation and operation phases of the project in order to minimise the extent of environmental impacts, and to manage environmental impacts associated with the access road.
- Ensure that the construction and operation phases do not result in undue or reasonably avoidable adverse environmental impacts, and ensure that any potential environmental benefits are enhanced.
- Identify entities who will be responsible for the implementation of the measures and outline functions and responsibilities.
- Propose mechanisms and frequency for monitoring compliance, and prevent long-term or permanent environmental degradation.
- Facilitate appropriate and proactive responses to unforeseen events or changes in project implementation that was not considered in the BA process.

The mitigation measures identified within the BA process are systematically addressed in the EMPr, ensuring the minimisation of adverse environmental impacts to an acceptable level.

Mainstream must ensure that the implementation of the project complies with the requirements of all environmental authorisations, permits, and obligations emanating from relevant environmental legislation. This obligation is partly met through the development and the implementation of this EMPr and through its integration into the contract documentation. Since this EMPr is part of the BA process for the Dwarsrug Access road, it is important that this document be read in conjunction with the BA report compiled for this project. This will contextualise the EMPr and enable a thorough understanding of its role and purpose in the integrated environmental management process. Should there be a conflict of interpretation between this EMPr and the Environmental Authorisation, the stipulations in the Environmental Authorisation shall prevail over that of the EMPr, unless otherwise agreed by the authorities in writing. Similarly, any provisions in legislation overrule any provisions or interpretations within this EMPr.

This EMPr shall be binding on all the parties involved in the planning, construction and operational phases of the project, and shall be enforceable at all levels of contract and operational management within the project. The document must be adhered to and updated as relevant throughout the project life cycle.

3.1 Project Team:

In accordance with the requirements of Appendix 4 of the EIA Regulations of 2014 (as amended in 2017), the details of the consulting team from Savannah Environmental (Pty) Ltd responsible for the BA process and compilation of this EMPr are as follows:

- **Hermien Slabbert**, is responsible for the compilation of this EMPr. She holds a BSc degree with Honours in Environmental Management and has two years of experience in the renewable energy sector. She has worked on renewable energy projects and has provided assistance basic assessments (BAs), amendment applications and water use license (WUL) applications. She has also done GIS mapping (ArcGIS) for small and large-scale projects.

- **Gideon Raath**, is the principal EAP for this project. He has 4.5 years of work experience in the environmental consulting industry. Furthermore, Gideon has an MSc in Environmental Management and Geography and is registered with SACNASP (11718), and his particular focus is on environmental impact assessments mainly within the renewable energy (wind and solar) sector, as well as for infrastructure (roads, pipelines and power line) related projects.

- **Nicolene Venter**, a Board Member of IAPSA (International Association for Public Participation South Africa). She holds a Higher Secretarial Diploma and has over 21 years of experience in public participation, stakeholder engagement, awareness creation processes and facilitation of various meetings (focus group, public meetings, workshops, etc.). Her line of work pertains to managing the public participation process of Environmental Impact Assessments and Basic Assessments undertaken by Savannah Environmental (Pty) Ltd.

- **Jo-Anne Thomas**, is a Director at Savannah Environmental (Pty) Ltd. Jo-Anne has a Master of Science Degree in Botany (M.Sc. Botany) from the University of the Witwatersrand and is registered as a Professional Natural Scientist (400024/2000) with the South African Council for Natural Scientific

Professions (SACNASP). She has gained extensive knowledge and experience on potential environmental impacts associated with electricity generation and transmission projects through her involvement in related EIA processes over the past 20 years. She has successfully managed and undertaken EIA processes for infrastructure development projects throughout South Africa.

Curricula Vitae (CVs) detailing Savannah Environmental team's expertise and relevant experience are provided in **Appendix A,** and those of the Specialists in **Appendix B** of this EMPr,

The Savannah Environmental team has extensive knowledge and experience in environmental impact assessment and environmental management, having been involved in EIA processes for more than twelve (12) years. They have managed and drafted Environmental Management Programmes for various renewable energy and associated infrastructure development projects throughout South Africa

CHAPTER 4: STRUCTURE OF THIS EMPR

The first three chapters provide background to the EMPr and the Dwarsrug Access road, while the chapters which follow consider the following:

» Construction activities;
» Operation activities; and
» Decommissioning activities.

Please note: As no impacts were determined for either alternative in the Basic Assessment or specialist studies, the following phases are not applicable for this EMPr:

» Planning and design;
» Pre-construction activities; and
» Rehabilitation of the environment after construction and where applicable post closure.

These chapters set out the procedures necessary for Mainstream as the project owner, to minimise environmental impacts and achieve environmental compliance. For each of the phases of implementation, an over-arching environmental **goal** is stated. In order to meet this goal, a number of **objectives** are listed. The EMPr has been structured in a table format in order to show the links between the goals for each phase and their associated objectives, activities/risk sources, mitigation actions, monitoring requirements and performance indicators. A specific EMPr table has been established for each environmental objective. The information provided within the EMPr table for each objective is illustrated below in **Table 1.3.** Furthermore, the objectives and EMPr tables are required to be reviewed and possibly modified throughout the life of the Dwarsrug Access road whenever changes, such as the following occur:

» Planned activities change (i.e. in terms of the components of the Dwarsrug Access road upgrades).
» Modification to or addition to environmental objectives and targets.
» Additional or unforeseen environmental impacts are identified and additional measures are required to be included in the EMPr to prevent further degradation of the environment.
» Relevant legal or other requirements are changed or introduced.
» Significant progress has been made in achieving an objective or target such that it should be re-examined to determine if it is still relevant or should be modified, etc.

Table 1.3: An example of the detailed EMPr table for the proposed Dwarsrug Access Road.

PHASE									
Project Component/s									
No	**Aspect**	**Potential Impact**	**Outcome**	**Mitigation measures/ management actions**	**Responsible Persons**	**Time period for implementation**	**Implementation indicator (KPI)**	**Monitoring Mechanism & staff responsible**	**Monitoring Method & Frequency**

This table is completed in the sections below to address each of the impacts identified through the Basic Assessment process, in accordance with the specifications of Appendix 4: Content of environmental management programme (EMPr), of GNR 326, EIA Regulations (as amended, 2017). Unless specified otherwise within the impact tables as shown in Table 1.3 above, all aspects, mitigation measures, impacts, roles & responsibility as well as performance indicators are identical for all alternatives proposed, and must be implemented as such.

4.1 Institutional Arrangements: Roles and Responsibilities for the implementation of the EMPr:

As the proponent, Mainstream must ensure that the implementation of the access road complies with the requirements of all environmental authorisations and permits, and obligations emanating from other relevant environmental legislation. This obligation is partly met through the development of the EMPr, and the implementation of the EMPr through its integration into the contract documentation.

Formal responsibilities are necessary to ensure that key procedures are executed. Specific responsibilities of the Project Manager; Engineer Representative; Environmental Manager; Environmental Officer; Environmental Control Officer; SHE Representative and the Contractor for the construction phase of this project are detailed below. Therefore, **Figure 5** provides an organogram indicating the organisational structure for the implementation of the EMPr.

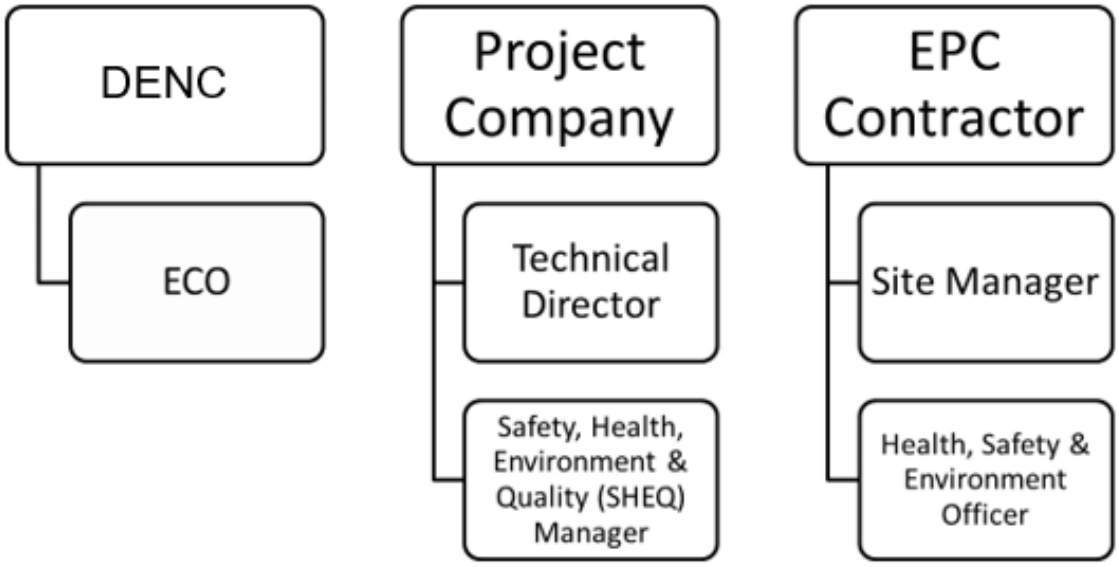


Figure 5: Organisational structure for the implementation of the EMPr.

The following roles and responsibilities are defined for the project, and may be applicable above and beyond the roles identified in Figure 5:

Project Manager (PM) will:

» Be responsible for managing the proposed Dwarsrug Access Road, contractors and consultants, as well as ensuring that the environmental management requirements are met. All decisions pertaining to environmental procedures must be approved by the PM. Authority is bestowed on the PM to stop any

construction-related activity in contravention of the EMPr in accordance with an approved disciplinary procedure.

- Ensure that all specifications and legal constraints specifically with regards to the environment are highlighted to the Contractor(s) so that they are aware of these before commencing with any activity on site.
- Ensure that all Contractor(s) are made aware of all stipulations within the EMPr.
- Ensure that the EMPr is correctly implemented throughout the project by means of site inspections and meetings. This will be documented as part of the site meeting minutes.
- Be fully conversant with the contents of the BA report compiled for this project; the EMPr, the conditions stipulated in the EA (once issued), and all relevant environmental legislation; and

Engineer Representative (ER) will:

- Be responsible for issuing instructions to the Contractor(s) including variation orders (VOs) as and when required subsequent to requests by the EM, EO or ECO.
- Oversee site works, liaise with Contractor(s) and the ECO.
- Ensure that adequate resources are made available and appropriately managed for the successful implementation of the EMPr.
- Conduct annual basis reviews of the EMPr to evaluate its effectiveness.
- Take appropriate action as a result of findings and recommendations in management reviews and audits.
- Provide forums to communicate matters regarding environmental management.

Environmental Manager/Environmental Officer (EM/EO) will:

- Be appointed by Mainstream as their representative at the Dwarsrug Access Road. He/she is not independent but must act on behalf of Mainstream with the mandate to enforce compliance under the proposed Dwarsrug Access Road contract which must include the EMPr.
- Possess the relevant qualifications and preferably competent in construction related methods and practices.
- Be part of the project team and be an active participant in all aspects of the proposed project planning that can potentially influence environmental conditions at the Dwarsrug Access Road.
- Be present during relevant project meetings and provide feedback on potential environmental issues associated with the proposed Dwarsrug Access Road.
- Ensure contents of the EMPr are clearly communicated to the Contractor(s) and ensure all site staff attend a site-specific induction programme and an environmental awareness training session prior to site handover to Contractor(s).
- Conduct regular inspections to monitor compliance in terms of the EMPr
- Issue non-compliances and hazard certificates.
- Develop and Implement an Environmental Management System (EMS) for the Dwarsrug Access Road.
- Maintain a register of all known environmental impacts and manage the monitoring thereof.
- Conduct internal environmental audits and co-ordinate external environmental audits.
- Compile environmental policies and procedures.
- Liaise with statutory bodies such as the National and Provincial Department of Environmental Affairs (DEA and DENC) on environmental performance and other issues.
- The Environmental Manager must provide fourteen (14) days written notification to the DENC that the activity operation phase will commence.

Site Manager (SM) (Contractor's on-site Representative) will:

- Be fully knowledgeable with the contents of the BA and risk management;
- Be fully knowledgeable with the contents and conditions of the Environmental Authorisation (once issued);
- Be fully knowledgeable with the contents of the EMPr;
- Have overall responsibility of the EMPr and its implementation;
- Ensure that no actions are commissioned which potentially harm or may indirectly cause harm to the environment, and take steps to prevent pollution on site;
- Confine activities to the demarcated construction site;
- Ensure that all employees and co-contractors are compliant with the requirements and provisions of this EMPr;
- Prepare method statements;
- Discuss implementation and compliance with this document with staff at routine site meetings;
- Report progress regarding the implementation of non-conformances in terms of this document at site meetings with the EM, EO and ECO;
- Ensure appropriate documentation and records are available to the EM/EO and ECO;
- Notify the ECO of all incidents, accidents and transgressions on site pertaining to the requirements stipulated in this document as wells as of any corrective actions/remedial actions taken;
- Inform the EM/EO and ECO of any issues arising from the implementation of the EMPr; and
- Inform the EM/EO and ECO of any complaints received.

An independent, suitably experienced **Environmental Control Officer (ECO)** must be appointed by Mainstream prior to the commencement of any authorised activities. The ECO will be based at the Dwarsrug Access Road and will be responsible for monitoring, reviewing and verifying compliance by the Contractor in terms of the requirements provided in the EMPr and the Environmental Authorisation. Therefore, the ECO will:

- Be on site before the commencement of any construction-related activities. He/she must endeavour to form an integral part of the proposed project team.
- Be fully knowledgeable with the contents of the conditions of the Environmental Authorisation (once issued), EMPr, and any environmental permits issued for the Dwarsrug Access road and the Dwarsrug WEF (i.e. WUL, AEL etc.)
- Conduct compliance audits in terms of the EMPr, EA and any other applicable environmental legislation.
- Liaise with relevant authorities (i.e. DENC, DWS and the project team).
- Communicate contents of the EMPr to the Contractor(s) site staff and visitors.
- Ensure that the Site Manager and co-contractors are continuously made aware of EMPr contents through discussion.
- Ensure that the compliance of the EMPr, EA and the relevant environmental legislation is monitored through regular and comprehensive inspections of the site and surrounding areas.
- Ensure that if the EMPr, EA and/or the legislation provisions, regulations or specifications are contravened, then appropriate corrective and remedial actions are undertaken to address non-compliances.
- Ensure that the Site Manager has provided input into the review and acceptance of construction methods and method statements.
- Ensure that activities on site adhere to and comply with all applicable environmental legislation.
- Undertake periodic environmental monitoring and verification to ensure that environmental impacts are kept to a minimum, as far as possible.

- Ensure that a removal is ordered of any person(s) and/or equipment responsible for any contravention of the specifications of the EMPr.
- Keep record of all activities on site, issues identified, transgressions noted and a task schedule of tasks undertaken by the ECO.
- Ensure that the compilation of progress reports for submission to the PM, ER and EM, with input from the Site Manager, takes place on a regular basis, including a final post-construction audit.
- Ensure that there is communication with the Site Manager regarding the monitoring of the site.
- Ensure that any non-compliance or remedial measures that need to be applied are reported.
- Keep record of all activities on site, problems identified, transgressions noted and a task schedule of tasks undertaken by the ECO.
- Submit independent reports to the DEA/DENC and other regulating authorities regarding compliance with the requirements of the EMPr, EA and other environmental permits.

The ECO shall remain employed and undertake compliance audits until all rehabilitation measures, as may be required, are completed and the site handed over for operation.

Contractors and Service Providers: It is important that contractors are aware of their duties & responsibilities in terms of applicable environmental legislation and the contents of this EMPr. The contractor is hereby responsible for informing employees and sub-contractors of their environmental obligations in terms of the applicable environmental provisions, and for ensuring that employees are adequately experienced and properly trained in order to execute tasks in a manner that will minimise environmental impacts and risk. The contractor's obligations in this regard will include the following:

- Ensure that all employees and sub-contractors have a basic understanding of the key environmental features of the construction site and the surrounding environment.
- Ensure a copy of the EMPr is easily accessible to all on-site staff members.
- Ensure that all employee and sub-contractors are conversant with the requirements of this EMPr and the environmental specifications as they apply to the construction of the Dwarsrug Access Road.
- Ensure prior to commencing of any site works, all employees and sub-contractors have attended an environmental awareness training course which must provide staff with an appreciation of the project's environmental requirements, and how they are to be implemented.
- Ensure staff is timeously informed of environmental issues as deemed necessary by the ECO.

All contractors (including sub-contractors and staff) and service providers are ultimately responsible for:

- Ensuring adherence to the environmental management specifications
- Ensuring that Method Statements are submitted to the Site Manager for approval before any work is undertaken
- Any lack of adherence to the above will be considered as non-compliance to the specifications of the EMPr
- Ensuring that any instructions issued by the Site Manager on the advice of the ECO are adhered to
- Ensuring that a report is tabled at each site meeting, which will document all incidents that have occurred during the period before the site meeting
- Ensuring that a register is kept in the site office, which lists all transgressions issued by the ECO
- Ensuring that a register of all public complaints is maintained
- Ensuring that all employees, including those of sub-contractors receive training before the commencement of construction in order that they can constructively contribute towards the successful

implementation of the EMPr (i.e. ensure their staff are appropriately trained as to the environmental obligations)

Contractor's Safety, Health and Environment Representative: The Contractor's Safety, Health and Environment (SHE) Representative, employed by the Contractor, is responsible for managing the day-to-day on-site implementation of this EMPr, and for the compilation of regular (usually weekly) Monitoring Reports. In addition, the SHE Rep must act as liaison and advisor on all environmental and health related issues. He or she must ensure that any complaints received from the public are duly recorded and forwarded to the Site Manager and Contractor. In some instances, a separate EO may be appointed to support this function.

The Contractor's Safety, Health and Environment Representative and/or Environmental Officer should:

- Be well versed in occupational health and environmental matters.
- Understand the relevant environmental legislation and processes.
- Understand the hierarchy of Environmental Compliance Reporting, and the implications of Non-Compliance.
- Know the background of the project and understand the implementation programme.
- Be able to resolve conflicts and make recommendations on site in terms of the requirements of this Specification.
- Keep accurate and detailed records of all EMPr-related activities on site.

CHAPTER 5: MANAGEMENT PROGRAMME: CONSTRUCTION PHASE

Overall Goal: Undertake the construction phase in a way that:

- Ensures that construction activities are properly managed in respect of environmental aspects and impacts.
- Enables construction activities to be undertaken without significant disruption to other land uses and activities in the area, in particular concerning noise impacts, traffic and road use, and effects on local residents.
- Minimises the impact on the indigenous natural vegetation, and habitats of ecological value.
- Minimises impacts on fauna in the study area.
- Minimises the impact on heritage sites should they be uncovered.
- Establish an environmental baseline during construction activities on the site, where possible.

5.1 Construction Phase Impacts

CONSTRUCTION PHASE									
Project Component/s		**Dwarsrug Access road**							
No	**Aspect**	**Potential Impact**	**Outcome**	**Mitigation measures/ management actions**	**Responsible Persons**	**Timeframe**	**Implementation indicator (KPI)**	**Monitoring Mechanism & staff responsible**	**Monitoring Method & Frequency**
1	Clearing of Vegetation	Impacts on Biodiversity	Effective rehabilitation of areas on-site affected by the construction phase.	» Contractors should rehabilitate areas that were affected by the proposed development. » The final route should be subject to a preconstruction walk-through before construction commences and adjusted where required to reduce impacts on Species of Conservation Concern (SCC) and habitats of concern. » Search and Rescue of SCCs should be conducted prior to clearing activities. » Preconstruction environmental induction for all construction staff on site to ensure that basic environmental principles are adhered to. This includes topics such as no littering, appropriate handling of pollution and chemical spills, avoiding fire hazards, minimising wildlife interactions, remaining within the demarcated construction areas etc. » All construction vehicles should adhere to clearly defined and demarcated roads. » No off-road driving is to be allowed.	» Contractor » Suitably qualified botanist (walk-through)	» Prior to the construction phase.	» That the cleared areas affected by the construction of the access road are revegetated.	» Audits and Inspections by the Site Manager, Environmental Manager (EM) and Environmental Officer EO; » Audits by Independent Environmental Control Officer (ECO).	» Inspections- every two weeks (Internal staff) » Audits-Monthly (Independent ECO)
2	Movement of machinery, trenching and excavation.	Soil Compaction and Erosion	Rehabilitation of areas on-site affected by the construction phase.	» Contractors should rehabilitate areas that were affected by the proposed development in accordance with the EMPr. » Bare areas should be suppressed for dust (using a water tank/bowser) in accordance with the EMPr. Therefore, this will reduce the likelihood of wind being an effective erosion agent for the duration of the 3-month construction phase. » All soils compacted as a result of construction activities should be profiled and monitored to ensure	» Contractor	» After the completion of the construction phase and before the commencement of the operation phase.	» That rehabilitated areas affected by the construction of the access road are revegetated and reinstated in the same condition as prior to construction	» Audits and Inspections by the Site Manager, EM and EO; » Audits by Independent ECO.	» Inspections-Weekly (Internal staff) » Audits-Monthly (Independent ECO)

				establishment of natural vegetation. » Removed soil should be used as infill material for any voids created during the construction phase. » Any erosion problems observed to be associated with the project infrastructure should be rectified as soon as possible and monitored thereafter to ensure that they do not re-occur. » Driving must take place on existing roads and a speed limit of 30km/h must be implemented on all roads associated with the project during the construction phase. » A road/civil engineer must ensure that stormwater structures are included in the road design, in order to minimise erosion. » All stormwater structures must be designed to comply with engineering requirements as per the design team					
3	Damage to the drainage lines	Damage to the drainage lines (such as erosion, siltation, dumping of waste) that will impact on ecosystem functioning.	Limit impacts on drainage features	» Disturbed areas should be rehabilitated and re-vegetated as soon as possible. » Vegetation clearance must be limited as far as possible and only within the servitude and course of the proposed access road. No unnecessary clearance is to be undertaken. » An alien invasive monitoring and control management programme must be compiled to manage encroachment of alien species within the watercourses and along the entire course of the road. » The alien invasive monitoring and control management programme is also to be implemented post-construction for approximately two (2) years to ensure alien invasive do not encroach following construction. » Movement of workers within the watercourse must be limited to the servitude of	» Contractor » Suitably qualified ecologist (IAP plan)	» After the completion of the construction phase and before the commencement of the operation phase.	» No disturbance outside of designated work areas. » Minimal siltation in drainage lines as a result of construction activities.	» On-going inspections of sediment control devices by SHE and ECO. » Immediate reporting of ineffective sediment control systems. » An incident reporting system must be implemented to record non-conformances.	» Audits-Monthly (Independent ECO)

				the road. Workers are not allowed to wonder freely in the watercourse. This will cause unnecessary degradation of the watercourse. » Construction of the access road in the watercourse is to take place preferably in the summer and spring months (September to March) as these are the drier months in which rainfall is likely to be limited. Construction in the autumn and winter months (April to August) is to be avoided as far as possible, as this is when rainfall can be expected and the watercourses are likely to be in flow after rainfall events. » All vehicles and machinery to be used within the watercourses during construction must be checked for oil and fuel leaks before being allowed to cross or work in the watercourses. Should a leak be detected, the vehicle is to be prohibited from working within or crossing through the watercourses until repaired. » No soil stockpiles are to be placed within 50m of any watercourse. Soil stockpiles within 100m of a watercourse must be bunded with suitable materials (such as bricks or planks), to prevent sedimentation. » During construction, silt netting must be erected on the downstream side, along the length of the road crossing, through the watercourse and riparian habitat (as delineated) during the dry season to contain sediment as far as possible.					
4	Soil erosion	Soil erosion and impacts on topsoil	Minimisation of development footprint, erosion and disturbance to topsoil	» Driving must take place on existing roads and a speed limit of 30km/h must be implemented on all roads associated with the project during the construction phase. » Erosion management at the site should take place according to the Erosion	» Contractor	» After the completion of the construction phase and before the commencement of the operation phase.	» No disturbance outside of designated work areas. » Retain natural vegetation, where possible	» On-going inspections of sediment control devices by SHE and ECO. » Immediate reporting of ineffective sediment control systems. » An incident reporting system must be	» Audits-Monthly (Independent ECO)

				Management Plan and Rehabilitation Plan. » All roads should have runoff control features which redirects water flow and dissipate any energy in the water that may pose an erosion risk. » Regular monitoring for erosion during construction to ensure that no erosion problems are developing as a result of the disturbance, as per the Erosion Management and Rehabilitation Plans for the project. » All erosion problems observed should be rectified as soon as possible, using the appropriate erosion control structures and revegetation techniques. » All cleared areas should be revegetated with indigenous perennial species from the local area. » A road/civil engineer must ensure that stormwater structures are included in the road design, in order to minimise erosion. » All stormwater structures must be designed to comply with engineering requirements as per the design team.				implemented to record non-conformances.	
5	Generation of dust emissions	Impacts on Air Quality	Reduction of dust emissions on-site	» Dust suppression methods should be undertaken during clearing, such as sprinkling and wind breaks. » Driving must take place on existing roads and a speed limit of 30km/h must be implemented on all roads associated with the project during the construction phase. » Dust generation must comply with the National Dust Control Regulations (GN No. R. 827) of 1 November 2013, promulgated in terms of the National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004). » Limit vegetation clearing as far as possible.	» Contractor	» Pre-construction » Construction phase	» Less than two complaints from construction workers, Dwarsrug Access Road staff and surrounding landowners per month concerning dust emissions.	» Audits and Inspections by Site Manager. » Audits and Inspections Environmental manager (EM) and Environmental Officer (EO). » Audits by Independent Environmental Control Officer (ECO).	» Audits-Monthly (independent ECO)

6	Presence of improperly disposed solid waste, i.e. litter, cement rubble and any surplus material generated during the clearance of the site	Generation of Solid Waste (General & Hazardous)	To minimise the production of general and hazardous waste.	» General waste should be disposed of an approved waste disposal facility. » Records of all waste being taken off site must be recorded and kept as evidence. » Management of solid waste should be handled according to the Dwarsrug Access Road Waste Management Procedure. » Where possible, waste should be recycled. » The waste management hierarchy must be adopted at the construction site where waste is prevented, if it cannot be prevented it should be minimised. If waste can't be minimised it must be reused or recycled. If this is not an option it should be used for energy recovery. This may involve selling waste to third part recovery organisations. Lastly if energy recovery is not possible waste should be disposal of. » Should waste be stored on site, it cannot be temporarily stored for longer than 80 days.	» Contractor	» Pre-construction » Construction phase	» Compliance with waste management legislation » To minimise production of waste » To ensure appropriate waste storage and disposal streams during auditing events.	» Audits and Inspections by Site Manager » Audits and Inspections EM » Audits by Independent ECO	» Observation and supervision of waste management practices throughout construction phase through daily inspections and monthly audits (internal staff) » Waste collection to be monitored on a weekly basis (internal staff) » Waste documentation completed by Site Manager in accordance with the Dwarsrug Access Road Waste Management Procedure. » An incident reporting system will be used and implemented by the EM and EO to record any non-conformances to the EMPr as and when an incident occurs.
7	Impacts on the health and safety of the Contractors and staff is anticipated during the construction phase.	Health & Safety Impacts	Zero occurrence of incidents and fatalities	» All construction staff must have the appropriate Personal Protective Equipment (PPE) and safety equipment before being allowed to carry construction activities. » The construction staff handling chemicals or hazardous materials must be trained in the use of the substances and the environmental, health and safety consequences of incidents. » Appoint Safety, Health and Environment (SHE) Officer to ensure monitoring of safety conditions during construction activities. » Classify all Hazardous waste and dispose of appropriately. » Adhere to the Occupational Health and	» Contractor » Site SHE Rep	» Pre-construction » Construction	» Any incidents or recorded on-site during the construction phase are limited to no more than 1 per month.	» Audits and inspections by the Site SHE Representative.	» Weekly or bi-weekly toolbox talks held by Site SHE Representative. » Weekly site inspections by the SHE Representative. » Monthly internal safety audits by the Site Manager and SHE Rep.

				Safety Act (OHSA) (Act 85 of 1993).					
8	Contractors are expected to give preference to unskilled and skilled labourers residing in the surrounding local communities for the duration of the construction phase.	Creation of employment opportunities	Ensuring that at least 15% unskilled labour is from the nearby communities.	» A local's first approach should be adopted for the procurement of sub-contractors and employees on the construction site. » Priority should be given to unskilled members of the local community. » Existing local community structures should be used as a communication or liaison tool between the applicant and members of the local community.	» Project Manager » Site Manager	» Duration of the Construction phase (3 months)	» Employment opportunities be generated during the construction phase.	» Project Manager will source and appoint accredited training service provider for the skills development programme. » Project Manager will liaise with local municipal and tribal authorities regarding the number of low-semi-skilled employees from local communities.	» Bi-annual skills audit of workers on-site to be conducted by Site Manager and reported to Project Manager.
9	Noise generation due to civil works, and movement of heavy machinery.	Noise Impacts	Reduction of noise-related impacts on employees and surrounding landowners.	» Any drilling activity should take place during the approved working hours, these are to be known and agreed upon with all contractors. » Machinery and equipment are to be switched off when not used. » All operations should meet the noise standard requirements of the Occupational Health and Safety Act (Act No 85 of 1993). » Retro-fit some equipment with dampening measures and ensure the use of noise protection ((i.e. earplugs/ear muffs) by all construction workers where excessive noise is to be generated.	» Site Manager » SHE Rep	» Duration of the Construction phase (3 months)	» Zero complains from construction workers and neighbouring land owners regarding increased levels of noise due to the development.	» Site Manager should ensure procure and supply workers with noise abatement devices (i.e. ear plugs or ear muffs). » SHE Representative in conjunction with supervisors/foremen should ensure that should ensure all workers have noise abatement devices and should report the lack thereof to the Site Manager.	» Weekly Inspections by the SHE Representative. » Mass Meetings with the Site Manager.
10	Increase in vehicular movement on roads in the surrounding areas.	Impacts on traffic	Minimise the impact of traffic associated with the construction of the access road.	» Contractors should adhere to speed limits and roads signs on and off site at all times. » All construction vehicles must be road worthy and all designated drivers must be in possession of a valid South African drivers licence. » If any abnormal loads will be transported to site during the construction phase, all the prescribed permits and clearances should be obtained from the relevant authorities. Above all, abnormal load transportation should be	» Project Manager » Engineering Representative » Site Manager	» Duration of the Construction phase (3 months)	» Any traffic-related incidents involving project personnel, or workers should be limited to no more than 1 per month.	» Project Manager, Engineering Representative and Site Manager should ensure all traffic-related signage is made available.	» Daily visual monitoring of traffic control measures to ensure they are effective by the Site Manager.

				limited to during peak hours. » Where possible, heavy vehicle traffic should be discouraged from using roads during peak traffic hours. » Transport of material and waste should comply with the necessary road regulations					

5.2 Detailing Method Statements

The environmental specifications need to be underpinned by a series of Method Statements, in which the Contractors and Service Providers are required to outline how any identified environmental risks will practically be mitigated and managed for the duration of the contract, and how specifications within this EMPr will be met. That is, the Contractor will be required to describe how specified requirements will be achieved through the submission of written Method Statements to the Site Manager and ECO.

A Method Statement is defined as "a written submission by the Contractor in response to the environmental specification or a request by the Site Manager, setting out the plant, materials, labour and method the Contractor proposes using to conduct an activity, in such detail that the Site Manager is able to assess whether the Contractor's proposal is in accordance with the Specifications and/or will produce results in accordance with the Specifications". The Method Statement must cover applicable details with regard to:

- Details of the responsible person/s;
- Construction procedures;
- Materials and equipment to be used;
- Getting the equipment to and from site;
- How the equipment/material will be moved while on-site;
- How and where material will be stored;
- The containment (or action to be taken if containment is not possible) of leaks or spills of any liquid or material that may occur;
- Timing and location of activities;
- Compliance/non-compliance with the Specifications; and
- Any other information deemed necessary by the Site Manager.

Method Statements must be compiled for all activities which affect any aspect of the environment and should be applied consistently to all activities. Specific areas to be addressed through method statements (pre, during and post construction) may include:

- Site establishment (which explains all activities from induction training to offloading, construction sequence for site establishment and the different amenities to be established etc., including a site camp plan indicating all of these).
- Excavations and backfilling procedure.
- Stormwater management method statement.
- Ablution facilities (placement, maintenance, management and servicing).
- Solid Waste Management:
  - Description of the waste storage facilities (on site and accumulative).
  - Placement of waste stored (on site and accumulative).
  - Management and collection of waste process.
  - Recycle, re-use and removal process and procedure.
- Dust and noise pollution:
  - Describe necessary measures to ensure that noise from construction activities is maintained within lawfully acceptable levels.
  - Procedure to control dust at all times on the site.

- Hazardous substance storage (ensure compliance with all national, regional and local legislation with regard to the storage of oils, fuels, lubricants, solvents, wood treatments, bitumen, cement, and any other harmful and hazardous substances and materials (South African National Standards apply).
  - Lists of all potentially hazardous substances to be used.
  - Appropriate handling, storage and disposal procedures.
  - Prevention protocol of accidental contamination of soil at storage and handling areas.
  - All storage areas, (i.e. for harmful substances appropriately bunded with a suitable collection point for accidental spills must be implemented and drip trays underneath dispensing mechanisms including leaking engines/machinery).
- Fire prevention and management measures on site.
- Incident and accident reporting protocol.
- Designate access road and the protocol on roads in use.

The Contractor may not commence the activity covered by the Method Statement until it has been reviewed by the Site Manager and ECO, except in the case of emergency activities and then only with the consent of the Site Manager. Approval of the Method Statement will not absolve the Contractor from their obligations or responsibilities in terms of their contract.

Failure to submit a required method statement may result in suspension of the activity concerned until such time as a method statement has been submitted and approved.

5.3 Awareness and Competence: Construction Phase of the Dwarsrug Access Road

To achieve effective environmental management, it is important that Contractors are aware of the responsibilities in terms of the relevant environmental legislation and the contents of this EMPr. The Contractor is responsible for informing employees and sub-contractors of their environmental obligations in terms of the environmental specifications, and for ensuring that employees are adequately experienced and properly trained in order to execute the works in a manner that will minimise environmental impacts. The Contractors obligations in this regard include the following:

- All Employees must have a basic understanding of the key environmental features of the construction site and the surrounding environment. This includes the discussion/explanation of site environmental matters during toolbox talks.
- The content and requirements of Method Statements are to be clearly explained to all plant operators and general workers. All staff acting in a supervisory capacity is to have copies of the relevant Method Statements and be aware of the content thereof.
- Ensuring that a copy of the EMPr is readily available on-site, and that all senior site staff is aware of the location and have access to the document. Senior site staff will be familiar with the requirements of the EMPr and the environmental specifications as they apply to the construction of the Water Treatment Plant.
- Ensuring that, prior to commencing any site works, all employees and sub-contractors have attended an Environmental Awareness Training session. The training session must provide the site staff with an appreciation of the project's environmental requirements, and how they are to be implemented.
  - Records must be kept of those that have completed the relevant training.
  - Training should be done either in a written or verbal format but must be appropriate for the receiving audience.

- Refresher sessions must be held to ensure the contractor staff are aware of their environmental obligations as practically possible.

» All sub-contractors must have a copy of the EMPr and sign a declaration/ acknowledgement that they are aware and familiar with the contents and requirements of the EMPr and that they will conduct work in such a manner as to ensure compliance with the requirements of the EMPr.

Therefore, prior to the commencement of construction activities on site and before any person commences with work on site thereafter, adequate environmental awareness and responsibility are to be appropriately presented to all staff present onsite, clearly describing their obligations towards environmental controls and methodologies in terms of this EMPr.

5.4 Monitoring Programme: Construction Phase of the Access Road

A monitoring programme must be in place not only to ensure conformance with the EMPr, but also to monitor any environmental issues and impacts which have not been accounted for in the EMPr that are, or could result in significant environmental impacts for which corrective action is required. The period and frequency of monitoring will be stipulated by the Environmental Authorisation. Where this is not clearly dictated, Mainstream will determine and stipulate the period and frequency of monitoring required in consultation with relevant stakeholders and authorities. The PM and EM will jointly ensure that monitoring is conducted and reported on. The intention of the monitoring and auditing process is to routinely monitor the implementation of the specified environmental specifications, in order to:

» Monitor and audit compliance with the prescriptive and procedural terms of the environmental specifications
» Ensure adequate and appropriate interventions to address non-compliance
» Ensure adequate and appropriate interventions to address environmental degradation
» Provide a mechanism for the lodging and resolution of public complaints
» Ensure appropriate and adequate record keeping related to environmental compliance
» Determine the effectiveness of the environmental specifications and recommend the requisite changes and updates based on audit outcomes, in order to enhance the efficacy of environmental management on site
» Aid communication and feedback to authorities and stakeholders.

5.4.1 Environmental Awareness Training

Environmental Awareness Training must be undertaken by the Contractor and must take the form of an on-site talk and demonstration by the SHE Officer and/or ECO before the commencement of site establishment and construction on site. The education/awareness programme should be aimed at all levels of management and construction workers within the contractor team. A record of attendance of this training must be maintained by the SHE Officer on site.

5.4.2 Induction Training

Environmental induction training must be presented to all persons who are to work on the site, be it for short or long durations; Contractor's or Engineer's staff; administrative or site staff; sub-contractors or visitors to site.

This induction training should be undertaken by the Contractor's SHE Officer and should include discussing the developer's environmental policy and values, the function of the EMPr and Contract Specifications and the importance and reasons for compliance to these. The induction training must highlight the overall "do's" and "don'ts" on site and clarify the repercussions of not complying with these. The non-conformance reporting system must be explained during the induction as well. Opportunity for questions and clarifications must form part of this training. A record of attendance of this training must be maintained by the SHE Officer on site.

5.4.3 Toolbox Talks

Toolbox talks should be held on a scheduled and regular basis where foremen, environmental and safety representatives of different components of the works and sub-consultants hold talks relating to environmental practices and safety awareness on site. These talks should also include discussions on possible common incidents occurring on site and the prevention of the reoccurrence thereof. Records of attendance and the awareness talk subject must be kept on file.

5.4.4 Non-Conformance Reports

All supervisory staff including Foremen, Resident Engineers, and the ECO must be provided with the means to be able to submit non-conformance reports to the Site Manager. Non-conformance reports will describe, in detail, the cause, nature and effects of any environmental non-conformance by the Contractor. Records of penalties imposed may be required by the relevant authority within 48 (forty eight) hours.

The non-conformance report will be updated on completion of the corrective measures indicated on the finding sheet. The report must indicate that the remediation measures have been implemented timeously and that the non-conformance can be closed-out to the satisfaction of the Site Manager and ECO.

5.4.5 Incident Reports

According to Section 30 of National Environmental Management Act (NEMA), an "Incident" is defined as an unexpected sudden occurrence, including a major emission, fire or explosion leading to serious danger to the public or potentially serious pollution of or detriment to the environment, whether immediate or delayed.

In terms of the requirements of NEMA, the responsible person must, within 14 days of the incident, report to the Director General, provincial head of department and municipality such information as is available to enable an initial evaluation of the incident, including:

a) the nature of the incident;
b) the substances involved and an estimation of the quantity released and their possible acute effect on persons and the environment and date needed to assess these effects;
c) initial measures taken to minimise impacts;
d) causes of the incident, whether direct or indirect, including equipment, technology, system, or management failure; and
e) measures taken in order to avoid a recurrence of such incident.

5.4.6 Chance and Fossil Finds Procedure

- If a chance find is made the person responsible for the find must immediately **stop working** and all work must cease in the immediate vicinity of the find.
- The person who made the find must immediately **report** the find to his/her direct supervisor which in turn must report the find to his/her manager and the ECO or site manager. The ECO must report the find to the relevant Heritage Agency (South African Heritage Research Agency, SAHRA). (Contact details: SAHRA, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa. Tel: 021 462 4502. Fax: +27 (0)21 462 4509. Web: www.sahra.org.za). The information to the Heritage Agency must include photographs of the find, from various angles, as well as the GPS co-ordinates.
- A preliminary report must be submitted to the Heritage Agency within **24 hours** of the find and must include the following: 1) date of find; 2) a description of the discovery and a 3) description of the fossil and its context (depth and position of the fossil), GPS co-ordinates.
- Photographs (the more the better) of the discovery must be of high quality, in focus, accompanied by a scale. It is also important to have photographs of the vertical section (side) where the fossil was found.

Upon receipt of the preliminary report the Heritage Agency will inform the ECO (site manager) whether a rescue excavation or rescue collection by a palaeontologist is necessary.

- The site must be secured to protect it from any further damage. **No attempt** should be made to remove material from their environment. The exposed finds must be stabilized and covered by a plastic sheet or sand bags. The Heritage agency will also be able to advice on the most suitable method of protection of the find.
- In the event that the fossil cannot be stabilized the fossil may be collected with extreme care by the ECO (site manager). Fossils finds must be stored in tissue paper and in an appropriate box while due care must be taken to remove all fossil material from the rescue site.
- Once Heritage Agency have issued written authorization, the developer may continue with the development.

5.4.7 Monitoring Reports

A monitoring report will be compiled by the ECO on a monthly basis and must be submitted to the Director: Compliance Monitoring at the competent authority for their records. This report should include details of the activities undertaken in the reporting period, any non-conformances or incidents recorded, corrective action required, and details of those non-conformances or incidents which have been closed out. The Contractor must ensure that all waste manifests are provided to the ECO on a monthly basis in order to inform and update the competent authority regarding waste related activities.

5.4.8 Audit Report

The Developer must ensure that project compliance with the conditions of the Environmental Authorisation is audited by an independent auditor, and that the audit reports are submitted to the Director: Compliance Monitoring at the competent authority. Such audits must be undertaken during both the construction and operation phases of the Dwarsrug Access Road. The effectiveness of the mitigation measures and recommendations for amongst others the following: grievance incidents; waste management, noise, dust emissions, traffic and transportation should be audited. The results form part of the project monitoring and audit reports.

5..9 Final Audit Report

A final environmental audit report must be compiled by an independent external auditor and be submitted to competent authority upon completion of the construction and rehabilitation activities (within 30 days of completion of the construction phase (i.e. within 30 days of site handover) and within 30 days of completion of rehabilitation activities). This report must indicate the date of the audit, the name of the auditor and the outcome of the audit in terms of compliance with the environmental authorisation conditions and the requirements of the EMPr.

CHAPTER 6: MANAGEMENT PROGRAMME: OPERATION

Overall Goal: To ensure that the operation of the Access Road does not have unforeseen impacts on the environment and to ensure that all impacts are monitored and the necessary corrective action taken in all cases. In order to address this goal, it is necessary to manage the access road in a way that:

- Ensures that operation activities are properly managed in respect of environmental aspects and impacts
- Minimises the impact on the indigenous natural vegetation, and habitats of ecological value.
- Minimises impacts on fauna in the study area.
- Minimises the impact on heritage sites should they be uncovered.

6.1 Operation Phase Impacts

OPERATION PHASE									
Project Component/s		**Dwarsrug Access road**							
No	**Aspect**	**Potential Impact**	**Outcome**	**Mitigation measures/ management actions**	**Responsible Persons**	**Time period for implementation**	**Implementation indicator (KPI)**	**Monitoring Mechanism & staff responsible**	**Monitoring Method & Frequency**
1	Domestic Waste is anticipated to be generated during the operational phase of the access road	Generation of Solid Waste	To minimise the production general waste.	**General waste:** » Where possible, waste should be recycled. » The waste management hierarchy must be adopted at the construction site where waste is prevented, if it cannot be prevented it should be minimised. If waste can't be minimised it must be reused or recycled. If this is not an option it should be used for energy recovery, this may involve selling waste to third part recovery organisations. Lastly if energy recovery is not possible waste should be disposal of. » General waste should be disposed of an approved waste disposal facility. » No dumping of waste material must be permitted in the surrounding open areas. » Records of all waste being taken off site must be recorded and kept as evidence. » All solid waste should be handled and disposed of in accordance with the Dwarsrug Access Road Waste Management Procedure. » Records of all waste being taken off site must be recorded and kept as evidence. » Should waste be stored on site, it cannot be temporarily stored for longer than 80 days.	» EM »	Duration of the Operation Phase	» Compliance with waste management legislation » To minimise production of waste » To ensure appropriate waste storage and disposal	» Internal audits by the EO and EM. » Quarterly inspections by the EO. » Quarterly audits - for the first 2 years by an independent ECO. » Annual audits for the years thereafter by an independent ECO.	» Observation and supervision of waste management practices throughout operation phase through daily inspections and monthly audits. » Waste collection to be monitored on a weekly basis by the EO. » An incident reporting system will be used to record non-conformances to the EMPr as and when an incident occurs. This to be implemented by the EO and EM.
2	Damage to the drainage lines	Damage to the drainage lines (such as erosion, siltation, dumping of waste) that will impact on ecosystem functioning.	Limit impacts on drainage features	» Disturbed areas should be rehabilitated and re-vegetated as soon as possible. » An alien invasive monitoring and control management programme must be compiled to manage encroachment of alien species within the watercourses and along the entire course of the road. Control along the entire route of the access road is required is to	» Contractor	Duration of the Operation Phase	» No disturbance outside of designated work areas. » Minimal siltation in drainage lines as a result of construction activities.	» On-going inspections of sediment control devices by SHE and ECO. » Immediate reporting of ineffective sediment control systems. » An incident reporting system must be implemented to record non-conformances.	» Monthly Audits by the Site Manager

				ensure that vegetation disturbance is managed and alien vegetation establishment does not take place high or lower along the road route which could result in encroachment on the watercourses at a later stage. » The alien invasive monitoring and control management programme is also to be implemented post-construction for approximately two (2) years to ensure alien invasive do not encroach following construction. » No fuels, oils or any other hazardous materials are to be brought into the watercourse or stored within 100m from the edge of the watercourses.					
3	Generation of dust emissions	Impacts on Air Quality	Reduction of dust emissions on-site	» Driving must take place on existing roads and must adhere to speed limits associated with the project during the operational phase. » Dust generation must comply with the National Dust Control Regulations (GN No. R. 827) of 1 November 2013, promulgated in terms of the National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004). » Limit vegetation clearing as far as possible.	» Contractor	Duration of the Operation Phase	» Less than two complaints from construction workers, Dwarsrug Access Road staff and surrounding landowners per month concerning dust emissions	» Audits and Inspections by Site Manager. » Audits and Inspections Environmental manager (EM) and Environmental Officer (EO). » Audits by the Site Manager.	» Monthly Audits by the Site Manager
4	Los of vegetation and faunal and fauna habitat	Impacts on Biodiversity	Minimise the impacts on and loss of indigenous vegetation and faunal habitat and fauna	» Contractors should rehabilitate areas that were affected by the proposed development. » Species of concern to be relocated and conserved in situ should be marked. Identification of suitable relocation sites for each species should be identified » Areas containing protected plant species must be noted and every effort made to reduce the impacts of construction on these areas. Protected plant species in any area to be cleared should be identified and rescued. Permits will be required from NC DENC to remove or translocate protected plant or animal species, if they are to be affected	» Contractor	Duration of the Operation Phase	» To minimise footprints of disturbance of vegetation/habitats on-site » To protect fauna	» Audits and Inspections by Site Manager. » Annual Audits and Inspections Environmental manager (EM) and Environmental Officer (EO). » Annual Audits by Independent Environmental Control Officer (ECO).	» Annual Audits by the Site Manager

				» Should any species be relocated, suitable relocation sites should be identified. » All construction vehicles should adhere to clearly defined and demarcated roads. » No off-road driving is to be allowed					
5	Soil erosion	Soil erosion and impacts on topsoil	Minimisation of, erosion and disturbance to topsoil	» Driving must take place on existing roads and a speed limit of 30km/h must be implemented on all roads associated with the project during the operation phase. » Any erosion problems observed to be associated with the project infrastructure should be rectified as soon as possible and monitored thereafter to ensure that they do not re-occur. » A road/civil engineer must ensure that stormwater structures are included in the road design, in order to minimise erosion. » All stormwater structures must be designed to comply with engineering requirements as per the design team.	» Contractor	Duration of the Operation Phase	» No disturbance outside of designated work areas. » Retain natural vegetation, where possible	» On-going inspections of sediment control devices by SHE and ECO. » Immediate reporting of ineffective sediment control systems. » An incident reporting system must be implemented to record non-conformances.	Monthly Audits by the Site Manager
6	Increase in vehicular movement on roads in the surrounding areas.	Impacts on traffic	Minimise the impact of traffic associated with the construction of the access road.	» Staff should adhere to speed limits and roads signs on and off site at all times. » All vehicles using the access road must be road worthy and all designated drivers must be in possession of a valid South African drivers licence. » Where possible, heavy vehicle traffic should be discouraged from using roads during peak traffic hours. » Transport of material and waste should comply with the necessary road regulations	» Project Manager » Site Manager	Duration of the Operation Phase	» Any traffic-related incidents involving project personnel, or workers should be limited to no more than 1 per month.	» Project Manager and Site Manager should ensure all traffic-related signage is made available.	» Daily visual monitoring of traffic control measures to ensure they are effective by the Site Manager.
7	Stormwater impacts during periods of rainfall	Storm Water Impacts	Minimal soil erosion occurrence on the access road	» Monitor and control hydrocarbon leakages from operations equipment and machinery (i.e. placement of drip trays underneath components during mechanical breakdowns). » Ensure ongoing and sufficient maintenance of the stormwater drains of the access road to ensure effective stormwater control on site. » All stormwater structures must comply with DWS and SANRAL requirements. » The road engineer must ensure that suitable stormwater structures are included in the road design in	» EM » EO	Operation Phase	» Minimal soil erosion within the road reserve. » Minimal siltation in drainage lines due to operation of the road.	» EO should conduct inspections monthly and report any erosion incidents to the ER. » ER should implement feasible, environmentally friendly measures to prevent erosion.	» Monthly internal audits by the EO or EM.

				order to minimise erosion and sedimentation of watercourses.					

CHAPTER 7: MANAGEMENT PROGRAMME: DECOMMISSIONING

Overall Goal: To ensure that the decommissioning of the Access road and associated infrastructure does not have unforeseen impacts on the environment and to ensure that all impacts are monitored and the necessary corrective action is taken at all costs.

The decommissioning activities of the access road would involve the rehabilitation of disturbed areas and establishment of vegetation. It must be noted that decommissioning activities need to be undertaken in accordance with the legislation applicable at that time.

» ***Soil Amelioration***

The steps that should be undertaken during the amelioration of soils are as follows:

- The deposited soils must be ripped to ensure reduced compaction;
- An acceptable seed bed should be produced by surface tillage;
- Restore soil fertility;
- Incorporate the immobile fertilisers in to the plant rooting zone before ripping; and
- Apply maintenance dressing of fertilisers on an annual basis until the soil fertility cycle has been restored.

» ***Establishment of Vegetation***

The objective is to restore the project site to a self-sustaining cycle, i.e. to realise the re-establishment of the natural nutrient cycle with ecological succession initiated.

7.1 Decommissioning Phase Impacts

DECOMMISSIONING PHASE									
Project Component/s	**Dwarsrug Access Road**								
No	**Aspect**	**Potential Impact**	**Outcome**	**Mitigation measures/ management actions**	**Responsible Persons**	**Time period for implementation**	**Implementation indicator (KPI)**	**Monitoring Mechanism & staff responsible**	**Monitoring Method & Frequency**
1	Disturbance created during decommissioning will leave the site vulnerable to alien plant invasion for several years after site clearing and decommissioning.	Invasion of alien plant species	Minimise the establishment and spread of alien invasive plants during the decommissioning phase	» Rehabilitate disturbed areas as quickly as possible. » Alien management at the site should take place according to the Alien Invasive Management Plan. » Regular monitoring for alien plant invasion following decommissioning to ensure that no erosion problems have developed as result of the disturbance, as per the Alien Management Plan for the project.	» EM » EO » ER » Site Manager	Decommissioning phase	» Minimal erosion and invasion of alien invasive plants. » Minimal establishment of additional alien invasive species.	» Monthly internal audits by the EM and EO. » Site Manager should ensure all disturbed areas are rehabilitated	» Annual audits by the EO and EM for 5 years.
2	Decommissioning of the site will leave the site vulnerable to soil erosion from earthwork.	Soil erosion impacts	Minimise soil erosion during the decommissioning phase	» Regular monitoring for erosion after decommissioning for at least 5 years to ensure that no erosion problems have developed as a result of the disturbance. » All erosion problems observed should be rectified as soon as possible, using the appropriate erosion control structures and revegetation techniques. » All cleared areas resulting from decommissioning should be revegetated with indigenous perennial species from the local area.	» EM » EO » Site Manager	Decommissioning phase	» Minimal soil erosion during the decommissioning phase	» EO should conduct inspections monthly and report any erosion incidents to the ER. » ER should implement feasible, environmentally friendly measures to prevent erosion.	» Annual audits by the EO and EM for 5 years.
3	Generation of Dust	Air Quality Impact	To minimise the generation of dust during this phase	» Regular suppression of bare areas with a water tank or bowser.	» EM » EO » Site Manager	Decommissioning phase	» Any complaints received from workers of the Dwarsrug Access Road staff and surrounding landowners should be limited to no more than 1 per month.	» EM » EO » Site Manager	» Visual inspections to ensure bare areas on site are suppressed by a water bowser.
4	Increase in vehicular movement	Traffic Impact	» Control traffic at the access road	» Contractors tasked with the decommissioning of the access road should	» PM » Site Manager » Security	Decommissioning phase	» Any traffic-related incidents involving project personnel,	» PM should ensure the appointed Contractor	» Visual monitoring of traffic control measures to ensure

				adhere to the speed limit and road signs at all times.			or workers should be limited to no more than 1 per month.	(represented by the Site Manager) adheres to all Dwarsrug Access Road traffic management procedures. » Site Manager should ensure drivers adhere to the prescribed speed limits. » Site Manager should ensure all drivers are in possession of valid South African Drivers Licences.	they are effective by the Site Manager

CHAPTER 8: REPORTING

Record keeping

The Engineers representative and the ECO must continuously monitor the contractor's adherence to the approved impact prevention procedures, and the RE must issue to the contractor a notice of non-compliance whenever transgressions are observed. The ECO should document the nature and magnitude of the non-compliances in a designated register , to include the following aspects:

- The action taken to discontinue the non-compliance;
- The action taken to mitigate its effects; and
- The results of the mitigatory actions and whether an issue may be closed or not.

The non-compliance shall be documented and reported to the engineer in the monthly report. These reports must be made available to competent authority when requested. The Contractor must further ensure that an electronic filing system identifying all documentation related to the EMP is established and kept diligently, for scrutiny should disputes arise, or historical documents need to be reviewed. Documents filed may include the following, per example:

A list of reports likely to be generated during all phases of the project is provided below, and all applicable documentation must be included in the environmental filing system catalogue or document retrieval index.

- Final Environmental Impact Assessment Report (BAR).
- Environmental Management Plan (this document).
- Final design documents and diagrams issued to and by the Contractor.
- Daily, weekly and monthly site monitoring reports.
- Complaints register.
- Training manual.
- Training attendance registers.
- Incident and accident reports.
- Emergency preparedness and response plans.
- Permits and legal documents.
- Disciplinary procedures.
- Monthly site meeting minutes during construction.
- Environmental Authorisation copies.
- All method statements from the Contractor for all phases of the project.

Document control:
The Contractor must ensure that documents are periodically reviewed and revised, where necessary, and that current versions are available at all locations where operations essential to the functioning of the EMPr are performed. All documents must be made available to the independent external auditor when requested.

CHAPTER 9: CONCLUSION

This EMPr should be seen as a day-to-day management document, containing foreseeable actions and potential mitigation or management actions as pertaining to the project. The EMPr thus sets out the environmental and social standards, which would be required to minimise the negative impacts and maximise the positive benefits of development, as detailed in the BAR and specialist reports. The EMPr could thus change frequently, and if managed correctly lead to a successful construction and operational phases. Further guidance should also be taken for any conditions contained in the Environmental Authorisation, if the project is granted approval, and that these conditions from the competent authority must be incorporated into the final EMPr.

APPENDIX G(A): A3 LAYOUT & SENSITIVITY MAPS

Dwarsrug Wind Farm Access Road, Northern Cape Province

Formal Sensitivity Map

N

HELIOS SUBSTATION

Klein-Roofberg

Raskraal

0 3,25 6,5 13 Km

Legend

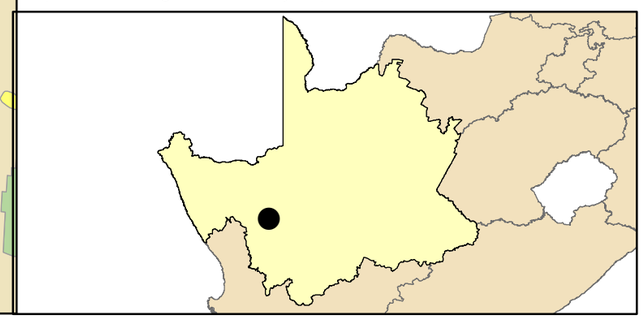
- On-site substation
- Eskom Substation
- Railway
- Dwarsrug access road Alt 1
- Dwarsrug access road Alt 2
- Granaatboskolk Road
- Existing Power Line

Formal Sensitivities

- Critical Biodiversity Area One
- Critical Biodiversity Area Two
- Ecological Support Area
- Other Natural Areas

savannah environmental

Scale: 1:75 206
Projection: LO19
Map Ref: Dwarsrug Road - Locality Map - 16.01.19



APPENDIX G(B): GRIEVANCE MECHANISM

GRIEVANCE MECHANISM / PROCESS

1. PURPOSE

This Grievance Mechanism has been developed to receive and facilitate resolution of concerns and grievances about the Project's environmental and social performance. The aim of the grievance mechanism is to ensure that grievances or concerns raised by local landowners and or communities are addressed in a manner that:

- Provides a predictable, transparent, and credible process to all parties, resulting in outcomes that are seen as fair, effective, and lasting.
- Builds trust as an integral component of broader community relations activities.
- Enables more systematic identification of emerging issues and trends, facilitating corrective action and pre-emptive engagement.

The aim of this Grievance Mechanism is to address grievances in a manner that does not require a potentially costly and time consuming legal process.

2. PROCEDURE FOR RECEIVING AND RESOLVING GRIEVANCES

- Local landowners, communities and authorities must be informed in writing by the Proponent of the grievance mechanism and the process by which grievances can be brought to the attention of the Proponent through its designated representative.
- A company representative must be appointed as the contact person for grievances to be addressed to. The name and contact details of the contact person must be provided to local landowners, communities and authorities.
- Project related grievances relating to the construction and operational phase must be addressed in writing to the contact person. The contact person should assist local landowners and or communities who may lack resources to submit/prepare written grievances.
- The grievance must be registered with the contact person who, within 2 working days of receipt of the grievance, must contact the Complainant to discuss the grievance and agree on suitable date and venue for a meeting in order to discuss the grievances raised. Unless otherwise agreed, the meeting should be held within 2 weeks of receipt of the grievance.
- The contact person must draft a letter to be sent to the Complainant acknowledging receipt of the grievance, the name and contact details of Complainant, the nature of the grievance, the date that the grievance was raised, and the date and venue for the meeting (once agreed).
- Prior to the meeting being held the contact person must contact the Complainant to discuss and agree on the parties who should attend the meeting. The people who will be required to attend the meeting will depend on the nature of the grievance. While the Complainant and or proponent are entitled to invite their legal representatives to attend the meeting/s, it should be made clear that to all the parties involved in the process that the grievance mechanism process is not a legal process. It is therefore recommended that the involvement of legal representatives be limited.

- The meeting should be chaired by the Proponent's representative appointed to address grievances. The Proponent must provide a person to take minutes of and record the meeting/s. Any costs associated with hiring venues must be covered by the Proponent.
- Draft copies of the minutes must be made available to the Complainant and the Proponent within 4 working days of the meeting being held. Unless otherwise agreed, comments on the Draft Minutes must be forwarded to the company representative appointed to manage the grievance mechanism within 4 working days of receipt of the draft minutes.
- In the event of the grievance being resolved to the satisfaction of all the parties concerned, the outcome must be recorded and signed off by the relevant parties. The record should provide details of the date of the meeting/s, the names of the people that attended the meeting/s, the outcome of the meeting/s, and where relevant, the measures identified to address the grievance, the party responsible for implementing the required measures, and the agreed upon timeframes for the measures to be implemented.
- In the event of a dispute between the Complainant and the Proponent regarding the grievance, the option of appointing an independent mediator to assist with resolving the issue should be discussed. The record of the meeting/s must note that a dispute has arisen and that the grievance has not been resolved to the satisfaction of all the parties concerned.
- In the event that the parties agree to appoint a mediator, the Proponent will be required to identify three (3) mediators and forward the names and CVs to the Complainant within 2 weeks of the dispute being declared. The Complainant, in consultation with the Proponent, must identify the preferred mediator and agree on a date for the next meeting. The cost of the mediator must be borne by the Proponent. The Proponent must provide a person to take minutes of and record the meeting/s.
- In the event of the grievance, with the assistance of the mediator, being resolved to the satisfaction of all the parties concerned, the outcome must be recorded and signed off by the relevant parties, including the mediator. The record should provide details on the date of the meeting/s, the names of the people that attended the meeting/s, the outcome of the meeting/s, and where relevant, the measures identified to address the grievance, the party responsible for implementing the required measures, and the agreed upon timeframes for the measures to be implemented.
- In the event of the dispute not being resolved, the mediator must prepare a draft report that summaries the nature of the grievance and the dispute. The report should include a recommendation by the mediator on the proposed way forward with regard to the addressing the grievance.
- The draft report must be made available to the Complainant and the Proponent for comment before being finalised and signed by all parties. Unless otherwise agreed, comments on the draft report must be forwarded to the company representative appointed to manage the grievance mechanism within 4 working days. The way forward will be informed by the recommendations of the mediator and the nature of the grievance.

A Complaint is closed out when no further action can be or needs to be taken. Closure status will be classified in the Complaints Register as follows:

- Resolved. Complaints where a resolution has been agreed and implemented and the Complainant has signed the Confirmation Form.

- Unresolved. Complaints where it has not been possible to reach an agreed resolution and the case has been authorised for close out by the Appeals Committee.
- Abandoned. Complaints where the Complainant is not contactable after one month following receipt of a Complaint and efforts to trace his or her whereabouts have been unsuccessful.

The grievance mechanism does not replace the right of an individual, community, group or organization to take legal action should they so wish. In the event of the grievance not being resolved to the satisfaction of Complainant and or the Proponent, either party may be of the opinion that legal action may be the most appropriate option.

APPENDIX G(C): WASTE MANAGEMENT PLAN

WASTE MANAGEMENT PLAN

1. PURPOSE

A Waste Management Plan (WMP) plays a key role in achieving sustainable waste management throughout all phases of the project. The plan prescribes measures for the collection, temporary storage and safe disposal of the waste streams associated with the project and includes provisions for the recovery, re-use and recycling of waste. The purpose of this plan is therefore to ensure that effective procedures are implemented for the handling, storage, transportation and disposal of waste on site during the construction phase.

This WMP has been compiled as part of the project Environmental Management Programme (EMPr) and includes waste stream information available at the time of compilation. Construction practices must be measured and analysed on an ongoing basis in order to determine the efficacy of the plan and whether further revision of the plan is required. This plan should be further updated should further detail regarding waste quantities and categorisation become available, during the construction phase.

2. WASTE GENERATED

It is expected that the development of the access road will generate construction solid waste, general waste, contaminated water and soil.

Waste generated on site, originates from various sources including but not limited to:

- Contaminated water, soil, rocks and vegetation due to hydrocarbon spills.
- Hazardous waste from vehicle, equipment and machinery parts, and servicing and used hydrocarbon containers.
- Recycable waste in the form of paper, glass, steel, aluminium, wood/ wood pallets, plastic (PET bottles, PVC, LDPE) and cardboard.
- Organic waste from food waste and alien and endemic vegetation removal.
- Sewage from portable toilets and septic tanks.
- Inert waste from spoil material from site clearance.

3. LEGISLATIVE REQUIREMENTS

Waste in South Africa is currently governed by several pieces of legislation, including:

- National Environmental Management: Waste Act (NEM:WA), 2008 (Act 59 of 2008)
- National Environmental Management: Waste Amendment Act, 2014 (Act 26 of 2014)
- The South African Constitution (Act 108 of 1996)
- Hazardous Substances Act (Act 5 of 1973)
- Health Act (Act 63 of 1977)
- Environment Conservation Act (Act 73 of 1989)
- Occupational Health and Safety Act (Act 85 of 1993)
- National Water Act (Act 36 of 1998)
- National Environmental Management Act (Act 107 of 1998) (as amended)
- Mineral and Petroleum Resources Development Act (Act 28 of 2002)
- Air Quality Act (Act 39 of 2004)

Storage of waste must be undertaken in accordance with the National Norms and Standards for the Storage of Waste published in GN926.

4. WASTE MANAGEMENT PRINCIPLES

An integrated approach to waste management on site is needed. Such an approach is illustrated in the **Figure 1**.

It is important to ensure that waste is managed with the following objectives in mind during the construction phase of the project:

- Reducing volumes of waste is a priority;
- If reduction is not feasible, the maximum amount of waste is to be recycled; and
- Waste that cannot be recycled is to be disposed of in the most environmentally responsible manner as possible.

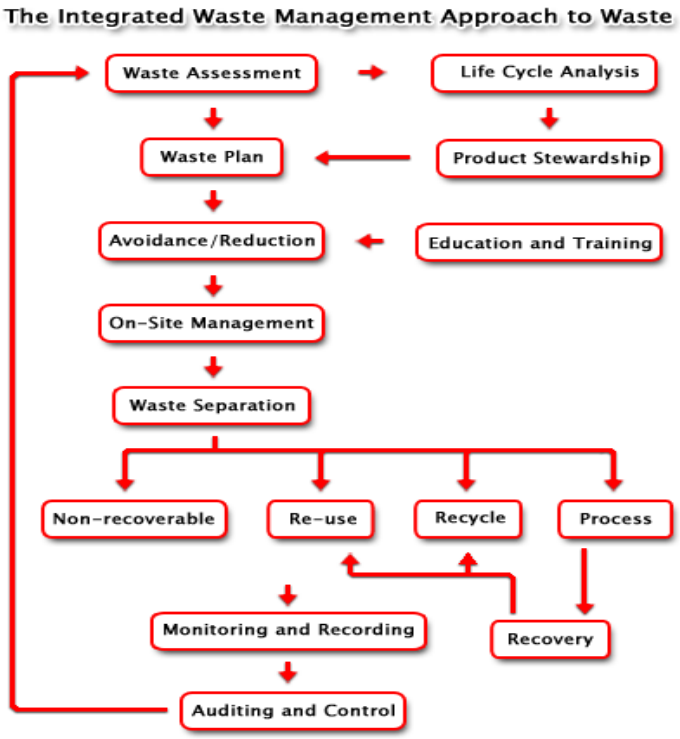


Figure 1: Integrated Waste Management Flow Diagram

4.1. Construction phase

A plan for the management of construction waste is detailed below. Construction practices must be measured and analysed in order to determine the efficacy of the plan and whether further revision of the plan is required. A Method Statement detailing specific waste management practices during construction should be prepared by the Contractor prior to the commencement of construction.

4.1.1. Waste Assessment / Inventory

- The Environmental Officer (EO), or designated staff member, must develop, implement and maintain a waste inventory reflecting all waste generated during construction for both general and hazardous waste streams.
- Construction method and materials should be carefully considered in view of waste reduction, re-use, and recycling opportunities.
- Once a waste inventory has been established, targets for recovery of waste (minimisation, re-use, recycling) should be set.
- The EO must conduct waste classification and rating in terms of SANS 10288 and Government Notice 634 published under the NEM: WA.

4.1.2. Waste collection, handling and storage

- It is the responsibility of the EO to ensure that each subcontractor implements their own waste recycling system, i.e. separate bins for food waste, plastics, paper, wood, glass cardboard, metals, etc.
- Waste manifests and waste acceptance approvals from designated waste facilities must be kept on hand in order to prove compliance.
- Septic tanks and portable toilets must be monitored and maintained daily. Below ground storage of septic tanks must withstand the external forces of the surrounding environment. The area above the tank must be demarcated to prevent any vehicles or heavy machinery from driving around the area.
- Waste collection bins and hazardous waste containers must be provided by the principal contractor and subcontractors and placed at various areas around site for the storage of organic, recyclable and hazardous waste.
- A dedicated waste area must be established on site for the storage of all waste streams, before removal from site. The storage period must not trigger listed waste activities as per the NEMWA, GN 921 of November 2013.
- Signage/ colour coding must be used to differentiate disposal areas for the various waste streams (i.e. paper, cardboard, metals, food waste, glass etc.).
- Hazardous waste must be stored within a bunded area constructed according to SABS requirements. The volume of waste stored in the bunds must not exceed 110% of the bund capacity.
- The location of all temporary waste storage areas must aim to minimise the potential for impact on the surrounding environment, including prevention of contaminated runoff, seepage, and vermin control.
- Waste storage shall be in accordance with all Regulations and best-practice guidelines and under no circumstances may waste be burnt on site.
- If possible a dedicated waste management team must be appointed by the principal contractors' EO, whom will be responsible for ensuring
- The continuous sorting of waste and maintenance of the area should be ensured. The principal contractors' EO will be responsible, and must be trained.
- All waste removed from site must be done so by a registered/ licensed subcontractor, whom must supply information regarding how waste recycling/ disposal will be achieved. The registered subcontractor must provide waste manifests for all removals at least once a month or for every disposal made.

4.1.3. Management of waste storage areas

- The position of all waste storage areas must be located at least 32m away from water features and ensure minimal degradation to the environment. The main waste storage area must have a suitable stormwater system separating clean and dirty stormwater.
- Collection bins placed around site and must be maintained and emptied on a regular basis by the principal contractor.
- Inspections and maintenance of the main waste storage area must be undertaken daily. Skips and storage containers must be clearly marked or colour coded and well-maintained, not allowing access to vermin or other rodents. A tarp or shade cloth should ideally be used to ensure avifauna does not have access to waste.
- Waste must be stored in designated containers and not on the ground.
- Inspections and maintenance of bunds must be undertaken daily. Bunds must be inspected for leaks or cracks in the foundation and walls.

» It is assumed that any rainwater collected inside the bund is contaminated and must be removed and stored as hazardous waste, and not released into the environment. If any leaks occur in the bund, these must be removed immediately.

4.1.4. Disposal

» Waste generated on site must be removed on a regular basis, as determined by the EO and ECO. This frequency may change during construction depending on waste volumes generated at different stages of the construction process.
» Waste must be removed by a suitably qualified contractor and disposed at an appropriately licensed landfill site. Proof of appropriate disposal must be provided by the contractor to the EO and ECO.

4.1.5. Record keeping

The success of the Waste Management Plan is determined by measuring criteria such as waste volumes, cost recovery from recycling, cost of disposal.

» Documentation (waste manifest, certificate of issue or safe disposal) must be kept detailing the quantity, nature, and fate of any regulated waste for audit purposes.
» Waste management must form part of the monthly reporting requirements in terms of volumes generated, types, storage and final disposal.

4.1.6. Training

Training and awareness regarding waste management shall be provided to all employees and contractors as part of the toolbox talks or on-site awareness sessions with the EO and at the frequency as set out by the ECO.

2. Operation phase

The Northern Cape Department of Roads and Public Works (NC DR&PW) will be responsible for maintenance activities.

3. Monitoring of Waste Management Activities

Records must be kept of the volumes/ mass of the different waste f that are collected from the site throughout the life of the project. The appointed waste contractor is to provide monthly reports to the operator containing the following information:

» Monthly volumes/ mass of the different waste streams collected;
» Monthly volumes/ mass of the waste that is disposed of at a landfill site, including proof of disposal (disposal slips or similar);
» Monthly volumes/ mass of the waste that is recycled;

» Data illustrating progress compared to previous months.

This report will aid in monitoring the progress and relevance of the waste management procedures that are in place. If it is found that the implemented procedures are not as effective as required, this WMP is to be reviewed and amended accordingly. This report must from part of the EO's reports to the ECO on a monthly basis.

APPENDIX G(D): ALIEN MANAGEMENT PLAN

ALIEN PLANT AND OPEN SPACE MANAGEMENT PLAN

1. PURPOSE

Invasive alien plant species pose the second largest threat to biodiversity after direct habitat destruction. The purpose of this Alien Management Plan is to provide a framework for the management of alien and invasive plant species during the construction of the access road. The broad objectives of the plan includes the following:

- Ensure alien plants do not become dominant in parts or the whole site, through the control and management of alien and invasive species presence, dispersal and encroachment.
- Develop and implement a monitoring and eradication programme for alien and invasive plant species.
- Promote the natural re-establishment and planting of indigenous species in order to retard erosion and alien plant invasion.

2. RELEVANT ASPECTS OF THE SITE

The disturbance created during the construction phase of the project would leave the site highly vulnerable to invasion by alien plant species, which would impact diversity and ecological processes within the area. Alien plant species currently present in the study area include the *Atriplex lindleyi subsp inflata, Atriplex semibaccata, Sasola kali* and *Prosopis glandulosa*.

3. LEGISLATIVE CONTEXT

Conservation of Agricultural Resources Act (Act No. 43 of 1983)

In terms of the amendments to the regulations under the Conservation of Agricultural Resources Act (Act No. 43 of 1983), all declared alien plant species must be effectively controlled. Landowners are legally responsible for the control of invasive alien plants on their properties. In terms of this Act alien invasive plant species are ascribed to one of the following categories:

- Category 1: Prohibited and must be controlled.
- Category 2 (commercially used plants): May be grown in demarcated areas provided that there is a permit and that steps are taken to prevent their spread.
- Category 3 (ornamentally used plants): May no longer be planted. Existing plants may be retained as long as all reasonable steps are taken to prevent the spreading thereof, except within the flood line of watercourses and wetlands.

National Environmental Management: Biodiversity Act, 2004 (Act No.10 of 2004)

The National Environmental Management: Biodiversity Act (NEM:BA) regulates all invasive organisms in South Africa, including a wide range of fauna and flora. Regulations have been published in

Government Notices R.506, R.507, R.508 and R.509 of 2013 under NEMBA. According to this Act and the regulations, any species designated under Section 70 cannot be propagated, grown, bought or sold without a permit. Below is an explanation of the three categories:

- **Category 1a:** Invasive species requiring compulsory control. Any specimens of Category 1a listed species need, by law, to be eradicated from the environment. No permits will be issued.
- **Category 1b:** Invasive species requiring compulsory control as part of an invasive species control programme. Remove and destroy. These plants are deemed to have such a high invasive potential that infestations can qualify to be placed under a government sponsored invasive species management programme. No permits will be issued.
- **Category 2:** Invasive species regulated by area. A demarcation permit is required to import, possess, grow, breed, move, sell, buy or accept as a gift any plants listed as Category 2 plants. No permits will be issued for Cat 2 plants to exist in riparian zones.
- **Category 3:** Invasive species regulated by activity. An individual plant permit is required to undertake any of the following restricted activities (import, possess, grow, breed, move, sell, buy or accept as a gift) involving a Category 3 species. No permits will be issued for Cat 3 plants to exist in riparian zones.

The following guide is a useful starting point for the identification of alien plant species: Bromilow, C. 2010. Problem Plants and Alien Weeds of South Africa. Briza, Pretoria.

It is important to note that alien plant species that are regulated in terms of the Conservation of Agricultural Resources Act (Act 43 of 1983) (CARA) as weeds and invader plants are exempted from NEM:BA. This implies that the provisions of the CARA in respect of listed weed and invader plants supersede those of NEM: BA.

4. ALIEN PLANT MANAGEMENT PRINCIPLES

4.1. Prevention and early eradication

A prevention strategy should be considered and established, including regular surveys of the road reserve and monitoring for invasive alien plants, effective rehabilitation of disturbed areas and prevention of unnecessary disturbance of natural areas.

Monitoring plans should be developed which are designed to identify Invasive Alien Plant Species shortly after they arrive in the project area. Keeping up to date on which weeds are an immediate threat to the site and road reserve is important, but efforts should be planned to update this information on a regular basis. When new Invasive Alien Plant Species are recorded on site, an immediate response of locating the site for future monitoring and either hand-pulling the weeds or an application of a suitable herbicide (where permissible only) should be planned. It is, however, better to monitor regularly and act swiftly than to allow invasive alien plants to become established on site.

4.2. Containment and control

If any alien invasive plants are found to become established on the site or within the road reserve, action plans for their control should be developed, depending on the size of the infestations, budgets, manpower considerations and time. Separate plans of control actions should be developed for each location and/or each species. Appropriate registered chemicals and other possible control agents should be considered in the action plans for each site/species. The key is to ensure that no invasions get out of control. Effective containment and control will ensure that the least energy and resources are required to maintain this status over the long-term. This will also be an indicator that natural systems are impacted to the smallest degree possible.

4.3. General Clearing and Guiding Principles

Alien species control programs are long-term management projects and should include a clearing plan which includes follow up actions for rehabilitation of the cleared area. The lighter infested areas should be cleared first to prevent the build-up of seed banks. All clearing actions should be monitored and documented to keep records of which areas are due for follow-up clearing.

i. Clearing Methods

Different species require different clearing methods such as manual, chemical or biological methods or a combination of both. Care should however be taken that the clearing methods used do not encourage further invasion. As such, regardless of the methods used, disturbance to the soil should be kept to a minimum.

Fire should not be used for alien species control or vegetation management at the site or within the road reserve. The best-practice clearing method for each species identified should be used.

» **Mechanical control**

This entails damaging or removing the plant by physical action. Different techniques could be used, e.g. uprooting, felling, slashing, mowing, ringbarking or bark stripping. This control option is only really feasible in sparse infestations or on a small scale, and for controlling species that do not coppice after cutting. Species that tend to coppice, need to have the cut stumps or coppice growth treated with herbicides following the mechanical treatment. Mechanical control is labour intensive and therefore expensive, and could cause severe soil disturbance and erosion.

» **Chemical Control**

Although it is usually preferable to use manual clearing methods where possible, such methods may create additional disturbance which stimulates alien plant invasion and may also be ineffective for many woody species which resprout. Where herbicides are to be used, the impact of the operation on the natural environment should be minimised by observing the following:

* Area contamination must be minimised by careful, accurate application with a minimum amount of herbicide to achieve good control.

- All care must be taken to prevent contamination of any water bodies. This includes due care in storage, application, cleaning equipment and disposal of containers, product and spray mixtures.
- Equipment should be washed where there is no danger of contaminating water sources and washings carefully disposed of in a suitable site.
- To avoid damage to indigenous or other desirable vegetation, products should be selected that will have the least effect on non-target vegetation.
- Coarse droplet nozzles should be fitted to avoid drift onto neighbouring vegetation.
- The appropriate health and safety procedures should also be followed regarding the storage, handling and disposal of herbicides.

For all herbicide applications, the following Regulations and guidelines should be followed:

- Working for Water: Policy on the Use of Herbicides for the Control of Alien Vegetation.
- Pesticide Management Policy for South Africa published in terms of the Fertilizers, Farm Feeds, Agricultural Remedies and Stock Remedies Act, 1947 (Act No. 36 of 1947) – GNR 1120 of 2010.
- South African Bureau of Standards, Standard SANS 10206 (2010)

According to Government Notice No. 13424 dated 26 July 1992, it is an offence to "*acquire, dispose, sell or use an agricultural or stock remedy for a purpose or in a manner other than that specified on the label on a container thereof or on such a container*".

Contractors using herbicides need to have a valid Pest Control Operators License (limited weeds controller) according to the Fertilizer, Farm Feeds, Agricultural Remedies and Stock Remedies Act (Act No. 36 of 1947). This is regulated by the Department of Agriculture, forestry and Fisheries.

» **Biological control**

Biological weed control consists in the use of natural enemies to reduce the vigour or reproductive potential of an invasive alien plant. Biological control agents include insects, mites, and micro-organisms such as fungi or bacteria. They usually attack specific parts of the plant, either the reproductive organs directly (flower buds, flowers or fruit) or the seeds after they have dropped. The stress caused by the biological control agent may kill a plant outright or it might impact on the plants reproductive capacity. In certain instances, the reproductive capacity is reduced to zero and the population is effectively sterilised. All of these outcomes will help to reduce the spread of the species.

To obtain biocontrol agents, provincial representatives of the Working for Water Programme or the Directorate: Land Use and Soil Management (LUSM), Department of Agriculture, Forestry and Fisheries (DAFF) can be contacted.

4.4. General management practices

The following general management practices should be encouraged or strived for:

» Establish an on-going monitoring programme for construction phase to detect and quantify any alien species that may become established and identify the problem species.

- » Alien vegetation regrowth on areas disturbed by construction must be immediately controlled once recorded throughout the entire site and the road reserve during construction, operation and maintenance.
- » Care must be taken to avoid the introduction of alien invasive plant species to the site and the road reserve. Particular attention must be paid to imported material such as building sand or dirty earth-moving equipment. Stockpiles should be checked regularly and any weeds emerging from material stockpiles should be removed.
- » Cleared areas that have become invaded by alien species can be sprayed with appropriate herbicides provided that these are such that break down on contact with the soil. Residual herbicides should not be used.
- » The effectiveness of vegetation control varies seasonally and this is also likely to impact alien species. Control early in the wet season will allow species to re-grow and follow-up control is likely to be required. It is tempting to leave control until late in the wet season to avoid follow-up control. However, this may allow alien species to set seed before control and hence will not contribute towards reducing alien species abundance. Therefore, vegetation control should be aimed at the middle of the wet season, with a follow-up event towards the end of the wet season. There are no exact dates that can be specified here as each season is unique and management must therefore respond according to the state and progression of the vegetation.
- » Alien plant management is an iterative process and it may require repeated control efforts to significantly reduce the abundance of a species. This is often due to the presence of large and persistent seed banks. However, repeated control usually results in rapid decline once seed banks become depleted.
- » Some alien species are best individually pulled by hand. Regular vegetation control to reduce plant biomass within the site and road reserve should be conducted. This should be timed so as to coincide with the critical growth phases of the most important alien species on site. This will significantly reduce the cost of alien plant management as this should contribute towards the control of the dominant alien species and additional targeted control will be required only for a limited number of species.
- » No alien species should be cultivated on-site. If vegetation is required for aesthetic purposes, then non-invasive, water-wise locally-occurring species should be used.
- » During operation, surveys for alien species should be conducted regularly. It is recommended that this be undertaken every 6 months for the first two years after construction and annually thereafter. All alien plants identified should be cleared using appropriate means.

4.5. Monitoring

In order to monitor the impact of clearing activities, follow-ups and rehabilitation efforts, monitoring must be undertaken. This section provides a description of a possible monitoring programme that will provide and assess of the magnitude of alien plant invasion on site and within the road reserve as well as an assessment of the success of the management programme.

In general, the following principles apply for monitoring:

- » Photographic records must be kept of areas to be cleared prior to work starting and at regular intervals during initial clearing activities. Similarly, photographic records should be kept of the area

from immediately before and after follow-up clearing activities. Rehabilitation processes must also be recorded.

» Simple records must be kept of daily operations, e.g. area/location cleared, labour units and, if ever used, the amount of herbicide used.

» It is important that, if monitoring results in detection of invasive alien plants, that this leads to immediate action.

The following monitoring should be implemented to ensure management of alien invasive plant species.

Construction Phase

Monitoring Action	Indicator	Timeframe
Document alien species present at the site of construction activities	List of alien plant species	Preconstruction & monthly thereafter
Document & record alien plant control measures implemented	Record of clearing activities	Monthly

Operation and Maintenance

Monitoring Action	Indicator	Timeframe
Document alien plant species distribution and abundance within road reserve	Alien plant distribution map	Biannually
Document alien plant control measures implemented during maintenance activities & success rate achieved	Records of control measures and their success rate. A decline in alien distribution and cover over time at the site	Biannually

APPENDIX G(E): REHABILITATION PLAN

REHABILITATION PLAN

1. PURPOSE

The purpose of the rehabilitation plan is to ensure that areas cleared or impacted during construction activities of the road realignment are rehabilitated with a plant cover that reduces the risk or erosion from these areas as well as restores some ecosystem function. The purpose of the rehabilitation plan for the site can be summarised as follows:

- Achieve long-term stabilisation of all disturbed areas to minimise erosion potential.
- Re-vegetate all disturbed areas with suitable local plant species.
- Minimise visual impact of disturbed areas.

This Rehabilitation Plan should be closely aligned with other site-specific plans, including inter alia an Erosion Management Plan and the Alien Management Plan. Prior to commencement of construction, a detailed Rehabilitation Plan and Method Statement for the construction site and road reserve should be compiled with the aid of a Rehabilitation Specialist, as required.

2. RELEVANT ASPECTS OF THE SITE

A site visit took place in October 2014 with a follow-up site visit on 26 October 2018. Based on species composition, physiognomy, moisture regime, rockiness, slope and soil properties, the main vegetation communities that were recognised is illustrated in Figure 1. The entire site falls within the Bushmanland Basin Shrubland vegetation type. With an extent of 34 690 km2 this is one of the most extensive vegetation types in South Africa. Bushmanland Basin Shrubland occurs on the extensive basin centred on Brandvlei and Van Wyksvlei, spanning Granaatboskolk in the west to Copperton in the east, and Kenhardt in the north to around Williston in the south. The area is characterised by slightly irregular plains dominated by a dwarf shrubland, with succulent shrubs or perennial grasses in places. The geology consists largely of mudstones and shales of the Ecca group and Dwyka tillites with occasional dolerite intrusions. Soils are largely shallow to non-existent, with calcrete present in most areas. Rainfall ranges from 100-200 mm and falls mostly during the summer months as thunder storms.

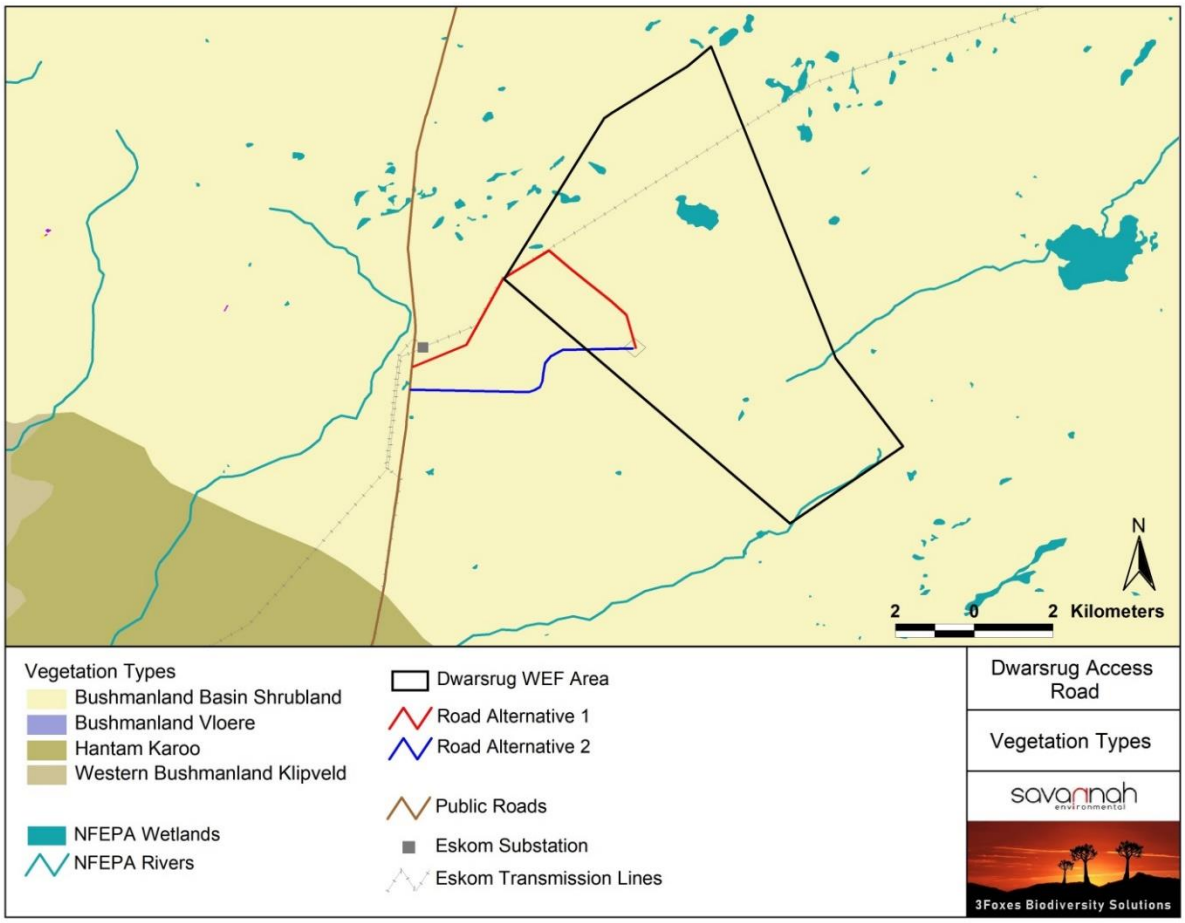


Figure 1: The national vegetation map for the Dwarsrug access road alternatives.

The site consists of flat to gently undulating open plains dominated by low shrubs or arid tussock grasses. It is typical of southwestern Bushmanland and does not contain any remarkable ecological features. The only notable features present are some low gravelly hills and some poorly developed drainage lines. There are also some small pans in the area, but these are not in proximity to the road routes. The vegetation of the site is very homogenous and shifts from shrub-dominated vegetation on gravelly soils to tussock-grass-dominated areas on sandy soils, with large areas also transitional between these extremes. The current road footprint areas are restricted to the Bushmanland Basin Shrubland habitat type with occasional drainage lines. These two habitats are described below.

Bushmanland Basin Shrubland

The majority of the site consists of low open shrubland on shallow, stony soils, typical of the Bushmanland Basin Shrubland vegetation type. Typical species include the shrubs *Pentzia incana*, *Zygophyllum lichtensteinianum*, *Asparagus capensis*, *Zygophyllum retrofractum*, *Eriocephalus spinescens*, *Aptosimum spinescens*, *Tripteris sinuata*, *Hermannia spinosa*, *Thesium lineatum*, *Felicia clavipilosa*, *Osteospermum armatum*, *Pegolettia retrofracta*, *Pteronia mucronata*, *Pteronia sordida*, *Rosenia humilis*, *Galenia fruticosa*, *Lycium pumilum* and *Salsola tuberculata*; succulent shrubs such as *Aridaria noctiflora*, *Ruschia intricata*, *Brownanthus ciliatus*, *Drosanthemum lique*, *Psilocaulon coriarium* and *Sarcocaulon patersonii* forbs such as *Aptosimum indivisum*, *Hypertelis salsoloides*, *Gazania lichtensteinii*, *Galenia sarcophylla* and *Fockea*

sinuata; geophytes including *Drimia intricata* and *Moraea miniata*. Overall diversity within this vegetation type at the site is low, which can be ascribed to the aridity of the area and the poorly developed soils. Areas of higher diversity include exposed calcrete soils which contain specialist species such as *Titanopsis calcarea*, while there are also some low shale-derived hills present which have species such as *Aloinopsis luckhoffii*, *Cephalophyllum fulleri* which is listed as Rare and protected species such as *Aloe falcata*, *Aloe claviflora* and *Hoodia gordonii*.

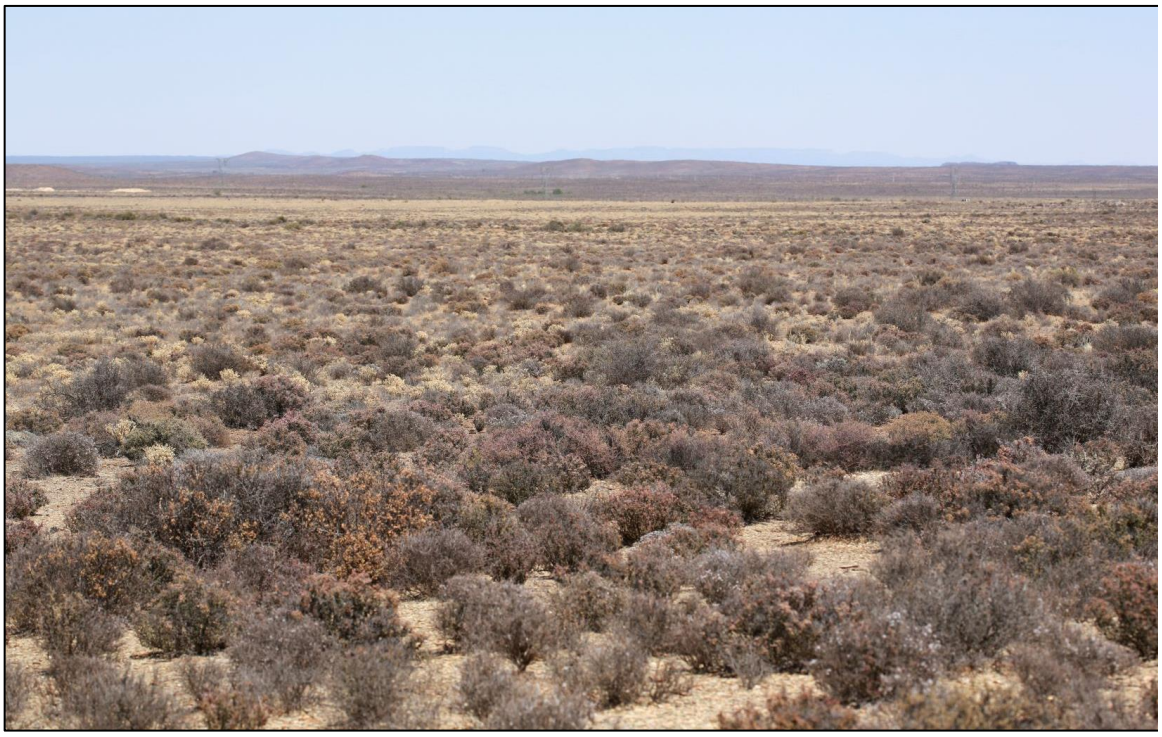


Figure 2. Typical low shrubland along Alternative 1, with woody vegetation in the foreground and the paler vegetation in the distance is dominated by *Brownanthus ciliatus*.

Figure 3. Looking over the plains near the substation and control buildings, where the access road would terminate within the Dwarsrug site.

Figure 4. Looking along the alignment of the central section of access road Alternative 2, showing the typical open shrubland of the area, with occasional Prosopis trees along a small drainage system in the distance.

Washes & Drainage Lines

The drainage lines of the site (**Error! Reference source not found.**) are not very well developed and do not have a tall woody component. Typical and dominant species include *Stipagrostis namaquensis*, *Stipagrostis obtusa*, *Osteospermum armatum*, *Arctotis fastuosa*, *Deverra denudata*, *Melianthus comosus*, *Salvia disermas*, *Lycium pumilum*, *Lycium oxycarpum*, *Galenia sarcophylla*, *Salsola aphylla* and *Sesamum capense*. Although the drainage lines are not well developed, which can be ascribed to aridity of the area, they are ecologically important because the higher cover and productivity of these areas is important for fauna forage and habitat availability and they also play an important hydrological role and regulate flow following occasional strong rainfall events. As such disturbance to these areas should be minimised as far as possible.

Figure 5. Typical small drainage line along road Alternative 1, about 1.5km from the Granaatboskolk road.

Listed Plant Species

The study area has been very poorly sampled in the past and many of the quarter degree squares in the area have no data available. According to the SIBIS database, a total of 135 indigenous species are known from the area, of which 89 have been observed by the consultant on the site and an additional 28 species were observed that have not been recorded from the area before. Although some additional species would undoubtedly be discovered with additional sampling, the area is not species-rich and even with intensive sampling the area is not likely to demonstrate exceptional richness. Listed and protected species observed in the area include *Cephalophyllum fulleri* which is classified as Rare and a number of provincially protected species including *Aloe falcata*, *Hoodia gordonii* and *Aloinopsis luckhoffii* and *Euphorbia multiceps*.

3. REHABILITATION METHODS

Any areas disturbed during the construction phase should be encouraged to rehabilitate as fast and effective as possible and, where deemed necessary by the ECO, artificial rehabilitation (e.g. re-seeding with collected or commercial indigenous seed mixes) should be applied in order to speed up the rehabilitation process in critical areas (e.g. steep slopes and unstable soils).

- Immediately after replacing topsoils in disturbed areas, the soil surface must be revegetated with a suitable plant cover.
- It is expected that soil seed banks of indigenous vegetation will be present to initiate initial vegetation cover. However, simply applying this topsoil to a well-prepared rehabilitation site does not result in the same species richness and diversity as the surrounding areas. In some areas the natural regeneration of the vegetation may be poor and the application relevant of seed to enhance vegetation recovery may be required.
- Where possible, seed should be collected from plants present at the site during plant rescue oprerations. Indigenous seeds may also be harvested for purposes of re-vegetation in areas that are free of alien or invasive vegetation, either at the site prior to clearance or from suitable neighbouring sites.
- Seed collection should be undertaken by a suitably qualified specialist who is familiar with the various seed types associated with the plant species and rehabilitation in the area.
- Seed collection may be done throughout the year as seed ripens, but can also be restricted to summer, when a large amount of the perennial seed should have ripened. The collection of unripe seeds will reduce the percentage germination thereby reducing the effectiveness of the rehabilitation efforts. Seeds should be stored in paper or canvas bags dusted with insecticide, and sown at the onset of the rainy season.
- Seed can be sown onto the soil, but should preferably be applied in conjunction with measures to improve seedling survival such as scarification of the soil surface or simultaneous application of mulch. Additional organic material may be added to the soil mix, if required, to assist with water retention during the early stages of seedling establishment.
- It should be ensured that the seed mix is as diverse as possible in the first season. After the first season, when pioneer plant communities have successfully established, attempts should be made to re-sow and replant the area with more perennial and woody species. It is a process that will require several follow-ups.
- Planting is dependent on species involved. Planting of species recommended for rehabilitation should be carried out as far as is practicable to coincide with the onset of the first significant rains. In general however, planting should commence as soon as possible after construction is completed in order to minimise the potential for erosion.
- The final vegetation cover should resemble the original (non-encroached and indigenous) vegetation composition and structure as far as practicably possible.
- Progressive rehabilitation is an important element of the rehabilitation strategy and should be implemented where feasible. Re-vegetation of disturbed surfaces must occur immediately after construction activities are completed.
- Once revegetated, areas should be protected to prevent trampling and erosion.

- No construction equipment, vehicles or unauthorised personnel should be allowed onto areas that have been vegetated.
- Any erosion channels or wash aways developing after revegetation should be restored to a stable condition.

4. MONITORING AND FOLLOW-UP ACTION

The following are the minimum criteria that should be monitored within the road reserve during road maintenance activities:

- Composition, density and stability of replanted vegetation.
- Associated nature and stability of surface soils.
- Emergence of alien and invasive plant species. If noted, remedial action must be taken immediately.

The initial revegetation period post-construction is estimated to be over a period of 6 months (minimum) to 12 months. The rehabilitation phase (including post seeding maintenance) should be at least 12 months (depending on time of seeding and rainfall) to ensure establishment of an acceptable plant cover is achieved (excluding invasive plant species or weeds).

Monitoring and follow-up action is important in order to achieve the desired cover and soil protection. The following monitoring protocol is recommended:

- Re-vegetated areas should be monitored every 4 months for the first 12 months following construction.
- Re-vegetated areas showing inadequate surface coverage (less than 20% within 12 months after re-vegetation) should be prepared and re-vegetated.
- Any areas showing erosion should be re-contoured and seeded with indigenous grasses or other locally occurring species which grow quickly.

If the plants have not established and the acceptable plant cover is not achieved within the specified maintenance period, maintenance of these areas shall continue until an acceptable plant cover is achieved (excluding alien plant species or weeds). Additional seeding or planting may be necessary to achieve acceptable plant cover. Hand seeding may have to be considered as an option in this case.

Monitoring of rehabilitation success and follow-up adaptive management, together with clearing of emerging alien plant species should continue for as long as considered necessary, depending on regrowth rates.

APPENDIX G(F): EROSION AND STORMWATER MANAGEMENT PLAN

PRINCIPLES FOR EROSION AND STORMWATER MANAGEMENT PLAN

1. PURPOSE

Exposed and unprotected soils are the main cause of erosion in most situations. Therefore, this erosion management plan and the revegetation and rehabilitation plan are closely linked to one another and should not operate independently, but should rather be seen as complementary activities within the broader environmental management of the site and should therefore be managed together.

This Erosion Management Plan addresses the management and mitigation of potential impacts relating to soil erosion. The objective of the plan is to provide:

» A general framework for soil erosion and sediment control, which enables the identification of areas where erosion can occur and is likely to be accelerated by construction related activities.
» An outline of general methods to monitor, manage and rehabilitate erosion prone areas, ensuring that all erosion resulting of the development is addressed.

2. EROSION AND SEDIMENT CONTROL PRINCIPLES

The goals of erosion control during and after construction for the length of the access road should be to:

» Protect the land surface within the road reserve and beyond from erosion;
» Intercept and safely direct and dissipate run-off water from the road surface without allowing it to cause erosion.
» Contain soil erosion, whether induced by wind or water forces, by constructing protective works to trap sediment at appropriate locations. This applies particularly during construction.
» Plan and construct stormwater management systems to remove contaminants before they pollute surface waters or groundwater resources.
» Reduce stormwater flows as far as possible by the effective use of attenuating devices (such as swales, berms, silt fences). As construction progresses, the stormwater control measures are to be monitored and adjusted to ensure complete erosion and pollution control at all times.
» Design culvert inlet structures to ensure that the capacity of the culvert does not exceed the pre-development stormwater flow at that point. Provide detention storage on the road and/or upstream of the stormwater culvert; and
» Progressively revegetate or stabilise disturbed areas.

These goals can be achieved by applying the management practices outlined in the following sections.

2.1. On-Site Erosion Management

General factors to consider regarding erosion risk at the site includes the following:

- Due to the sandy nature of soils in the study area, soil loss will be greater during dry periods as it is more prone to wind erosion.
- Soil loss will be greater on steeper slopes. Ensure that steep slopes are not de-vegetated unnecessarily and subsequently become hydrophobic (i.e. have increased runoff and a decreased infiltration rate) increasing the erosion potential.
- Soil loss is related to the length of time that soils are exposed prior to rehabilitation or stabilisation. Therefore, the gap between construction activities and rehabilitation should be minimised. Phased construction and progressive rehabilitation, where practically possible, are therefore important elements of the erosion control strategy.
- The extent of disturbance will influence the risk and consequences of erosion. Therefore site clearing should be restricted to areas required for construction purposes only.
- The road should be planned and constructed in a manner which minimises the erosion potential. The road should therefore follow the natural contour as far as possible.
- Ensure that development does not increase the rate of stormwater flow above that which the natural ground can safely accommodate at any point in the sub-catchments.
- Where necessary, the new road constructed should include water diversion structures present with energy dissipation features present to slow and disperse the water into the receiving area.
- The road and other disturbed areas should be regularly monitored for erosion. Any erosion problems recorded should be rectified as soon as possible and monitored thereafter to ensure that they do not re-occur.
- Compacted areas should have adequate drainage systems to avoid pooling and surface flow. Where compaction does occur during construction outside of the pavement area, the areas should be ripped.
- All bare areas should be revegetated with appropriate locally occurring species, to bind the soil and limit erosion potential.
- Gabions and other stabilisation features should be used on steep slopes and other areas vulnerable to erosion to minimise erosion risk as far as possible.
- Topsoil should be removed and stored in a designated area separately from subsoil and away from construction activities (as per the recommendations in the EMPr). Topsoil should be reapplied where appropriate as soon as possible in order to encourage and facilitate rapid regeneration of the natural vegetation in cleared areas.
- Regular monitoring of the site for erosion problems during construction (ongoing) and operation (at least twice annually) is recommended, particularly after large summer thunderstorms have been experienced.

2.2. Engineering Specifications

A detailed engineering specification Stormwater Management Plan describing and illustrating the proposed stormwater control measures must be prepared by the Civil Engineers during the detailed design phase and should include erosion control measures. Requirements for project design include:

- Erosion control measures to be implemented before and during the construction period, including the final stormwater control measures (post construction).

- All temporary and permanent water management structures or stabilisation methods must be indicated within the Stormwater Management Plan.
- The drainage system for the site should be designed to specifications that can adequately deal with a 1:50 year intensity rainfall event or more to ensure sufficient capacity for carrying stormwater away.
- Procedures for stormwater flow through a project site need to take into consideration both normal operating practice and special circumstances. Special circumstances in this case typically include severe rainfall events.
- An on-site Engineer or Environmental Officer (EO)/ SHE Representative to be responsible for ensuring implementation of the erosion control measures on site during the construction period. The ECO to monitor the effectiveness of these measures on the interval agreed upon with the Site Manager and EO.

2.3. Monitoring

The site must be monitored continuously during construction and operation in order to determine any indications of erosion. If any erosion features are recorded as a result of the activities on-site, the Environmental Officer (EO)/ SHE Representative (during construction) or Environmental Manager (during operation) must:

- Assess the significance of the situation.
- Photograph the areas of soil degradation as a record.
- Determine the cause of the soil erosion.
- Inform the contractor/operator that rehabilitation must take place and that the contractor/operator is to implement a rehabilitation method statement and management plan to be approved by the Site/Environmental Manager in conjunction with the ECO.
- Monitor that the contractor/operator is taking action to stop the erosion and assist them where needed.
- Report and monitor the progress of the rehabilitation weekly and record all the findings in a site register (during construction).
- All actions with regards to the incidents must be reported on a monthly compliance report which should be kept on file for if/when the Competent Authority requests to see it (during construction) and kept on file for consideration during the annual audits (during construction and operation).

The Contractor (in consultation with an appropriate specialist, e.g. an engineer) must:

- Select a system/mechanism to treat the erosion.
- Design and implement the appropriate system/mechanism.
- Monitor the area to ensure that the system functions like it should. If the system fails, the method must be adapted or adjusted to ensure the accelerated erosion is controlled.
- Continue monitoring until the area has been stabilised.

3. CONCLUSION

The implementation of management measures is not only good practice to ensure minimisation of degradation, but also necessary to ensure compliance with legislative requirements. This document forms part of the EMPr, and is required to be considered and adhered to during the design, construction, and maintenance phases of the project (if and where applicable).

APPENDIX G(G): CURRICULUM VITAE OF THE PROJECT TEAM

savannah environmental

1st Floor, Block 2, 5 Woodlands Drive Office Park
Woodlands Drive, Woodmead
Johannesburg, South Africa

Email: joanne@savannahsa.com
Tel: +27 (11) 656 3237

CURRICULUM VITAE OF JO-ANNE THOMAS

Profession:	Environmental Management and Compliance Consultant; Environmental Assessment Practitioner
Specialisation:	Environmental Management; Strategic environmental advice; Environmental compliance advice & monitoring; Environmental Impact Assessments; Policy, strategy & guideline formulation; Project Management; General Ecology
Work experience:	Twenty one (21) years in the environmental field

VOCATIONAL EXPERIENCE

Provide technical input for projects in the environmental management field, specialising in Strategic Environmental Advice, Environmental Impact Assessment studies, environmental auditing and monitoring, environmental permitting, public participation, Environmental Management Plans and Programmes, environmental policy, strategy and guideline formulation, and integrated environmental management. Key focus on integration of the specialist environmental studies and findings into larger engineering-based projects, strategic assessment, and providing practical and achievable environmental management solutions and mitigation measures. Responsibilities for environmental studies include project management (including client and authority liaison and management of specialist teams); review and manipulation of data; identification and assessment of potential negative environmental impacts and benefits; review of specialist studies; and the identification of mitigation measures. Compilation of the reports for environmental studies is in accordance with all relevant environmental legislation.

Undertaking of numerous environmental management studies has resulted in a good working knowledge of environmental legislation and policy requirements. Recent projects have been undertaken for both the public- and private-sector, including compliance advice and monitoring, electricity generation and transmission projects, various types of linear developments (such as National Road, local roads and power lines), waste management projects (landfills), mining rights and permits, policy, strategy and guideline development, as well as general environmental planning, development and management.

SKILLS BASE AND CORE COMPETENCIES

- Project management for a range of projects
- Identification and assessment of potential negative environmental impacts and benefits through the review and manipulation of data and specialist studies
- Identification of practical and achievable mitigation and management measures and the development of appropriate management plans
- Compilation of environmental reports in accordance with relevant environmental legislative requirements
- External and peer review of environmental reports & compliance advice and monitoring
- Formulation of environmental policies, strategies and guidelines
- Strategic and regional assessments; pre-feasibility & site selection
- Public participation processes for a variety of projects
- Strategic environmental advice to a wide variety of clients both in the public and private sectors
- Working knowledge of environmental planning processes, policies, regulatory frameworks and legislation

EDUCATION AND PROFESSIONAL STATUS

Degrees:

- B.Sc Earth Sciences, University of the Witwatersrand, Johannesburg (1993)
- B.Sc Honours in Botany, University of the Witwatersrand, Johannesburg (1994)
- M.Sc in Botany, University of the Witwatersrand, Johannesburg (1996)

Short Courses:

- Environmental Impact Assessment, Potchefstroom University (1998)
- Environmental Law, Morgan University (2001)
- Environmental Legislation, IMBEWU (2017)
- Mining Legislation, Cameron Cross & Associates (2013)
- Environmental and Social Risk Management (ESRM), International Finance Corporation (2018)

Professional Society Affiliations:

- Registered with the South African Council for Natural Scientific Professions as a Professional Natural Scientist: Environmental Scientist (400024/00)
- Registered with the International Associated for Impact Assessment South Africa (IAIAsa): 5601
- Member of the South African Wind Energy Association (SAWEA)

EMPLOYMENT

Date	Company	Roles and Responsibilities
January 2006 - Current	Savannah Environmental (Pty) Ltd	Director Project manager Independent specialist environmental consultant, Environmental Assessment Practitioner (EAP) and advisor.
1997 – 2005	Bohlweki Environmental (Pty) Ltd	Senior Environmental Scientist at. Environmental Management and Project Management
January – July 1997	Sutherland High School, Pretoria	Junior Science Teacher

PROJECT EXPERIENCE

Project experience includes large infrastructure projects, including electricity generation and transmission, wastewater treatment facilities, mining and prospecting activities, property development, and national roads, as well as strategy and guidelines development.

RENEWABLE POWER GENERATION PROJECTS: PHOTOVOLTAIC SOLAR ENERGY FACILITIES

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
Christiana PV 2 SEF, North West	Solar Reserve South Africa	Project Manager & EAP
De Aar PV facility, Northern Cape	iNca Energy	Project Manager & EAP
Everest SEF near Hennenman, Free State	FRV Energy South Africa	Project Manager & EAP
Graafwater PV SEF, Western Cape	iNca Energy	Project Manager & EAP
Grootkop SEF near Allanridge, Free State	FRV Energy South Africa	Project Manager & EAP
Hertzogville PV 2 SEF with 2 phases, Free State	SunCorp / Solar Reserve	Project Manager & EAP
Karoshoek CPV facility on site 2 as part of the larger Karoshoek Solar Valley Development East of Upington, Northern Cape	FG Emvelo	Project Manager & EAP

Project Name & Location	Client Name	Role
Kgabalatsane SEF North-East for Brits, North West	Built Environment African Energy Services	Project Manager & EAP
Kleinbegin PV SEF West of Groblershoop, Northern Cape	MedEnergy Global	Project Manager & EAP
Lethabo Power Station PV Installation, Free State	Eskom Holdings SoC Limited	Project Manager & EAP
Majuba Power Station PV Installation, Mpumalanga	Eskom Holdings SoC Limited	Project Manager & EAP
Merapi PV SEF Phase 1 – 4 South-East of Excelsior, Free State	SolaireDirect Southern Africa	Project Manager & EAP
Sannaspos Solar Park, Free State	SolaireDirect Southern Africa	Project Manager & EAP
Ofir-Zx PV Plant near Keimoes, Northern Cape	S28 Degrees Energy	Project Manager & EAP
Oryx SEF near Virginia, Free State	FRV Energy South Africa	Project Manager & EAP
Project Blue SEF North of Kleinsee, Northern Cape	WWK Development	Project Manager & EAP
S-Kol PV Plant near Keimoes, Northern Cape	S28 Degrees Energy	Project Manager & EAP
Sonnenberg PV Plant near Keimoes, Northern Cape	S28 Degrees Energy	Project Manager & EAP
Tutuka Power Station PV Installation, Mpumalanga	Eskom Transmission	Project Manager & EAP
Two PV sites within the Northern Cape	MedEnergy Global	Project Manager & EAP
Two PV sites within the Western & Northern Cape	iNca Energy	Project Manager & EAP
Upington PV SEF, Northern Cape	MedEnergy Global	Project Manager & EAP
Vredendal PV facility, Western Cape	iNca Energy	Project Manager & EAP
Waterberg PV plant, Limpopo	Thupela Energy	Project Manager & EAP
Watershed Phase I & II SEF near Litchtenburg, North West	FRV Energy South Africa	Project Manager & EAP
Alldays PV & CPV SEF Phase 1, Limpopo	BioTherm Energy	Project Manager & EAP
Hyperion PV Solar Development 1, 2, 3, 4, 5 & 6	Building Energy	Project Manager & EAP

Basic Assessments

Project Name & Location	Client Name	Role
Aberdeen PV SEF, Eastern Cape	BioTherm Energy	Project Manager & EAP
Christiana PV 1 SEF on Hartebeestpan Farm, North-West	Solar Reserve South Africa	Project Manager & EAP
Heuningspruit PV1 & PV 2 facilities near Koppies, Free State	Sun Mechanics	Project Manager & EAP
Kakamas PV Facility, Northern Cape	iNca Energy	Project Manager & EAP
Kakamas II PV Facility, Northern Cape	iNca Energy	Project Manager & EAP
Machadodorp 1 PV SEF, Mpumalanga	Solar To Benefit Africa	Project Manager & EAP
PV site within the Northern Cape	iNca Energy	Project Manager & EAP
PV sites within 4 ACSA airports within South Africa, National	Airports Company South Africa (ACSA)	Project Manager & EAP
RustMo1 PV Plant near Buffelspoort, North West	Momentous Energy	Project Manager & EAP
RustMo2 PV Plant near Buffelspoort, North West	Momentous Energy	Project Manager & EAP
RustMo3 PV Plant near Buffelspoort, North West	Momentous Energy	Project Manager & EAP
RustMo4 PV Plant near Buffelspoort, North West	Momentous Energy	Project Manager & EAP
Sannaspos PV SEF Phase 2 near Bloemfontein, Free State	SolaireDirect Southern Africa	Project Manager & EAP
Solar Park Expansion within the Rooiwal Power Station, Gauteng	AFRKO Energy	Project Manager & EAP
Steynsrus SEF, Free State	SunCorp	Project Manager & EAP

Project Name & Location	Client Name	Role
Sirius Solar PV Project Three and Sirius Solar PV Project Four (BA in terms of REDZ regulations), Northern Cape	SOLA Future Energy	Project Manager & EAP

Screening Studies

Project Name & Location	Client Name	Role
Allemans Fontein SEF near Noupoort, Northern Cape	Fusion Energy	Project Manager & EAP
Amandel SEF near Thabazimbi, Limpopo	iNca Energy	Project Manager & EAP
Arola/Doornplaat SEF near Ventersdorp, North West	FRV & iNca Energy	Project Manager & EAP
Bloemfontein Airport PV Installation, Free State	The Power Company	Project Manager & EAP
Brakspruit SEF near Klerksorp, North West	FRV & iNca Energy	Project Manager & EAP
Carolus Poort SEF near Noupoort, Northern Cape	Fusion Energy	Project Manager & EAP
Damfontein SEF near Noupoort, Northern Cape	Fusion Energy	Project Manager & EAP
Everest SEF near Welkom, Free State	FRV & iNca Energy	Project Manager & EAP
Gillmer SEF near Noupoort, Northern Cape	Fusion Energy	Project Manager & EAP
Grootkop SEF near Allansridge, Free State	FRV & iNca Energy	Project Manager & EAP
Heuningspruit PV1 & PV 2 near Koppies, Free State	Cronimat	Project Manager & EAP
Kimberley Airport PV Installation, Northern Cape	The Power Company	Project Manager & EAP
Kolonnade Mall Rooftop PV Installation in Tshwane, Gauteng	Momentous Energy	Project Manager & EAP
Loskop SEF near Groblersdal, Limpopo	S&P Power Unit	Project Manager & EAP
Marble SEF near Marble Hall, Limpopo	S&P Power Unit	Project Manager & EAP
Morgenson PV1 SEF South-West of Windsorton, Northern Cape	Solar Reserve South Africa	Project Manager & EAP
OR Tambo Airport PV Installation, Gauteng	The Power Company	Project Manager & EAP
Oryx SEF near Virginia, Free State	FRV & iNca Energy	Project Manager & EAP
Rhino SEF near Vaalwater, Limpopo	S&P Power Unit	Project Manager & EAP
Rustmo2 PV Plant near Buffelspoort, North West	Momentous Energy	Project Manager & EAP
Spitskop SEF near Northam, Limpopo	FRV & iNca Energy	Project Manager & EAP
Steynsrus PV, Free State	Suncorp	Project Manager & EAP
Tabor SEF near Polokwane, Limpopo	FRV & iNca Energy	Project Manager & EAP
UpingtonAirport PV Installation, Northern Cape	The Power Company	Project Manager & EAP
Valeria SEF near Hartebeestpoort Dam, North West	Solar to Benefit Africa	Project Manager & EAP
Watershed SEF near Lichtenburg, North West	FRV & iNca Energy	Project Manager & EAP
Witkop SEF near Polokwane, Limpopo	FRV & iNca Energy	Project Manager & EAP
Woodmead Retail Park Rooftop PV Installation, Gauteng	Momentous Energy	Project Manager & EAP

Environmental Compliance, Auditing and ECO

Project Name & Location	Client Name	Role
ECO and bi-monthly auditing for the construction of the Adams Solar PV Project Two South of Hotazel, Northern Cape	Enel Green Power	Project Manager
ECO for the construction of the Kathu PV Facility, Northern Cape	REISA	Project Manager
ECO and bi-monthly auditing for the construction of the Pulida PV Facility, Free State	Enel Green Power	Project Manager
ECO for the construction of the RustMo1 SEF, North West	Momentous Energy	Project Manager
ECO for the construction of the Sishen SEF, Northern	Windfall 59 Properties	Project Manager

Project Name & Location	Client Name	Role
Cape		
ECO for the construction of the Upington Airport PV Facility, Northern Cape	Sublanary Trading	Project Manager
Quarterly compliance monitoring of compliance with all environmental licenses for the operation activities at the Kathu PV facility, Northern Cape	REISA	Project Manager
ECO for the construction of the Konkoonsies II PV SEF and associated infrastructure, Northern Cape	BioTherm Energy	Project Manager
ECO for the construction of the Aggeneys PV SEF and associated infrastructure, Northern Cape	BioTherm Energy	Project Manager

Compliance Advice and ESAP Reporting

Project Name & Location	Client Name	Role
Aggeneys Solar Farm, Northern Cape	BioTherm Energy	Environmental Advisor
Airies II PV Facility SW of Kenhardt, Northern Cape	BioTherm Energy	Environmental Advisor
Kalahari SEF Phase II in Kathu, Northern Cape	Engie	Environmental Advisor
Kathu PV Facility, Northern Cape	Building Energy	Environmental Advisor
Kenhardt PV Facility, Northern Cape	BioTherm Energy	Environmental Advisor
Kleinbegin PV SEF West of Groblershoop, Northern Cape	MedEnergy	Environmental Advisor
Konkoonises II SEF near Pofadder, Northern Cape	BioTherm Energy	Environmental Advisor
Konkoonsies Solar Farm, Northern Cape	BioTherm Energy	Environmental Advisor
Lephalale SEF, Limpopo	Exxaro	Environmental Advisor
Pixley ka Seme PV Park, South-East of De Aar, Northern Cape	African Clean Energy Developments (ACED)	Environmental Advisor
RustMo1 PV Plant near Buffelspoort, North West	Momentous Energy	Environmental Advisor
Scuitdrift 1 SEF & Scuitdrift 2 SEF, Limpopo	Building Energy	Environmental Advisor
Sirius PV Plants, Northern Cape	Aurora Power Solutions	Environmental Advisor
Upington Airport PV Power Project, Northern Cape	Sublunary Trading	Environmental Advisor
Upington SEF, Northern Cape	Abengoa Solar	Environmental Advisor
Ofir-ZX PV SEF near Keimoes, Northern Cape	Networx S28 Energy	Environmental Advisor
Steynsrus PV1 & PV2 SEF's, Northern Cape	Cronimet Power Solutions	Environmental Advisor
Heuningspruit PV SEF, Northern Cape	Cronimet Power Solutions	Environmental Advisor

Due Diligence Reporting

Project Name & Location	Client Name	Role
5 PV SEF projects in Lephalale, Limpopo	iNca Energy	Environmental Advisor
Prieska PV Plant, Northern Cape	SunEdison Energy India	Environmental Advisor
Sirius Phase One PV Facility near Upington, Northern Cape	Aurora Power Solutions	Environmental Advisor

Environmental Permitting, S53, Water Use Licence (WUL), Waste Management Licence (WML) & Other Applications

Project Name & Location	Client Name	Role
Biodiversity Permit & WULA for the Aggeneys SEF near Aggeneys, Northern Cape	BioTherm Energy	Project Manager & EAP
Biodiversity Permit for the Konkoonises II SEF near Pofadder, Northern Cape	BioTherm Energy	Project Manager & EAP
Biodiversity Permitting for the Lephalale SEF, Limpopo	Exxaro Resources	Project Manager & EAP

Project Name & Location	Client Name	Role
Environmental Permitting for the Kleinbegin PV SEF West of Groblershoop, Northern Cape	MedEnergy	Project Manager & EAP
Environmental Permitting for the Upington SEF, Northern Cape	Abengoa Solar	Project Manager & EAP
Environmental Permitting for the Kathu PV Facility, Northern Cape	Building Energy	Project Manager & EAP
Environmental Permitting for the Konkoonsies Solar Farm, Northern Cape	BioTherm Energy	Project Manager & EAP
Environmental Permitting for the Lephalale SEF, Limpopo	Exxaro Resources	Project Manager & EAP
Environmental Permitting for the Scuitdrift 1 SEF & Scuitdrift 2 SEF, Limpopo	Building Energy	Project Manager & EAP
Environmental Permitting for the Sirius PV Plant, Northern Cape	Aurora Power Solutions	Project Manager & EAP
Environmental Permitting for the Steynsrus PV1 & PV2 SEF's, Northern Cape	Cronimet Power Solutions	Project Manager & EAP
Environmental Permitting for the Heuningspruit PV SEF, Northern Cape	Cronimet Power Solutions	Project Manager & EAP
Permits for the Kleinbegin and UAP PV Plants, Northern Cape	MedEnergy Global	Project Manager & EAP
S53 Application for Arriesfontein Solar Park Phase 1 – 3 near Danielskuil, Northern Cape	Solar Reserve / SunCorp	Project Manager & EAP
S53 Application for Hertzogville PV1 & PV 2 SEFs, Free State	Solar Reserve / SunCorp	Project Manager & EAP
S53 Application for the Bloemfontein Airport PV Facility, Free State	Sublunary Trading	Project Manager & EAP
S53 Application for the Kimberley Airport PV Facility, Northern Cape	Sublunary Trading	Project Manager & EAP
S53 Application for the Project Blue SEF, Northern Cape	WWK Developments	Project Manager & EAP
S53 Application for the Upington Airport PV Facility, Free State	Sublunary Trading	Project Manager & EAP
WULA for the Kalahari SEF Phase II in Kathu, Northern Cape	Engie	Project Manager & EAP
Environmental Permitting for the Steynsrus PV1 & PV2 SEF's, Northern Cape	Cronimet Power Solutions	Project Manager & EAP
Environmental Permitting for the Heuningspruit PV SEF, Northern Cape	Cronimet Power Solutions	Project Manager & EAP

RENEWABLE POWER GENERATION PROJECTS: CONCENTRATED SOLAR FACILITIES (CSP)

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
Ilanga CSP 2, 3, 4, 5, 7 & 9 Facilities near Upington, Northern Cape	Emvelo Holdings	Project Manager & EAP
Ilanga CSP near Upington, Northern Cape	Ilangethu Energy	Project Manager & EAP
Ilanga Tower 1 Facility near Upington, Northern Cape	Emvelo Holdings	Project Manager & EAP

Project Name & Location	Client Name	Role
Karoshoek CPVPD 1-4 facilities on site 2 as part of the larger Karoshoek Solar Valley Development East of Upington, Northern Cape	FG Emvelo	Project Manager & EAP
Karoshoek CSP facilities on sites 1.4; 4 & 5 as part of the larger Karoshoek Solar Valley Development East of Upington, Northern Cape	FG Emvelo	Project Manager & EAP
Karoshoek Linear Fresnel 1 Facility on site 1.1 as part of the larger Karoshoek Solar Valley Development East of Upington, Northern Cape	FG Emvelo	Project Manager & EAP

Environmental Compliance, Auditing and ECO

Project Name & Location	Client Name	Role
ECO for the construction of the !Khi CSP Facility, Northern Cape	Abengoa Solar	Project Manager
ECO for the construction of the Ilanga CSP 1 Facility near Upington, Northern Cape	Karoshoek Solar One	Project Manager
ECO for the construction of the folar Park, Northern Cape	Kathu Solar	Project Manager
ECO for the construction of the KaXu! CSP Facility, Northern Cape	Abengoa Solar	Project Manager
Internal audit of compliance with the conditions of the IWUL issued to the Karoshoek Solar One CSP Facility, Northern Cape	Karoshoek Solar One	Project Manager

Screening Studies

Project Name & Location	Client Name	Role
Upington CSP (Tower) Plant near Kanoneiland, Northern Cape	iNca Energy and FRV	Project Manager & EAP

Compliance Advice and ESAP reporting

Project Name & Location	Client Name	Role
Ilanga CSP Facility near Upington, Northern Cape	Ilangethu Energy	Environmental Advisor
Ilangalethu CSP 2, Northern Cape	FG Emvelo	Environmental Advisor
Kathu CSP Facility, Northern Cape	GDF Suez	Environmental Advisor
Lephalale SEF, Limpopo	Cennergi	Environmental Advisor
Solis I CSP Facility, Northern Cape	Brightsource	Environmental Advisor

Environmental Permitting, S53, Water Use Licence (WUL), Waste Management Licence (WML) & Other Applications

Project Name & Location	Client Name	Role
Environmental Permitting for the Ilanga CSP Facility near Upington, Northern Cape	Ilangethu Energy	Project Manager & EAP
Environmental Permitting for the Kathu CSP, Northern Cape	GDF Suez	Project Manager & EAP
WULA for the Solis I CSP Facility, Northern Cape	Brightsource	Project Manager & EAP

RENEWABLE POWER GENERATION PROJECTS: WIND ENERGY FACILITIES

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
Sere WEF, Western Cape	Eskom Holdings SoC Limited	EAP

Project Name & Location	Client Name	Role
Aberdeen WEF, Eastern Cape	Eskom Holdings SoC Limited	Project Manager & EAP
Amakhala Emoyeni WEF, Eastern Cape	Windlab Developments	Project Manager & EAP
EXXARO West Coast WEF, Western Cape	EXXARO Resources	Project Manager & EAP
Goereesoe Wind Farm near Swellendam, Western Cape	iNca Energy	Project Manager & EAP
Hartneest WEF, Western Cape	Juwi Renewable Energies	Project Manager & EAP
Hopefield WEF, Western Cape	Umoya Energy	EAP
Kleinsee WEF, Northern Cape	Eskom Holdings SoC Limited	Project Manager & EAP
Klipheuwel/Dassiesfontein WEF within the Overberg area, Western Cape	BioTherm Energy	Project Manager & EAP
Moorreesburg WEF, Western Cape	iNca Energy	Project Manager & EAP
Oyster Bay WEF, Eastern Cape	Renewable Energy Resources Southern Africa	Project Manager & EAP
Project Blue WEF, Northern Cape	Windy World	Project Manager & EAP
Rheboksfontein WEF, Western Cape	Moyeng Energy	Project Manager & EAP
Spitskop East WEF near Riebeeck East, Eastern Cape	Renewable Energy Resources Southern Africa	Project Manager & EAP
Suurplaat WEF, Western Cape	Moyeng Energy	Project Manager & EAP
Swellendam WEF, Western Cape	IE Swellendam	Project Manager & EAP
Tsitsikamma WEF, Eastern Cape	Exxarro	Project Manager & EAP
West Coast One WEF, Western Cape	Moyeng Energy	Project Manager & EAP

Basic Assessments

Project Name & Location	Client Name	Role
Amakhala Emoyeni Wind Monitoring Masts, Eastern Cape	Windlab Developments	Project Manager & EAP
Beaufort West Wind Monitoring Masts, Western Cape	Umoya Energy	Project Manager & EAP
Hopefield Community Wind Farm near Hopefield, Western Cape	Umoya Energy	Project Manager & EAP
Koekenaap Wind Monitoring Masts, Western Cape	EXXARO Resources	Project Manager & EAP
Koingnaas WEF, Northern Cape	Just Palm Tree Power	Project Manager & EAP
Laingsburg Area Wind Monitoring Masts, Western Cape	Umoya Energy	Project Manager & EAP
Overberg Area Wind Monitoring Masts, Western Cape	BioTherm Energy	Project Manager & EAP
Oyster Bay Wind Monitoring Masts, Eastern Cape	Renewable Energy Systems Southern Africa (RES)	Project Manager & EAP

Screening Studies

Project Name & Location	Client Name	Role
Albertinia WEF, Western Cape	BioTherm Energy	Project Manager & EAP
Koingnaas WEF, Northern Cape	Just Pal Tree Power	Project Manager & EAP
Napier Region WEF Developments, Western Cape	BioTherm Energy	Project Manager & EAP
Tsitsikamma WEF, Eastern Cape	Exxarro Resources	Project Manager & EAP
Various WEFs within an identified area in the Overberg area, Western Cape	BioTherm Energy	Project Manager & EAP
Various WEFs within an identified area on the West Coast, Western Cape	Investec Bank Limited	Project Manager & EAP
Various WEFs within an identified area on the West Coast, Western Cape	Eskom Holdings Limited	Project Manager & EAP

Project Name & Location	Client Name	Role
Various WEFs within the Western Cape	Western Cape Department of Environmental Affairs and Development Planning	Project Manager & EAP
Velddrift WEF, Western Cape	VentuSA Energy	Project Manager & EAP
Wind 1000 Project	Thabo Consulting on behalf of Eskom Holdings	Project Manager & EAP
Wittekleibosch, Snylip & Doriskraal WEFs, Eastern Cape	Exxarro Resources	Project Manager & EAP

Environmental Compliance, Auditing and ECO

Project Name & Location	Client Name	Role
ECO for the construction of the West Coast One WEF, Western Cape	Aurora Wind Power	Project Manager
ECO for the construction of the Gouda WEF, Western Cape	Blue Falcon	Project Manager
EO for the Dassiesklip Wind Energy Facility, Western Cape	Group 5	Project Manager
Quarterly compliance monitoring of compliance with all environmental licenses for the operation activities at the Gouda Wind Energy facility near Gouda, Western Cape	Blue Falcon	Project Manager
Annual auditing of compliance with all environmental licenses for the operation activities at the West Coast One Wind Energy facility near Vredenburg, Western Cape	Aurora Wind Power	Project Manager
External environmental and social audit for the Amakhala Wind Farm, Eastern Cape	Cennergi	Project Manager
External environmental and social audit for the Tsitsikamma Wind Farm, Eastern Cape	Cennergi	Project Manager
ECO for the construction of the Excelsior Wind Farm and associated infrastructure, Northern Cape	BioTherm Energy	Project Manager
External compliance audit of the Dassiesklip Wind Energy Facility, Western Cape	BioTherm Energy	Project Manager

Compliance Advice

Project Name & Location	Client Name	Role
Amakhala Phase 1 WEF, Eastern Cape	Cennergi	Environmental Advisor
Dassiesfontein WEF within the Overberg area, Western Cape	BioTherm Energy	Environmental Advisor
Excelsior Wind Farm, Western Cape	BioTherm Energy	Environmental Advisor
Great Karoo Wind Farm, Northern Cape	African Clean Energy Developments (ACED)	Environmental Advisor
Hopefield Community WEF, Western Cape	African Clean Energy Developments (ACED)	Environmental Advisor
Rheboksfontein WEF, Western Cape	Moyeng Energy	Environmental Advisor
Tiqua WEF, Western Cape	Cennergi	Environmental Advisor
Tsitsikamma WEF, Eastern Cape	Cennergi	Environmental Advisor
West Coast One WEF, Western Cape	Moyeng Energy	Environmental Advisor

Due Diligence Reporting

Project Name & Location	Client Name	Role
Witteberg WEF, Western Cape	EDPR Renewables	Environmental Advisor
IPD Vredenburg WEF within the Saldanha Bay area, Western Cape	IL&FS Energy Development Company	Environmental Advisor

Environmental Permitting, S53, Water Use Licence (WUL), Waste Management Licence (WML) & Other Applications

Project Name & Location	Client Name	Role
Biodiversity Permitting for the Power Line between the Tsitikamma Community WEF & the Diep River Substation, Eastern Cape	Cennergi	Project Manager & EAP
Biodiversity Permitting for the West Coast One WEF, Western Cape	Aurora Wind Power	Project Manager & EAP
Environmental Permitting for the Excelsior WEF, Western Cape	BioTherm Energy	Project Manager & EAP
Plant Permits & WULA for the Tsitsikamma Community WEF, Eastern Cape	Cennergi	Project Manager & EAP
S24G and WULA for the Rectification for the commencement of unlawful activities on Ruimsig AH in Honeydew, Gauteng	Hossam Soror	Project Manager & EAP
S24G Application for the Rheboksfontein WEF, Western Cape	Ormonde - Theo Basson	Project Manager & EAP
S53 Application & WULA for Suurplaat and Gemini WEFs, Northern Cape	Engie	Project Manager & EAP
S53 Application for the Hopefield Community Wind Farm near Hopefield, Western Cape	Umoya Energy	Project Manager & EAP
S53 Application for the Project Blue WEF, Northern Cape	WWK Developments	Project Manager & EAP
S53 for the Oyster Bay WEF, Eastern Cape	RES	Project Manager & EAP
WULA for the Great Karoo Wind Farm, Northern Cape	African Clean Energy Developments (ACED)	Project Manager & EAP

CONVENTIONAL POWER GENERATION PROJECTS (COAL)

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
Mutsho Power Station near Makhado, Limpopo	Mutsho Consortium	Project Manager & EAP
Coal-fired Power Station near Ogies, Mpumalanga	Ruukki SA	Project Manager & EAP
Thabametsi IPP Coal-fired Power Station, near Lephalale, Limpopo	Axia	Project Manager & EAP
Transalloys Coal-fired Power Station, Mpumalanga	Transalloys	Project Manager & EAP
Tshivasho IPP Coal-fired Power Station (with WML), near Lephalale, Limpopo	Cennergi	Project Manager & EAP
Umbani Coal-fired Power Station, near Kriel, Mpumalanga	ISS Global Mining	Project Manager & EAP
Waterberg IPP Coal-Fired Power Station near Lephalale, Limpopo	Exxaro Resources	Project Manager & EAP

Basic Assessments

Project Name & Location	Client Name	Role
Coal Stockyard on Medupi Ash Dump Site, Limpopo	Eskom Holdings	Project Manager & EAP

Project Name & Location	Client Name	Role
Biomass Co-Firing Demonstration Facility at Arnot Power Station East of Middleburg, Mpumlanaga	Eskom Holdings	Project Manager & EAP

Screening Studies

Project Name & Location	Client Name	Role
Baseload Power Station near Lephalale, Limpopo	Cennergi	Project Manager & EAP
Coal-Fired Power Plant near Delmas, Mpumalanga	Exxaro Resources	Project Manager & EAP
Makhado Power Station, Limpopo	Mutsho Consortium, Limpopo	Project Manager & EAP

Environmental Compliance, Auditing and ECO

Project Name & Location	Client Name	Role
ECO for the Camden Power Station, Mpumalanga	Eskom Holdings	Project Manager

Compliance Advice

Project Name & Location	Client Name	Role
Thabametsi IPP Coal-fired Power Station, near Lephalale, Limpopo	Axia	Environmental Advisor

Environmental Permitting, S53, Water Use Licence (WUL), Waste Management Licence (WML) & Other Applications

Project Name & Location	Client Name	Role
Permit application for the Thabametsi Bulk Water Pipeline, near Lephalale, Limpopo	Axia	Project Manager & EAP
S53 & WULA for the Waterberg IPP Coal-Fired Power Station near Lephalale, Limpopo	Exxaro Resources	Project Manager & EAP
S53 Application for the Tshivasho Coal-fired Power Station near Lephalale, Limpopo	Cennergi	Project Manager & EAP

CONVENTIONAL POWER GENERATION PROJECTS (GAS)

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
Ankerlig OCGT to CCGT Conversion project &400 kV transmission power line between Ankerlig and the Omega Substation, Western Cape	Eskom Holdings SoC Limited	Project Manager & EAP
Gourikwa OCGT to CCGT Conversion project & 400 kV transmission power line between Gourikwa & Proteus Substation, Western Cape	Eskom Holdings SoC Limited	Project Manager & EAP
Richards Bay Gas to Power Combined Cycle Power Station, KwaZulu-Natal	Eskom Holdings SoC Limited	Project Manager & EAP
Richards Bay Gas to Power Plant, KwaZulu-Natal	Richards Bay Gas	Project Manager & EAP
Decommissioning & Recommissioning of 3 Gas Turbine Units at Acacia Power Station & 1 Gas Turbine Unit at Port Rex Power Station to the existing Ankerlig Power Station in Atlantis Industria, Western Cape	Eskom Holdings	Project Manager & EAP
Two 132kV Chickadee Lines to the new Zonnebloem Switching Station, Mpumalanga	Eskom Holdings	Project Manager & EAP

Screening Studies

Project Name & Location	Client Name	Role
Fatal Flaw Analysis for 3 area identified for the establishment of a 500MW CCGT Power Station	Globeleq Advisors Limited	Project Manager & EAP
Richards Bay Gas to Power Combined Cycle Power Station, KwaZulu-Natal	Eskom Holdings SoC Limited	Project Manager & EAP

GRID INFRASTRUCTURE PROJECTS

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
Aggeneis-Oranjemond Transmission Line & Substation Upgrade, Northern Cape	Eskom Transmission	Project Manager & EAP
Ankerlig-Omega Transmission Power Lines, Western Cape	Eskom Transmission	Project Manager & EAP
Karoshoek Grid Integration project as part of the Karoshoek Solar Valley Development East of Upington, Northern Cape	FG Emvelo	Project Manager & EAP
Koeberg-Omega Transmission Power Lines,, Western Cape	Eskom Transmission	Project Manager & EAP
Koeberg-Stikland Transmission Power Lines, Western Cape	Eskom Transmission	Project Manager & EAP
Kyalami Strengthening Project, Gauteng	Eskom Transmission	Project Manager & EAP
Mokopane Integration Project, Limpopo	Eskom Transmission	Project Manager & EAP
Saldanha Bay Strengthening Project, Western Cape	Eskom Transmission	Project Manager & EAP
Steelpoort Integration Project, Limpopo	Eskom Transmission	Project Manager & EAP
Transmission Lines from the Koeberg-2 Nuclear Power Station site, Western Cape	Eskom Transmission	Project Manager & EAP
Tshwane Strengthening Project, Phase 1, Gauteng	Eskom Transmission	Project Manager & EAP

Basic Assessments

Project Name & Location	Client Name	Role
Dassenberg-Koeberg Power Line Deviation from the Koeberg to the Ankerlig Power Station, Western Cape	Eskom Holdings	Project Manager & EAP
Golden Valley II WEF Power Line & Substation near Cookhouse, Eastern Cape	BioTherm Energy	Project Manager & EAP
Golden Valley WEF Power Line near Cookhouse, Eastern Cape	BioTherm Energy	Project Manager & EAP
Karoshoek Grid Integration project as part of the Karoshoek Solar Valley Development East of Upington, Northern Cape	FG Emvelo	Project Manager & EAP
Konkoonsies II PV SEF Power Line to the Paulputs Substation near Pofadder, Northern Cape	BioTherm Energy	Project Manager & EAP
Perdekraal West WEF Powerline to the Eskom Kappa Substation, Westnern Cape	BioTherm Energy	Project Manager & EAP
Rheboksfontein WEF Powerline to the Aurora Substation, Western Cape	Moyeng Energy	Project Manager & EAP
Soetwater Switching Station near Sutherland, Northern Cape	African Clean Energy Developments (ACED)	Project Manager & EAP

Solis Power I Power Line & Switchyard Station near Upington, Northern Cape	Brightsource	Project Manager & EAP
Stormwater Canal System for the Ilanga CSP near Upington, Northern Cape	Karoshoek Solar One	Project Manager & EAP
Tsitsikamma Community WEF Powerline to the Diep River Substation, Eastern Cape	Eskom Holdings	Project Manager & EAP

Environmental Compliance, Auditing and ECO

Project Name & Location	Client Name	Role
ECO for the construction of the Ferrum-Mookodi Transmission Line, Northern Cape and North West	Trans-Africa Projects on behalf of Eskom	Project Manager
EO for the construction of the Gamma-Kappa Section A Transmission Line, Western Cape	Trans-Africa Projects on behalf of Eskom	Project Manager
EO for the construction of the Gamma-Kappa Section B Transmission Line, Western Cape	Trans-Africa Projects on behalf of Eskom	Project Manager
EO for the construction of the Hydra IPP Integration project, Northern Cape	Trans-Africa Projects on behalf of Eskom	Project Manager
EO for the construction of the Kappa-Sterrekus Section C Transmission Line, Western Cape	Trans-Africa Projects on behalf of Eskom	Project Manager
EO for the construction of the Namaqualand Strengthening project in Port Nolloth, Western Cape	Trans-Africa Projects on behalf of Eskom	Project Manager
ECO for the construction of the Neptune Substation Soil Erosion Mitigation Project, Eastern Cape	Eskom	Project Manager
ECO for the construction of the Ilanga-Gordonia 132kV power line, Northern Cape	Karoshoek Solar One	Project Manager

Environmental Permitting, S53, Water Use Licence (WUL), Waste Management Licence (WML) & Other Applications

Project Name & Location	Client Name	Role
Environmental Permitting and WULA for the Rockdale B Substation & Loop in Power Lines,	Eskom Holdings	Project Manager & EAP
Environmental Permitting and WULA for the Steelpoort Integration project, Limpopo	Eskom Holdings	Project Manager & EAP
Environmental Permitting for Solis CSP near Upington, Northern Cape	Brightsource	Project Manager & EAP

MINING SECTOR PROJECTS

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
Elitheni Coal Mine near Indwe, Eastern Cape	Elitheni Coal	Project Manager & EAP
Groot Letaba River Development Project Borrow Pits	liso	Project Manager & EAP
Grootegeluk Coal Mine for coal transportation infrastructure between the mine and Medupi Power Station (EMPr amendment) , Limpopo	Eskom Holdings	Project Manager & EAP
Waterberg Coal Mine (EMPr amendment), Limpopo	Seskoko Resources	Project Manager & EAP
Aluminium Plant WML & AEL, Gauteng	GfE-MIR Alloys & Minerals	Project Manager & EAP
Zero Waste Recovery Plant at Highveld Steel, Mpumalanga	Anglo African Metal	Project Manager & EAP

Basic Assessments

Project Name & Location	Client Name	Role

Rare Earth Separation Plant in Vredendal, Western Cape	Rareco	Project Manager & EAP
Decommissioning and Demolition of Kilns 5 & 6 at the Slurry Plant, Kwa-Zulu Natal	PPC	Project Manager & EAP

Environmental Compliance, Auditing and ECO

Project Name & Location	Client Name	Role
ECO for the construction of the Duhva Mine Water Recovery Project, Mpumalanga	Eskom Holdings SoC Limited	Project Manager
External compliance audit of Palesa Coal Mine's Integrated Water Use License (IWUL), near KwaMhlanga, Mpumalanga	HCI Coal	Project Manager
External compliance audit of Palesa Coal Mine's Waste Management License (WML) and EMP, near KwaMhlanga, Mpumalanga	HCI Coal	Project Manager
External compliance audit of Mbali Coal Mine's Integrated Water Use License (IWUL), near Ogies, Mpumalanga	HCI Coal	Project Manager
Independent External Compliance Audit of Water Use License (WUL) for the Tronox Namakwa Sands (TNS) Mining Operations (Brand se Baai), Western Cape	Tronox Namakwa Sands	Project Manager
Independent External Compliance Audit of Water Use License (WUL) for the Tronox Namakwa Sands (TNS) Mineral Separation Plant (MSP), Western Cape	Tronox Namakwa Sands	Project Manager
Independent External Compliance Audit of Water Use License (WUL) for the Tronox Namakwa Sands (TNS) Smelter Operations (Saldanha), Western Cape	Tronox Namakwa Sands	Project Manager
Compliance Auditing of the Waste Management Licence for the PetroSA Landfill Site at the GTL Refinery, Western Cape	PetroSA	Project Manager

Environmental Permitting, S53, Water Use Licence (WUL), Waste Management Licence (WML) & Other Applications

Project Name & Location	Client Name	Role
Waste Licence Application for the Rare Earth Separation Plant in Vredendal, Western Cape	Rareco	Project Manager & EAP
WULA for the Expansion of the Landfill site at Exxaro's Namakwa Sands Mineral Separation Plant, Western Cape	Exxaro Resources	Project Manager & EAP
S24G & WML for an Aluminium Plant, Gauteng	GfE-MIR Alloys & Minerals	Project Manager & EAP

INFRASTRUCTURE DEVELOPMENT PROJECTS (BRIDGES, PIPELINES, ROADS, WATER RESOURCES, STORAGE, ETC)

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
Bridge across the Ngotwane River, on the border of South Africa and Botswana	Eskom Holdings	Project Manager & EAP
Chemical Storage Tanks, Metallurgical Plant Upgrade & Backfill Plant upgrade at South Deep Gold Mine, near Westornaria, Gauteng	Goldfields	Project Manager & EAP

Project Name & Location	Client Name	Role
Expansion of the existing Welgedacht Water Care Works, Gauteng	ERWAT	Project Manager & EAP
Golden Valley WEF Access Road near Cookhouse, Eastern Cape	BioTherm Energy	Project Manager & EAP
Great Fish River Wind Farm Access Roads and Watercourse Crossings near Cookhouse, Eastern Cape	African Clean Energy Developments (ACED)	Project Manager & EAP
Ilanga CSP Facility Watercourse Crossings near Upington, Northern Cape	Karoshoek Solar one	Project Manager & EAP
Modification of the existing Hartebeestfontein Water Care Works, Gautng	ERWAT	Project Manager & EAP
N10 Road Realignment for the Ilanga CSP Facility, East of Upington, Northern Cape	SANRAL	Project Manager & EAP
Nxuba (Bedford) Wind Farm Watercourse Crossings near Cookhouse, Eastern Cape	African Clean Energy Developments (ACED)	Project Manager & EAP
Pollution Control Dams at the Medupi Power Station Ash Dump & Coal Stockyard, Limpopo	Eskom	Project Manager & EAP
Qoboshane borrow pits (EMPr only), Eastern Cape	Emalahleni Local Municipality	Project Manager & EAP
Tsitsikamma Community WEF Watercourse Crossings, Eastern Cape	Cennergi	Project Manager & EAP
Clayville Central Steam Plant, Gauteng	Bellmall Energy	Project Manager & EAP
Msenge Emoyeni Wind Farm Watercourse Crossings and Roads, Eastern Cape	Windlab	Project Manager & EAP

Basic Assessments

Project Name & Location	Client Name	Role
Harmony Gold WWTW at Doornkop Mine, Gauteng	Harmony Doornkop Plant	Project Manager & EAP
Ofir-ZX Watercourse Crossing for the Solar PV Facility, near Keimoes, Northern Cape	Networx S28 Energy	Project Manager & EAP
Qoboshane bridge & access roads, Eastern Cape	Emalahleni Local Municipality	Project Manager & EAP
Relocation of the Assay Laboratory near Carletonville, Gauteng	Sibanye Gold	Project Manager & EAP
Richards Bay Harbour Staging Area, KwaZulu-Natal	Eskom Holdings	Project Manager & EAP
S-Kol Watercourse Crossing for the Solar PV Facility, East of Keimoes, Northern Cape	Networx S28 Energy	Project Manager & EAP
Sonnenberg Watercourse Crossing for the Solar PV Facility, West Keimoes, Northern Cape	Networx S28 Energy	Project Manager & EAP
Kruisvallei Hydroelectric Power Generation Scheme, Free State	Building Energy	Project Manager & EAP
Masetjaba Water Reservoir, Pump Station and Bulk Supply Pipeline near Nigel, Gauteng	Naidu Consulting Engineers	Project Manager & EAP
Access Road for the Dwarsug Wind Farm, Northern Cape Province	South Africa Mainsteam Renewable Power	Project Manager & EAP
Upgrade of the Cooling Water Treatment Facility at the Kriel Power Station, Mpumalanga	Eskom	Project Manager & EAP

Screening Studies

Project Name & Location	Client Name	Role
Roodepoort Open Space Optimisation Programme (OSOP) Precinct, Gauteng	TIMAC Engineering Projects	Project Manager & EAP

Vegetable Oil Plant and Associated Pipeline, Kwa-Zulu Natal	Wilmar Oils and Fats Africa	Project Manager & EAP

Environmental Compliance, Auditing and ECO

Project Name & Location	Client Name	Role
ECO and bi-monthly auditing for the construction of the Olifants River Water Resources Development Project (ORWRDP) Phase 2A: De Hoop Dam, R555 realignment and housing infrastructure	Department of Water and Sanitation	Project Manager Auditor
ECO for the Rehabilitation of the Blaaupan & Storm Water Channel, Gauteng	Airports Company of South Africa (ACSA)	Project Manager
Due Diligence reporting for the Better Fuel Pyrolysis Facility, Gauteng	Better Fuels	Project Manager
ECO for the Construction of the Water Pipeline from Kendal Power Station to Kendal Pump Station, Mpumalanga	Transnet	Project Manager
ECO for the Replacement of Low-Level Bridge, Demolition and Removal of Artificial Pong, and Reinforcement the Banks of the Crocodile River at the Construction at Walter Sisulu National Botanical Gardens, Gauteng Province	South African National Biodiversity Institute (SANBI)	Project Manager
External Compliance Audit of the Air Emission Licence (AEL) for a depot in Bloemfontein, Free State Province and in Tzaneen, Mpumalanga Province	PetroSA	Project Manager

Environmental Permitting, S53, Water Use Licence (WUL), Waste Management Licence (WML) & Other Applications

Project Name & Location	Client Name	Role
WULA for the Izubulo Private Nature Reserve, Limpopo	Kjell Bismeyer, Jann Bader, Laurence Saad	Project Manager & EAP
WULA for the Masodini Private Game Lode, Limpopo	Masodini Private Game Lodge	Environmental Advisor
WULA for the Ezulwini Private Nature Reserve, Limpopo	Ezulwini Investments	Project Manager & EAP
WULA for the Masodini Private Game Lode, Limpopo	Masodini Private Game Lodge	Project Manager & EAP
WULA for the N10 Realignment at the Ilanga SEF, Northern Cape	Karoshoek Solar One	Project Manager & EAP
WULA for the Kruisvallei Hydroelectric Power Generation Scheme, Free State	Building Energy	Project Manager & EAP
S24G and WULA for the Ilegal construction of structures within a watercourse on EFF 24 Ruimsig Agricultural Holdings, Gauteng	Sorror Language Services	Project Manager & EAP

HOUSING AND URBAN PROJECTS

Basic Assessments

Project Name & Location	Client Name	Role
Postmasburg Housing Development, Northern Cape	Transnet	Project Manager & EAP

Compliance Advice and reporting

Project Name & Location	Client Name	Role
Kampi ya Thude at the Olifants West Game Reserve, Limpopo	Nick Elliot	Environmental Advisor
External Compliance Audit of WUL for the Johannesburg Country Club, Gauteng	Johannesburg Country Club	Project Manager

Environmental Compliance, Auditing and ECO

Project Name & Location	Client Name	Role
Due Diligence Audit for the Due Diligence Audit Report, Gauteng	Delta BEC (on behalf of Johannesburg Development Agency (JDA))	Project Manager

ENVIRONMENTAL MANAGEMENT TOOLS

Project Name & Location	Client Name	Role
Development of the 3rd Edition Environmental Implementation Plan (EIP)	Gauteng Department of Agriculture and Rural Development (GDARD)	Project Manager & EAP
Development of Provincial Guidelines on 4x4 routes, Western Cape	Western Cape Department of Environmental Affairs and Development Planning	EAP
Compilation of Construction and Operation EMP for the Braamhoek Transmission Integration Project, Kwazulu-Natal	Eskom Holdings	Project Manager & EAP
Compilation of EMP for the Wholesale Trade of Petroleum Products, Gauteng	Munaca Technologies	Project Manager & EAP
Operational Environmental Management Programme (OEMP) for Medupi Power Station, Limpopo	Eskom Holdings	Project Manager & EAP
Operational Environmental Management Programme (OEMP) for the Dube TradePort Site Wide Precinct	Dube TradePort Corporation	Project Manager & EAP
Operational Environmental Management Programme (OEMP) for the Kusile Power Station, Mpumalanga	Eskom Holdings	Project Manager & EAP
Review of Basic Assessment Process for the Wittekleibosch Wind Monitoring Mast, Eastern Cape	Exxaro Resources	Project Manager & EAP
Revision of the EMPr for the Sirius Solar PV	Aurora Power Solutions	Project Manager & EAP
State of the Environment (SoE) for Emalahleni Local Municipality, Mpumalanga	Simo Consulting on behalf of Emalahleni Local Municipality	Project Manager & EAP
Aspects and Impacts Register for Salberg Concrete Products operations	Salberg Concrete Products	EAP
First State of Waste Report for South Africa	Golder on behalf of the Department of Environmental Affairs	Project Manager & EAP
Responsibilities Matrix and Gap Analysis for the Kruisvallei Hydroelectric Power Generation Scheme, Free State Province	Building Energy	Project Manager
Responsibilities Matrix and Gap Analysis for the Roggeveld Wind Farm, Northern & Western Cape Provinces	Building Energy	Project Manager

PROJECTS OUTSIDE OF SOUTH AFRICA

Project Name & Location	Client Name	Role
Advisory Services for the Zizabona Transmission Project, Zambia, Zimbabwe, Botswana & Namibia	PHD Capital	Advisor
EIA for the Semonkong WEF, Lesotho	MOSCET	Project Manager & EAP
EMP for the Kuvaninga Energia Gas Fired Power Project, Mozambique	ADC (Pty) Ltd	Project Manager & EAP
Environmental Screening Report for the SEF near Thabana Morena, Lesotho	Building Energy	EAP
EPBs for the Kawambwa, Mansa, Mwense and Nchelenge SEFs in Luapula Province, Zambia	Building Energy	Project Manager & EAP
ESG Due Diligence for the Hilton Garden Inn Development in Windhoek, Namibia	Vatange Capital	Project Manager
Mandahill Mall Rooftop PV SEF EPB, Lusaka, Zambia	Building Energy	Project Manager & EAP
Monthly ECO for the PV Power Plant for the Mocuba Power Station	Scatec	Project Manager

1st Floor, Block 2, 5 Woodlands Drive Office Park
Woodlands Drive, Woodmead
Johannesburg, South Africa

Email: gideon@savannahsa.com
Tel: +27 (11) 656 3237

CURRICULUM VITAE OF GIDEON RAATH

Profession : Environmental and Permitting Consultant

Specialisation: Environmental Impact Assessments, Water Use Licencing, Waste Licencing, Environmental Compliance Officer, Ecological Specialist, Wetland Specialist, GIS, MPRDA permitting

Work Experience: 4.5 years' experience in environmental management, National Water Act, Mineral and Petroleum Resources Development Act, ECO and compliance auditing, wetland and ecological specialist reporting

VOCATIONAL EXPERIENCE

Gideon holds an MSc (Geography and Environmental Management; SU), a BSc Honours (Ecology and Environmental Studies - Cum laude; Wits) and a BSc (Geography and Environmental Management; UJ). His MSc thesis focused on the hydrological impact on the spatial distribution of invasive Eucalyptus trees along the Breede River, while his honours thesis evaluated ethnobotanical relationships around the Rio Tinto copper mine in Phalaborwa. Most recently he has worked as an Environmental Consultant at EOH Coastal and Environmental Services (EOH CES), conducting environmental authorisations applications (NWA, NEMA, MPRDA), Public Participation Processes, GIS specialisation as well as Ecological and Wetland specialist studies. Previously, Gideon worked as the Monitoring & Evaluation Project Manager for the City of Cape Town's invasive species unit (Environmental Resources Management Department).

Gideon's GIS background includes the management of the City of Cape Town invasive species GIS database, involving the storage, management, recall and quality control off all sightings, clearance visits and known infestations. Further experience include mapping for various consulting projects, boundary verification through ground-truthing and the spatial mapping and delineation component of this MSc research. Gideon has further attended public participation workshops, and has been involved with IAP identification, translation, public meetings and engagement for a variety of projects, mainly within the Afrikaans speaking Northern Cape. Gideon is interested in invasion ecology, treatment of groundwater pollution through phytoremediation, botanical and wetland specialist studies, GIS application for ecology and environmental management, and the EIA processes in general.

SKILLS BASE AND CORE COMPETENCIES

- Environmental Management
- GIS data manipulation, storage, management and mapping
- EIA Impact Assessments and Basic Assessment
- Environmental Management Programmes
- Environmental Compliance Monitoring
- Mining Rights, Mining Permits, Prospecting Rights (and renewal) applications (MPRDA & NEMA)
- Public and Stakeholder Engagement (NEMA)
- Ecological/Botanical Specialist Studies

- Wetland Delineation, Functional and Impact Assessment studies
- Water Use Licence Applications (NWA)
- General Authorisations (NWA)

EDUCATION AND PROFESSIONAL STATUS

Degrees:

- M.Sc. Geography and Environmental Science (2014), Stellenbosch University (2014)
- B.Sc. (Hons) Ecology, Environment and Conservation (Cum Laude), University of the Witwatersrand (2011)
- B.Sc. Life and Environmental Sciences, University of Johannesburg (2010)

Short Courses:

- GroundTruth SASS5 competency course, GroundTruth Aquatic Consulting (2017)
- DWS 21C&I GA training workshop, Department of Water and Sanitation (2016)
- IAIAsa Public Participation Process Workshop, IAIA South Africa (2016)
- EIA Theory and application, EOH Coastal and Environmental Services (2015)
- Water Safety Training, City of Cape Town Environmental Resources Department (2014)
- Herbicide safety and application for weed control, City of Cape Town Environmental Resources Department (2014)
- Snake awareness training, City of Cape Town Environmental Resources Department (2014)
- Habitable Planet Workshop, Applied Centre for Climate & Earth Systems Science, Cape Town (2011)

Professional Society Affiliations:

- Golden Key International Honour Society – University of the Witwatersrand Chapter
- South African Council for Scientific Natural Professionals (SACNASP): Certified Natural Scientist – Pr.Sci.Nat. (Membership No.: 117178)
- IAIAsa (Membership No.: 3619)

Other Relevant Skills:

- GPS use, spatial data capturing and ground truthing

EMPLOYMENT

Date	Company	Roles and Responsibilities
October 2018 - Current:	Savannah Environmental (Pty) Ltd	Environmental and Permitting Consultant <u>Tasks include</u>: Undertaking environmental impact assessments, basic assessments, environmental management programmes (EMPrs), environmental amendments, water use license applications, general authorisations, wetland assessments, botanical/ecological assessments, mining rights and permit applications, prospecting rights applications, environmental compliance officer audits and reporting, Ensuring environmental compliance on permitting processes, client liaison and relationship management.

Date	Company	Roles and Responsibilities
February 2015 – September 2018	EOH Coastal and Environmental Services (Pty) Ltd	Senior Environmental Consultant Tasks included: Undertaking environmental impact assessments, basic assessments, environmental management programmes (EMPrs), environmental amendments, water use license applications, general authorisations, wetland assessments, botanical/ecological assessments, mining rights and permit applications, prospecting rights applications, environmental compliance officer audits and reporting, Ensuring environmental compliance on permitting processes, client liaison and relationship management, public participation processes for environmental authorisations.
March 2014 – February 2015	Invasive Species Unit (ISU), Environmental Resources Management Department (ERMD), City of Cape Town	Professional Officer Tasks included: Managed the Monitoring & Evaluation project portfolio, entailing the establishment of an invasive species monitoring & evaluation system for the ISU, as well as GIS database management, quality assurance and reporting thereof. Position required managing a small staff compliment (dealing directly with GIS database management), managing time and budgets for the monitoring division, conducting monitoring trials and research, writing species management plans as well as handling the GIS database, quality control, verification and integrity for the ISU.
January 2012 – March 2014	University of Stellenbosch	Departmental Assistant Tasks included: Technical editing of academic reports. Formatting of PhD and MSc reports on a weekly basis, with short turnaround time and good quality feedback.
January 2011 – January 2012	University of the Witwatersrand	Departmental Assistant Tasks included: Responsible for practical tutorials and marking of 1st year medical students. Included zoology and botany.
January 2006 – November 2010 (part time)	Codeon Networking CC	Co-founder and web developer Tasks included: Small business owner, responsible for all facets of the business. Self-taught HTML, CSS, PHP and MySQL. Won and produced two medium enterprise websites serving the gaming community. Websites required user profiles & permissions, CMS system and automated payment options as functionality. Development

Date	Company	Roles and Responsibilities
		and maintenance of a user database and account management system.

PROJECT EXPERIENCE

Project experience includes project management, EIA, BA and EMPr documentation development, integrated water use license applications, general authorisations, specialist botanical and ecological impact assessments, specialist wetland delineation and impact assessments, GIS applications and mapping, compliance auditing and monitoring, vegetation rehabilitation and monitoring plans, integrated waste management plans and waste licencing, mining right & permits, as well as prospecting rights applications.

Industry experience includes the waste sector (IWMP's and waste licencing), road and rail infrastructure (BAR, S&EIR, WUL/GA, Waste Licence), ports and harbours (management plans), private sector clients across varying industries (various permits), mining sector (BAR, S&EIR, mining permits and rights, prospecting rights), conservation sector (biodiversity plans), renewable energy industry (BAR, S&EIR) as well as the gas and oil industry (biodiversity reports).

RENEWABLE POWER GENERATION PROJECTS: SOLAR ENERGY FACILITIES

Environmental Compliance, Auditing and ECO

Project Name & Location	Client Name	Role
Enel Paleisheuwel Solar compliance auditing, Paleisheuwel, Northern Cape	Enel Green Power RSA (EGP RSA)	Environmental consultant

RENEWABLE POWER GENERATION PROJECTS: WIND ENERGY FACILITIES

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
G7 Brandvalley S&EIR, Matjiesfontein, Northern Cape	G7 Renewable Energy (Pty) Ltd	Environmental consultant
G7 Rietkloof S&EIR, Matjiesfontein, Northern Cape	G7 Renewable Energy (Pty) Ltd	Environmental consultant

Basic Assessments

Project Name & Location	Client Name	Role
G7 Renewable Energy 132kV BAR & EMPr, Matjiesfontein, Northern Cape	G7 Renewable Energy (Pty) Ltd	Project Manager, Environmental consultant, Public Participation

Compliance Advice and ESAP reporting

Project Name & Location	Client Name	Role
Biotherm Energy Golden Valley Wind Energy Facility ESAP, Bedford, Eastern Cape	Biotherm Energy Pty Ltd	Environmental consultant

Amendments

Project Name & Location	Client Name	Role

Mosselbay Energy EA Amendment, Mosselbay, Western Cape	Mosselbay Energy IPP (Pty) Ltd	Environmental consultant

GAS PROJECTS

Screening Studies

Project Name & Location	Client Name	Role
iGas integrated biodiversity screening, Saldanha, Western Cape	Central Energy Fund - iGas (subsidiary)	Environmental consultant, Faunal specialist (assistant)

MINING SECTOR PROJECTS

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
Triton Minerals Limited Ancuabe and Nicanda Hills EPDA, Ancuabe, Cabo Del Gado Province, Mozambique	Triton Minerals Ltd	Environmental consultant
Ancuabe graphite mine Environmental and Social Impact Assessment (ESIA), Cabo Del Gado Province, Mozambique	Grafex Limitada Mozambique	Environmental consultant

Basic Assessments

Project Name & Location	Client Name	Role
SANRAL material sourcing BAR (DMR), Hendrina, Mpumalanga Province	SANRAL SOC Ltd & Leo consulting engineers	Project Manager, Environmental consultant, Public Participation
SANRAL Bierspruit R510 Borrow Pit authorisation, Thabazimbi, Limpopo Province	SANRAL SOC Ltd & Royal HaskoningDHV South Africa	Project Manager, Environmental consultant, Ecological specialist, Public Participation
Almenar tin prospecting BAR, Carnarvon, Northern Cape	Almenar Property Investments (Pty) Ltd	Environmental consultant

Rehabilitation Studies

Project Name & Location	Client Name	Role
Ancuabe baseline vegetation monitoring assessment and programme, Ancuabe, Cabo Del Gado Province, Mozambique	Grafex Limitada Mozambique	Botanical specialist
Prospecting pit rehabilitation programme, Ancuabe, Cabo Del Gado Province, Mozambique	Grafex Limitada Mozambique	Botanical specialist, Environmental consultant
Mayfield Quarry rehabilitation plan, Grahamstown, Eastern Cape	Mayfield Quarry	Environmental consultant

Environmental Compliance, Auditing and ECO

Project Name & Location	Client Name	Role
Construction monitoring and DMR environmental authorisation, Hendrina, Mpumalanga Province	SANRAL SOC Ltd & Leo consulting engineers	Project Manager, ECO,
SANRAL Caledon N2 Section 3 road upgrade ECO Audits and Reporting, Caledon, Western Cape Province	JG Afrika Engineering	Project Manager, ECO

Environmental Permitting, S53, Water Use Licence (WUL), Waste Management Licence (WML) & Other Applications

Project Name & Location	Client Name	Role
VMC Mining permit renewal application, Rust De Winter, Gauteng	Vergenoeg Mining Company (Pty) Ltd	Environmental consultant
Zirco Resources Kamiesberg heavy mineral sand mine water use licence, Kamiesberg, Northern Cape	Zirco Roode Heuwel (Pty) Ltd	Environmental consultant

INFRASTRUCTURE DEVELOPMENT PROJECTS (BRIDGES, PIPELINES, ROADS, WATER RESOURCES, STORAGE, ETC)

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
S&EIR authorisation for the SANRAL Zandkraal-Windburg N1 road upgrade, Windburg, Free State Province	SANRAL SOC Ltd & SMEC Consulting Engineers	Project Manager, Environmental consultant, Public Participation
Thabazimbi Local Municipality Integrated Waste Management Plan, Thabazimbi, Limpopo Province	Thabazimbi Local Municipality & Anglo American Plc	Environmental consultant, Public Participation

Basic Assessments

Project Name & Location	Client Name	Role
SANRAL Masekwaspoort N1 Road Upgrade BA, Louis Trichardt, Limpopo Province	SANRAL SOC Ltd & Knight Piésold Consulting	Project Manager, Environmental consultant, Public Participation
SANRAL Polokwane N1 Ring Road Upgrade Basic Assessment, Polokwane, Limpopo Province	SANRAL SOC Ltd & KBK Engineers	Environmental consultant
Boshoek Loop Rail Upgrade BAR, Rustenburg, North-West Province	Transnet SOC Ltd	Project Manager, Environmental consultant, Wetland specialist, Public Participation
Heysterkrand Loop Rail Upgrade BAR, Rustenburg, North-West Province	Transnet SOC Ltd	Project Manager, Environmental consultant, Public Participation
SANRAL Bierspruit R510 road upgrade Basic Assessment, Thabazimbi, Limpopo Province	SANRAL SOC Ltd & Royal HaskoningDHV South Africa	Project Manager, Environmental consultant, Ecological specialist, Public Participation
Barberton IAPS Waste Water Treatment Works development BAR, Barberton, Mpumalanga Province	Umjindi Local Municipality and Rhodes University	Project Manager, Environmental consultant, Public Participation
SANRAL Caledon N2 Section 3 road upgrade project Basic Assessment, Caledon, Western Cape Province	JG Afrika Engineering	Project Manager, Environmental consultant, Ecological specialist, ECO

Environmental Compliance, Auditing and ECO

Project Name & Location	Client Name	Role
Construction Monitoring and DMR environmental authorisation, Hendrina, Mpumalanga Province	SANRAL SOC Ltd & Leo consulting engineers	Project Manager, Environmental consultant, ECO

Environmental Permitting, S53, Water Use Licence (WUL), Waste Management Licence (WML) & Other Applications

Project Name & Location	Client Name	Role
Water use licence for the SANRAL Zandkraal-Windburg N1 road upgrade and quarrying, Windburg, Free State Province	SANRAL SOC Ltd & SMEC Consulting Engineers	Project Manager, Environmental consultant, Public Participation
SANRAL Masekwaspoort N1 road upgrade water use licence application, Louis Trichardt, Limpopo Province	SANRAL SOC Ltd & Knight Piésold Consulting	Project Manager, Environmental consultant, Public Participation
Boshoek Loop Rail Upgrade water use licence application, Rustenburg, North-West Province	Transnet SOC Ltd	Project Manager, Environmental consultant, Wetland specialist, Public Participation
SANRAL Bierspruit R510 road water use licence, Thabazimbi, Limpopo Province	SANRAL SOC Ltd & Royal HaskoningDHV South Africa	Project Manager, Environmental consultant, Ecological specialist, Public Participation
Barberton IAPS Waste Water Treatment Works water use licence and SASS 5 assessment, Barberton, Mpumalanga Province	Umjindi Local Municipality and Rhodes University	Project Manager, Environmental consultant, Aquatic specialist, Public Participation
SANRAL Caledon N2 Section 3 road upgrade water use licence and specialist reports, Caledon, Western Cape Province	JG Afrika Engineering	Project Manager, Environmental consultant, Ecological specialist, Public Participation

HOUSING AND URBAN PROJECTS

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
Scoping and EIR authorisation, Water Use Licence, for the Ganspan tourism facility development, Jan Kempdorp, Northern Cape	Frances Baard Local Municipality	Project Manager, Environmental consultant, Public Participation

Basic Assessments

Project Name & Location	Client Name	Role
Basic Assessment for the office complex development within the Pretoria National Botanical Gardens, Pretoria, Gauteng	South African National Biodiversity Institute (SANBI)	Project Manager, Environmental consultant, Public Participation, ECO
Corner Berg and Drooge Street township development BAR, Zeerust, North-West Province	Ramotshere Moiloa Local Municipality	Project Manager, Environmental consultant, Public Participation
Corner Kort and Bree Street township development BAR, Zeerust, North-West Province	Ramotshere Moiloa Local Municipality	Project Manager, Environmental consultant, Public Participation
Hope Village township development BAR, Johannesburg, Gauteng	Door of Hope Charity Organisation	Project Manager, Environmental consultant, Public Participation
ACSA Jones Road Filling Station Basic Assessment, Johannesburg, Gauteng	Airports Company South Africa SOC Ltd	Project Manager, Environmental consultant, Public Participation

Screening Studies

Project Name & Location	Client Name	Role
Kibler Park Church Development ecological assessment, Johannesburg, Gauteng	Riverside Community Church	Project Manager, Ecological specialist
DEA Quoin Point dune specialist assessments, Gansbaai, Western Cape	Department of Environmental Affairs (national)	Project Manager, Environmental consultant

Environmental Compliance, Auditing and ECO

Project Name & Location	Client Name	Role
Transnet Depot and Siding compliance auditing programme, Johannesburg, Gauteng & Rustenburg, North-West Province	Transnet SOC Ltd	ECO
Environmental compliance monitoring for the office complex development within the Pretoria National Botanical Gardens, Pretoria, Gauteng	South African National Biodiversity Institute (SANBI)	Project Manager, Environmental consultant, Public Participation, ECO

Environmental Permitting, S53, Water Use Licence (WUL), Waste Management Licence (WML) & Other Applications

Project Name & Location	Client Name	Role
Atmospheric Emissions Licence, Section 24G for the ER Galvanizing plant and operations, Johannesburg, Gauteng	ER Galvanizers Pty Ltd	Project Manager, Environmental consultant, Public Participation
City of Johannesburg nature reserve proclamation (Phase II), Johannesburg, Gauteng	City of Johannesburg SOC Ltd	Project Manager, Environmental consultant, Public Participation, Botanical specialist
Hope Village township development water use licence, Johannesburg, Gauteng	Door of Hope Charity Organisation	Project Manager, Environmental consultant, Public Participation
Diamond Park Township Development Section 24G, Kimberley, Northern Cape	Sol Plaatje Local Municipality	Project Manager, Environmental consultant, Public Participation
Boschendal Wine Estate hydro-electric power station Water Use Licence and S24G application, Stellenbosch, Western Cape	Boschendal Wine Estate	Environmental consultant
City of Johannesburg nature reserve proclamation boundary verification (Phase I), Johannesburg, Gauteng	City of Johannesburg SOC Ltd	Environmental consultant
PRDW Cape Town harbour breakwater rehabilitation EMPr, Cape Town, Western Cape	PRDW Engineering	Project Manager, Environmental consultant
PRDW Bushman's Estuary dune encroachment project management, Kenton-on-sea, Eastern Cape	PRDW Engineering	Environmental consultant
Corner Berg and Drooge Street township development water use licence application, Zeerust, North-West Province	Ramotshere Moiloa Local Municipality	Project Manager, Environmental consultant
Corner Kort and Bree Street township development water use licence, Zeerust, North-West Province	Ramotshere Moiloa Local Municipality	Project Manager, Environmental consultant
Bloekombos (Kraaifontein) hospital water use licence application, Cape Town, Western Cape	Western Cape Provincial Government (PGWC)	Project Manager, Environmental consultant, Botanical specialist, Wetland specialist

SPECIALIST STUDIES

Project Name & Location	Client Name	Role
Boshoek Loop Rail Upgrade BAR and Water Use Licence, Rustenburg, North-West Province	Transnet SOC Ltd	Wetland specialist
City of Johannesburg nature reserve proclamation (Phase II), Johannesburg, Gauteng	City of Johannesburg SOC Ltd	Botanical specialist
SANRAL Bierspruit R510 road upgrade Water Use Licence, Basic Assessment, Thabazimbi, Limpopo Province	SANRAL SOC Ltd & Royal HaskoningDHV South Africa	Ecological specialist
Kibler Park Church Development Ecological Assessment, Johannesburg, Gauteng	Riverside Community Church	Ecological specialist
Barberton IAPS Waste Water Treatment Works development BAR, water use licence and SASS 5 assessment, Barberton, Mpumalanga Province	Umjindi Local Municipality and Rhodes University	Aquatic specialist
Wijnberg Trust Dam 2 expansion Aquatic Impact Assessment	Wijnberg Trust	Aquatic specialist
SANRAL Caledon N2 Section 3 road upgrade project Basic Assessment, Water Use Licence and Specialist reports, Caledon, Western Cape Province	JG Afrika Engineering	Ecological specialist
City of Johannesburg nature reserve proclamation boundary verification (Phase I), Johannesburg, Gauteng	City of Johannesburg SOC Ltd	GIS specialist
iGas integrated biodiversity screening, Saldanha, Western Cape	Central Energy Fund - iGas (subsidiary)	Faunal specialist (assistant)
Bloekombos (Kraaifontein) botanical baseline and impact assessment, Cape Town, Western Cape	Western Cape Provincial Government (PGWC)	Wetland specialist Botanical specialist

savannah environmental

1st Floor, Block 2, 5 Woodlands Drive Office Park
Woodlands Drive, Woodmead
Johannesburg, South Africa

Email: nicolene@savannahsa.com
Tel: +27 (11) 656 3237

CURRICULUM VITAE OF NICOLENE VENTER

Profession : Public Participation and Social Consultant

Specialisation: Public participation process; stakeholder engagement; facilitation (workshops, focus group and public meetings; public open days; steering committees); monitoring and evaluation of public participation and stakeholder engagement processes

Work Experience: 21 years' experience as a Public Participation Practitioner and Stakeholder Consultant

VOCATIONAL EXPERIENCE

Over the past 21 years Nicolene established herself as an experienced and well recognised public participation practitioner, facilitator and strategic reviewer of public participation processes. She has experience in managing public participation projects and awareness creation programmes. Her experience includes designing and managing countrywide public participation and awareness creation projects, managing multi-project schedules, budgets and achieving project goals. She has successfully undertaken several public participation processes for EIA, BA and WULA projects. The EIA and BA process include linear projects such as the NMPP, Eskom Transmission and Distribution power lines as well as site specific developments such as renewable energy projects i.e. solar, photo voltaic and wind farms. She also successfully managed stakeholder engagement projects which were required to be in line with the Equator Principles.

SKILLS BASE AND CORE COMPETENCIES

- Project Management
- Public Participation, Stakeholder Engagement and Awareness Creation
- Public Speaking and Presentation Skills
- Facilitation (workshops, focus group meetings, public meetings, public open days, working groups and committees)
- Social Assessments (Stakeholder Analysis / Stakeholder Mapping)
- Monitoring and Evaluation of Public Participation and Stakeholder Engagement Processes
- Community Liaison
- IFC Performance Standards
- Equator Principles
- Minute taking, issues mapping, report writing and quality control

EDUCATION AND PROFESSIONAL STATUS

Degrees:

- Higher Secretarial Certificate, Pretoria Technicon (1970)

Short Courses:

- Techniques for Effective Public Participation, International Association for Public Participation, IAP2 (2008)
- Foundations of Public Participation (Planning and Communication for Effective Public Participation, IAP2 (2009)
- Certificate in Public Relations, Public Relation Institute of South Africa, Damelin Management School (1989)

Professional Society Affiliations:

- Board Member of International Association for Public Participation (IAP2): Southern Africa

EMPLOYMENT

Date	Company	Roles and Responsibilities
November 2018 – current	Savannah Environmental (Pty) Ltd	Public Participation and Social Consultant <u>*Tasks include:*</u> *Tasks include: Drafting of a Public Participation Plan with key deliverable dates and methodology to be followed, Background Information Document, Letters to Stakeholders and Interested and/or Affected Parties (I&APs) inclusive of key project deliverables and responses to questions / concerns raised; Stakeholder identification; facilitating stakeholder workshops, focus group and public meetings; conduct one-on-one consultation with Community Leaders, Tribal Chiefs, affected landowners, etc.* *Managing interaction between Stakeholders and Team Members, liaising with National, Provincial and Local Authorities, managing community consultation and communications in project affected areas, attend to the level of technical information communicated to and consultation with all level of stakeholders involved.*
2016 – October 2018	Imaginative Africa (Pty) Ltd *(company owned by Nicolene Venter)*	Independent Consultant *Consulting to various Environmental Assessment Practitioners for Public Participation and Stakeholder Engagements:* <u>*Tasks include:*</u> *Tasks include: Drafting of a Public Participation Plan with key deliverable dates and methodology to be followed, Background Information Document, Letters to Stakeholders and Interested and/or Affected Parties (I&APs) inclusive of key project deliverables and responses to questions / concerns raised; Stakeholder identification; facilitating stakeholder workshops, focus group and public meetings; conduct one-on-one consultation with Community Leaders, Tribal Chiefs, affected landowners, etc.* *Managing interaction between Stakeholders and Team Members, liaising with National, Provincial and Local Authorities, managing community consultation and communications in project*

		affected areas, attend to the level of technical information communicated to and consultation with all level of stakeholders involved *<u>Clients</u>:* *SiVEST Environmental, Savannah Environmental, Baagi Environmental; Royal Haskoning DHV (previously SSI)*
2013 - 2016	Zitholele Consulting *Contact person: Dr Mathys Vosloo* *Contact number: 011 207 2060*	Senior Public Participation Practitioner and Project Manager <u>Tasks included:</u> *Project managed public participation process for EIA/BA/WULA/EAL projects. Manages two Public Participation Administrators. Public Participation tasks as outlined as above and including financial management of public participation processes.*
2011 - 2013	Imaginative Africa (Pty) Ltd *(company owned by Nicolene Venter)*	Independent Consultant Consulting to various Environmental Assessment Practitioners for Public Participation and Stakeholder Engagements <u>Tasks included:</u> *Drafting of a Public Participation Plan with key deliverable dates and methodology to be followed, Background Information Document, Letters to Stakeholders and Interested and/or Affected Parties (I&APs) inclusive of key project deliverables and responses to questions / concerns raised; Stakeholder identification; facilitating stakeholder workshops, focus group and public meetings; conduct one-on-one consultation with Community Leaders, Tribal Chiefs, affected landowners, etc.* *Managing interaction between Stakeholders and Team Members, liaising with National, Provincial and Local Authorities, managing community consultation and communications in project affected areas, attend to the level of technical information communicated to and consultation with all level of stakeholders involved* *<u>Clients</u>:* *Bohlweki Environmental, Bembani Sustainability (Pty) Ltd; Naledzi Environmental*
2007 – 2011	SiVEST SA (Pty) Ltd *Contact person: Andrea Gibb* *Contact number: 011 798 0600*	Unit Manager: Public Participation Practitioner *<u>Tasks included:</u>* *Project managed public participation process for EIA/BA projects. Manages two Junior Public Participation Practitioners. Public Participation*

		tasks as outlined as above and including financial management of public participation processes.
2005 – 2006	Imaginative Africa (Pty) Ltd *(company owned by Nicolene Venter)*	Independent Consultant Public Participation and Stakeholder Engagement Practitioner <u>*Tasks included:*</u> *Drafting of a Public Participation Plan with key deliverable dates and methodology to be followed, Background Information Document, Letters to Stakeholders and Interested and/or Affected Parties (I&APs) inclusive of key project deliverables and responses to questions / concerns raised; Stakeholder identification; facilitating stakeholder workshops, focus group and public meetings; conduct one-on-one consultation with Community Leaders, Tribal Chiefs, affected landowners, etc.* *Managing interaction between Stakeholders and Team Members, liaising with National, Provincial and Local Authorities, managing community consultation and communications in project affected areas, attend to the level of technical information communicated to and consultation with all level of stakeholders involved.* <u>*Clients:*</u> *Manyaka-Greyling-Meiring (previously Greyling Liaison and currently Golder Associates)*
1997 - 2004	Imaginative Africa (Pty) Ltd *(company owned by Nicolene Venter)*	Independent Consultant: Public Participation Practitioner. <u>*Tasks included:*</u> *Drafting of a Public Participation Plan with key deliverable dates and methodology to be followed, Background Information Document, Letters to Stakeholders and Interested and/or Affected Parties (I&APs) inclusive of key project deliverables and responses to questions / concerns raised; Stakeholder identification; facilitating stakeholder workshops, focus group and public meetings; conduct one-on-one consultation with Community Leaders, affected landowners, etc.* *Managing interaction between Stakeholders and Team Members, liaising with National, Provincial Local Authorities, managing community consultation and communications in project affected areas, attend to the level of technical*

		information communicated to and consultation with all level of stakeholders involved. *<u>Clients</u>:* *Greyling Liaison (currently Golder Associates); Bembani Sustainability (Pty) Ltd; Lidwala Environmental; Naledzi Environmental*

PROJECT EXPERIENCE

<u>RENEWABLE POWER GENERATION PROJECTS: PHOTOVOLTAIC SOLAR ENERGY FACILITIES</u>

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	***Client Name***	***Role***
Lichtenburg PVs (3 PVs) & Power Lines (grid connection), Lichtenburg, North West Province	*Atlantic Energy Partners* *EAP: Savannah Environmental*	*Project Manage the Public Participation Process* *Facilitate all meetings* *Consultation with Government Officials, Key Stakeholders, Landowners & Community Leaders*
Allepad PVs 4 PVs) & Power Lines (grid connection), Upington, Northern Cape Province	*IL Energy* *EAP: Savannah Environmental*	
Hyperion Solar PV Developments (4 PVs) and Associated Infrastructures, Kathu, Northern Cape Province	*Building Energy* *EAP: Savannah Environmental*	
Aggeneys Solar PV Developments (2 PVs) and Associated Infrastructures, Aggeneys, Northern Cape Province	*Atlantic Energy Partners and ABO Wind* *EAP: Savannah Environmental*	

Project Name & Location	***Client Name***	***Role***
Tlisitseng PV, including Substations & Power Lines, Lichtenburg, North West Province	*BioTherm Energy* *EAP: SiVEST*	*Public Participation, Landowner and Community Consultation*
Sendawo PVs, including Substations & Power Lines, Vryburg, North West Province		
Helena Solar 1, 2 and 3 PVs, Copperton, Northern Cape Province		
Farm Spes Bona 23552 Solar PV Plants, Bloemfontein, Free State Province	*Surya Power* *EAP: SiVEST*	*Public Participation, Landowner and Community Consultation*
De Aar Solar Energy Facility, De Aar, Northern Cape Province	*South Africa Mainstream Renewable Power Developments* *EAP: SiVEST*	*Public Participation, Landowner and Community Consultation*
Droogfontein Solar Energy Facility, Kimberley, Northern Cape Province		
Kaalspruit Solar Energy Facility, Loeriesfontein, Northern Cape Province		
Platsjambok East PV, Prieska, Northern Cape Province		
Renosterburg PV, De Aar, Northern Cape Province	*Renosterberg Wind Energy Company* *EAP: SiVEST*	*Public Participation, Landowner and Community Consultation*

19MW Solar Power Plant on Farm 198 (Slypklip), Danielskuil, Northern Cape Province	*Solar Reserve South Africa* *EAP: SiVEST*	*Public Participation, Landowner and Community Consultation*

Basic Assessments and Environmental Management Programmes – Located within the Renewable Energy Development Zones (REDZ)

Project Name & Location	***Client Name***	***Role***
Moeding Solar PV Solar Energy Facility, Vryburg, North West Province	*Kabi Solar* *EAP: Savannah Environmental*	*Project Manage the Public Participation Process* *Facilitate all meetings* *Consultation with Government Officials, Key Stakeholders, Landowners & Community Leaders*
Sirius Solar PV Solar Energy Facility, Upington, Northern Cape Province	*SOLA Future Energy* *EAP: Savannah Environmental*	

RENEWABLE POWER GENERATION PROJECTS: WIND ENERGY FACILITIES

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	***Client Name***	***Role***
Aletta Wind Farm, Copperton, Northern Cape Province	*BioTherm Energy* *EAP: SiVEST*	*Public Participation*
Eureka Wind Farm, Copperton, Northern Cape Province		
Loeriesfontein Wind Farm, Loeriesfontein, Northern Cape Province	*South Africa Mainstream Renewable Power Developments* *EAP: SiVEST*	*Public Participation*
Droogfontein Wind Farm, Loeriesfontein, Northern Cape Province		
Four Leeuwberg Wind Farms, Loeriesfontein, Northern Cape Province		
Noupoort Wind Farm, Noupoort, Northern Cape Province		
Mierdam PV & Wind Farm, Prieska, Northern Cape Province		
Platsjambok West Wind Farm & PV, Prieska, Northern Cape Province		

Basic Assessments and Environmental Management Programmes – Located within the Renewable Energy Development Zones (REDZ)

Project Name & Location	**Client Name**	**Role**
Nama Wind Energy Facility, Northern Cape Province	*Genesis ECO* *EAP: Savannah Environmental*	*Project Manage the Public Participation Process* *Facilitate all meetings* *Consultation with Government Officials, Key Stakeholders, Landowners & Community Leaders*
Zonnequa Wind Energy Facility, Northern Cape Province		

Environmental Authorisation Amendments

Project Name & Location	***Client Name***	***Role***

Beaufort West 280MW Wind Farm into two 140MW Trakas and Beaufort West Wind Farms, Western Cape	*South Africa Mainstream Renewable Power Developments* *EAP: SiVEST*	*Public Participation*

RENEWABLE POWER GENERATION PROJECTS: CONCENTRATED SOLAR FACILITIES (CSP)

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	***Client Name***	***Role***
Upington Concentrating Solar Plant and associated Infrastructures, Northern Cape Provionce	*Eskom Holdings* *EAP: Bohlweki Environmental*	*Public Participation*

GRID INFRASTRUCTURE PROJECTS

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	***Client Name***	***Role***
Pluto-Mahikeng Main Transmission Substation and 400kV Power Line (Carletonville to Mahikeng), Gauteng and North West Provinces	*Eskom Holdings* *EAP: Baagi Environmental*	
Thyspunt Transmission Lines Integration Project, Eastern Cape Province	*Eskom Holdings* *EAP: SiVEST*	*Public Participation, Landowner and Community Consultation*
Westrand Strengthening Project, Gauteng Province		*Public Participation,*
Mookodi Integration Project, North-West Province		
Transnet Coallink, Mpumalanga and KwaZulu-Natal Provinces		
Delarey-Kopela-Phahameng Distribution power line and newly proposed Substations, North-West Province		*Public Participation, Landowner and Community Consultation*
Invubu-Theta 400kV Eskom Transmission Power Line, KwaZulu-Natal Province	*Eskom Holding* *EAP: Bembani Environmental*	

Facilitation

Project Name & Location	***Client Name***	***Meeting Type***
Bloemfontein Strengthening Project, Free State Province	*Eskom Holdings* *EAP: Baagi Environmental*	*Public Meetings*
Mooidraai-Smitkloof 132kV Power Line and Substation, Northern Cape Province	*Eskom Holdings* *EAP: SSI*	*Focus Group Meetings*
Aggeneis-Oranjemond 400kV Eskom Transmission Power Line, Northern Cape Province	*Eskom Holdings* *EAP: Savannah Environmental*	*Focus Group Meetings & Public Meetings*
Ariadne-Eros 400kV/132kV Multi-Circuit Transmission Power Line (Public Meetings)	*Eskom Holdings* *EAP: ACER Africa*	*Public Meetings*
Majuba-Venus 765kV Transmission Power Lines, Mpumlanaga Province		*Public Meetings*

Basic Assessments and Environmental Management Programmes

Project Name & Location	***Client Name***	***Role***

Melkhout-Kudu-Grassridge 132kV Power Line Project (project not submitted to DEA), Eastern Cape Province	*Eskom Holdings* *EAP: SiVEST*	*Public Participation, Landowner and Community Consultation*
Tweespruit-Welroux-Driedorp-Wepener 132Kv Power Line, Free State Province		*Public Participation, Landowner and Community Consultation*
Kuruman 132Kv Power Line Upgrade, Northern Cape Province	*Eskom Holdings* *EAP: Zitholele*	*Public Participation, Landowner and Community Consultation*
Vaalbank 132Kv Power Line, Free State Province		*Public Participation, Landowner and Community Consultation*
Pongola-Candover-Golela 132kV Power Line (Impact Phase), KwaZulu-Natal Province		*Public Participation, Landowner and Community Consultation*
Ndumo-Geziza 132kV Power Line, KwaZulu-Natal Province		*Public Participation, Landowner and Community Consultation*

Screening Studies

Project Name & Location	***Client Name***	***Role***
Potential Power Line Alternatives from Humansdorp to Port Elizabeth, Eastern Cape Province	*Nelson Mandela Bay Municipality* *EAP: SiVEST*	*Social Assessment*

CONVENTIONAL POWER GENERATION PROJECTS (COAL, GAS AND ASSOCIATED INFRASTRUCTURE)

Stakeholder Engagement

Project Name & Location	***Client Name***	***Role***
Determination, Review and Implementation of the Reserve in the Olifants/Letaba System	*Department of Water and Sanitation* *Golder Associates*	*Secretarial Services*
Orange River Bulk Water Supply System		
Levuvu-Letaba Resources Quality Objectives		

Facilitation

Project Name & Location	***Client Name***	***Meeting Type***
Thabametsi IPP Power Station, Limpopo Province	*Thabametsi Power Company* *EAP: Savannah Environmental*	*Focus Group Meeting & Public Meeting*

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	***Client Name***	***Role***
Richards Bay Combined Cycle Power Plant, Richards Bay, Kwa-Zulu Natal Province (Impact Phase)	*Eskom Holdings* *EAP: Savannah Environmental*	*Public Participation*
Medupi Flue Gas Desulphurisation Project (up to completion of Scoping Phase), Limpopo Province	*Eskom Holdings SOC Ltd* *EAP: Zitholele Consulting*	*Public Participation, Landowner and Community Consultation*
Kendal 30-year Ash Disposal Facility, Mpumalanga Province		
Kusile 60-year Ash Disposal Facility, Mpumalanga Province		

Camden Power Station Ash Disposal Facility, Mpumalanga Province		
Tutuka Fabric Filter Retrofit and Dust Handling Plant Projects, Mpumalanga Province	*Eskom Holdings SOC Ltd* *EAP: Lidwala Environmental*	*Public Participation, Landowner and Community Consultation*
Eskom's Majuba and Tutuka Ash Dump Expansion, Mpumalanga Province		*Public Participation, Landowner and Community Consultation*
Hendrina Ash Dam Expansion, Mpumalanga Province		*Public Participation, Landowner and Community Consultation*

INFRASTRUCTURE DEVELOPMENT PROJECTS (BRIDGES, PIPELINES, RAILWAY LINES, ROADS, WATER RESOURCES, STORAGE FACILITIES, ETC)

Facilitation

Project Name & Location	***Client Name***	***Meeting Type***
Determination, Review and Implementation of the Reserve in the Olifants/Letaba System	*Department of Water and Sanitation* *Golder Associates*	*Secretarial Services*
Orange River Bulk Water Supply System	*Department of Water and Sanitation* *Golder Associates*	*Secretarial Services*
Levuvu-Letaba Resources Quality Objectives	*Department of Water and Sanitation* *Golder Associates*	*Secretarial Services*
SmancorCR Chemical Plant (Public Meeting), Gauteng Province	*Samancor Chrome (Pty) Ltd* *EAP: Environment al Science Associates*	*Public Meeting*
SANRAL N4 Toll Highway Project (2nd Phase), Gauteng & North West Provinces	*Department of Transport* *EAP:*	*Public Meetings*

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	***Client Name***	***Role***
Transnet's New Multi-Products Pipeline traversing Kwa-Zulu Natal, Free State and Gauteng Provinces	*Transnet* *EAP: Bohlweki Environmental*	*Public Participation*

Basic Assessments

Project Name & Location	***Client Name***	***Role***
Realignment of the Bulshoek Dam Weir near Klawer and the Doring River Weir near Clanwilliam, Western Cape Province	*Dept of Water and Sanitation* *EAP: Zitholele*	*Public Participation*

MINING SECTOR

Environmental Impact Assessment and Environmental Management Programme

Project Name & Location	**Client Name**	**Role**
Zero Waste Recovery Plant at highveld Steel, Mpumalanga Province	*Anglo African Metals* *EAP: Savannah Environmental*	*Public Participation*
Koffiefontein Slimes Dam, Free State Province	*Petra Diamond Mines* *EAP: Zitholele*	*Public Participation*

Baobab Project: Ethenol Plant, Chimbanje, Middle Sabie, Zimbabwe	*Applicant: Green Fuel* *EAP: SiVEST*	*Public Participation & Community Consultation*
BHP Billiton Energy Coal SA's Middelburg Water Treatment Plant, Mpumalanga	*BHP Billiton Group* *EAP: Jones & Wagener*	*Public Participation*

1st Floor, Block 2, 5 Woodlands Drive Office Park
Woodlands Drive, Woodmead
Johannesburg, South Africa

Email: hermien@savannahsa.com
Tel: +27 (11) 656 3237

CURRICULUM VITAE OF HERMIEN SLABBERT

Profession : Trainee Environmental Consultant

Specialisation: Environmental Permitting, Project Management, Environmental Impact Assessments, Geographical Information Systems (GIS), Project administration

Work Experience: 2 years of experience in renewable energy

VOCATIONAL EXPERIENCE

Hermien Slabbert has two years of experience in the renewable energy sector, specifically relating to Solar Photovoltaic projects. She has experience in project management as well as environmental permitting.

SKILLS BASE AND CORE COMPETENCIES

- Project management
- Environmental Permitting
- Administrative tasks
- GIS Mapping

EDUCATION AND PROFESSIONAL STATUS

Degrees:

- B.Sc. (Hons) Environmental Management (2014), North-West University, Potchefstroom
- B.Sc. Degree, Geography and Geology (2013), North-West University, Potchefstroom

Courses:

- Environmental Law (2017), Centre for Environmental Management, Johannesburg
- Occupational Health and Safety law (2018), Centre for Environmental Management, Johannesburg

EMPLOYMENT

Date	Company	Roles and Responsibilities
January 2019 – current	Savannah Environmental (Pty) Ltd	Trainee Environmental Consultant *Tasks include: Environmental Impact Assessment Reports, Basic Assessments and Environmental management programmes; Specialist management and the Process of EIA Applications.* GIS (utilising ArcGIS) *Tasks include: Analysis and manipulation of data and compilation of maps.*
January 2017 – October 2017	FedGroup Holdings (Pty) Ltd	Project coordinator *Tasks include:* *Project coordination, project finance, financial modelling, project proposals*
August 2015- December 2016	Subsolar Energy (Pty) Ltd	Project Assistant *Tasks include:* *Environmental Permitting, Specialist management, Project management, Site selection*

PROJECT EXPERIENCE

RENEWABLE POWER GENERATION PROJECTS: WIND ENERGY FACILITIES

Part 1 Amendment Applications

Project Name & Location	*Client Name*	*Role*
Rheboksfontein WEF, Western Cape Province	*Moyeng Energy*	*EAP*
Dorper WEF, Eastern Cape Province	*Dorper Wind Farm*	*EAP*
West Coast One WEF, Western Cape Province	*Aurora Wind*	*EAP*

Part 2 Amendment Applications

Project Name & Location	*Client Name*	*Role*
Great Karoo WEF, Northern Cape Province	*African Clean Energy Developments*	*EAP*

RENEWABLE POWER GENERATION PROJECTS: SOLAR ENERGY FACILITIES

Project Management

Project Name & Location	*Client Name*	*Role*
Gamma SEF, North West Province	*Subsolar*	*Project Manager*
Khubu SEF, North West Province	*Subsolar*	*Project Manager*
Boitshoko SEF, Northern Cape Province	*Subsolar*	*Project Manager*
Camel Thorn SEF, Northern Cape Province	*Subsolar*	*Project Manager*
Beta SEF, Free state Province	*Subsolar*	*Project Manager*
Oryx SEF, Free state Province	*Subsolar*	*Project Manager*
Kappa SEF, North West Province	*Subsolar*	*Project Manager*

Delta SEF, North West Province	*Subsolar*	*Project Manager*

Geographical Information Systems (GIS)

Project Name & Location	**Client Name**	**Role**
Steynsrus PV 1, Free state Province	*Cronimet Power Solutions*	*GIS Consultant*
Steynsrus PV 2, Free state Province	*Cronimet Power Solutions*	*GIS Consultant*
Heuningspruit PV 1, Free state Province	*Cronimet Power Solutions*	*GIS Consultant*
Aggeneys PV 1, Northern Cape Province	*ABO Wind*	*GIS Consultant*
Aggeneys PV 2, Northern Cape Province	*ABO Wind*	*GIS Consultant*
Sirius PV3, Northern Cape Province	*Sola future*	*GIS Consultant*
Sirius PV4, Northern Cape Province	*Sola future*	*GIS Consultant*

Environmental Permitting, S53, Water Use Licence (WUL), Waste Management Licence (WML) & Other Applications

Project Name & Location	***Client Name***	***Role***
Gamma SEF, North West Province	*Subsolar*	*Project Manager*
Camel Thorn SEF, Northern Cape Province	*Subsolar*	*Project Manager*
Boitshoko SEF, Northern Cape Province	*Subsolar*	*Project Manager*
Khubu SEF, North West Province	*Subsolar*	*Project Manager*

GAS PROJECTS

Geographical Information Systems (GIS)

Project Name & Location	***Client Name***	***Role***
Richards Bay Combined Cycle Power Plant (CCPP) power plant, KwaZulu-Natal (EIA phase)	*Eskom*	*GIS Consultant*

TRANSPORT SECTOR PROJECTS

Basic Assessment

Project Name & Location	***Client Name***	***Role***
Dwarsrug Access Road, Northern Cape Province	*Mainstream Renewable Energy Developments*	*EAP*

Geographical Information Systems (GIS)

Project Name & Location	**Client Name**	**Role**
Dwarsrug Access Road, Northern Cape Province	*Mainstream Renewable Energy Developments*	*GIS Consultant*

INFRASTRUCTURE DEVELOPMENT PROJECTS (BRIDGES, PIPELINES, ROADS, WATER RESOURCES, STORAGE, ETC)

Basic Assessments

Project Name & Location	***Client Name***	***Role***
Nigel gas transmission pipeline, Gauteng Province	*Energy Group*	*EAP*

Geographical Information Systems (GIS)

Project Name & Location	**Client Name**	**Role**
Nigel Gas Transmission Pipeline, Gauteng Province	*Energy Group*	*GIS Consultant*
Wilmar Oil Pipeline	*Wilmar Processing*	*GIS Consultant*

GRID NFRASTRUCTURE PROJECTS

Geographical Information Systems (GIS)

Project Name & Location	Client Name	Role
Bloemhoek 1 Power Line, Northern Cape Province	*ABO Wind*	*GIS Consultant*
Bloemhoek 2 Power Line, Northern Cape Province	*ABO Wind*	*GIS Consultant*

savannah environmental

1st Floor, Block 2, 5 Woodlands Drive Office Park
Woodlands Drive, Woodmead
Johannesburg, South Africa

Email: shaun@savannahsa.com
Tel: +27 (11) 656 3237

CURRICULUM VITAE OF SHAUN TAYLOR

Profession : Environmental and Permitting Lead Consultant

Specialisation: Environmental Impact Assessments; Strategic Environmental Assessments; Environmental permitting compliance, advice & assurance; Water Use Licenses; Project Management; Wetland Assessments.

Work Experience: Eleven (11) years' experience in the environmental field

OCATIONAL EXPERIENCE

Shaun's highest qualification is a Master of Science Degree in Aquatic Health. Shaun has an in-depth understanding of environmental and water related South African legislation. Applicable legislation includes the National Environmental Management Act, 1998 (Act No. 107 of 1998), the Environmental Impact Assessment (EIA) Regulations (2006, 2010 and 2014, as amended) and the National Water Act, 1998 (Act No. 36 of 1998). Over and above a number of other projects, Shaun has successfully conducted and obtained environmental approvals for numerous renewable energy (wind and solar) developments as well as for infrastructure (roads, water pipeline and power line) related projects. Shaun has excellent experience in dealing with the entire environmental authorization (EA) process from beginning to end i.e. submission of applications, undertaking Environmental Impact Assessments and Basic Assessments (BAs), conducting EA amendments, extension applications and compiling Draft and Final Environmental Management Programmes (EMPrs). Shaun is well acquainted and experienced in dealing with the key provincial and national environmental authorities, other organs of state as well as any other key stakeholders.

Within the water field, Shaun has completed numerous water use license applications (WULAs), General Authorisations (GAs), Risk Assessments and WULA compliance monitoring for various developments. Shaun is also specialised in wetland ecology and operates as a wetland specialist. Shaun has undertaken and completed numerous wetland and riparian assessments for renewable energy, linear projects as well as site specific projects. Shaun has also undertaken a wetland offset plan and several wetland rehabilitation plans for various developments.

SKILLS BASE AND CORE COMPETENCIES

- Environmental Project Management
- Environmental Impact Assessments and Basic Assessments
- Environmental Management Programmes
- Environmental Compliance Monitoring
- Environmental Amendments
- Strategic Environmental Assessments
- Environmental Management
- Public and Stakeholder Engagement
- Water Use License Applications
- General Authorisations

- Risk Assessment Matrix
- Wetland Delineation, Functional and Impact Assessments
- Geographic Information Systems (GIS)

EDUCATION AND PROFESSIONAL STATUS

Degrees:

- M.Sc. Aquatic Health, University of Johannesburg, Johannesburg (2011)
- B.Sc (Hons) Geography and Environmental Studies, University of Witwatersrand, Johannesburg (2010)
- B.A Geography and Environmental Science, Monash University, Johannesburg (2008)

Short Courses:

- National Training and Development Buffer Zone Workshop, Eco-pulse (2015)
- Integrated Water Resources Management (IWRM), the National Water Act (NWA), and Water Use Authorisations, focusing on Water Use License Applications – Procedures, Guidelines, Integrated Water and Waste Management Plan (IWWMP), Carin Bosman Sustainable Solutions (2014)
- Grass identification short course, Bushveld Eco Services (2010)
- Wildflower identification short course, Bushveld Eco Services (2010)
- Veld management short course, Bushveld Eco Services (2010)
- Short course and certification in Wetland Delineation and Rehabilitation Training Course from the School of Continuing Education, University of Pretoria (2008)

Professional Society Affiliations:

- Member of the South African Wetland Society (SAWS) (Current)
- Registration pending with the South African Council for Natural Scientific Professions as a Professional Natural Scientist: Environmental Scientist (Current)

Other Relevant Skills:

- Project Management Course, SiVEST (2017)

EMPLOYMENT

Date	Company	Roles and Responsibilities
June 2018 – Current:	Savannah Environmental (Pty) Ltd	Environmental and Permitting Lead Consultant *Tasks include: undertaking strategic environmental assessments, environmental impact assessments, basic assessments, environmental management programmes (EMPrs), environmental amendments, environmental screening and due diligence assessments, water use license applications, wetland assessments and rehabilitation plans. Ensuring environmental compliance on permitting processes. Client liaison and relationship management.*
November 2010 – May 2018	SiVEST South Africa (Pty) Ltd	Environmental Scientist *Tasks included: conducting environmental impact assessments, basic assessments and water use license application processes, undertaking amendment and exemption*

Date	Company	Roles and Responsibilities
		applications, general project management, report writing, marketing and proposal writing, client liaison and relationship management, invoicing, conducting specialist riparian/wetland delineation and functional assessments, environmental and water related compliance monitoring and auditing.
October 2009 – March 2010	Envirokey cc	Junior Environmental Consultant and GIS support *Tasks included: being responsible for managing basic assessments, report writing, conducting specialist wetland assessments, auditing procedures and GIS mapping.*
August 2007 – September 2009	Holgate Meyer and Associates Environmental Management Services	Junior Environmental Consultant *Tasks included: being responsible for managing basic assessments, report writing, conducting specialist wetland assessments, environmental auditing procedures and GIS mapping.*

PROJECT EXPERIENCE

Project experience includes environmental approvals for numerous renewable energy (wind and solar) developments as well as for infrastructure (roads, water pipeline and power line) related projects. Within the water field, project experience includes numerous water use license applications, general authorisations, risk assessments and compliance monitoring for various developments. In terms of wetland assessments, project experience includes numerous wetland and riparian delineation, functional and impact assessments for renewable energy, linear projects and site-specific projects. The wetland experience also includes a wetland offset plan and several wetland rehabilitation plans (various types of developments).

RENEWABLE POWER GENERATION PROJECTS: SOLAR ENERGY FACILITIES

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	***Client Name***	***Role***
Hyperion 1, 2, 3 and 4 – 75MW Photovoltaic (PV) Plants near Kathu, Northern Cape Province	*Building Energy South Africa*	*Project leader, environmental consultant, public participation*
Loeriesfontein PV Plant, Northern Cape Province	*Mainstream Renewable Power South Africa*	*Environmental consultant, public participation, wetland specialist*
Renosterberg PV Plant near De Aar, Northern Cape Province	*Renosterberg Wind Energy Corporation (RWEC) & Industrial Development Corporation (IDC) of South Africa*	*Environmental consultant, public participation, wetland specialist*
Droogfontein II - 70MW Solar Photovoltaic Power Plant near Kimberley, Northern Cape Province	*Mainstream Renewable Power South Africa*	*Environmental consultant, wetland specialist*
Construction of a Concentrated PV/ PV Plant in De Aar, Northern Cape	*Mainstream Renewable Power South Africa*	*Environmental consultant, wetland specialist*

Basic Assessments

Project Name & Location	***Client Name***	***Role***
Sirius Solar 3 and 4 100MW PV Plants near Upington, Northern Cape Province	*SOLA Future Energy*	*Project leader, environmental consultant, public participation*
Aggeneys 2 X 100MW PV Plants, Northern Cape Province	*Atlantic Energy Partners & ABO Wind*	*Project leader, environmental consultant, public participation*
Proposed development of a 19MW Photovoltaic Solar Power Plant near Kimberley, Northern Cape Province	*SolarReserve South Africa (Pty) Ltd*	*Environmental consultant, public participation, wetland specialist*
Proposed development of a 19MW Photovoltaic Solar Power Plant near Danielskuil, Northern Cape Province	*SolarReserve South Africa (Pty) Ltd*	*Environmental consultant, public participation, wetland specialist*
Loeriesfontein 70MW PV Plant, Northern Cape Province	*Biotherm Energy*	*Environmental consultant*
Droogfontein II - 70MW Solar Photovoltaic Power Plant near Kimberley, Northern Cape Province	*SunEdison*	*Project leader, environmental consultant*

Environmental Permitting, S53, Water Use Licence (WUL), Waste Management Licence (WML) & Other Applications

Project Name & Location	***Client Name***	***Role***
Sol Invictus 3 & 4 PV Part 2 Amendment Application, Northern Cape Province	*Building Energy South Africa*	*Project leader, environmental consultant*
Aries PV Part 1 Amendment Application, Northern Cape Province	*Biotherm Energy (Pty) Ltd*	*Project leader, environmental consultant*
Konkoonsies PV Part 1 Amendment Application, Northern Cape Province	*Biotherm Energy (Pty) Ltd*	*Project leader, environmental consultant*
Steynsrus PV 1 & PV 2 Financial Close, Free State Province	*Cronimet*	*Project leader, environmental consultant*
Heuningspruit PV 1 Financial Close, Free State Province	*Cronimet*	*Project leader, environmental consultant*
Integrated Water Use License Application for the Construction of a Concentrated PV/ PV Plant in De Aar, Northern Cape Province	*Mainstream Renewable Power South Africa*	*Environmental consultant, wetland specialist*
Proposed Construction of the De Wildt Solar Photovoltaic Power Plant, General Authorisation and Risk Assessment, Gauteng Province	*SunEdison*	*Project leader, environmental consultant, wetland specialist*
Loeriesfontein Photovoltaic (PV) Plant Vegetation Permits, Northern Cape Province	*Mainstream Renewable Power South Africa*	*Environmental consultant*
Droogfontein II 70MW Solar Photovoltaic Power Plant near Kimberley Vegetation Permits, Northern Cape Province	*SunEdison*	*Environmental consultant*

RENEWABLE POWER GENERATION PROJECTS: WIND ENERGY FACILITIES

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	***Client Name***	***Role***
Noupoort Wind Farm, Northern Cape Province	*Mainstream Renewable Power South Africa*	*Environmental consultant & public participation*

Loeriesfontein Wind Farm, Northern Cape Province	*Mainstream Renewable Power South Africa*	*Environmental consultant, public participation, wetland specialist*
Khobab Wind Farm, Northern Cape Province	*Mainstream Renewable Power South Africa*	*Environmental consultant, public participation, wetland specialist*
Renosterberg Wind Farm near De Aar, Northern Cape Province	*Renosterberg Wind Energy Corporation (RWEC) & Industrial Development Corporation (IDC) of South Africa*	*Environmental consultant, public participation, wetland specialist*
Ithemba Wind Farm, Northern Cape Province	*Mainstream Renewable Power South Africa*	*Environmental consultant, public participation, wetland specialist*
Harte Beeste Leegte Wind Farm, Northern Cape Province	*Mainstream Renewable Power South Africa*	*Environmental consultant, public participation, wetland specialist*
Gras Koppies Wind Farm, Northern Cape Province	*Mainstream Renewable Power South Africa*	*Environmental consultant, public participation, wetland specialist*
Xha! Boom Wind Farm, Northern Cape Province	*Mainstream Renewable Power South Africa*	*Environmental consultant, public participation, wetland specialist*

Screening Studies

Project Name & Location	***Client Name***	***Role***
Environmental Constraints Analysis Report for the establishment of four Wind Farms in the Northern and Eastern Cape Provinces	*Mainstream Renewable Power South Africa*	*Environmental consultant, wetland specialist*

Compliance Advice and ESAP reporting

Project Name & Location	***Client Name***	***Role***
Noupoort Wind Farm, Northern Cape Province	*Mainstream Renewable Power South Africa*	*Environmental advisor*

Environmental Permitting, S53, Water Use Licence (WUL), Waste Management Licence (WML) & Other Applications

Project Name & Location	***Client Name***	***Role***
Perdekraal West Wind Farm Part 2 Amendment Application, Western Cape Province	*Biotherm Energy (Pty) Ltd*	*Project leader, environmental consultant*
Witberg Wind Farm Part 2 Amendment Application, Western Cape Province	*Building Energy South Africa*	*Project leader, environmental consultant*
Karreebosch Wind Farm Part 2 Amendment Application, Northern & Western Cape Provinces	*G7 Renewable Energies*	*Project leader, environmental consultant*
Dassiesklip Wind Farm Part 1 Amendment Application, Western Cape Province	*Biotherm Energy (Pty) Ltd*	*Project leader, environmental consultant*
Water Use License for the Dwarsrug Wind Farm, Northern Cape Province	*Mainstream Renewable Power South Africa*	*Environmental consultant, wetland specialist*
Water Use License for the Victoria West Wind Farm, Northern Cape Province	*Mainstream Renewable Power South Africa*	*Environmental consultant, wetland specialist*
Khobab Wind Farm Vegetation Permits, Northern Cape Province	*Mainstream Renewable Power South Africa*	*Environmental consultant*

Loeriesfontein Wind Farm Vegetation Permits, Northern Cape Province	*Mainstream Renewable Power South Africa*	*Environmental consultant*

RENEWABLE POWER GENERATION PROJECTS: CONCENTRATED SOLAR FACILITIES (CSP)

Environmental Permitting, S53, Water Use Licence (WUL), Waste Management Licence (WML) & Other Applications

Project Name & Location	***Client Name***	***Role***
Integrated Water Use License Application for the Construction of a CPV/ PV Plant in De Aar, Northern Cape Province of South Africa	*Mainstream Renewable Power South Africa*	*Environmental consultant, wetland specialist*
Water Use License for the Rooipunt Concentrated Solar Power Project, Northern Cape Province	*SolarReserve South Africa (Pty) Ltd*	*Environmental consultant, wetland specialist*
Water Use License for the Limestone Concentrated Solar Power Project, Northern Cape Province	*SolarReserve South Africa (Pty) Ltd*	*Environmental consultant, wetland specialist*

RENEWABLE POWER GENERATION PROJECTS: GAS POWER FACILITIES

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	***Client Name***	***Role***
Richards Bay Combined Cycle Gas Turbine Power Plant near Richards Bay, KwaZulu Natal Province	*Eskom*	*Environmental consultant & public participation*

CONVENTIONAL POWER GENERATION PROJECTS (COAL)

Basic Assessments

Project Name & Location	***Client Name***	***Role***
Proposed Installation of a 500m³ Bulk Storage Fuel Oil Tank at Grootvlei Power Station, Mpumalanga Province	*Eskom Generation*	*Environmental consultant, wetland specialist*

Environmental Compliance, Auditing and ECO

Project Name & Location	***Client Name***	***Role***
Water Use License Compliance Auditing for Grootvlei Power Station, Mpumalanga Province, South Africa	*Eskom Generation*	*Project leader, environmental auditor, wetland specialist*
Kusile Power Station Armcor Water Use License Compliance Audit, Mpumalanga Province	*Eskom Generation*	*Project leader, environmental auditor, wetland specialist*
Kusile Power Station Ash Dump Water Use License Compliance Audit, Mpumalanga Province	*Eskom Generation*	*Project leader, environmental auditor, wetland specialist*
Kusile Power Station Pollution Dams Water Use License Compliance Audit, Mpumalanga Province	*Eskom Generation*	*Project leader, environmental auditor, wetland specialist*
Kusile Power Station Stream Diversion and Water Pipeline Crossings Water Use License Compliance Audit, Mpumalanga Province	*Eskom Generation*	*Project leader, environmental auditor, wetland specialist*
Kusile Power Station Geotechnical Water Use License Compliance Audit, Mpumalanga Province	*Eskom Generation*	*Project leader, environmental auditor, wetland specialist*

GRID INFRASTRUCTURE PROJECTS

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	***Client Name***	***Role***
Mookodi Integration Project Environmental Impact Assessment, North West Province	*Eskom Distribution*	*Environmental consultant, wetland specialist*
Eskom Thyspunt Nuclear Integration Project – Transmission and Substation Infrastructure (Northern and Southern Corridor), Eastern Cape Province	*Eskom Transmission*	*Environmental consultant, wetland specialist*

Basic Assessments

Project Name & Location	***Client Name***	***Role***
Frankfort Strengthening Project: 88kV Power Line from Heilbron (via Frankfort) to Villiers, Free State Province	*Eskom Distribution*	*Project leader, environmental consultant, wetland specialist*
Wilger 132kV Overhead Distribution Power Line, Northern Cape Province	*SolarReserve South Africa (Pty) Ltd*	*Project leader, environmental consultant, wetland specialist*
Limestone 1 – 132kV Overhead Distribution Power Line, Northern Cape Province	*SolarReserve South Africa (Pty) Ltd*	*Environmental consultant, wetland specialist*
Limestone 2 – 132kV Overhead Distribution Power Line, Northern Cape Province	*SolarReserve South Africa (Pty) Ltd*	*Environmental consultant, wetland specialist*
Proposed Tweespruit to Welroux Power Line and Substations, Free State Province	*Eskom Distribution*	*Project leader, environmental consultant, wetland specialist*
Proposed Construction of a 132kV Power Line and Associated Infrastructure for the evacuation of power from the proposed 200MW Concentrated Solar Power (CSP) Plant on the Farm Rooipunt Number 617 near Upington, Northern Cape Province	*SolarReserve South Africa (Pty) Ltd*	*Project leader, environmental consultant, wetland specialist*
Loeriesfontein 132kV Power Line, Northern Cape Province	*Biotherm Energy*	*Project leader, environmental consultant, wetland specialist*
Proposed Construction of a 132kV Power Line and Associated Infrastructure for the evacuation of power from the Kalkaar Concentrating Solar Thermal Power Project on the Remainder of Portion 1 of the Farm Kalkaar 389 near Jacobsdal, Free State and Northern Cape Provinces	*SolarReserve South Africa (Pty) Ltd*	*Project leader, environmental consultant, wetland specialist*
Droogfontein II – 132kV power line and substation near Kimberley, Northern Cape Province	*SunEdison*	*Project leader, environmental consultant*
Mookodi Integration Project II – 132kV Power Line, Havelock Loop-in/Loop-out, Ganyesa Substation, North West Province	*Eskom Distribution*	*Project leader, environmental consultant, wetland specialist*

Environmental Compliance, Auditing and ECO

Project Name & Location	***Client Name***	***Role***
Environmental Compliance Auditing for the Nigel Substation to Jameson Park (Inland Terminal 2) 88kV power lines	*Eskom Distribution*	*Environmental auditor*

Ga-rankuwa 11kV Underground Power Cable Water Use License Compliance Audit, Gauteng Province	*Eskom Distribution*	*Project leader, environmental auditor*

Environmental Permitting, S53, Water Use Licence (WUL), Waste Management Licence (WML) & Other Applications

Project Name & Location	***Client Name***	***Role***
Water Use License / General Authorisation for Ga-rankuwa Substation, Gauteng Province	*Eskom Distribution*	*Project leader, environmental consultant, wetland specialist*
Water Use License / General Authorisation for Klevebank to Dalkieth 88kV Power Line, Gauteng Province	*Eskom Distribution*	*Project leader, environmental consultant, wetland specialist*
Water Use License Application for the Frankfort Strengthening Project: 88kV Power Line from Heilbron (via Frankfort) to Villiers, Free State Province	*Eskom Distribution*	*Project leader, environmental consultant, wetland specialist*
Water Use License / General Authorisation Proposed Tweespruit to Welroux Power Line and Substations, Free State Province	*Eskom Distribution*	*Project leader, environmental consultant, wetland specialist*

MINING SECTOR PROJECTS

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	***Client Name***	***Role***
Karowe Diamond Mine Environmental Management Plan Review and Update, Boteti District, Botswana	*Karowe Diamond Mine*	*Environmental consultant*

Environmental Compliance, Auditing and ECO

Project Name & Location	***Client Name***	***Role***
Post-rehabilitation Assessment of Three Wetland Crossing Sites for the Re-working of a Tailings Dam Project near Stilfontein, North West Province	*Chemwes (Pty) Ltd*	*Environmental auditor*

TRANSPORT SECTOR PROJECTS

Basic Assessments

Project Name & Location	***Client Name***	***Role***
Polokwane Integrated Rapid Public Transport Network, Limpopo Province	*City of Polokwane*	*Environmental consultant, wetland specialist*

Environmental Compliance, Auditing and ECO

Project Name & Location	***Client Name***	***Role***
Transnet Rail Water Use License Compliance Audit, Northern Cape Province	*Hatch-Goba / Transnet*	*Environmental auditor*

Environmental Permitting, S53, Water Use Licence (WUL), Waste Management Licence (WML) & Other Applications

Project Name & Location	***Client Name***	***Role***
Water Use Licensing for the Polokwane Integrated Rapid Public Transport Network, Limpopo Province	*City of Polokwane*	*Environmental consultant, wetland specialist*
General Authorisation for the proposed eThekwini Integrated Rapid Public Transport Network (IRPTN) -	*Nako Iliso*	*Environmental consultant, wetland specialist*

BRT Phase 1: Route C1A, General Authorisation and Risk Assessment, Kwa-Zulu Natal Province		

INFRASTRUCTURE DEVELOPMENT PROJECTS (BRIDGES, PIPELINES, ROADS, WATER RESOURCES, STORAGE, ETC)

Basic Assessments

Project Name & Location	***Client Name***	***Role***
Sir Lowry's Pass River Flood Alleviation Project, Western Cape Province	*City of Cape Town*	*Environmental consultant*

Screening Studies

Project Name & Location	***Client Name***	***Role***
Environmental Screening Assessment for a vegetable oil pipeline in Richards Bay Industrial Development Zone, KwaZulu Natal	*Wilmar Processing (Pty) Ltd*	*Environmental consultant, wetland specialist*

Environmental Compliance, Auditing and ECO

Project Name & Location	***Client Name***	***Role***
Wetland Post-rehabilitation Assessment of the Inland New Multi-Purpose Pipeline in the Mpumalanga and Gauteng Provinces	*Transnet SOC Ltd*	*Wetland specialist*

HOUSING AND URBAN PROJECTS

Screening Studies

Project Name & Location	***Client Name***	***Role***
Social Housing Projects in Sasolburg and Secunda, Gauteng Province	*Provincial Department of Human Settlements*	*Environmental consultant, wetland specialist*

INDUSTRIAL PROJECTS

Basic Assessments

Project Name & Location	***Client Name***	***Role***
PPC Slurry Plant decommissioning of Kilns 5 & 6, North West Province	*PPC Limited*	*Project leader, environmental consultant*
SPAR Distribution Centre, Port Elizabeth, Eastern Cape Province	*SPAR Group Ltd*	*Project leader, environmental consultant, wetland specialist*

Environmental Compliance, Auditing and ECO

Project Name & Location	***Client Name***	***Role***
Environmental Compliance Auditing for the Meadow Feeds Standerton Broiler Feed Mill, Mpumalanga Province	*Meadow Feeds*	*Environmental consultant, wetland specialist*

Environmental Permitting, S53, Water Use Licence (WUL), Waste Management Licence (WML) & Other Applications

Project Name & Location	***Client Name***	***Role***
Water Use License for the SPAR Distribution Centre, Port Elizabeth, Eastern Cape Province	*SPAR Group Ltd*	*Project leader, environmental consultant, wetland specialist*

Water Use License for the Proposed Tissue Manufacturing Capacity at the Kliprivier Operations Base, General Authorisation and Risk Assessment, Gauteng Province	*Twinsaver Group*	*Project leader, environmental consultant, wetland specialist*

ENVIRONMENTAL MANAGEMENT TOOLS

Strategic Environmental Assessments

Project Name & Location	***Client Name***	***Role***
Molemole Local Municipality Strategic Environmental Assessment, Limpopo Province	*Capricorn District Municipality*	*Environmental consultant, wetland specialist*
Blouberg Local Municipality Strategic Environmental Assessment, Limpopo Province	*Capricorn District Municipality*	*Environmental consultant, wetland specialist*

SPECIALIST STUDIES

Wetland and Riparian Delineation, Functional and Impact Assessments

Project Name & Location	***Client Name***	***Role***
Wetland delineation assessment for a vegetable oil pipeline in Richards Bay, KwaZulu Natal Province	*Wilmar Processing (Pty) Ltd*	*Wetland specialist*
Surface water assessment for the Dwarsrug Wind Farm Access Road near Loeriesfontein, Northern Cape Province	*Mainstream Renewable Power South Africa*	*Wetland specialist*
Surface Water Assessment for the Construction of a Wind Farm in Prieska, Northern Cape Province	*Mainstream Renewable Power South Africa*	*Wetland specialist*
Surface Water Assessment for the Construction of a Wind Farm in Loeriesfontein, Northern Cape Province	*Mainstream Renewable Power South Africa*	*Wetland specialist*
Surface Water Assessment for the Construction of a 132KV Distribution Line from the Kudu Substation to Dorstfontein Substation in Mpumalanga Province	*Eskom Distribution*	*Wetland specialist*
EIA for the Thyspunt Transmission Lines Integration Project: Surface Water Impact Assessment Report – EIA – Northern Corridor: Eastern Cape Province	*Eskom Transmission*	*Wetland specialist*
EIA for the Thyspunt Transmission Lines Integration Project: Surface Water Impact Assessment Report – EIA – Southern Corridor: Eastern Cape Province	*Eskom Transmission*	*Wetland specialist*
Surface Water Assessment for the Construction of a CSP and a CPV/ PV Plant in De Aar, Northern Cape Province	*Mainstream Renewable Power South Africa*	*Wetland specialist*
Environmental Management Framework for the Mogale City Local Municipality Surface Water Report – Desired State Report: Gauteng Province	*Mogale City*	*Wetland specialist*
Surface Water Assessment for the Proposed Township Development on the Remainder of Portion 27 of the Farm Middelburg and Townsland 287 JS, Mpumalanga Province	*Steve Tshwete Local Municipality*	*Wetland specialist*
Surface Water Assessment for the Construction of a CSP and a CPV/ PV Plant in De Aar, Northern Cape Province	*Mainstream Renewable Power South Africa*	*Wetland specialist*
Surface Water Assessment for the Construction of a CSP and a CPV/ PV Plant in Kimberley, Northern Cape Province, South Africa	*Mainstream Renewable Power South Africa*	*Wetland specialist*

Surface Water Assessment for the Westrand Strengthening Project from Westgate Substation to Hera Substation and Westgate Substation Extension, Gauteng Province	*Eskom Distribution*	*Wetland specialist*
Mookodi Integration Project 2 Basic Assessment Surface Water Impact Assessment, North West Province	*Eskom Distribution*	*Wetland specialist*
Surface Water Assessment for the Construction of a Gabion Structure at Waterval Substation in the Midrand Area, Gauteng Province	*Eskom Distribution*	*Wetland specialist*
Surface Water Assessment for the Proposed Construction of a Single 400kV Power Line from Borutho to Nzhlele, North West Province	*Eskom Transmission*	*Wetland specialist*
Surface Water Assessment for the Proposed Construction of an 88kv Power Line at Palmridge in the Ekurhuleni Metropolitan Municipality, Gauteng Province	*Eskom Distribution*	*Wetland specialist*
Surface Water Assessment for the Proposed Construction of a 19MW Photovoltaic Solar Power Plant near Danielskuil, Northern Cape Province	*SolarReserve South Africa (Pty) Ltd*	*Wetland specialist*
Surface Water Assessment for the Proposed Rebuilding of an 88kV Power Line from Henneman Substation to Serfontein Substation near Kroonstad, Free State Province	*Eskom Distribution*	*Wetland specialist*
Surface Water Assessment for the Proposed Deconstruction and Construction of an 11kV Power Line near Delmas, Mpumalanga Province	*Eskom Distribution*	*Wetland specialist*
Surface Water Assessment for the Proposed Construction of a Solar Photovoltaic Power Plant near De Aar, Northern Cape Province, South Africa	*Renosterberg Wind Energy Corporation (RWEC) & Industrial Development Corporation (IDC) of South Africa*	*Wetland specialist*
Surface Water Assessment for the Proposed Construction of a Wind Farm near De Aar, Northern Cape Province	*Renosterberg Wind Energy Corporation (RWEC) & Industrial Development Corporation (IDC) of South Africa*	*Wetland specialist*
Surface Water Assessment for the Proposed Construction of a Low-Cost Housing Development in the Soutpan area of Tshwane, Gauteng Province	*Makole Property Development*	*Wetland specialist*
Surface Water Assessment for the Proposed Construction of a 132kV Power Line near Kimberley, Northern Cape Province	*Eskom Distribution*	*Wetland specialist*
Surface Water Assessment for the Proposed Extension of Delmas Substation and Associated Power Lines, Mpumalanga Province, South Africa	*Eskom Distribution*	*Wetland specialist*
Surface Water Assessment for the Proposed Construction of a Substation in the Midrand area of Gauteng Province	*Eskom Distribution*	*Wetland specialist*
Surface Water Assessment for the Construction of an 88kV Power Line at Lochvaal Kudu in the Emfuleni Municipality, Gauteng Province	*Eskom Distribution*	*Wetland specialist*

Surface Water Assessment for the Proposed construction of an 88kV Power Line from Klevebank Substation to Dalkeith Substation, Gauteng Province	*Eskom Distribution*	*Wetland specialist*
Surface Water Assessment for the Proposed Construction of an 88kV Power Line from Heilbron Substation to Villiers Substation, Free State Province	*Eskom Distribution*	*Wetland specialist*
Surface Water Assessment for the Proposed Construction of a 132kV Power Line, Substation and the Extension of Homestead Substation Associated with the 75MW Concentrating Photovoltaic (CPV) / Photovoltaic (PV) Plant (PV 3) on the Farm Droogfontein in Kimberley, Northern Cape Province	*Eskom Distribution*	*Wetland specialist*
Surface Water Assessment for the Moddershaft Underground to Overhead Cable Replacement of an 11kV Power Line from Moddershaft Substation to a Minisub near Anzac, Gauteng Province	*Eskom Distribution*	*Wetland specialist*
Surface Water Assessment for the Proposed Construction of an 11kV Underground Power Cable from Civic Centre to Zola Substation, Gauteng Province	*Eskom Distribution*	*Wetland specialist*
Surface Water Assessment for the Proposed Construction of a Substation on Portion 265 Randjesfontein 405-JR, Gauteng Province	*Eskom Distribution*	*Wetland specialist*
Surface Water Assessment for the Proposed Re-build of a Section of the Mathibestad Danhauser 33kV Power Line Network, North West Province	*Eskom Distribution*	*Wetland specialist*
Surface Water Assessment for the Proposed Re-build of a Section of the Existing 33kV Mathibestad-Danhauser Power Line Network, Gauteng Province	*Eskom Distribution*	*Wetland specialist*
Surface Water Assessment for the Proposed Re-build of a Section of the Existing 33kV Mothutlung North Power Line Network, Gauteng Province	*Eskom Distribution*	*Wetland specialist*
Surface Water Assessment for the Proposed Re-build of a Section of the Existing 33kV Mothutlung South Power Line Network, Gauteng Province	*Eskom Distribution*	*Wetland specialist*
Surface Water Assessment for the Proposed Re-build of a Section of the Existing 33kV Nonyane Madidi North Power Line Network, Gauteng Province	*Eskom Distribution*	*Wetland specialist*
Surface Water Assessment for the Proposed Re-build of a Section of the Existing 33kV Nonyane Swartdam Power Line Network, Gauteng Province	*Eskom Distribution*	*Wetland specialist*
Surface Water Assessment for the Proposed Rebuild of a Section of the Existing 33kV Pelly Klipdrift Network, Gauteng and North West Provinces	*Eskom Distribution*	*Wetland specialist*
Surface Water Assessment for the Proposed Re-build of a Section of the Existing 33kV Zonderwater Kraal Power Line Network, Gauteng Province	*Eskom Distribution*	*Wetland specialist*
Surface Water Assessment for the Proposed Re-build of a Section of the Existing 33kV Hammanskraal Lusthof Power Line Network, Gauteng Province	*Eskom Distribution*	*Wetland specialist*

Surface Water Assessment for the Proposed Re-build of a Section of the Existing 33kV Klipgat Circle Power Line Network, Gauteng Province	*Eskom Distribution*	*Wetland specialist*
Surface Water Assessment for the Proposed Re-build of Sections of the Existing 33kV Erasmus Aviva Power Line Network, Gauteng Province	*Eskom Distribution*	*Wetland specialist*
Surface Water Assessment for the Proposed Construction of an 11kV Underground Power Cable at the Ga-Rankuwa Substation, Gauteng Province	*Eskom Distribution*	*Wetland specialist*
Surface Water Assessment for the Mamatwan Manganese Mine, Northern Cape Province	*Groundwater Consulting Services (Pty) Ltd*	*Wetland specialist*
Surface Water Assessment for the Dwarsrug Wind Farm, Northern Cape Province	*Mainstream Renewable Power South Africa*	*Wetland specialist*
Surface Water Assessment for the Manzimtoti Sewer Line Project, Kwa-Zulu Natal Province	*Environmental Planning and Design cc*	*Wetland specialist*
Surface Water Assessment for the Compensation Flats Development, Kwa-Zulu Natal Province	*Tongaat Hulett*	*Wetland specialist*
Surface Water Assessment for the Tinley Manor South Road Development, Kwa-Zulu Natal Province	*Tongaat Hulett*	*Wetland specialist*
Surface Water Assessment for the Ntuzuma Sewer Line Project, Kwa-Zulu Natal Province	*Environmental Planning and Design cc*	*Wetland specialist*
Surface Water Assessment for the Esphiva Sewer Line Project, Kwa-Zulu Natal Province	*Environmental Planning and Design cc*	*Wetland specialist*
Frankfort 132kV Power Line Wetland Walk-down Assessment, Free State Province	*Eskom Distribution*	*Wetland specialist*
Surface Water Assessment for the Proposed Construction of the Esphiva Water Pipeline near Ulundi, KwaZulu-Natal Province	*Environmental Planning and Design cc*	*Wetland specialist*
Surface Water Assessment for the Grootvlei Power Station, Mpumalanga Province	*Eskom Generation*	*Wetland specialist*
Surface Water Assessment for the Proposed Construction of the Embangweni and Bhekabantu Irrigation Schemes, KwaZulu-Natal Province	*Nzingwe Consultancy*	*Wetland specialist*
Surface Water Assessment for the Proposed Construction of the Nondabuya and Khwehle Primary Agriculture Schemes, KwaZulu-Natal Province	*Nzingwe Consultancy*	*Wetland specialist*
Surface Water Assessment for the Proposed Expansion of the Makhathini Irrigation Scheme, KwaZulu-Natal Province	*Nzingwe Consultancy*	*Wetland specialist*
Surface Water Assessment for the Proposed Construction of the Mbaliyezwe Irrigation Schemes, KwaZulu-Natal Province	*Nzingwe Consultancy*	*Wetland specialist*
Surface Water Assessment for the Proposed Mixed Use Development on the Remainder of Portion 27 of the Farm Middelburg Town and Townlands 287 JS, Steve Tshwete Local Municipality in the Mpumalanga Province	*Steve Tshwete Local Municipality*	*Wetland specialist*
Surface Water Assessment for the Proposed Construction of Two Power Lines and Two	*Mainstream Renewable Power South Africa*	*Wetland specialist*

Substations for the Mainstream Wind Facilities near Beaufort West, Western Cape Province		
Surface Water Assessment for the Proposed eThekwini Integrated Rapid Transport Network (IRPTN) – Bus Rapid Transport (BRT) Phase 1: Route C1A, KwaZulu-Natal Province	*Nako Iliso*	*Wetland specialist*
Surface Water Assessment for the Proposed Coal Railway Siding at the Welbedacht Marshalling Yard and associated Milder Road Upgrade near Springs, Gauteng Province	*Canyon Coal*	*Wetland specialist*
Surface Water Assessment for the Proposed Development of a 22kV Medium Voltage Power Line in Mofofutso, North West Province	*Eskom Distribution*	*Wetland specialist*
Wetland Walk-down Assessment for the Mookodi Integration Power Line Project, North West Province	*Eskom Distribution*	*Wetland specialist*
Surface Water Assessment for the Proposed Construction of a Coal Loading Facility within the existing Bronkhorstspruit Railway Siding near Bronkhorstspruit, Gauteng Province	*Canyon Coal*	*Wetland specialist*
Surface Water Assessment for the Proposed Construction of the Two 75MW Tlisitseng Solar Photovoltaic Energy Facilities near Lichtenburg, North West Province	*Biotherm Energy*	*Wetland specialist*
Surface Water Assessment for the Proposed Construction of the Two 75MW Sendawo Solar Photovoltaic Energy Facilities near Lichtenburg, North West Province	*Biotherm Energy*	*Wetland specialist*
Surface Water Assessment for the Proposed Construction of the Sendawo Solar Substation and associated 400kV Power Line near Lichtenburg, North West Province	*Biotherm Energy*	*Wetland specialist*
Surface Water Assessment for the Proposed Construction of the Helena 1, 2 & 3 Photovoltaic Energy Facilities near Copperton, Northern Cape Province	*Biotherm Energy*	*Wetland specialist*
Surface Water Assessment for the Proposed Construction of a 70MW Photovoltaic Facility and 132kV Power Line near Loeriesfontein, Northern Cape Province	*Mainstream Renewable Power South Africa*	*Wetland specialist*
Surface Water Assessment for the Proposed Expansion of the Tissue Manufacturing Capacity at the Kliprivier Operations Base, Gauteng Province	*Twinsaver Group*	*Wetland specialist*
Surface Water Assessment for the Proposed Construction of the Eureka West 140MW Wind Farm near Copperton, Northern Cape Province	*Biotherm Energy*	*Wetland specialist*
Surface Water Assessment for the Proposed Construction of the Eureka East 140MW Wind Farm near Copperton, Northern Cape Province	*Biotherm Energy*	*Wetland specialist*
Surface Water Assessment for the Proposed Construction of the Eureka 132kV Power Line near Copperton, Northern Cape Province	*Biotherm Energy*	*Wetland specialist*

Surface Water Assessment for the Proposed Construction of the Aletta 140MW Wind Farm near Copperton, Northern Cape Province	*Biotherm Energy*	*Wetland specialist*
Surface Water Assessment for the Proposed Construction of the Ithemba Wind Farm, Northern Cape Province	*Mainstream Renewable Power South Africa*	*Wetland specialist*
Surface Water Assessment for the Proposed Construction of the Harte Beeste Leegte Wind Farm, Northern Cape Province	*Mainstream Renewable Power South Africa*	*Wetland specialist*
Surface Water Assessment for the Proposed Construction of the Gras Koppies Wind Farm, Northern Cape Province	*Mainstream Renewable Power South Africa*	*Wetland specialist*
Surface Water Assessment for the Proposed Construction of the Xha! Boom Wind Farm, Northern Cape Province	*Mainstream Renewable Power South Africa*	*Wetland specialist*
Surface Water Assessment for the Proposed Expansion of the Mountain Valley "A" Grade Chicken Abattoir on the Remainder of Subdivision of Portion 17 (of 16) of the Farm Leeuw Poort 1120 FT, KwaZulu-Natal Province	*Shangoni Management Services (Pty) Ltd*	*Wetland specialist*
Surface Water Assessment for the Proposed Construction of a Linking Station, Power Lines and Substations for the Mainstream Wind Energy Facilities near Beaufort West, Western Cape Province	*Mainstream Renewable Power South Africa*	*Wetland specialist*
Surface Water Assessment for the Proposed Construction 132kV Power Lines and a Substation for Tsakane Ext 10 and 22, Gauteng Province	*Eskom Distribution*	*Wetland specialist*
Surface Water Assessment for the Proposed Construction of the Harte Beeste Leegte Wind Farm, Northern Cape Province	*Mainstream Renewable Power South Africa*	*Wetland specialist*
Surface Water Assessment for the Proposed Construction of the Ithemba Wind Farm, Northern Cape Province	*Mainstream Renewable Power South Africa*	*Wetland specialist*
Surface Water Assessment for the Proposed Construction of the Gras Koppies Wind Farm, Northern Cape Province	*Mainstream Renewable Power South Africa*	*Wetland specialist*
Surface Water Assessment for the Proposed Construction of the Xha! Boom Wind Farm, Northern Cape Province	*Mainstream Renewable Power South Africa*	*Wetland specialist*
Surface Water Assessment for the Proposed Construction of the SPAR Distribution Centre, Port Elizabeth, Eastern Cape Province	*SPAR Group Ltd*	*Wetland specialist*
Surface Water Assessment for the Proposed Construction of a 140MW Wind Farm and Associated Infrastructure near Hutchison, Northern Cape Province	*Mainstream Renewable Power South Africa*	*Wetland specialist*
Surface Water Assessment for the Proposed Maintenance of the Water Pipeline in Parys, Ngwathe Local Municipality, Free State Province	*Gedezar Consulting*	*Wetland specialist*
Surface Water Assessment for the Proposed Construction of the Rietkuil Coal Railway Siding near Bronkhorstspruit, Gauteng Province	*Canyon Coal*	*Wetland specialist*

Surface Water Assessment for the Proposed Construction of a 75MW Solar Photovoltaic Power Plant near Dennilton, Limpopo Province	*Nokukhanya Energy (Pty) Ltd*	*Wetland specialist*
Surface Water Assessment for the Proposed Construction of a 9.9 MW Solar Photovoltaic (PV) Energy Facility on the Farm Wildebeestkuil near Leeudoringstad, North West Province	*Leeudoringstad Solar Plant (Pty) Ltd*	*Wetland specialist*
Surface Water Assessment for the Proposed Construction of up to a 5MW Solar Photovoltaic (PV) Energy Facility on Portion 37 of the Farm Leeuwbosch No. 44 near Leeudoringstad, North West Province	*Leeudoringstad Solar Plant (Pty) Ltd*	*Wetland specialist*
Surface Water Assessment for the Proposed Construction of the De Wildt Solar Photovoltaic Power Plant, Gauteng Province	*SunEdison*	*Wetland specialist*

Wetland and Riparian Rehabilitation Plans

Project Name & Location	***Client Name***	***Role***
Wetland and River Rehabilitation Plan for the Fourways 22kV Feeder Cable, Gauteng Province	*Eskom Distribution*	*Wetland specialist*
Wetland and Riparian Rehabilitation Plan for the Proposed eThekwini Integrated Rapid Transport Network (IRPTN) – Bus Rapid Transport (BRT) Phase 1: Route C1A, KwaZulu-Natal Province	*eThekwini Metropolitan Municipality*	*Wetland specialist*
Wetland Rehabilitation Plan for the Delmas Pedestrian Bridge, Mpumalanga Province	*Canyon Coal*	*Wetland specialist*
Wetland Remediation Plan for the Graspan Colliery Extension on the Remaining Extent of Portion 31 on the Farm Elandspruit 291 JS, Mpumalanga Province	*GiBB*	*Wetland specialist*

Wetland Offset Plans

Project Name & Location	***Client Name***	***Role***
Wetland Offset Plan for the Proposed Construction of the SPAR Distribution Centre, Port Elizabeth, Eastern Cape Province	*SPAR Group Ltd*	*Wetland specialist*

Short CV/Summary of Expertise – Simon Todd

ECOLOGICAL SPECIALIST SERVICES

Assessment/Management/Research

Simon Todd Pr.Sci.Nat

C: 082 3326502
O: 021 782 0377
Simon.Todd@3foxes.co.za

60 Forrest Way
Glencairn
7975

Ecological Solutions for People & the Environment

Professional Profile

Simon Todd has extensive experience in biodiversity management and ecological assessment across South African ecosystems. This includes a variety of broad-scale strategic assessments and best-practice guidelines for a range of industries. In addition, Simon Todd has conducted a large amount of research on the impacts of land-use on biodiversity and has published numerous scientific papers in international peer-reviewed journals on this topic. Simon Todd is a recognised ecological expert and is a past chairman and current executive committee member of the Arid-Zone Ecology Forum and has over 20 years' experience working throughout the country. Simon Todd is registered with the South African Council for Natural Scientific Professions (No. 400425/11).

Recent notable projects include:

- First-author of a book chapter on the ecological impacts of Shale Gas development on the Karroo of South Africa. (2017)
- Co-author on the Biodiversity chapter of the Shale Gas SEA being conducted by CSIR. (2016)
- Co-author on the Eskom Grid Infrastructure SEA, managed by CSIR. (2016)
- Co-author on the Wind and Solar SEA, managed by CSIR. (2015)

Abbreviated CV

- Profession: Independent Ecological Consultant - Pr.Sci.Nat 400425/11
- Specialisation: Plant & Animal Ecology
- Years of Experience: 20 Years

Skills & Primary Competencies

- Research & description of ecological patterns & processes in Thicket, Savannah Nama Karoo, Succulent Karoo, Arid Grassland and Fynbos Ecosystems.
- Ecological Impacts of land use on biodiversity and provision of associated management advice.

- Vegetation surveys & degradation assessment & mapping
- Long-term vegetation monitoring
- Faunal surveys & assessment.
- GIS & remote sensing

Tertiary Education:

- 1992-1994 – BSc (Botany & Zoology), University of Cape Town
- 1995 – BSc Hons, Cum Laude (Zoology) University of Natal
- 1996-1997- MSc, Cum Laude (Conservation Biology) University of Cape Town

Employment History

- 1997 – 1999 – Research Scientist (Contract) – South African National Biodiversity Institute
- 2000-2004 – Specialist Scientist (Contract) - South African National Biodiversity Institute
- 2004-2007 – Senior Scientist (Contract) – Plant Conservation Unit, Department of Botany, University of Cape Town
- 2007-Present – Senior Scientist (Associate) – Plant Conservation Unit, Department of Botany, University of Cape Town.
- 2010-Present – Self-employed as consultant and sole proprietor of Simon Todd Consulting, which has conducted more than 150 specialist assessments.

General Experience & Expertise

- Lead ecologist on several SEA chapters, including Eskom Grid Infrastructure, Wind and Solar SEA and Shale Gas SEA.
- Conducted a large number of fauna and flora specialist assessments distributed widely across South Africa. Projects have ranged in extent from <50 ha to more than 50 000 ha.
- Widely-recognized ecology specialist. Published numerous peer-reviewed scientific publications based on various ecological studies across the country. Past chairman of the Arid Zone Ecology Forum and current executive committee member.
- Extensive field and personal experience across a broad range of South African ecosystems, with particular focus on the Western, Northern and Eastern Cape.
- Strong research background which has proved invaluable when working on ecologically sensitive and endangered ecosystems, habitats and species.
- Published numerous research reports as well as two book chapters and a large number of papers in leading scientific journals dealing primarily with human impacts on the vegetation and ecology of South African ecosystems.
- Maintain several long-term vegetation monitoring projects which have led to several publications.
- Guest lecturer at two universities and have also served as an external examiner.
- Reviewed papers for more than 12 international ecological journals.
- SACNASP registered as a Professional Natural Scientist, (Ecology) No. 400425/11.

Current Committees

- SANBI Vegmap Committee – 2015 – present
- CSIR Wind and Solar SEA Phase II advisory committee – 2016-present
- AZEF deputy chair – 2012-present
- SANBI Karoo Biogaps Taxon leads' committee and executive committee member.

Recent & Relevant Outputs & Publications

Strategic Environmental Assessments

Co-Author. Chapter 7 - Biodiversity & Ecosystems - Shale Gas SEA. CSIR 2016.

Co-Author. Chapter 1 Scenarios and Activities – Shale Gas SEA. CSIR 2016.

Co-Author – Ecological Chapter – Wind and Solar SEA. CSIR 2014.

Co-Author – Ecological Chapter – Eskom Grid Infrastructure SEA. CSIR 2015.

Contributor – Ecological & Conservation components to SKA SEA. CSIR 2017.

Specialist Fauna and Flora Assessments:

Specialist Ecological studies for many different developments distributed across the country including:

- Over 30 Wind Energy projects
- More than 60 Solar Energy developments
- More than 30 different housing, roads, mining and other infrastructure development projects.
- More than 20 electricity transmission infrastructure projects.

A full list of projects is available on request.

Appendix C

Project team CV's

ILAN SMEYATSKY

Professional Archaeologist

Personal Details

- **Name:** Ilan
- **Surname:** Smeyatsky
- **Identity Number:** 9109275072080
- **Date of Birth:** 27-09-1991
- **Citizenship:** South African
- **Gender:** Male
- **Marital Status:** Single
- **Languages Spoken**: English

Education History

2010-2013: **BSc bachelor's Degree**

University of the Witwatersrand, Johannesburg, South Africa

- Archaeology
- Psychology
- Statistics
- Research Design and Analysis
- 67% Pass (**2:1 Qualification**)

2014: **BSc (Hons) in Archaeology**

AWARDS:

- Received the 2014 Centre of Excellence in Palaeoscience award - **Bursary to the value of ZAR 30000 ≈ $2500**
- Received the Post-Graduate Merit Award in 2015 for academic merit for my Honours academic results - **Bursary to the value of ZAR 25000 ≈ $1800**

University of the Witwatersrand, Johannesburg, South Africa

- Archaeology
- Excavation techniques
- Theory
- 69% Pass (**2:1 Qualification**)
- **Distinction** received for thesis entitled: "Stylistic variation in Later Stone Age tanged arrowheads: a pilot study using geometric morphometrics"

2015-2017: **MSc by Research (Archaeology)**

University of the Witwatersrand, Johannesburg, South Africa

- Archaeology
- Statistical analysis
- GIS (Geographic Information Systems)
- Thesis entitled: "Discerning and explaining shape variations in Later Stone Age tanged arrowheads, South Africa"

Aug 2016 –
Jan 2017: **Semester of Archaeology Masters**

AWARD: Received the 2016 AESOP+ full Masters scholarship to study at Uppsala University, Uppsala, Sweden – **Scholarship to the value of ZAR 160,000 ≈ $11,000**
Uppsala University, Uppsala, Sweden

- Archaeological theory
- GIS (Geographic Information Systems)
- Invitational research

Employment History
Part time employment as a student:

- **2009-2013**: Part-Time Electrician Apprentice: Assisting in home electrical repair jobs.
- **2014-2015:** Lab Research Assistant: Analysing and classifying lithic artefacts, Data capturing, Mentoring trainee research assistants.

Experience in the field of archaeology:

- **2013-2015: Fieldwork/Excavator - Responsibilities:** Feature detection, excavation, sieving, sorting, analysis, soil sampling, field documentation, 'dumpy' operation, Total Station operation, DGPS operation, rock art tracing and photography, engraving tracing and photography.
    - South African excavations:
        - Early Stone Age excavation at Maropeng World Heritage Site in Gauteng (1 Week – August 2015)
        - Pig cadaver exhumation as part of forensic experiment near Pretoria, Gauteng (1 Week – December 2014) - Praised for having the determination of returning for each subsequent excavation day as it was performed on a purely volunteer basis and the work conditions were particularly strenuous - Dr. Coen Nienaber

- Iron Age excavation at Komati Gorge, Mpumalanga (1 Week – August 2014) - Praised for being exceptionally “methodical and proficient” with my excavation techniques – Dr. Alex Schoeman
- Rock art fieldwork at Komati Gorge, Mpumalanga (1 Week – August 2014)
- Underwater archaeology site mapping Komati Gorge, Mpumalanga (1 Week – August 2014)
- Early Stone Age excavation at Maropeng World Heritage Site in Gauteng (2 Weeks - September 2013) - Personally uncovered some of the only stone tools (~1.8 million years old) found during that digging season.

- **2016: Excavation Supervisor - Responsibilities:** Supervision of two junior excavators, site detection, decision of excavation grid placement, excavation, sieving, sorting, soil sampling, field documentation.
    - Historical (farm site) excavation at Graaff-Reinet, Eastern Cape, South Africa (2 Weeks)
    - Completed dig 1 week ahead of schedule aided by my efficient direction, drive and support to the excavators under my supervision.
- **April 2017 – April 2018:** Intern Archaeologist – PGS Heritage: Heritage Impact assessments, background research, report writing, permit applications, collections management, stakeholder engagement and grave relocation.
- **April 2018 – PRESENT:** Archaeologist – PGS Heritage: Heritage Impact assessments, background research, report writing, permit applications, collections management, stakeholder engagement and grave relocation.

Professional Body Membership:

- Professional Archaeologist - Association of Southern African Professional Archaeologists (ASAPA) - Professional Member
- CRM Accreditation (ASAPA) -
    - Field Supervisor – Stone Age, Iron Age & Grave Relocations

CURRICULUM VITAE

Name:	HS (Henk) Steyn
Profession:	Archaeologist
Date of birth:	1971-09-15
Parent Firm:	PGS Heritage (Pty) Ltd
Position at Firm:	Managing Director
Years with firm:	15
Years of experience:	20
Nationality:	South African
HDI Status:	White Male

EDUCATION

Name of University or Institution: University of Pretoria

Degree obtained:	BA
Major subjects:	Archaeology, History & Cult. History
Year:	1996

Name of University or Institution: University of Pretoria

Degree obtained:	BA [Hons] (Cum laude)
Major subjects:	Archaeology
Year:	1997

Professional Qualifications:

Professional Archaeologist - Association of Southern African Professional Archaeologists -
Professional Member
CRM Accreditation:

- Principal Investigator - Grave Relocations
- Field Director – Iron Age
- Field Supervisor – Colonial Period and Stone Age

Treasurer of ASAPA (Association of Southern African Professional Archaeologists) from 2012 -
2017

Languages:

Afrikaans – First language
English – Speaking (Good) Reading (Good), Writing (Good)

KEY QUALIFICATIONS

Grave Relocation Management, Cultural Resource Management and Heritage Impact Assessment Management, Archaeology, Business Management

EXPERIENCE

Heritage Assessments

As a heritage practitioner I have been involved with approximately 60 Heritage Impact Assessments including, but not limited to:

• Archaeological Walkdown, Hydra-Perseus Transmission line (260km), Northern Cape Province - Eskom
• Phase 2 Heritage Impact Assessment and EMP, Gamma-Omega Transmission line (550km), Western Cape Province - Nature Conservation Corporation
• Archaeological Walk Down and EMP, Eros-Neptune Transmission Line (380km), Transkei,
Eastern Cape Province – Aurecon
• Phase 2 Heritage Impact Assessment in terms of the proposed Comet Ext. 8 Development, Ekurhuleni Metropolitan Municipality – Urban Dynamics
• Heritage Impact Assessment for the proposed development of Comet Ext. 14, Ekurhuleni
Metropolitan Municipality, Marsh Environmental
• Nature Conservation Corporation, Phase 2 Heritage Impact Assessment and EMP, Hydra-
Perseus Transmission line (260km – selected areas), Northern Cape Province
• Heritage Assessment, Friarsdale, Northern Cape – Afrimat
• Heritage Assessments for three SCP Projects (De Aar, Kimberley, Loeriesfontein) – SiVEST
• Co-Author of a Cultural Resources Management Plan for Marakele National Park.
• Co-Author of a Cultural Resources Management Plan for Augrabies National Park.

Grave Relocations

As Managing Director of PGS, I have been involved in a large number of grave relocation
projects, including:

• iMpunzi Division of Duiker Mining, Witbank, Relocation of 950 graves.
• University of Pretoria, Nandoni Dam Grave Relocation Project, Thohoyandou, Limpopo Province. Relocation of approximately 1,000 graves.
• Alveda Park Development, NewHco. Relocation of 114 graves.
• Tselentis Colliery, Duiker Mining. Relocation of 80 graves.
• Tselentic Colliery, Expansion of mining activities. Relocation of 15 graves.
• Abland, Proposed development of Portion 41 of the farm Wonderboom 302-JR. Relocation of 17 graves
• TCTA, VRESAP Development. Relocation of 56 graves.
• Biscuit Trading, Proposed Development of Portion 97 of the farm Knopjeslaagte 385-JR. Relocation of 5 graves.
• Savannah Country Estates, Mamelodi, Pretoria, Gauteng Province. Relocation of 7 graves.
• Atterbury Property Developments, Hartebeespoort Dam, Pretoria. Relocation of 11 graves.
• The Outpost Estate, Bela-Bela, Limpopo Province. Relocation of 78 graves.
• Nkomati Mine, Onverwacht grave relocation, near Badplaas, Mpumalanga. Relocation of 45 graves.
• Nkomati Mine, Nkomati Mine grave relocation, near Badplaas, Mpumalanga. Relocation of 60 graves..
• New Vaal Colliery, Mac West Project, Free State, Relocation of 650 graves.
• Phokathaba Platinum, Smokey Hills Mine, Maandagshoek, Burgersfort, Limpopo Province. Relocation of 11 graves.
• Martins Funerals (Randburg), Garstfontein Road grave relocation, Pretoria, Gauteng Province. Relocation of 1 grave.
• Bombela CJV, Graves affected by Gautrain Development, Midrand, Gauteng Province. Relocation of 26 graves.
• Cranbrook Properties, Motaganeng Project, Burgersfort, Limpopo Province. Relocation of 60 graves..
• Silver Glade Investments, Swavelpoort, Pretoria. Relocation of 45 graves.
• Anglo Coal (Kleinkopje Colliery), Zondagsvlei, near Ogies, Mpumalanga Province. Relocation of 110 graves.
• Anglo Coal (Kleinkopje Colliery), Kleinkopje Coppiery, Witbank, Mpumalanga Province. Relocation of 4 graves.
• Africon. Rescue excavation of 1 grave near Silvertondale, Pretoria, Gauteng Province.

• Osizweni Plaza, Newcastle, KwaZulu-Natal. Relocation of 65 graves.
• Anglo Coal, Farm Straffontein, Delmas, Mpumalanga. Relocation of 16 graves.
• Beaurivage, Relocation of 3 graves, Hartebeestpoort, North West Province.
• EIMS, Rescue excavation of 2 graves, Waltloo, Pretoria, Gauteng Province. Project Manager and Permit Holder with WC Nienaber as PI.
• Xstrata Coal, Phoenix Plant. Relocation of 1 grave.
• Xstrata Coal, ATCOM East. Relocation of 53 graves.
• AGES Environmental, Sephaku Fluoride Chemical Plant, Ekandustria, Bronkhorstspruit, Gauteng Province.
• Nkomati Mine, near Badplaas, Mpumalanga Province. Relocation of approximately 70 graves in various phases.
• SMEC South Africa/Hillary Construction (on behalf of SANRAL). Relocation of 64 graves affected by the widening of the N1 at Holfontein, Kroonstad. (Current project)
• Crystal Park Development Pty (Ltd). Rescue excavation of 17 graves exposed during construction activities. Crystal Park, Benoni (Current Project)
• Hatch-Goba, relocation of 30 graves from the Coega Industrial Development Zone, Port Elizabeth.
• Transnet, Relocation of 190 graves from the Coega Industrial Development Zone, Port Elizabeth.
• Glencore, relocation of 850 graves from the Tweefontein Optimisation Project, Ogies, Mpumalanga
• Rietvlei Mining, relocation of 59 graves near Middelburg, Mpumalanga (current project)
• Kophia Diamonds, relocation of 5 graves exposed during mining activities. Boshoff, Free State (current project).
• Estor Properties, relocation of 90 graves from The Orchards, Pretoria (current project)

EMPLOYMENT SUMMARY

Managing Director of PGS Heritage (Pty) Ltd 2003 - current
Director of PGS Heritage (Pty) Ltd – Lesotho
Director of PGS Heritage Africa
Shareholder in PGS Heritage Mozambique

Countries of work experience:

• South Africa

• Botswana

WOUTER FOURIE

Professional Heritage Specialist and Professional Archaeologist and Director PGS Heritage

Summary of Experience

Specialised expertise in Archaeological Mitigation and excavations, Cultural Resource Management and Heritage Impact Assessment Management, Archaeology, Anthropology, Applicable survey methods, Fieldwork and project management, Geographic Information Systems, including *inter alia* -

Involvement in various grave relocation projects (some of which relocated up to 1000 graves) and grave "rescue" excavations in the various provinces of South Africa

Involvement with various Heritage Impact Assessments, within South Africa, including -

- Archaeological Walkdowns for various projects
- Phase 2 Heritage Impact Assessments and EMPs for various projects
- Heritage Impact Assessments for various projects
    - Iron Age Mitigation Work for various projects, including archaeological excavations and monitoring
    - Involvement with various Heritage Impact Assessments, outside South Africa, including -
- Archaeological Studies in Democratic Republic of Congo
- Heritage Impact Assessments in Mozambique, Botswana and DRC
- Grave Relocation project in DRC

Key Qualifications

BA [Hons] (Cum laude) - Archaeology and Geography - 1997

BA - Archaeology, Geography and Anthropology - 1996

Professional Archaeologist - Association of Southern African Professional Archaeologists (ASAPA) - Professional Member

Accredited Professional Heritage Specialist – Association of Professional Heritage Practitioners (APHP)

CRM Accreditation (ASAPA) -

- Principal Investigator - Grave Relocations
- Field Director – Iron Age
- Field Supervisor – Colonial Period and Stone Age
- Accredited with Amafa KZN

Key Work Experience

2003- current - Director – Professional Grave Solutions (Pty) Ltd

2007 – 2008 - Project Manager – Matakoma-ARM, Heritage Contracts Unit, University of the Witwatersrand

2005-2007 - Director – Matakoma Heritage Consultants (Pty) Ltd

2000-2004 - CEO– Matakoma Consultants

1998-2000 - Environmental Coordinator – Randfontein Estates Limited. Randfontein, Gauteng

1997-1998 - Environmental Officer – Department of Minerals and Energy. Johannesburg, Gauteng

Worked on various heritage projects in the SADC region including, Botswana, Mozambique and the Democratic Republic of the Congo