ANGLO AFRICAN METALS ZERO WASTE RECOVERY SOLUTION, MPUMALANGA PROVINCE

ENVIRONMENTAL MANAGEMENT PROGRAMME

May 2021

Prepared for
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PROJECT DETAILS

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DEFINITIONS AND TERMINOLOGY

The following definitions and terminology may be applicable to this project and may occur in the report below:

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 of collecting, organising, analysing, interpreting and communicating information which is relevant.

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: The impact of an activity that in itself may not be significant, but may become significant when added to the existing and potential impacts eventuating from similar or diverse activities or undertakings in the area.

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.

'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.

Dust: Solid materials suspended in the atmosphere in the form of small irregular particles, many of which are microscopic in size

Environment: the surroundings within which humans exist and that is 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 Authorisation (EA): means the authorisation issued by a competent authority (Department of Environmental Affairs) of a listed activity or specified activity in terms of the National Environmental Management Act (No 107 of 1998) and the EIA Regulations promulgated under the Act.

Environmental Assessment Practitioner (EAP): An individual responsible for the planning, management and coordinating of environmental management plan or any other appropriate environmental instruments introduced by legislation.

Environmental Control Officer (ECO): An individual appointed by the Owner prior to the commencement of any authorised activities, responsible for monitoring, reviewing and verifying compliance by the EPC Contractor with the environmental specifications of the EMPr and the conditions of the Environmental Authorisation

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

Environmental impact assessment (EIA): 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 (EMPr): A plan that organises and co-ordinates mitigation, rehabilitation and monitoring measures in order to guide the implementation of a project or facility and its ongoing maintenance after implementation.

Environmental Officer (EO): The Environmental Officer (EO), 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. The EO must act as liaison and advisor on all environmental and related issues and ensure that any complaints received from the public are duly recorded and forwarded to the Site Manager and Contractor.

Fossil: Mineralised bones of animals, shellfish, plants and marine animals. A trace fossil is the track or footprint of a fossil animal that is preserved in stone or consolidated sediment.

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.

Heritage: That which is inherited and forms part of the National Estate (Historical places, objects, fossils as defined by the National Heritage Resources Act of 2000).

Incident: An unplanned occurrence that has caused, or has the potential to cause, environmental damage.

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.

Method Statement: 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.

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

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.

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 by notice in the *Gazette*.

ABBREVIATIONS

The following abbreviations may be applicable to this project and may occur in the report below:

AEL	Atmospheric Emissions Licence
CO_2	Carbon dioxide
CO	Carbon monoxide
CV	Curriculum Vitae
DEA	Department of Environmental Affairs
DFFE	Department Forestry, Fisheries and the Environment
DHSWS	Department of Human Settlements, Water and Sanitation
EA	Environmental Authorisation
EAP	Environmental Impact Practitioner
ECO	Environmental Control Officer
EHS	Environmental, Health and Safety
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
EMS	Environmental Management System
EO	Environmental Officer
GNR	Government Notice Regulation
I&APs	Interested and Affected Parties
LPG	Liquified Petroleum Gas
NAAQS	National Ambient Air Quality Standards
NO_2	Nitrogen dioxide
PM	Particulate matter
$PM_{2.5}$	Inhalable particulate matter (aerodynamic diameter less than 2.5 µm)
PM_{10}	Thoracic particulate matter (aerodynamic diameter less than 10 µm)
SAHRA	South African National Heritage Resources Agency
SANS	South African National Standards
SAWS	South Africa Weather Station
SHE	Safety, Health and Environment
SO_2	Sulphur dioxide
TiO_2	Titanium dioxide

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APPENDICES

1. PROJECT DETAILS

Anglo African Metals (Pty) Ltd (the South African registered company of Fodere Titanium) has identified a suitable tailings/slag resource which can be processed using their developed technology at Highveld Steel located between Balmoral and eMalahleni in Mpumalanga Province. The waste recovery plant is proposed to be located on Portion 48 of the Farm Elandsfontein 309JS (to be referred to as the Remaining Extent of the Farm Highveld Industrial Park No. 1230 JS upon finalisation of the subdivision and consolidation process), approximately 17 km west of eMalahleni town in the eMalahleni Local Municipality (LM) within the Nkangala District Municipality (DM) in Mpumalanga Province (**Figure 1.1**). The development area is approximately 4ha in extent (it is assumed that100% of the 4ha development area will be cleared for the establishment of the zero waste recovery plant and associated infrastructure) and is contained within the EVRAZ Highveld Steel and Vanadium property[1]. The site is accessible directly off the R104, from the N4 turnoff near Kwa-Guqa informal settlement.

Table 1.1 provides a summary of properties associated with the proposed Anglo African Metals Zero Waste Recovery Solution.

Table1.1: Summary of the preferred project site identified for the development of the Anglo African Metals Zero Waste Recovery Solution

Province	**Mpumalanga**
District Municipality	Nkangala District Municipality
Local Municipality	eMalahleni Local Municipality
Ward number(s)	22
Nearest town(s)	Approximately 17km west of eMalahleni town, near Kwa-Guqa informal settlement
Farm name(s) and number(s)	Waste recovery plant: » Portion 48 of the Farm Elandsfontein 309JS (T0JS0000000030900048) (to be referred to as the Remaining Extent of the Farm Highveld Industrial Part No. 1230 JS (T0JS000000000123000000) upon finalisation of the subdivision and consolidation process)
Current zoning	Waste recovery plant: » Industrial Use
Current land use	General Industrial

[1] A sale process is underway to transfer the property to Highveld Industrial Park (Pty) Ltd

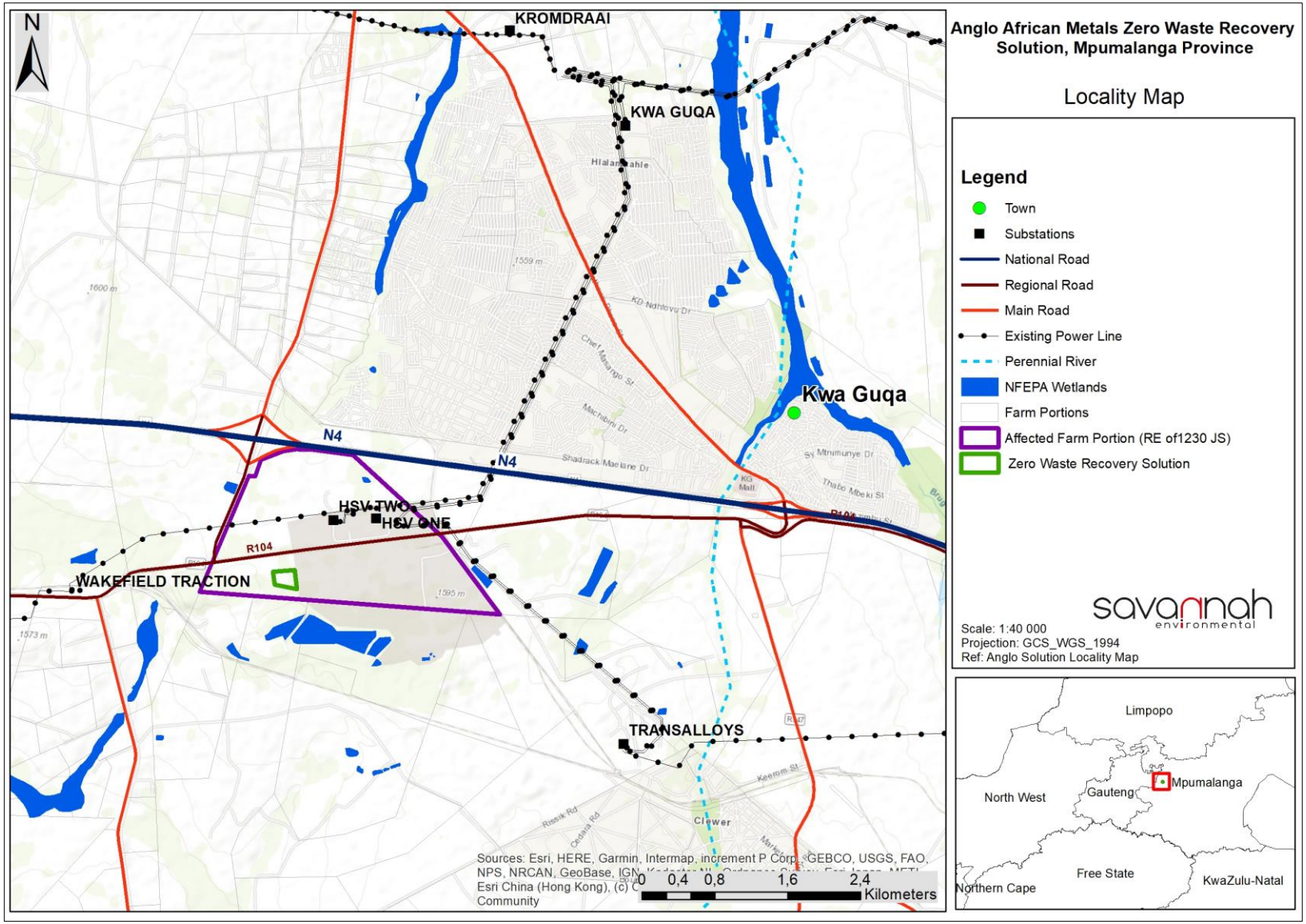


Figure1.1: Locality map showing the area proposed for the establishment of the Anglo African Metals Zero Waste Recovery Solution

The main infrastructure associated with the facility includes the following:

- Chemical plant area, where all process chemicals including acid are produced, stored and handled as required by the waste recovery process.
- Substation and plant utility unit as interface and controlling unit for the electricity utilised by the plant during operation.
- Slag stockpile.
- Crushing plant.
- Mill.
- Product area for storage of the various products produced through the recovery process.
- Reagent area, for the storage and handling of reactants utilised in the waste recovery process.
- Fuel storage area with a fuel storage tank (or tanks, as required) of up to 70m^3 for the bulk storage of gas (LPG or similar) utilised in the waste recovery process.
- A security area.
- Parking lot.
- Admin and control room including offices and ablutions for staff.

A summary of the planned infrastructure proposed as part of the Anglo African Metals Zero Waste Recovery Solution (including the infrastructure dimensions) is provided in **Table 1.2** (refer to **Figure 1.2** for an indicative layout[2]):

Table 1.2: Infrastructure proposed as part of the Anglo African Metals Zero Waste Recovery Solution

Infrastructure	Dimensions/Details

Extent of the project development footprint	- Approximately 4ha – includes the following:
	  - Internal roads
	  - Air and gas pipelines
	  - Control and electrical buildings (including a central control room)
	  - Administrative buildings
	  - Firefighting systems
	  - Bulk water storage
	  - Storage facilities for fuels, gas and chemicals
	  - Emergency back-up generators
	  - Effluent reticulation systems

Chemical plant	- To be utilised for the production, storage and handling of process chemicals required by the waste recovery process.
	- Process chemicals to be stored include:
	  - Coal stored in bin of up to 3 m^3
	  - Sodium carbonate stored in bin of up to 4 m^3
	  - Ammonium sulphate stored in bin of up to 4 m^3
	  - Sulphuric acid in 2 tanks of up to 30 m^3 (60 m^3)
	  - Lime is slurried in a tank of up 6 m^3
	  - Sodium hydroxide into solution stored in tank of up to 20 m^3
	  - A fuel storage tank (or multiple tanks, as required) of up to 70 m^3 for the bulk storage of gas (LPG or similar type) utilised in the waste recovery process
	All storage areas will be bunded.

[2] Note that this layout is indicative at this stage and is subject to change following final design

Infrastructure	Dimensions/Details
Proposed technology	» Pyrometallurgical and hydrometallurgical patented extraction process for high-purity Titanium Dioxide production as well as Vanadium, Aluminium and Magnesium
Processing capacity	2 000 tons of tailings/slag per month, 3 tons per hours, 72 tons per day x 28 days x 12 months
Stack dimensions (Site elevation: 155 m above mean sea)	» Stack 1: 20 m above ground » Stack 2: 13 m above ground
Substation and plant utility unit	» Interface and controlling unit for the electricity utilised by the plant during operation. » Control Room: Length: 12m, Width: 3m, Height: 2.6m, Area: 36m^2 » Server Room: Length: 6m, Width: 2.4m, Height: 2.5m, Area: 14.4m^2 » Substation: Length: 12m, Width: 3m, Height: 2.6m, Area: 36m^2
Crushing plant	» Operating hours are split into two categories, namely milling and hydrometallurgy, as indicated below: Operating Hours (milling/crushing) (h/d) **9** Operating Hours (hydrometallurgy) (h/d) 24
Mill	The mill will be housed in the main facility building and will operate 9 hours per day.
Product area	* To be utilised for the storage of the various products produced through the recovery process. * Approximately 36m^2
Reagent area	* To be utilised for the storage and handling of reactants utilised in the water recovery process. * Approximately 96m^2
Security area	Approximately 14.4m^2
Admin and control room, including offices and ablutions for staff.	Estimated surface area: 187.2m^2
Supporting Infrastructure	» Internal water, air and gas pipelines » Control and electrical buildings, including a central control room » Administrative buildings » Firefighting systems » Bulk water storage » Emergency back-up generators » Effluent reticulation systems - i.e. 1) sanitary wastewater system 2) storm water and rainwater collection system
Access road	» Main access to the project site will be via the existing access from the R104 to Highveld Steel
Raw/Process-Water Storage Reservoir	* Process water stored on site in a tank of 20 000 m^3. Process water will be recycled, and no process water effluent will be discharged * Potable water is to be stored in 2 tanks of 5 m^3 each, one at ablution block and one at the admin offices * Water for fire-fighting purposes will be located on site in a 20 000 m^3 tanks
Services required	» Services agreements for refuse disposal, water, and electricity have been entered into with Highveld Steel in terms of the lease agreement » Sanitation waste generated in septic tanks system will be emptied as required by a licensed service provider for disposal

The plant will be developed to process 2 000 tonnes of tailings/slag per month, approximately 3 tons per day and will be primarily fuelled by LPG and Sasol gas brought into site by dedicated transport truck deliveries.

Operation of the plant is anticipated for 24 hours per day, 365 per year (i.e. non-stop operation) and will utilise the slag produced by the Highveld Steel operations. Operating hours are split into two categories, namely, milling and hydrometallurgy, as indicated below:

Operating Hours (milling/crushing)	**(h/d)**	**9**
Operating Hours (hydrometallurgy)	(h/d)	24

Figure1.2: Proposed layout of the plant.

Table 1.2 provides details of the proposed project.

Table 1.2: Details of the proposed Zero Waste Recovery Facility, near Kwa-Guqa.

Location of the site	Portion 48 of the Farm Elandsfontein 309JS (to be referred to as the Remaining Extent of the Farm Highveld Industrial Part No. 1230 JS upon finalisation of the subdivision and consolidation process)
Landowner	EVRAZ Highveld Steel and Vanadium[3]

[3] A sale process is underway to transfer the property to Highveld Industrial Park (Pty) Ltd

Municipal Jurisdiction	Nkangala District Municipality and eMalahleni Local Municipality
Extent of preferred project site	Approximately 350 ha
Extent of the project development footprint	Approximately 4 ha
Coordinates of the development footprint	The following development footprint coordinates are proposed:

Latitude	Longitude
25°52'58.26"S	29° 4'47.58"E
25°52'56.83"S	29° 4'55.73"E
25°53'2.34"S	29° 4'57.16"E
25°53'3.63"S	29° 4'48.86"E

1.1. Overview of the Technology

The technology developed by Anglo African Metals includes the following approximate process[4]:

- Crushing and milling of titanium dioxide (TiO_2) slag to the appropriate size for further treatment.
- Magnetic separation of entrained metallic iron from the crushed slag, which is used to separate ferroalloy production process.
- Alkali roasting of the remaining feedstock using a gas fired kiln. Off-gases from the kiln is a combination of mainly carbon monoxide (CO), and carbon dioxide and, a very small concentration of sulphur dioxide. These off gases are passed through the off-gas scrubber to remove SO_2 and the remaining CO_2 and CO is reused in the kiln to supply part of the required heat.
- The material produced during alkali roasting from the kiln is then leached in water to dissolve vanadium and alumina.
- A further process produces vanadium pentoxide and recovers aluminium oxide from the leached products in the steps above.
- The remaining solid or residue after extracting vanadium is treated via leaching and curing sulphuric acid. The SO_2 gases or fumes given out during leaching or roasting are scrubbed off.
- Iron, magnesium and TiO_2 are recovered from solution via precipitation steps.
- Precipitated TiO_2 is heated to remove water.
- The leach solution is neutralised with lime to form calcium sulphate and respective sulphates. The mixture of sulphates is heated in the furnace to produce sulphuric acid which is then used in the leaching step. The solid material after heating in the furnace is mainly calcium silicate which is used for cement production and construction.
- The remaining material after leaching of titanium, magnesium, aluminium oxide etc. is mainly silica sand which is also used for construction. Metals may also be produced from the precipitation processes above, intended for third party resale.

This process therefore recovers vanadium and titanium oxide from slag materials, with water, carbon monoxide and carbon dioxide, gypsum, various metals and synthetic rutile produced at the various stages. These materials are all useful in other processes and are planned to be collected and sold to third parties. The process itself therefore results in no further waste production, while simultaneously utilising a common waste type – i.e. slag.

[4] Note that due to intellectual property and commercial sensitivity of this process, only a high level summary is provided providing an understanding of the main components of the process

2. FINDINGS OF THE ENVIRONMENTAL IMPACT ASSESSMENT (EIA)

2.1. Impacts Identified and Assessed through the EIA Process

The potential environmental impacts associated with the Anglo African Metals Zero Waste Recovery Solution identified and assessed throughout the EIA process include:

» Impacts on heritage resources (including palaeontology)
» Impacts on air quality
» Socio-economic impacts

2.1.1 Impacts on Heritage Resources (including Palaeontology)

The desktop assessment and field survey conducted on 5 March 2021 as part of the Heritage Impact Assessment (**Appendix E** of the EIA Report) indicated no heritage resources within the overall project site and development footprint due to the extensive disturbance of the footprint by industrial activity.

The SAHRIS palaeontological sensitivity map rates the study as underlain by geological strata with a Very High palaeontological significance. However, the palaeontological desktop assessment (**Appendix E** of the EIA Report), supported by the fieldwork concluded by the heritage specialist, has considered the potential impact and, due to the disturbed nature of the site, has concluded that no further fieldwork will be required, but that a chance finds protocol must be implemented.

From a heritage perspective, it is the specialist's opinion that the overall impact on heritage resources will be Low. Provided that the recommended mitigation measures are implemented, the impact would be acceptably Low or could be totally mitigated to the degree that the project could be approved.

2.1.2 Impacts on Air Quality

The Air Quality Impact Assessment (**Appendix D** of the EIA Report) assessed baseline air quality data for the SAWS managed eMalahleni Station (located approximately 12.3km northeast of the proposed project location) for thoracic particulates (with a diameter less than 10 µm – PM10), inhalable particulates (with an aerodynamic diameter less than 2.5 µm – $PM_{2.5}$), sulfur dioxide (SO_2) and nitrogen dioxide (NO_2) using baseline data for the period 2020. Impacts are expected during the construction, operational and decommissioning phases.

Construction (and decommissioning) activities associated with the zero waste facility are likely to result in emissions of particulate and gaseous pollutants due to civil and building work and from vehicle traffic. The nature of emissions from construction activities is highly variable in terms of temporal and spatial distribution and is also transient. Increased ambient concentrations of fine particulates and gaseous pollutants may result in negative human health impacts. Increased nuisance dustfall is likely as a result of wind-blown dust emissions from the working areas. Increased nuisance dustfall rates will likely result in negative impact on dustfall in the immediate vicinity of the construction area. Unmitigated particulate emissions could result in higher particulate concentrations and dust fallout in the immediate vicinity of the plant, but are unlikely to result in any noticeable impact any identified sensitive receptor locations. The impact of gaseous pollutants is likely to minor.

The operational phase of the zero waste recovery plant will result in elevated ambient concentrations of particulate and gaseous atmospheric pollutants, including SO_2, NO_2 and PM. Increased ambient concentrations may result in negative human health impacts, as well as negative impacts on vegetation and animals within the surrounding area. No exceedances were however recorded at any of the identified sensitive receptors.

The findings from the Air Quality Impact Assessment are summarised as follows:

» The extent of incremental impacts due to the Zero-Waste Recovery Plant are expected to be localised to the vicinity of the operations, with possible exceedances of the SA NAAQS simulated outside the property boundary, but simulated impacts are negligible at all sensitive receptor locations.
» The duration of the impacts is expected to be long-term (for the life of the project) while the magnitude of impacts is expected to be medium for particulate emissions, low to medium for gaseous pollutants (SO_2 and NO_2), and low for dust fallout. If all fugitive sources are properly managed, no residual impact is expected post closure.
» Impacts during the construction phase are expected to be transient and highly variable from day to day, depending on the construction activities being performed. For this reason, construction phase impacts are expected to be low.
» Given that particulate concentrations in the study area are already elevated, it is possible that cumulative impacts could be high in magnitude.

From an air quality perspective, it is the opinion of the specialist that the project be authorised and licensed to operate, on condition that:

» The plant is designed to comply with the Subcategory 4.20 Minimum Emission Standards.
» A Fugitive Dust Management Plan is implemented, inclusive of the following mitigation measures aimed at controlling fugitive dust emissions from the operations and minimize the impact of particulate emissions on the receiving environment:
  o Paving of all on-site roads. While the surface moisture content of unpaved roads can be increased with water bowsers, it is much easier to control the silt loading on paved roads.
  o Regular sweeping of on-site paved roads to reduce silt loading on the road surface, higher silt loading results in higher vehicle entrainment emissions.
  o Clean-up of all spillages to avoid re-entrainment by vehicles.
  o Implementation of strict on-site speed limits.
  o Mitigation of crushing plant emissions, either by water sprays or enclosure with dust extraction.
  o Control of dust emissions from stockpiles during periods of high wind speeds, either by increasing moisture content of material with water sprays, or by decreasing wind speeds using enclosures or bund walls
» Stack testing is conducted as indicated in the AEL for the operations.
» Dust fallout sampling is conducted on the facility boundary in the four cardinal wind direction.

2.1.3 Social-Economic Impacts

The Socio-Economic Impact Assessment (**Appendix F** of the EIA Report) identified both positive and negative impacts to be associated with both the construction and operational phases of the project.

During the construction phase, the positive impacts expected to occur include increase production, increase in the provincial GDP, increase in employment opportunities, skills development, increase in government revenue and improvements of household income and standard of living. The significance of the positive construction phase impacts ranges from medium to low, following the implementation of the recommended enhancement measures.

Negative impacts expected to occur during construction include an increase in pressure on services and social and local infrastructure, as well as an increase in demand for housing, which may contribute to increased levels of competition in the temporary housing market. The significance of the negative construction phase impacts is expected to be low, following implementation of the recommended mitigation measures. No negative impacts of a high significance were identified for the project, after implementation of mitigation measures.

During the operational phase, the positive impacts expected to occur include increase production, increase in the provincial GDP, increase in employment opportunities, skills development, improved household income and standard of living, and increase in government revenue. The significance of the positive construction phase impacts is expected to be medium, following implementation of the recommended enhancement measures.

Negative impacts expected to occur during the operational phase include a temporary increase in pressure on services and social and local infrastructure, as well as potential health risks due to cumulative air emissions of existing industry and the proposed facility. The impacts are expected to be of medium to low significance, after implementation of mitigation measures.

Overall, numerous positive socio-economic impacts will occur as a result of the zero waste recovery plant and these positive impacts far outweigh any potential negative impacts that might occur. Considering the numerous positive socio-economic impacts associated with the proposed project, it is the specialist's opinion the establishment of the proposed waste recovery facility be continued, provided mitigation measures are implemented to address the identified externalities or negative effects.

2.1.4 Assessment of Cumulative Impacts

Cumulative impacts are expected to occur with the development of the proposed facility throughout all phases of the project life cycle. The main aim for the assessment of cumulative impacts is to test and determine whether the development will be acceptable within the landscape proposed for the development, and whether the loss, from an environmental and social perspective, will be acceptable without whole-scale change.

The assessment of the cumulative impacts was undertaken through the consideration of impacts in isolation and compared to the cumulative impacts of the proposed facility in combination with other known or proposed industrial developments within the area. The significance of the cumulative impacts associated with the development of the facility is expected to be medium to low. There are no impacts or risks identified to be considered as unacceptable with the development of the zero waste recovery facility when considered together with other developments within the surrounding area. In addition, no impacts which will result in whole-scale change are expected.

The limited potential for cumulative impacts and risks makes the location of this project within the identified site of the EVRAZ Highveld Steel and Vanadium property[5] a desirable location for the proposed project, provided that environmental impacts are mitigated to suitable standards as recommended within this EIA Report.

2.2. Environmental Sensitivities

The proposed development site is located in a large existing industrialised area surrounded by several heavy industries and mining operations. It is a brownfield site that has already undergone extensive transformation, and as such, no environmental sensitivities were identified within the project site (refer to **Figure 2.1**).

[5] A sale process is underway to transfer the property to Highveld Industrial Park (Pty) Ltd

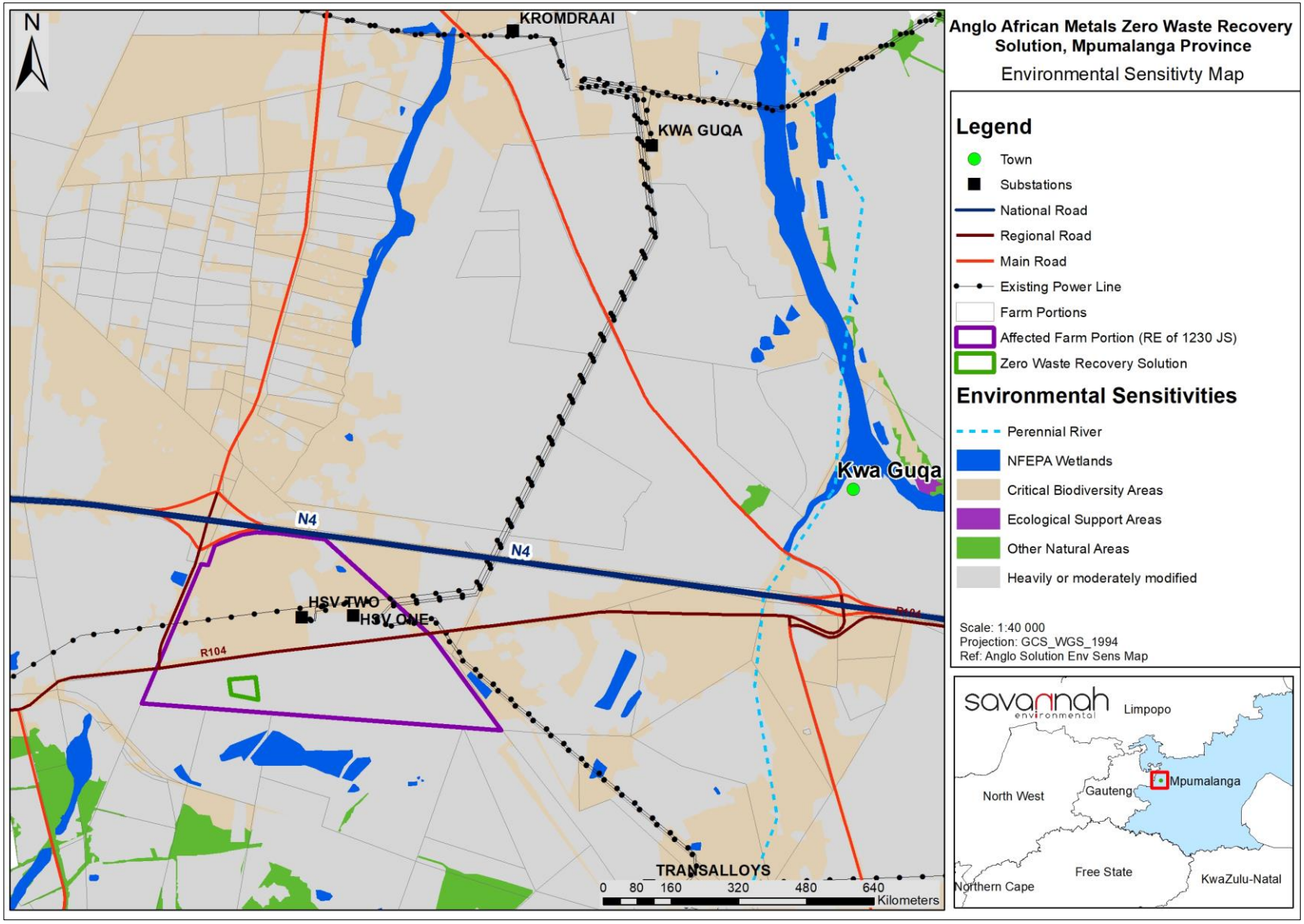


Figure 2.1: Final preferred layout map overlain by the environmental sensitivities for the Project site.

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 plant. 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 construction and operation activities so that unnecessary or preventable environmental impacts do not result. These impacts range from those incurred during start up (site clearing and site establishment) through to those incurred during the construction activities themselves (erosion, noise, dust) to those incurred during site rehabilitation and operation. The EMPr also defines monitoring requirements in order to ensure that the specified objectives are met.

This EMPr is applicable to all employees and contractors working on the pre-construction, construction, and operation and maintenance phases of the zero waste recovery plant. The document must be adhered to and 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) (refer to **Table 4.1**). The specifications have been developed on the basis of the findings of the Environmental Impact Assessment (EIA), and must be implemented to protect sensitive 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.

The EMPr has the following objectives:

- Outline mitigation measures and environmental specifications which are required to be implemented for the planning, construction and operation phases of the project to minimise the extent of environmental impacts, and to manage environmental impacts associated with the project.
- 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 were not considered in the EIA process.

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

Anglo African Metals 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 relevant contract documentation provided to parties responsible for construction and/or operation activities on the site. This EMPr is applicable to the Project Proponent and contractors working on the pre-construction, construction, and operation and maintenance phases of the project. In terms of the Duty of Care provision in S28(1) of the National Environmental Management Act (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, halted or minimised. The document must therefore 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 EIA Report for the project. As such, it is important that this document be read in conjunction with the EIA 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. This is a dynamic document and will be further developed in terms of specific requirements listed in any authorisations issued for the project and/or as the project develops. This will ensure that the construction and operation activities are planned and implemented taking sensitive environmental features into account. 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).

4. STRUCTURE OF THIS EMPR

The preceding chapters provide background to the EMPr and the proposed project, while the chapters which follow consider the following:

- Planning and design activities;
- Construction activities;
- Operation activities; and
- Decommissioning activities.

These chapters set out the procedures necessary for the project owner to minimise environmental impacts and achieve environmental compliance. For each of the phases of implementation for the project, an overarching environmental **goal** is stated. In order to meet this goal, a number of **objectives** are listed accompanied by management **actions** that are aimed at achieving these objectives. The management programme has been structured in table format in order to show the links between the goals for each phase and their associated objectives, activities/risk sources, mitigation actions, responsibilities, 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:

OBJECTIVE: Description of the objective, which is necessary to meet the overall goals; which take into account the findings of the EIA specialist studies

Project Component/s	List of project components affecting the objective, i.e.: » Zero Waste Recovery Plant. » Internal roads. » Internal water, air and gas pipelines. » Control and electrical buildings, including a central control room. » Administrative buildings. » Firefighting systems. » Bulk water storage. » Storage facilities for fuels, gas and chemicals. » Emergency back-up generators. » Effluent reticulation systems - i.e. 1) sanitary wastewater system 2) storm water and rainwater collection system.
Potential Impact	Brief description of potential environmental impact if objective is not met.
Activity/Risk Source	Description of activities which could affect achieving the objective.
Mitigation: Target/Objective	Description of the target and/or desired outcomes of mitigation.

Mitigation: Action/Control	Responsibility	Timeframe
List specific action(s) required to meet the mitigation target/objective described above.	Who is responsible for the measures	Time periods for implementation of measures

Performance Indicator	Description of key indicator(s) that track progress/indicate the effectiveness of the management programme.
Monitoring	Mechanisms for monitoring compliance; the key monitoring actions required to check whether the objectives are being achieved, taking into consideration responsibility, frequency, methods, and reporting.

The objectives and EMPr tables are required to be reviewed and possibly modified whenever changes, such as the following, occur:

- Planned activities change (i.e. in terms of the components and/or layout of the plant);
- 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 deterioration or further deterioration of the environment.
- Relevant legal or other requirements are changed or introduced; and
- Significant progress has been made on achieving an objective or target such that it should be re-examined to determine if it is still relevant, should be modified, etc.

Any amendments to the EMPr must be undertaken in accordance with the requirements of the legislation relevant at the time, as well as in accordance with any specific requirements of the EA (once issued).

4.1. Contents of this Environmental Management Programme (EMPr)

This Environmental Management Programme (EMPr) has been prepared as part of the EIA process being conducted in support of the application for Environmental Authorisation (EA) for the Anglo African Metals Zero Waste Recovery Solution This EMPr has been prepared in accordance with DFFE's requirements as contained in Appendix 4 of the 2014 EIA Regulations (GNR 326), and within the Acceptance of Scoping dated 18 February 2021. It provides recommended management and mitigation measures with which to minimise impacts and enhance benefits associated with the project.

An overview of the contents of this EMPr, as prescribed by Appendix 4 of the 2014 EIA Regulations (GNR 326), and where the corresponding information can be found within this EMPr is provided in **Table 4.1**.

Table 4.1: Summary of where the requirements of Appendix 4 of the 2014 NEMA EIA Regulations (GNR 326) are provided in this EMPr.

Requirement	Location in this EMPr
(1) An EMPr must comply with section 24N of the Act and include – (a) Details of – (i) The EAP who prepared the EMPr. (ii) The expertise of that EAP to prepare an EMPr, including a curriculum vitae.	Section 4.2.1 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 1

Requirement	Location in this EMPr
(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.	Figure 2.1 Appendix B
(d) A description of the impact management outcomes, including management statements, identifying the impacts and risks that need to be avoided, managed and mitigated as identified through the environmental impact assessment process for all phases of the development including –	Chapter 6
(i) Planning and design.	
(ii) Pre-construction activities.	Chapter 6
(iii) Construction activities.	Chapter 7
(iv) Rehabilitation of the environment after construction and where applicable post closure.	Chapter 7
(v) Where relevant, operation activities.	Chapter 8
(f) A description of proposed impact management actions, identifying the manner in which the impact management outcomes contemplated in paragraph (d) will be achieved, and must, where applicable, include actions to – (i) Avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation. (ii) Comply with any prescribed environmental management standards or practices. (iii) Comply with any applicable provisions of the Act regarding closure, where applicable. (iv) Comply with any provisions of the Act regarding financial provision for rehabilitation, where applicable.	Chapter 6-9
(g) The method of monitoring the implementation of the impact management actions contemplated in paragraph (f).	Chapter 6-9
(h) The frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f).	Chapter 6-9
(i) An indication of the persons who will be responsible for the implementation of the impact management actions.	Chapter 6-9
(j) The time periods within which the impact management actions contemplated in paragraph (f) must be implemented.	Chapter 6-9
(k) The mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f).	Chapter 6-9
(l) A program for reporting on compliance, taking into account the requirements as prescribed by the Regulations.	Chapter 6-9
(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. (ii) Risks must be dealt with in order to avoid pollution or the degradation of the environment.	Chapter 7
(n) Any specific information that may be required by the competent authority.	Table 4.2
(2) Where a government notice gazetted by the Minister provides for a generic EMPr, such generic EMPr as indicated in such notice will apply.	N/A

An overview of the contents of this EMPr, as prescribed by DFFE's Acceptance of the Scoping Report dated 18 February 2021, and where the corresponding information can be found within this EMPr is provided in **Table 4.2**.

Table 4.2: Summary of where the requirements prescribed by DFFE's Acceptance of the Scoping Report are provided in the EMPr

DFFE requirement for EMPr	Response / Location in this EMPr
A construction and operational phase EMPr that includes mitigating and monitoring measures must be submitted with the final EIAr.	This construction and operational phase EMPr, inclusive of mitigating and monitoring measures, will be submitted with the final EIAr.

4.2. Project Team

In accordance with Regulation 12 of the 2014 EIA Regulations (GNR 326), the applicant appointed Savannah Environmental (Pty) Ltd as the independent environmental consultants responsible for managing the application for EA and the supporting EIA process. The application for EA and the EIA process, is being managed in accordance with the requirements of NEMA, the 2014 EIA Regulations (GNR 326), and all other relevant applicable legislation.

4.2.1 Details and Expertise of the Environmental Assessment Practitioner (EAP)

Savannah Environmental is a leading provider of integrated environmental and social consulting, advisory and management services with considerable experience in the fields of environmental assessment and management. The company is wholly woman-owned (51% black woman-owned) and is rated as a Level 2 Broad-Based Black Economic Empowerment (B-BBEE) Contributor. The company was established in 2006 with a clear objective to provide services to the infrastructure development sector. Savannah Environmental benefits from the pooled resources, diverse skills and experience in the environmental field held by its team that has been actively involved in undertaking environmental studies for a wide variety of infrastructure development projects throughout South Africa and neighbouring countries. Strong competencies have been developed in project management of environmental processes, as well as strategic environmental assessment and compliance advice, and the assessment of environmental impacts, the identification of environmental management solutions and mitigation/risk minimising measures.

The Savannah Environmental team has considerable experience in environmental impact assessments and environmental management and has been actively involved in undertaking environmental studies for a wide variety of projects throughout South Africa.

The Savannah Environmental team comprises:

» **Mmakoena Mmola:** holds a BSc Honours in Geochemistry from the University of the Witwatersrand and is currently completing a BSc Honours in Environmental Management with the University of South Africa. She has 3.5 years of experience in the environmental management field. Her key focus is on undertaking environmental impact assessments, environmental permitting and authorisations, compliance auditing, public participation and environmental management programmes. She is registered as a Candidate Natural Scientist with the South African Council for Natural Scientific Professions (SACNASP), Registration Number: 126748.

» **Gideon Raath:** 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. Gideon's experience includes EIA permitting for ~72 different projects, ranging from infrastructure, mining, energy, housing, renewable energy and the conservation industries. These include Environmental Authorisations (BAR, S&EIR), Water Use Licencing, Waste Licencing, Environmental Compliance Officer compliance auditing, GIS studies and MPRDA permitting. He therefore has wide ranging experience in NEMA, NHRA, NEM:WA, NEM:BA, MPRDA and NWA regulations, having applied them for numerous private and public sector clients across various industries, for small, medium and large projects. Gideon is also an experienced Ecological & Wetland Specialist having conducted ~21 specialist studies, accredited with SACNASP as a professional natural scientist (Pr.Sci.Nat) since 2017. Gideon also has experience beyond the permitting sphere through numerous screening assessments for potential developers, including fatal flaw screenings, regulatory and permitting approval screening as well as ecological and hydrological sensitivity screening. Gideon has also served in an advisory role for various infrastructure and mining projects, assisting with environmental due diligence, bankable feasibility study input and assistance towards financial close.

» **Jo-Anne Thomas:** holds a Master of Science Degree in Botany (M.S.c Botany) from the University of the Witwatersrand and is registered as a Professional Natural Scientist (400024/2000) with SACNASP and a registered Environmental Assessment Practitioner (EAP) with EAPASA (2019/726). She has over 20 years of experience in the field of environmental assessment and management, and the management of large environmental assessment and management projects. During this time, she has managed and coordinated a multitude of large-scale infrastructure EIAs and is also well versed in the management and leadership of teams of specialist consultants, and dynamic stakeholders. She has been responsible for providing technical input for projects in the environmental management field, specialising in Strategic Environmental Advice, EIA studies, environmental permitting, public participation, EMPs and EMPrs, environmental policy, strategy and guideline formulation, and integrated environmental management (IEM). Her responsibilities for environmental studies include project management, review and integration of specialist studies, identification and assessment of potential negative environmental impacts and benefits, and the identification of mitigation measures, and compilation of reports in accordance with applicable environmental legislation.

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

4.2.2 Details of the Specialist Consultants

A number of independent specialist consultants have been appointed as part of the EIA project team in order to adequately identify and assess potential impacts associated with the project (refer to **Table 4.3**).

Table 4.3: Specialist Consultants which form part of the EIA project team

Issue	Specialist
Heritage (including Palaeontology)	Wouter Fourie of PGS Heritage
Air Quality	Nick Grobler of AirShed Planning Professionals
Socio-Economic	Elena Broughton of Urban Econ Development Economists

CVs detailing the independent specialist consultants, including details of their expertise and relevant experience are included in the respective specialist reports (refer to **Appendix D – F** the EIA Report).

5. ROLES AND RESPONSIBILITIES

For the purposes of the EMPr, the generic roles that need to be defined are those of the:

» Project Developer;
» Project Manager/Site Manager;
» Environmental Control Officer;
» Lead Contractor;
» Contractor's Safety, Health and Environment Representative/Environmental Officer;
» Plant Manager; and
» Environmental Officer during operation.

It is acknowledged that the specific titles for these functions may vary once the project is implemented. The purpose of this section of the EMPr is to give a generic outline of what these roles typically entail. It is expected that this will be further defined during project implementation.

OBJECTIVE 1: Establish clear reporting, communication, and responsibilities during construction in relation to the overall implementation of the EMPr

i) The Developer

The Project Developer is responsible for the implementation of the requirements of the EA (once issued), the requirements of all other relevant environmental permits and the specifications of the EMPr during all phases of the project. Decommissioning will entail the appointment of a new professional team and responsibilities will be similar to those during the design, pre-construction and construction phases.

ii) Project Manager/Site Manager

The Project Manager/Site Manager is responsible for overall management of project and EMPr implementation. The following tasks will fall within his/her responsibilities:

» Be aware of the findings and conclusions of the Environmental Impact Assessment and the conditions stated within the Environmental Authorisation (once issued);
» Be familiar with the recommendations and mitigation measures of this EMPr, and implement these measures;
» Monitor site activities on a daily basis for compliance;
» Conduct internal audits of the construction site against the EMPr;
» Confine the construction site to the demarcated area; and
» Rectify transgressions through the implementation of corrective action.

iii) Environmental Control Officer

A suitably qualified Environmental Control Officer (ECO) must be appointed by the project proponent prior to the commencement of any authorised activities and will be responsible for monitoring, reviewing and verifying compliance by the Contractor with the environmental specifications of the EMPr and the conditions of the EA. Accordingly, the ECO will:

- Undertake bi-weekly (every 2 weeks) audits of the project site to monitor and verify compliance with the EMPr commitments and EA conditions and that environmental impacts are kept to a minimum;
- Be fully knowledgeable of the contents of the EIA;
- Be fully knowledgeable of the contents of the ~~the~~ EA (once issued);
- Be fully knowledgeable of the contents of the EMPr;
- Be fully knowledgeable of the contents of all relevant environmental legislation, and ensure compliance therewith;
- Be fully knowledgeable of the contents of all relevant licences and permits issued for the project;
- Ensure that the contents of the EMPr are communicated to the Contractor's site staff and that the Site Manager and Contractors are constantly made aware of the contents through ongoing discussion;
- Ensure that the Site Manager has input into the review and acceptance of construction methods and method statements or site-specific plans;
- Ensure that activities on site comply with all relevant environmental legislation;
- Ensure that a removal is ordered of any person(s) and/or equipment responsible for any contravention of the specifications of the EMPr;
- Ensure that any non-compliance or remedial measures that need to be applied are reported;
- Keep records of all activities on site, problems identified, transgressions noted and a task schedule of tasks undertaken by the ECO;
- Independently report to the DFFE in terms of compliance with the specifications of the EMPr and conditions of the EA (once issued); and
- Keep records of all reports submitted to DFFE.

iv) Lead Contractor

The Lead Contractor is responsible for the following:

- Ensure compliance with the EA, environmental permits and the EMPr at all times during construction;
- Ensure that all appointed contractors and sub-contractors are aware of the EMPr and their respective responsibilities;
- Provide all necessary supervision during the execution of the project. He/ She should be available on site all the time;
- Comply with special conditions as stipulated by landowners during the negotiation process;
- Inform and educate all employees about the environmental risks associated with the various activities to be undertaken, and highlight those activities which should be avoided during the construction process in order to minimise significant impacts to the environment;
- Maintain an environmental register which keeps a record of all incidents which occur on the site during construction. These incidents include:
  - Public involvement / complaints
  - Health and safety incidents
  - Hazardous materials stored on site

- Non-compliance incidents

» Where construction activities are undertaken is close to any inhabited area, the necessary precautions shall be taken by the Contractor to safeguard the lives and property of the inhabitants;
» The Contractor shall under no circumstances interfere with the property of landowners, Grid staff or nearby communities; and
» Should the Contractor require clarity on any aspect of the EMPr the Contractor must contact the Environmental Consultant/Officer for advice.

v) Contractor's Safety, Health and Environment Representative/Environmental Officer

The Contractor's Safety, Health and Environment (SHE) Representative/Environmental Officer (EO), 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/EO must act as liaison and advisor on all environmental and related issues and ensure that any complaints received from the public are duly recorded and forwarded to the Site Manager and Contractor.

The Contractor's SHE/EO should:

» Be well versed in 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; and
» Keep accurate and detailed records of all EMPr-related activities on site.

OBJECTIVE 2: Establish clear reporting, communication, and responsibilities during operation in relation to overall implementation of the EMPr during operation

Formal responsibilities are necessary to ensure that key procedures are executed during operation. Several professionals will form part of the operation team. For the purposes of the EMPr, the generic roles that need to be defined are those of the:

» Plant Manager; and
» Environmental Manager

It is acknowledged that the specific titles for these functions may vary once the project is implemented. The purpose of this section of the EMPr is to give a generic outline of what these roles typically entail. It is expected that this will be further defined during project implementation.

i) Plant Manager

The Plant Manager will:

- Ensure that adequate resources (human, financial, technology) are made available and appropriately managed for the successful implementation of the operational 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; and
- Provide forums to communicate matters regarding environmental management.

ii) Environmental Manager

The Environmental Manager will:

- Develop and Implement an Environmental Management System (EMS) for the facility and associated infrastructure;
- Manage and report on the facility's environmental performance;
- Maintain a register of all known environmental impacts and manage the monitoring thereof;
- Conduct internal environmental audits and co-ordinate external environmental audits;
- Liaise with statutory bodies (such as the National and Provincial Department of Environmental Affairs, Air Emissions Licensing Authority, and conservation authorities) on environmental performance and other issues;
- Conduct environmental training and awareness for the employees who operate and maintain the facility;
- Compile environmental policies and procedures;
- Liaise with interested and affected parties on environmental issues of common concern; and
- Track and control the lodging of any complaints regarding environmental matters.

6. PLANNING AND DESIGN MANAGEMENT PROGRAMME

Overall Goal: undertake the pre-construction activities (planning and design phase) in a way that:

- Ensures that the design of the zero waste recovery plant and associated infrastructure responds to the identified environmental constraints and opportunities;
- Ensures that pre-construction activities are undertaken in accordance with all relevant legislative requirements and avoids sensitive environmental areas as far as practically possible;
- Ensures that adequate regard has been taken of any landowner and community concerns and that these are appropriately addressed through design and planning (where appropriate);
- Ensures that the best environmental options are selected for the zero waste recovery plant and associated infrastructure; and
- Enables the zero waste recovery plant construction activities to be undertaken without significant disruption to other land uses in the area.

In order to meet this goal, the following objectives have been identified, together with necessary actions and monitoring requirements.

6.1. Objectives

OBJECTIVE 1: Ensure the facility design responds to identified environmental constraints and opportunities

Project Component/s	» Zero Waste Recovery Plant. » Internal roads. » Internal water, air and gas pipelines. » Control and electrical buildings, including a central control room. » Administrative buildings. » Firefighting systems. » Bulk water storage. » Storage facilities for fuels, gas and chemicals. » Emergency back-up generators. » Effluent reticulation systems - i.e. 1) sanitary wastewater system 2) storm water and rainwater collection system.
Potential Impact	» Design fails to respond optimally to the environmental considerations. » Positioning of temporary laydown areas.
Activities/Risk Sources	» Positioning of all project components.
Mitigation: Target/Objective	» To ensure that the design of the zero waste recovery plant and associated infrastructure responds to the identified environmental constraints and opportunities.

Mitigation: Action/Control	Responsibility	Timeframe
General		
Plan and conduct pre-construction activities in an environmentally acceptable manner.	Project developer Contractor	Pre-construction

Mitigation: Action/Control	Responsibility	Timeframe
The EMPr must form part of the contract with the Contractors appointed to construct the zero waste recovery plant, and must be used to ensure compliance with environmental specifications and management measures. The implementation of this EMPr for all phases of the proposed project is considered to be key in achieving the appropriate environmental management standards as detailed for this project.	Project developer Contractor	Tender Design and Design Review Stage
The construction site must be appropriately fenced off.	Project developer	Project planning
The contractor must compile a comprehensive stormwater management plan, in conjunction with Highveld Industrial Park, for implementation during the construction and operation of the Zero Waste Recovery Plant.	Contractor Highveld Industrial Park	Pre-construction
Ambient Air Quality		
The zero waste recovery plant needs to be designed to comply with Subcategory 4.20 Minimum Emission Standards.	Project developer Design engineer	Design and planning
Layout		
Plan for consolidating infrastructure as far as possible near to existing impacted areas associated with the EVRAZ Highveld Steel and Vanadium property and make use of already disturbed areas and access roads rather than pristine sites, wherever possible.	Project Developer	Planning phase

Performance Indicator	» Design and layouts respond to the mitigation measures and recommendations in the EIA Report.
Monitoring	» Review of the design and layout by the Project Manager and the ECO prior to the commencement of construction. » Monitor ongoing compliance with the EMPr.

OBJECTIVE 2: Ensure that relevant permits and site-specific plans/procedures are in place to manage impacts on the environment

Project Component/s	» Zero Waste Recovery Plant. » Internal roads. » Internal water, air and gas pipelines. » Control and electrical buildings, including a central control room. » Administrative buildings. » Firefighting systems. » Bulk water storage. » Storage facilities for fuels, gas and chemicals. » Emergency back-up generators. » Effluent reticulation systems - i.e. 1) sanitary wastewater system 2) storm water and rainwater collection system.
Potential Impact	» Impact on identified sensitive areas. » Design fails to respond optimally to the environmental considerations.

Activities/Risk Sources	» Positioning of all project components. » Positioning of laydown areas.
Mitigation: Target/Objective	» To ensure that the design of the zero waste recovery plant responds to the identified environmental constraints and opportunities.

Mitigation: Action/Control	Responsibility	Timeframe
Obtain an Atmospheric Emissions License from Nkangala District Municipality.	Project developer / Consultant	Planning Phase
A chance find procedure must be developed and implemented in the event that archaeological or palaeontological resources are found.	Project developer Contractor	Pre-construction
A comprehensive Fugitive Dust Management Plan must be prepared and implemented, inclusive of the following mitigation measures aimed at controlling fugitive dust emissions from the operations and minimize the impact of particulate emissions on the receiving environment: * Paving of all on-site roads. While the surface moisture content of unpaved roads can be increased with water bowsers, it is much easier to control the silt loading on paved roads. * Regular sweeping of on-site paved roads to reduce silt loading on the road surface, higher silt loading results in higher vehicle entrainment emissions. * Clean-up of all spillages to avoid re-entrainment by vehicles. * Implementation of strict on-site speed limits. * Mitigation of crushing plant emissions, either by water sprays or enclosure with dust extraction. * Control of dust emissions from stockpiles during periods of high wind speeds, either by increasing moisture content of material with water sprays, or by decreasing wind speeds using enclosures or bund walls	Suitably qualified specialist appointed by the Project developer	Planning phase
Develop and implement an emergency preparedness plan for the construction and operational phase of the zero waste recovery plant.	Suitably qualified person appointed by the Project developer	Planning phase

Performance Indicator	» Permits are obtained and relevant conditions complied with. » Relevant management plans/procedures prepared and implemented.
Monitoring	» Review of the design by the Project Manager and the ECO prior to the commencement of construction. » Monitor ongoing compliance with the EMPr.

OBJECTIVE 3: Ensure appropriate planning is undertaken by contractors

Project Component/s	» Zero Waste Recovery Plant. » Internal roads. » Internal water, air and gas pipelines. » Control and electrical buildings, including a central control room.

	» Administrative buildings. » Firefighting systems. » Bulk water storage. » Storage facilities for fuels, gas and chemicals. » Emergency back-up generators. » Effluent reticulation systems - i.e. 1) sanitary wastewater system 2) storm water and rainwater collection system.
Potential Impact	» Design and planning fail to respond optimally to the environmental considerations.
Activities/Risk Sources	» Positioning of all project components. » Positioning of temporary sites. » Employment and procurement procedures.
Mitigation: Target/Objective	» To ensure that the design of the zero waste recovery plant responds to the identified environmental constraints and opportunities. » To ensure that the pre-construction activities are undertaken in an environmentally friendly manner.

Mitigation: Action/Control	Responsibility	Timeframe
The terms of this EMPr and the Environmental Authorisation must be included in all tender documentation and Contractors contracts.	Project developer Contractor	Pre-construction
Pre-construction environmental induction for all construction staff on site must be provided to ensure that basic environmental principles are adhered to. This includes awareness of no littering, appropriate handling of pollution and chemical spills, avoiding fire hazards, remaining within demarcated construction areas etc.	EO	Pre-construction
Contractor to sign and undertake to comply with environmental specifications.	Contractor	Pre-construction
A local employment and procurement policy must be adopted to maximise the benefit to the local economy.	Project developer Contractor	Pre-construction
Set-up a skills desk at the local municipal office and in the nearby communities to identify skills available in the community and assist in recurring labour during the construction phase.	Project developer	Pre-construction
Sub-contract to local construction companies and use local suppliers.	Project developer	Duration of project

Performance Indicator	» Conditions of the EMPr form part of all contracts. » Local employment and procurement is encouraged.
Monitoring	» Monitor ongoing compliance with the EMPr and method statements.

OBJECTIVE 4: Ensure effective communication mechanisms

On-going communication with affected and surrounding landowners is important to maintain during the construction and operation phases of the development. Any issues and concerns raised should be addressed as far as possible in as short a timeframe as possible.

Project component/s	» Zero Waste Recovery Plant. » Internal roads. » Internal water, air and gas pipelines. » Control and electrical buildings, including a central control room. » Administrative buildings. » Firefighting systems. » Bulk water storage. » Storage facilities for fuels, gas and chemicals. » Emergency back-up generators. » Effluent reticulation systems - i.e. 1) sanitary wastewater system 2) storm water and rainwater collection system.
Potential Impact	» Impacts on affected and surrounding landowners and land uses
Activity/risk source	» Activities associated with construction » Activities associated with operation
Mitigation: Target/Objective	» Effective communication with affected and surrounding landowners, and communities. » Addressing of any issues and concerns raised as far as possible in as short a timeframe as possible.

Mitigation: Action/control	Responsibility	Timeframe
Compile and implement a grievance mechanism procedure for the public to be implemented during both the construction and operation phases of the facility. This procedure must include details of the contact person who will be receiving issues raised by interested and affected parties, and the process that will be followed to address issues.	Project developer Contractor Operator	Pre-construction (construction procedure) Pre-operation (operation procedure)
Develop and implement a grievance mechanism for the construction, operation and closure phases of the project for all employees, contractors, subcontractors and site personnel. This procedure must be in line with the South African Labour Law.	Project developer Contractor Operator	Pre-construction (construction procedure) Pre-operation (operation procedure)
Establish a complaints register and/or incident reporting system where personnel, communities and adjacent landowners can lodge complaints regarding construction activities. Ideal location would be security post at point of site access.	EO	Pre-construction

Performance Indicator	» Effective communication procedures in place.
Monitoring	» A Public Complaints register must be maintained, by the Contractor to record all complaints and queries relating to the project and the action taken to resolve the issue. » All correspondence must be in writing. » An incident reporting system should be used to record non-conformances to the EMPr.

7. MANAGEMENT PROGRAMME: CONSTRUCTION

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

» Ensures that construction activities are appropriately 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.
» Minimises the impact on ambient air quality.
» Minimises the impact on heritage resources, should they be uncovered.

7.1. Objectives

In order to meet the overall goal for construction, the following objectives, actions, and monitoring requirements have been identified.

OBJECTIVE 1: Minimise impacts related to inappropriate site establishment

Project Component/s	» Zero Waste Recovery Plant. » Internal roads. » Internal water, air and gas pipelines. » Control and electrical buildings, including a central control room. » Administrative buildings. » Firefighting systems. » Bulk water storage. » Storage facilities for fuels, gas and chemicals. » Emergency back-up generators. » Effluent reticulation systems - i.e. 1) sanitary wastewater system 2) storm water and rainwater collection system.
Potential Impact	» Hazards to landowners and the public.
Activities/Risk Sources	» Any unintended or intended open excavations (foundations and cable trenches). » Movement of construction vehicles in the area and on-site.
Mitigation: Target/Objective	» To secure the site against unauthorised entry. » To protect members of the public/landowners/residents.

Mitigation: Action/Control	Responsibility	Timeframe
Secure site, working areas and excavations in an appropriate manner.	Contractor	Site establishment, and duration of construction
Adequate protective measures must be implemented to prevent unauthorised access to the working area and the internal access routes.	Contractor	Construction
All unattended open excavations must be adequately demarcated and/or fenced.	Contractor	Construction

Mitigation: Action/Control	Responsibility	Timeframe
Establish appropriately bunded areas for storage of hazardous materials (i.e. fuel to be required during construction).	Contractor	Site establishment, and duration of construction
Establish the necessary ablution facilities with chemical toilets. Provide adequate sanitary facilities and ablutions for construction workers) at appropriate locations on site (at least one sanitary facility for each sex and for every 30 workers as per the 2014 Construction Regulations; Section 30(1) (b)) at appropriate locations on site).	Contractor	Site establishment, and duration of construction
Supply adequate weather and vermin proof waste collection bins and skips (covered at minimum with secured netting or shade cloth) at the site where construction is being undertaken. Separate bins must be provided for general and hazardous waste. Provision must be made for separation of waste for recycling.	Contractor	Site establishment, and duration of construction
Establish appropriately bunded areas for storage of hazardous materials (i.e. fuel to be required during construction).	Contractor	Sie establishment

Performance Indicator	» Site is secure and there is no unauthorised entry. » No members of the public/ landowners injured. » Appropriate and adequate waste management and sanitation facilities provided at construction site. » No unnecessary environmental impacts associated with site establishment.
Monitoring	» An incident reporting system is used to record non-conformances to the EMPr. » EO and ECO to monitor all construction areas on a continuous basis until all construction is completed. Non-conformances must be immediately reported to the site manager.

OBJECTIVE 2: Appropriate management of the construction site and construction workers

Project Component/s	» Zero Waste Recovery Plant. » Internal roads. » Internal water, air and gas pipelines. » Control and electrical buildings, including a central control room. » Administrative buildings. » Firefighting systems. » Bulk water storage. » Storage facilities for fuels, gas and chemicals. » Emergency back-up generators. » Effluent reticulation systems – i.e. 1) sanitary wastewater system 2) storm water and rainwater collection system. » Delivery of any component required for the construction phase of the plant.
Potential Impact	» Impacts on the surrounding environment due to inadequate sanitation and waste removal facilities. » Pollution/contamination of the environment. » Impact of heavy construction vehicles on road surfaces, and possible increased risk in accidents involving people and animals.

Activities/Risk Sources	» Access to and from the equipment storage area/s. » Ablution facilities. » Waste management. » Contractors not aware of the requirements of the EMPr, leading to unnecessary impacts on the surrounding environment. » Construction vehicle movement. » Speeding on local roads. » Transportation of project components, equipment and materials to the site.
Mitigation: Target/Objective	» Limit equipment storage within demarcated designated areas. » Ensure adequate sanitation facilities and waste management practices. » Ensure appropriate management of actions by on-site personnel in order to minimise impacts to the surrounding environment. » To minimise potential for negative interaction between pedestrians traffic associated with the construction of the zero waste recovery plant. » To ensure all vehicles are roadworthy and all materials/equipment are transported appropriately.

Mitigation: Action/Control	Responsibility	Timeframe
To minimise impacts on the surrounding environment, contractors must be required to adopt a certain Code of Conduct and commit to restricting construction activities to areas within the development footprint. Contractors and their sub-contractors must be familiar with the conditions of the Environmental Authorisation, the EIA Report, and this EMPr, as well as the requirements of all relevant environmental legislation.	Contractors	Construction
All construction vehicles must adhere to clearly defined and demarcated roads.	Contractor	Construction
Reduce and control construction dust through the use of approved dust suppression techniques as and when required (i.e. whenever dust becomes apparent).	Contractor	Construction
Ensure all construction equipment and vehicles are properly maintained at all times.	Contractor	Construction
Ensure that construction workers are clearly identifiable. All workers must carry identification cards and wear identifiable clothing.	Contractor	Construction
Ensure that operators and drivers are properly trained and make them aware, through regular toolbox talks, of any risk they may pose to the safety of other on site personnel.	Contractor	Construction
Contact details of emergency services must be prominently displayed on site.	Contractor	Construction
Open fires on the site for heating, smoking or cooking are not allowed, except in designated areas.	Contractor	Construction
Contractor must provide adequate firefighting equipment on site and provide firefighting training to selected construction staff.	Contractor	Construction
Personnel trained in first aid must be on site to deal with smaller incidents that require medical attention.	Contractor	Construction
Ensure waste storage facilities are maintained and emptied on a regular basis.	Contractor	Duration of construction

Mitigation: Action/Control	Responsibility	Timeframe
Ensure that rubble, litter, and disused construction materials are appropriately stored (if not removed daily) and then disposed regularly at licensed waste disposal facilities.	Contractor	Duration of construction
Ensure that all personnel have the appropriate level of environmental awareness and competence to ensure continued environmental due diligence and on-going minimisation of environmental harm. This can be achieved through the provision of appropriate environmental awareness training to all personnel. Records of all training undertaken must be kept.	Contractor	Duration of construction
Ensure compliance with all national, regional and local legislation with regard to the storage, handling and disposal of hydrocarbons, chemicals, solvents and any other harmful and hazardous substances and materials.	Contractor	During construction
Ensure ablution facilities are appropriately maintained. Ablutions must be cleaned regularly and associated waste disposed of at a registered/permitted waste disposal site. Ablutions must be removed from site when construction is completed.	Contractor and sub-contractor/s	Duration of construction
Cooking and eating of meals must take place in a designated area. No fires are allowed on site. No firewood or kindling may be gathered from the site or surrounds.	Contractor and sub-contractor/s	Duration of contract
All litter must be deposited in a clearly marked, closed, animal-proof disposal bin in the construction area. Particular attention needs to be paid to food waste.	Contractor and sub-contractor/s	Duration of contract
Keep a record of all hazardous substances stored on site. Clearly label all the containers storing hazardous waste.	Contractor	Duration of contract
Contractors must ensure that all workers are informed at the outset of the construction phase of the conditions contained on the Code of Conduct.	Contractor and sub-contractor/s	Pre-construction
Ensure proper health and safety plans in place during the construction period to ensure safety on and around site during construction, including fencing of the property and site access restriction.	Contractor and sub-contractor/s	Pre-construction
On completion of the construction phase, all construction workers must leave the site within one week of their contract ending.	Contractor and sub-contractor/s	Construction
Maintain the general appearance of the site as a whole.	Contractor	Construction
Foundations and trenches must be backfilled using originally excavated materials as far as possible when construction in an area is completed. Excess excavation materials must be disposed of only in approved areas, or, if suitable, stockpiled for use in reclamation activities.	Contractor	Site establishment, and duration of construction and rehabilitation
All construction vehicles must be road worthy. Appropriate maintenance of all vehicles must be ensured to minimise risk of breakdowns.	Contractor	Construction

Mitigation: Action/Control	Responsibility	Timeframe
All construction vehicle drivers must have the relevant licenses for the specific vehicles used and need to strictly adhere to the rules of the road.	Contractor	Construction

Performance Indicator	» Ablution and waste removal facilities are in a good working order and do not pollute the environment due to mismanagement. » No complaints regarding contractor behaviour or habits. » Appropriate training of all staff is undertaken prior to them commencing work on the construction site. » Code of Conduct drafted before commencement of the construction phase. » Vehicles are in good working order and safety standards are implemented. » No traffic incidents involving the waste recovery plant construction vehicles.
Monitoring	» Regular audits of the construction camps and areas of construction on site by the EO. » Proof of disposal of sewage at an appropriate licensed wastewater treatment works. » Proof of disposal of waste at an appropriate licensed waste disposal facility. » An incident reporting system must be used to record non-conformances to the EMPr. » Observation and supervision of Contractor practices throughout the construction phase by the EO. » Complaints must be investigated and, if appropriate, acted upon.

OBJECTIVE 3: Maximise local employment, skills development and business opportunities associated with the construction phase

Project Component/s	» Construction activities associated with the establishment of the zero waste recovery plant. » Procurement of equipment and services.
Potential Impact	» The opportunities and benefits associated with the creation of local employment and business should be maximised.
Activities/Risk Sources	» Contractors who make use of their own labour for unskilled tasks, thereby reducing the employment and business opportunities for locals. » Sourcing of individuals with skills similar to the local labour pool outside the municipal area. » Unavailability of locals with the required skills resulting in locals not being employed and labour being sourced from outside the municipal area.
Enhancement: Target/Objective	» The contractor must aim to employ as many low-skilled and semi-skilled workers from the local area as possible. This must also be made a requirement for all sub-contractors. » Appropriate skills training and capacity building. » Stimulate the local economy

Mitigation: Action/Control	Responsibility	Timeframe
Locally sourced materials and equipment must be used where feasible to maximize the benefit to the local economy.	Contractor	Construction
Sub-contracting of local construction companies to occur as far as possible for the construction of the waste recovery plant and associated infrastructure.	Contractor	Construction

Mitigation: Action/Control	Responsibility	Timeframe
Where feasible, effort must be made to employ locally in order to create maximum benefit for the communities.	Contractor	Construction
To maximise the positive impact, the contractor must provide training courses for employees where feasible to ensure that employees gain as much as possible from the work experience.	Contractor	Construction
Adopt policies that address gender in labour recruitment.	Contractor	Construction
Engage with local authorities and business organisations to investigate the possibility of procurement of construction materials, goods, and products from local suppliers where feasible.	Project developer and contractor	Construction
Use local suppliers where viable and arrange with local SMMEs to provide transport, catering and other services for the construction crew.	Project developer	Construction
Utilise labour intensive construction methods, where feasible, to encourage employment opportunities.	Project developer	Construction
Set-up a skills desk at the local municipal office and in the nearby communities to identify skills available in the community and assist in recurring labour during the construction phase	Project developer	Pre-construction and during construction
Ensure that the main contractor shares knowledge with the sub-contracting companies during the construction period.	Project developer and contractor	Construction
Encourage the main contractor to offer internships and learnerships, especially to those coming from the local communities.	Project developer and contractor	Construction

Performance Indicator	» Job opportunities, especially of low to semi-skilled positions, are primarily awarded to members of local communities as appropriate. » Locals and previously disadvantaged individuals (including women) are considered during the hiring process. » Labour, entrepreneurs, businesses, and SMMEs from the local sector are awarded jobs, where possible, based on requirements in the tender documentation. » The involvement of local labour is promoted. » Reports are not made from members of the local communities regarding unrealistic employment opportunities or that only outsiders were employed. » Employment and business policy document that sets out local employment and targets is completed before the construction phase commences. » Skills training and capacity building initiatives are developed and implemented.
Monitoring	» Project proponent and contractor must keep a record of local recruitments and information on local labour to be shared with the ECO for reporting purposes. » The contractor to provide information on training and skills development initiatives to the ECO for reporting purposes.

OBJECTIVE 4: Protection of heritage resources

No heritage resources were identified within the overall project site and development footprint due to the extensive disturbance of the footprint by industrial activity. From a palaeontological perspective, the study site is underlain by geological strata with a Very High palaeontological significance. However, the

palaeontological desktop assessment (**Appendix E** of the EIA Report), supported by the fieldwork concluded by the heritage specialist, has considered the potential impact and, due to the disturbed nature of the site, has concluded that no further fieldwork will be required, but that a chance finds protocol must be implemented.

Project Component/s	» Zero Waste Recovery Plant. » Internal roads. » Internal water, air and gas pipelines. » Control and electrical buildings, including a central control room. » Administrative buildings. » Firefighting systems. » Bulk water storage. » Storage facilities for fuels, gas and chemicals. » Emergency back-up generators. » Effluent reticulation systems - i.e. 1) sanitary wastewater system 2) storm water and rainwater collection system.
Potential Impact	» Possible loss of fossil heritage.
Activity/Risk Source	» Site preparation and earthworks. » Foundations or plant equipment installation. » Mobile construction equipment movement on site.
Mitigation: Target/Objective	» To ensure that any cultural material exposed during construction is treated appropriately and in accordance with the relevant legislation.

Mitigation: Action/control	Responsibility	Timeframe
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.	Contractor	Duration of construction
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 Environmental Officer (EO) (if appointed) or site manager. The EO 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) and the provincial heritage authority (Mpumalanga Provincial Heritage Resource Authority. The information to the Heritage Agency must include photographs of the find, from various angles, as well as the GPS co-ordinates.	Contractor, EO	Duration of construction
A preliminary report must be submitted to the Heritage Agency within 24 hours of the find and must include the following: 1) date of the 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.	EO	Duration of construction
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.	Contractor, EO	Duration of construction

Mitigation: Action/control	Responsibility	Timeframe
The site must be secured to protect the exposed fossil 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 advise on the most suitable method of protection of the find.	Contractor	Duration of construction
In the event that the fossil cannot be stabilized the fossil may be collected with extreme care by the EO (or 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.	EO	Duration of construction
Construction activities may only commence once authorisation has been issued by the heritage agency.	Contractor	Duration of construction

Performance Indicator	» No loss of fossil heritage. » All chance finds are dealt with as per the legislative guidelines.
Monitoring	» Due care taken during earthworks and disturbance of land by all staff and any heritage objects found reported. » Observation and monitoring of excavation activities and earthworks by ECO throughout the construction phase. » Appropriate permits obtained from SAHRA prior to the disturbance or destruction of heritage sites (if required). » An incident reporting system will be used to record non-conformances to the EMPr.

OBJECTIVE 5: Minimise impact on ambient air quality through effective management, mitigation, and monitoring during construction phase

Project Component/s	» All project components.
Potential Impact	» Heavy vehicles and construction equipment can generate dust and fine particulate matter and release air pollutants (NO_2, CO, PM, SO_2) due to movement on-site and movement of materials on-site. » Construction activities such as temporary stockpiles, foundation excavation, and road construction can result in dust and particulate release potentially affecting human health on nearby communities or result in nuisance dustfall and reduced visibility during active construction.
Activity/Risk Source	» The use of heavy vehicle and construction equipment. » Excavation, grading, and scraping. » Transport and movement of materials, equipment, and materials to site and around site (as required). » Transport and movement of materials, equipment, and materials to site and around site (as required). » Wind erosion from cleared areas, temporary stockpiles, and unsealed roads. » Combustion of fuel in construction equipment (e.g. generators) and heavy vehicles..
Mitigation: Target/Objective	» Minimise potential particulate matter impacts associated with vehicles and construction equipment use.

	» Minimise potential health and nuisance impacts to communities and adjacent landowners from particulate emissions. » Minimise emissions from combustion engines (stationary or mobile) during the construction phase.

Mitigation: Action/control	Responsibility	Timeframe
Appropriate dust suppression measures on cleared areas, temporary stockpiles, and unsealed roads such as water suppression (using non-potable water if possible), especially during high wind speed events	Contractor(s) and EO	During construction
Use minimum safe drop heights when transferring material on-site	Contractor(s) and EO	During construction
Trucks to be restricted to specified roads and using the most direct route.	Transportation contractor	During construction
Cover material stockpiles with tarpaulins or story in protected temporary bunkers	Contractor(s) and EO	During construction
Limit cleared area for bulk earthworks to minimum as practically feasible	Contractor(s) and EO	During construction
Heavy vehicles and construction equipment to be road worthy and regularly maintained.	Contractor(s), transportation contractor(s) and EO	During construction
All vehicles leaving site with loose material must have load-bins covered with tarpaulins.	Contractor(s) and EO	During construction
All vehicles associated with the construction phase must adhere to the designated speed limits on- and off-site.	Contractor(s), transportation contractor(s) and EO	Duration of contract
Investigate inadequate mitigation and control measures if monitoring or complaints potential issues are indicated by non-conformance with performance indicators	Contractor(s) and EO	During construction

Performance Indicator	» Appropriate dust suppression measures are implemented during construction phrase. No visible dust plumes from cleared areas and temporary stockpiles during high wind speed events. No visible plumes from unsealed roads when in use or during high wind speed events. » Drivers are aware of potential safety issues and strict enforcement of on-site speed limits when employed and when entering site. » Vehicle roadworthy certificates and maintenance records for all heavy vehicles are made available prior to construction and updated regularly. No or minimal visible exhaust fumes during normal operation.
Monitoring	» The performance indicators listed above should be met during the construction phase by the responsible parties. » Any potential or actual issues that could results in non-conformance with the performance indicator must be reported by on-site personnel to the Site Manager immediately. » An incident reporting system must be used to record non-conformances to the EMPr. » A complaints register must be used to record complaints from the public.

OBJECTIVE 6: Appropriate handling and management of waste

The construction of the zero waste recovery plant and associated infrastructure will involve the generation of various wastes. In order to manage the wastes effectively, guidelines for the assessment, classification, and management of wastes, along with industry principles for minimising construction wastes must be implemented. The main wastes expected to be generated by the construction activities include:

» general solid waste
» hazardous waste
» inert waste (rock and soil)

Project Component/s	» Storage and handling of waste
Potential Impact	» Inefficient use of resources resulting in excessive waste generation. » Litter or contamination of the site through poor waste management practices. » Generation of contaminated wastes from used chemical containers. » Pollution of the surrounding environment through inappropriate waste management practices.
Activity/Risk Source	» Packaging. » Other construction wastes. » Hydrocarbon use and storage. » Spoil material from excavation, earthworks and site preparation.
Mitigation: Target/Objective	» To comply with waste management legislation. » To minimise production of waste. » To ensure appropriate waste storage and disposal. » To avoid environmental harm from waste disposal. » A waste manifest must be developed for the ablutions showing proof of disposal of sewage at appropriate water treatment works.

Mitigation: Action/Control	Responsibility	Timeframe
Implement an integrated waste management approach that is based on waste minimisation and incorporates reduction, recycling, re-use and disposal where appropriate.	Contractor	Construction
Construction methods and materials must be carefully considered in view of waste reduction, re-use, and recycling opportunities.	Contractor	Construction
Ensure that no litter, refuse, rubbish, rubble, debris and builders wastes generated on the premises be placed, dumped or deposited on adjacent/surrounding properties, and that the waste is disposed of at a dumping site as approved by the Municipality.	Contractor	Construction
Specific areas must be designated on-site for the temporary management of various waste streams, i.e. general refuse, construction waste (wood and metal scrap), and contaminated waste as required.	Contractor	Construction
Where practically possible, construction and general wastes on-site must be reused or recycled. Bins and skips must be available	Contractor	Construction

Mitigation: Action/Control	Responsibility	Timeframe
on-site for collection, separation, and storage of waste streams (such as wood, metals, general refuse etc.).		
Disposal of waste must be in accordance with relevant legislative requirements, including the use of licensed contractors.	Contractor	Construction
Uncontaminated waste must be removed at least weekly for disposal, if feasible; other wastes must be removed for recycling/ disposal at an appropriate frequency.	Contractor	Construction
Hydrocarbon waste must be contained and stored in sealed containers within an appropriately bunded area and clearly labelled. This must be regularly removed and recycled (where possible) or disposed of at an appropriately licensed landfill site.	Contractor	Construction
Waste must be stored in accordance with the relevant legislative requirements.	Contractor	Construction
Documentation (waste manifest) must be maintained detailing the quantity, nature, and fate of any regulated waste. Waste disposal records must be available for review at any time.	Contractor	Construction
Regularly serviced chemical toilet facilities and/or septic tank must be used to ensure appropriate control of sewage. Daily inspection of all chemical toilets and septic tanks must be performed by environmental representatives on site.	Contractor	Construction
Under no circumstances may waste be burnt or buried on site.	Contractor	Construction
Litter generated by the construction crew must be collected in rubbish bins and disposed of weekly, or at an appropriate frequency, at registered waste disposal sites.	Contractor	Construction
Upon the completion of construction, the area must be cleared of potentially polluting materials (including chemical toilets). Spoil stockpiles must also be removed and appropriately disposed of or the materials re-used for an appropriate purpose.	Contractor	Construction
Corrective action must be undertaken immediately if a complaint is made, or potential/actual leak or spill of polluting/toxic substance identified. This includes stopping the contaminant from further escaping, cleaning up the affected environment as much as practically possible and implementing preventative measures.	Contractor	Construction

Performance Indicator	» No complaints received regarding waste on site or indiscriminate dumping. » Internal site audits ensuring that waste segregation, recycling and reuse is occurring appropriately. » Provision of all appropriate waste manifests for all waste streams.
Monitoring	» Observation and supervision of waste management practices throughout construction phase. » Waste collection will be monitored on a regular basis. » Waste documentation completed. » Proof of disposal of sewage at an appropriate wastewater treatment works. » A complaints register will be maintained, in which any complaints from the community will be logged. Complaints will be investigated and, if appropriate, acted upon. » An incident reporting system will be used to record non-conformances to the EMPr.

OBJECTIVE 7: Appropriate handling and storage of chemicals, hazardous substances

The construction phase may involve the storage and handling of a variety of chemicals including adhesives, abrasives, oils and lubricants, paints and solvents.

Project Component/s	» Zero Waste Recovery Plant. » Associated Infrastructure.
Potential Impact	» Release of contaminated water from contact with spilled chemicals. » Generation of contaminated wastes from used chemical containers. » Pollution of the surrounding environment through inappropriate materials management and practices. » Accidental spills could lead to water pollution. » Damage to water resources.
Activity/Risk Source	» Construction activities. » Hydrocarbon spills by vehicles and machinery during levelling and transport of materials and equipment, and fuel storage tanks. » Accidental spills of hazardous chemicals. » Polluted water from wash bays and workshops.
Mitigation: Target/Objective	» To ensure that the storage and handling of chemicals and hydrocarbons on-site does not cause pollution to the environment or harm to persons. » To ensure that the storage and maintenance of machinery on-site does not cause pollution of the environment or harm to persons. » Prevent and contain hydrocarbon leaks. » Undertake proper waste management. » Store hazardous chemicals safely in a bunded area. » No significant impact to hydrological features.

Mitigation: Action/Control	Responsibility	Timeframe
Implement an emergency preparedness plan during the construction phase.	Contractor	Duration of contract
Any liquids stored on site, including fuels and lubricants, must be stored in accordance with applicable legislation.	Contractor	Duration of contract
Spill kits must be made available on-site for the clean-up of spills and leaks of contaminants. These must be maintained regularly.	Contractor	Duration of contract
Losses of fuel and lubricants from the oil sumps and steering racks of vehicles and equipment must be contained using a drip tray with plastic sheeting filled with absorbent material when not parked on hard standing.	Contractor	Construction
An effective monitoring system must be implemented during the construction phase to detect any leakage or spillage of hazardous substances during their transportation, handling, use and storage.	Contractor	Construction
The storage of flammable and combustible liquids such as oils must be stored in compliance with Material Safety Data Sheets (MSDS) files.	Contractor	Duration of contract

Mitigation: Action/Control	Responsibility	Timeframe
Corrective action must be undertaken immediately if a complaint is made, or potential/actual leak or spill of polluting substance identified. This includes stopping the contaminant from further escaping, cleaning up the affected environment as much as practically possible and implementing preventive measures. Where required, a NEMA Section 30 report must be submitted to DFFE within 14 days of the incident.	Contractor	Duration of contract
In the event of a major spill or leak of contaminants, the relevant administering authority must be immediately notified as per the notification of emergencies/incidents.	Contractor	Duration of contract
Spilled cement or concrete must be cleaned up as soon as possible and disposed of at a suitably licensed waste disposal site.	Contractor	Duration of contract
Accidental spillage of potentially contaminating liquids and solids must be cleaned up immediately in line with procedures by trained staff with the appropriate equipment.	Contractor	Duration of contract
Any contaminated/polluted soil removed from the site must be disposed of at a licensed hazardous waste disposal facility.	Contractor	Duration of contract
All machinery and equipment must be inspected regularly for faults and possible leaks,	Contractor	Construction
Routine servicing and maintenance of vehicles must not to take place on-site (except for emergencies). If repairs of vehicles must take place, an appropriate drip tray must be used to contain any fuel or oils.	Contractor	Duration of contract
Construction machinery must be stored in an appropriately sealed area.	Contractor	Duration of contract
Any storage and disposal permits/approvals which may be required must be obtained, and the conditions attached to such permits and approvals will be compiled with.	Contractor	Duration of contract
Transport of all hazardous substances must be in accordance with the relevant legislation and regulations.	Contractor	Duration of contract
Precautions must be in place to limit the possibility of oil and other toxic liquids from entering the soil or clean stormwater system.	Contractor	Construction
Have appropriate action plans on site, and training for contactors and employees in the event of spills and leaks. All waste generated on-site during construction must be adequately managed.	Contractor	Construction
Minimise fuels and chemicals stored on site.	Contractor	Construction
Implement a contingency plan to handle spills, so that environmental damage is avoided.	Contractor	Construction
In the case of petrochemical spillages, the spill must be collected immediately and stored in a designated area until it can be disposed of in accordance with the Hazardous Chemical Substances Regulations, 1995 (Regulation 15).	Contractor	Construction
Upon completion of construction, the area must be cleared of potentially polluting materials.	Contractor	Completion of Construction

Mitigation: Action/Control	Responsibility	Timeframe
All water resources must be protected from direct or indirect spills of pollutants such as solid waste, cement, oils, fuels, chemicals, wash and contaminated water or organic material resulting from the Contractor's activities.	Contractor	Construction
In the event of a spill, prompt action must be taken to clear the polluted or affected areas.	Contractor	Construction

Performance Indicator	» No chemical spills outside of designated storage areas. » No water or soil contamination by spills. » Safe storage of hazardous chemicals. » Proper waste management. » Provision of all appropriate waste manifests of all waste streams.
Monitoring	» Observation and supervision of chemical storage and handling practices and vehicle maintenance throughout construction phase. » A complaints register must be maintained, in which any complaints from the community will be logged. Complaints will be investigated and, if appropriate, acted upon. » An incident reporting system must be used to record non-conformances to the EMPr. » Monitor hydrocarbon spills from vehicles and machinery during construction continuously and record volume and nature of spill, location and clean-up actions. » Waste collection to be monitored on a regular basis. » Waste documentation completed. » ECO to monitor all construction areas on a continuous basis until all construction is completed; immediate report backs to site manager in terms of non-conformances recorded.

7.2. Detailing Method Statements and/or Site-specific Plans

OBJECTIVE 8: Ensure all construction activities are undertaken with the appropriate level of environmental awareness to minimise environmental risk

The environmental specifications are required to be underpinned by a series of Method Statements and/or site-specific plans, within 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 and/or site-specific plans 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:

» 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.
- 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 must be applied consistently to all activities. Specific areas to be addressed in the method statement: pre, during and post construction include:

- Site establishment (which explains all activities from induction training to offloading, construction sequence for site establishment and the different amenities and to be established etc. Including a site camp plan indicating all of these).
- Preparation of the site (i.e. removing existing infrastructure and waste).
- Soil management/stockpiling and erosion control.
- Excavations and backfilling procedure.
- Stipulate norms and standards for water supply and usage (i.e.: comply strictly to licence and legislation requirements and restrictions).
- Stormwater 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.
- Liquid waste management.
- Design, establish, maintain and operate suitable pollution control facilities necessary to prevent discharge of water containing polluting matter or visible suspended materials into the surrounding environment. Should grey water (i.e. water from basins, showers, baths, kitchen sinks etc.) need to be disposed of, link into an existing facility where possible. Where no facilities are available, grey water runoff must be controlled to ensure no seepage into the surrounding environment occurs.
- Dust and noise pollution:
  - Describe the 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, access roads and spoil sites (dust control shall be sufficient so as not to have significant impacts in terms of the biophysical and social environments). These impacts include visual pollution, decreased safety due to reduced visibility, negative effects on human health and the ecology due to dust particle accumulation.
- 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, pesticides 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.
- General administration.
- Designate access road and the protocols while roads are in use.
- Requirements on gate control protocols.

The Contractor may not commence the activity covered by the Method Statement until it has been approved by the Site Manager (with input from the 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 method statement may result in suspension of the activity concerned until such time as a method statement has been submitted and approved.

7.3. Awareness and Competence: Construction Phase

OBJECTIVE 9: To ensure all construction personnel have the appropriate level of environmental awareness and competence to ensure continued environmental due diligence and on-going minimisation of environmental harm

To achieve effective environmental management, it is important that all personnel involved in the project are aware of the responsibilities in terms of the relevant environmental legislation and the contents of this EMPr. The ECO is responsible for monitoring compliance pre, during and post construction. 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 are to have copies of the relevant Method Statements and be aware of the contents thereof.
- Ensuring that a copy of the EMPr is readily available on-site, and that all senior site staff are 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 facility.
- 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 must 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.
» Contractors and main sub-contractors must have a basic training in the identification of archaeological sites/objects, and protected flora and fauna that may be encountered on the site.
» Awareness of any other environmental matters, which are deemed to be necessary by the ECO.
» Ensuring that employee information posters, outlining the environmental "do's" and "don'ts" (as per the environmental awareness training course) are erected at prominent locations throughout the site.

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. This training and awareness will be achieved in the following ways:

7.3.1 Environmental Awareness and Induction Training

The EO, in consultation with the contractor, shall ensure that all construction workers receive an induction presentation, as well as on-going environmental education and awareness, on the importance and implications of the EMPr and the environmental requirements it prescribes. The presentation shall be conducted, as far as is possible, in the employees' language of choice. The contractor must provide a translator from their staff for the purpose of translating, should this be necessary.

As a minimum, induction training must include:

» Explanation of the importance of complying with the EMPr.
» Explanation of the importance of complying with the Environmental Authorisation.
» Discussion of the potential environmental impacts of construction activities.
» The benefits of improved personal performance.
» Employees' roles and responsibilities, including emergency preparedness (this should be combined with this induction, but presented by the contractor's Health and Safety Representative).
» Explanation of the mitigation measures that must be implemented when carrying out their activities.
» Explanation of the specifics of this EMPr and its specification (no-go areas, etc.).

Environmental Awareness Training must take the form of an on-site talk and demonstration by the EO/ECO before the commencement of site establishment and construction on site. The education/awareness programme must 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 EO/ECO on site. Proof of awareness training must be kept on record. 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 must be undertaken by the Contractor's Environmental Officer and must include discussing the Contractor'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 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 EO/ECO on site.

7.3.2 Toolbox Talks

Toolbox talks must be held on a scheduled and regular basis (at least twice a month) 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 must also include discussions on possible common incidents occurring on site and ones recommended by the on-site EO and the prevention of reoccurrence thereof. Records of attendance and the awareness talk subject must be kept on file.

7.4. Monitoring Programme: Construction Phase

OBJECTIVE 10: To monitor the performance of the control strategies employed against environmental objectives and standards

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 (once issued). The Technical Director/ Project Manager will ensure that the monitoring is conducted and reported.

The aim of the monitoring and auditing process would be to 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 in communication and feedback to authorities and stakeholders.

All documentation e.g. audit/monitoring/compliance reports and notifications, required to be submitted to the DFFE in terms of the Environmental Authorisation, must be submitted to the Director: Compliance Monitoring of the Department.

Records relating to monitoring and auditing must be kept on site and made available for inspection to any relevant and competent authority in respect of this development.

6.5.1. Non-Conformance Reports

All supervisory staff, including Foremen, Engineers, and the ECO must be provided 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.

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.

6.5.2. 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 DFFE for their records. This report must 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 DFFE regarding waste related activities.

6.5.3. Audit Reports

The holder of the Environmental Authorisation must, for the period during which the Environmental Authorisation and EMPr remain valid, ensure that project compliance with the conditions of the Environmental Authorisation and the EMPr are audited, and that the audit reports are submitted to the Director: Compliance Monitoring of the DFFE.

An environmental internal audit must be conducted and submitted biannually and an external audit must be conducted on construction completion and the report is to be submitted to DFFE. This report must be compiled in accordance with Appendix 7 of the EIA Regulations, 2014, as amended, and 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.

6.5.4. Final Audit Report

An ECO close-out environmental audit report must be compiled by an independent auditor and be submitted to DFFE upon completion of the construction and rehabilitation activities. The report must be submitted 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.

8. MANAGEMENT PROGRAMME: OPERATION AND MAINTENANCE

Overall Goal: To ensure that the operation of the zero waste recovery facility and associated infrastructure 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 operate the facility in a way that:

» Ensures that operation and maintenance activities are properly managed in respect of environmental aspects and impacts.
» Enables the operation and maintenance activities to be undertaken without significant disruption to other land uses in the area, in particular with regard to farming practices, traffic and road use, and effects on local residents.

8.1. Objectives

In order to meet this goal, the following objectives have been identified, together with necessary actions and monitoring requirements.

OBJECTIVE 1: Minimise impact on ambient air quality through effective management, mitigation, and monitoring during the operational phase.

Project Component/s	» All project components.
Potential Impact	» All project components. » The normal operation of the Zero Waste Recovery Solution will result in emission of gaseous and particulate pollutants including: SO_2, NO_2, and PM. Increased ambient concentrations of these pollutants may result in negative human health impacts, and nuisance dustfall.
Activities/Risk Sources	» Alkali roasting of feedstock using a gas or coal fired kiln. » Recovery of V2O5 and TiO2. » Production of sulfuric acid and calcium silicate. » Fugitive dust emissions from crushing and screening at the crushing plant. » Recovery of Alumina salts, aluminium and magnesium. » Treatment of off-gas and production of sulfuric acid. » Vehicle entrainment from on-site unpaved roads. » Fugitive dust emissions from materials handling and wind erosion at the slag stockpile. » Fugitive dust emissions from materials handling and wind erosion at the product area.
Mitigation: Target/Objective	» Ensure compliance with minimum emission limits as applicable to the scrubber and acid plant stacks. » Ensure compliance with ambient air quality and dustfall standards at the property boundary.

Mitigation: Action/Control	Responsibility	Timeframe
Establish a complaints register and/or incident reporting system where personnel, communities and adjacent landowners can lodge complaints regarding construction activities. Ideal location would be security post at point of site access.	EO and Plant Manager	Prior to commissioning

Mitigation: Action/Control	Responsibility	Timeframe
Regular maintenance and inspection of scrubber and acid plants as per original equipment manufacturer requirements.	EO and Plant Manager	During operations
Annual emissions monitoring campaign (as per conditions of the AEL), by independent contractor, on all stationary point sources.	EO, Operator and Plant Manager	During operations
Annual emissions reporting (as per conditions of the AEL).	EO, Operator and Plant Manager	During operations
Dust fallout sampling be conducted on the facility boundary in the four cardinal wind directions according to the ASTMD1739 standard method.	EO, Operator and Plant Manager	During operations
Appropriate dust suppression measures on access road, including regularly sweeping and or wet suppression, to minimise particulate matter build-up.	EO and Plant Manager	During operations
All product haul vehicles to be road worthy and regularly maintained.	Transportation contractor(s) and EO	Duration of contract
All vehicles accessing the site during the operational phase must adhere to the designated speed limits on- and off-site.	Transportation contractor(s) and EO	Duration of contract
Investigate inadequate mitigation and control measures if monitoring or complaints potential issues are indicated by non-conformance with performance indicators.	EO	During operations

Performance Indicator	» Appropriate dust suppression measures are implemented during along access road, including the consideration of paving all on-site roads. No visible dust plumes from roads when in use or during high wind speed events. » Drivers are aware of potential safety issues and strict enforcement of on-site speed limits when employed and when entering site. » Vehicle roadworthy certificates and maintenance records for haul vehicles are made available prior to construction and updated regularly. No or minimal visible exhaust fumes during normal operation. » Compliance with emission limits applicable to the process during normal operation. » Compliance with National Dustfall Control Regulations based on dustfall sampling campaign.
Monitoring	» The performance indicators listed above should be met during the operational phase by the responsible parties. » Any potential or actual issues that could results in non-conformance with the performance indicator must be reported by on-site personnel to the Site Manager immediately. » An incident reporting system must be used to record non-conformances to the EMPr. » A complaints register must be used to record complaints from the public. » Annual emissions monitoring campaign (as per conditions of the AEL), by independent contractor, on all stationary point sources. » Annual emissions reporting (as per conditions of the AEL). » Dust fallout sampling be conducted on the facility boundary in the four cardinal wind directions according to the ASTMD1739 standard method.

OBJECTIVE 2: Ensure the implementation of appropriate emergency response plans

Project Component/s	» Operation and maintenance of the facility and associated infrastructure. » Storage of dangerous substances (such as Diesel and LPG). »
Potential Impact	» Loss of containment of hazardous components at the proposed resulting in exposure to: • Thermal radiation from fires.
Activities/Risk Sources	» LPG installation. » Fuel Storage and Offloading.
Mitigation: Target/Objective	» To avoid or minimise the risk of impacts to workers, surrounding landowners and communities.

Mitigation: Action/Control	Responsibility	Timeframe
Implement emergency response arrangements and systems, such as alarms to allow for personnel to muster in case of emergency, as well as fire-fighting systems and cooperation with emergency responders.	Project proponent	Operation
Implement preventive measures, including maintenance procedures to prevent the occurrence of a catastrophic loss of containment from corrosion, fire and gas detection and firewater systems to prevent escalation as well as strict control of ignition sources and other measures, which may be required according to standards such as those prescribed by the South African National Standards system.	Project proponent	Operation
Ensure that appropriate communication channels are established to be implemented in the event of an emergency.	Project proponent	Operation
Provide adequate firefighting equipment on site and establish a fire-fighting management plan during operation.	Project proponent	Operation
Provide fire-fighting training to selected operation and maintenance staff.	Project proponent	Operation
Fire breaks must be established where and when required. Cognisance must be taken of the relevant legislation when planning and burning firebreaks (in terms of timing, etc.).	Project proponent	Operation
Contact details of emergency services must be prominently displayed on site.	Project proponent	Operation

Performance Indicator	» Firefighting equipment and training provided before the operation phase commences. » Appropriate fire breaks in place. » Appropriate emergency response arrangements and systems in place. » Appropriate preventive measures implemented for all installations.
Monitoring	» The Plant Manager must monitor indicators listed above to ensure that they have been met.

OBJECTIVE 3: Maximise local employment, skills development and business opportunities associated with the construction phase

Project Component/s	» Operation and maintenance activities associated with the facility and associated infrastructure. » Availability of required skills in the local communities for the undertaking of the construction activities.
Potential Impact	» The opportunities and benefits associated with the creation of local employment and business should be maximised.
Activities/Risk Sources	» Limited use of local labour, thereby reducing the employment and business opportunities for locals. » Sourcing of individuals with skills similar to the local labour pool outside the municipal area. » Unavailability of locals with the required skills resulting in locals not being employed and labour being sourced from outside the municipal area.
Enhancement: Target/Objective	» The project Proponent must aim to employ as many low-skilled and semi-skilled workers from the local area as possible. This must also be made a requirement for all contractors. » Employment of a maximum number of the low-skilled and/or semi-skilled workers from the local area where possible. » Appropriate skills training and capacity building.

Mitigation: Action/Control	Responsibility	Timeframe
Procure goods and services from local businesses, where feasible.	Project proponent	Operation
Local Small and Medium Enterprises are to be approached to investigate the opportunities for supplying inputs required for the maintenance and operation of the facility, as far as feasible.	Project proponent	Operation
In order to maximise the positive impact, it is suggested that the project company provide training courses for employees where feasible to ensure that employees gain as much as possible from the work experience.	Project proponent	Operation
Facilitate the transfer of knowledge between experienced employees and the local staff.	Project proponent	Operation
Where possible train and empower local communities for employment in the operation of the zero waste recovery plant.	Project proponent	Operation
Where possible, offer internships and learnerships, especially to those coming from the local communities.	Project proponent	Operation
Investigate opportunities to increase local procurement and locality the facility's expenditure.	Project proponent	Operation
Explore opportunities to employ as many people form the local communities as possible.	Project proponent	Operation

Performance Indicator	» Job opportunities, especially of low to semi-skilled positions, are primarily awarded to members of local communities as appropriate. » Locals and previously disadvantaged individuals (including women) are considered during the hiring process.

	» Labour, entrepreneurs, businesses, and SMMEs from the local sector are awarded jobs, where possible, based on requirements in the tender documentation. » The involvement of local labour is promoted. » Reports are not made from members of the local communities regarding unrealistic employment opportunities or that only outsiders were employed. » Employment and business policy document that sets out local employment and targets is completed before the construction phase commences. » Skills training and capacity building initiatives are developed and implemented.
Monitoring	» The project proponent must keep a record of local recruitments and local labour.

OBJECTIVE 4: Appropriate handling and management of hazardous substances, waste and dangerous goods

The operation of the facility and associated infrastructure will involve the storage of chemicals and hazardous substances, as well as the generation of limited waste products. The main wastes expected to be generated by the operation activities includes general solid waste and hazardous waste.

Project Component/s	» Gas turbines. » Stacks. » Access roads. » Fuel offloading areas and storage tanks. » Associated infrastructure.
Potential Impact	» Inefficient use of resources resulting in excessive waste generation. » Litter or contamination of the site or water through poor waste management practices. » Contamination of water or soil because of poor materials management.
Activity/Risk Source	» Substation, transformers, switchgear and supporting equipment. » Workshop / control room.
Mitigation: Target/Objective	» Comply with waste management legislation. » Minimise production of waste. » Ensure appropriate waste disposal. » Avoid environmental harm from waste disposal. » Ensure appropriate storage of chemicals and hazardous substances.

Mitigation: Action/Control	Responsibility	Timeframe
Hazardous substances must be stored in sealed containers within a clearly demarcated designated area.	Operator	Operation
Storage areas for hazardous substances must be appropriately sealed and bunded.	Operator	Operation
Spill kits must be made available on-site for the clean-up of spills and leaks of contaminants.	Project proponent	Operation and maintenance
Any accidental chemical, fuel and oil spills that occur at the site must be cleaned up in the appropriate manner as related to the nature of the spill.	Operator	Operation
All structures and/or components replaced during maintenance activities must be appropriately disposed of at an appropriately licensed waste disposal site or sold to a recycling merchant for recycling.	Project proponent	Operation

Mitigation: Action/Control	Responsibility	Timeframe
Care must be taken to ensure that spillage of oils and other hazardous substances are limited during maintenance. Handling of these materials must take place within an appropriately sealed and bunded area. Should any accidental spillage take place, it must be cleaned up according to specified standards regarding bioremediation.	Operator	Operation and maintenance
Implement an integrated waste management approach that is based on waste minimisation and incorporates reduction, recycling, re-use and disposal where appropriate. Where solid waste is disposed of, such disposal shall only occur at an appropriately licensed landfill.	Project proponent	Operation
Waste handling, collection, and disposal of waste must be in accordance with relevant legislative requirements, including the use of licensed contractors.	Operator	Operation
All food waste and litter at the site must be placed in bins with lids and removed from the site on a regular basis.	Operator	Operation
Hazardous waste (including hydrocarbons) and general waste must be stored and disposed of separately.	Operator	Operation
Documentation (waste manifest) must be maintained detailing the quantity, nature, and fate of any regulated waste. Waste disposal records must be available for review at any time.	Operator	Operation
All servicing and re-fuelling of machines and equipment must either take place off-site, or in controlled and bunded working areas.	Operator	Operation
Immediately report significant spillages and initiate an environmental site assessment for risk assessment and remediation if necessary. Where required, a NEMA Section 30 report must be submitted to DFFE within 14 days of the incident.	Operator and EO / Environmental Manager	Operation
Emergency response arrangements and systems such as foam pourers, fire-fighting systems and cooperation with emergency responders. Preventive measures could include maintenance procedures to prevent the occurrence of a catastrophic loss of containment, as well as strict control of ignition sources and other measures which may be required according to standards such as those prescribed by the South African National Standards system.	Project proponent	Operation

Performance Indicator	» No complaints received regarding waste on site or indiscriminate dumping. » Internal site audits identifying that waste segregation recycling and reuse is occurring appropriately. » Provision of all appropriate waste manifests. » No contamination as a result of accidental spills.
Monitoring	» Waste collection must be monitored on a regular basis. » Waste documentation must be completed and available for inspection. » Regular reports on exact quantities of all waste streams exiting the site must be compiled by the waste management contractor and monitored by the O&M operator. » All appropriate waste disposal certificates accompany the monthly reports.

9. MANAGEMENT PROGRAMME: DECOMMISSIONING

The lifespan of the proposed facility will depend on the availability of the slag resource, which is currently envisaged to be approximately 25 years and potentially longer. Equipment associated with this facility would only be decommissioned once it has reached the end of its economic life or if it is no longer required. An assessment will be undertaken prior to the end of the lifecycle of the plant to determine whether the plant should be decommissioned or whether the operation of the plant should continue.

It is most likely that decommissioning activities of the infrastructure of the facility discussed in this EIA process would comprise the disassembly, removal and disposal of the infrastructure. Future use of the site after decommissioning of the facility could possibly form part of an alternative industry that would be able to utilise some of the existing infrastructure associated with the project. This would however be dependent on the development plans of the area at the time.

It is expected that temporary employment opportunities will be made available during the decommissioning phase.

As part of the decommissioning phase, the Project Proponent will undertake the required permitting processes applicable at the time of decommissioning.

9.1. Objectives

OBJECTIVE 1: To avoid and/or minimise the potential impacts associated with the decommissioning phase

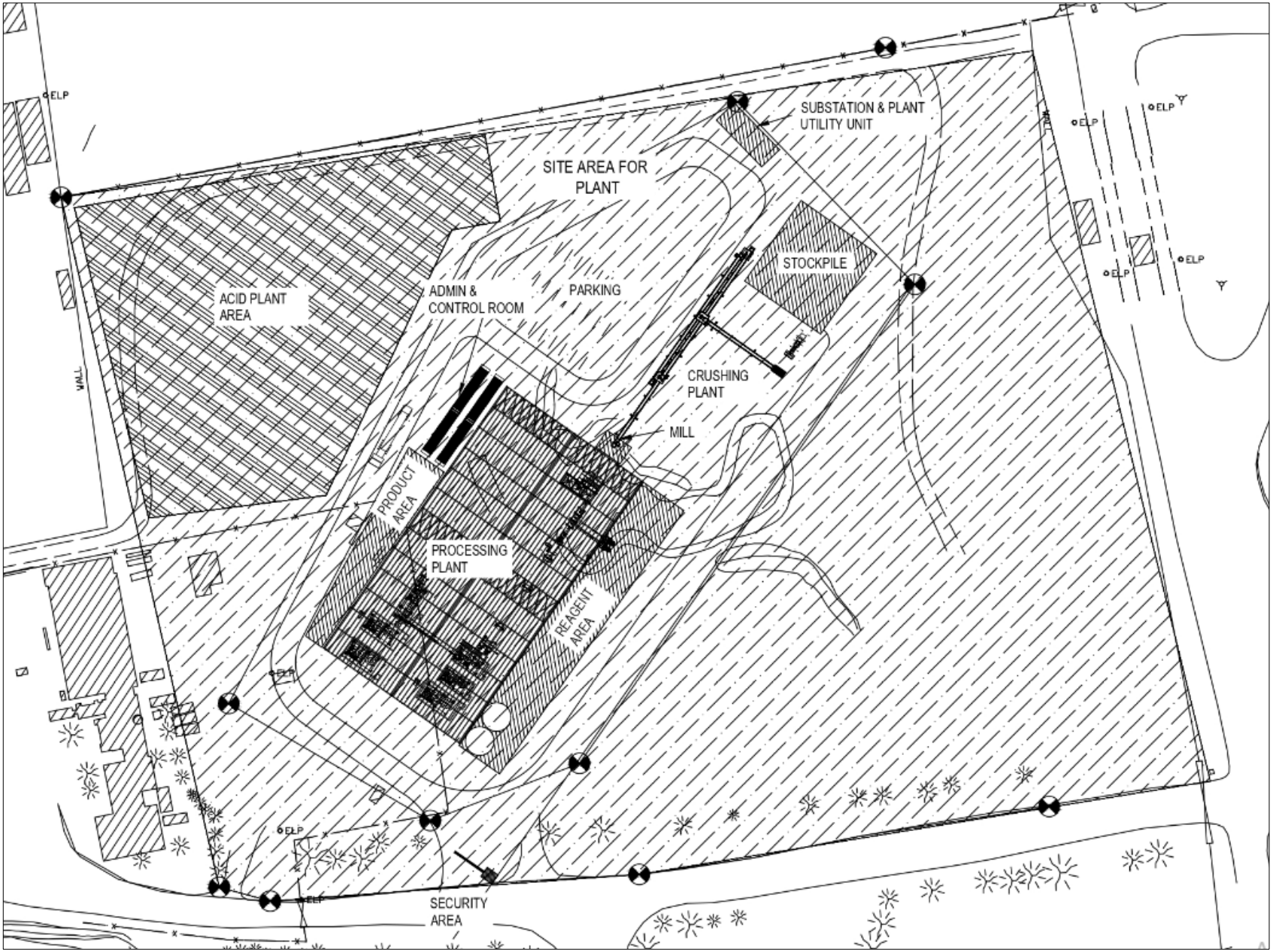
Project Component/s	» Decommissioning of the facility and associated infrastructure.
Potential Impact	» Decommissioning will result in job losses, which in turn can result in a number of social impacts. » Decommissioning is also similar to the construction phase in that it will also create temporary employment opportunities. » Decommissioning can cause environmental impacts.
Activity/Risk Source	» Decommissioning of the facility and associated infrastructure.
Mitigation: Target/Objective	» To avoid and/or minimise the potential social and environmental impact associated with decommissioning of the zero waste recovery plant.

Mitigation: Action/Control	Responsibility	Timeframe
Retrenchments should comply with South African Labour Legislation.	Project developer	Decommissioning
Once the facility has exhausted its lifespan, the main facility and all associated infrastructure not required for the post-rehabilitation use of the site should be removed, and all disturbed areas appropriately rehabilitated.	Project developer	Decommissioning
All building materials must be removed from the site.	Appointed contractor	Decommissioning
All recyclable rubble and solid waste (e.g. scrap metal, cables, bottles, cans, and plastic residues) shall be collected and disposed of through a registered recycling company.	Appointed contractor	Decommissioning

Mitigation: Action/Control	Responsibility	Timeframe
All non-recyclable rubble and solid waste shall be collected and disposed of at an approved waste disposal site.	Appointed contractor	Decommissioning

Performance Indicator	» Compliance with South African Labour Legislation relevant at the time. » Successful rehabilitation of the site.
Monitoring	» No monitoring will be required as the development footprint is situated in a highly transformed industrial area, with no sensitive environmental features. Rehabilitation of the site will not include activities such as re-vegetation and re-seeding.

APPENDIX A:
LAYOUT



Appendix A: Layout map of the preferred development footprint for the zero waste recovery plant, as was assessed as part of the EIA process

APPENDIX B:
EAP CURRICULUM VITAE

savannah environmental

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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 three (23) 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
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
450MW gas to power project and associated 132kV power line, Richards bay, KwaZulu-Natal	Phinda Power Producers	Project Manager & EAP
4000MW gas to power project and associated 400kV power lines, Richards bay, KwaZulu-Natal	Phinda Power Producers	Project Manager & EAP
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 & 400kV 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 2 Power	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	Eskom Holdings	Project Manager & EAP

Project Name & Location	Client Name	Role
Ankerlig Power Station in Atlantis Industria, Western Cape		
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
Olifantshoek Power line, Northern Cape	Eskom Holdings	Project Manager & EAP
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

Project Name & Location	Client Name	Role
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

Project Name & Location	Client Name	Role
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
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

Project Name & Location	Client Name	Role
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
Decommissioning of the Asbestos Landfill at Kriel Power Station, Mpumalanga	Eskom	Project Manager & EAP
Decommissioning and demolition of Kilns 3 & 4 at PPC Slurry Plant, North West	PPC	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

Project Name & Location	Client Name	Role
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

Project Name & Location	Client Name	Role
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

CURRICULUM VITAE OF GIDEON RAATH

Profession:	Environmental and Permitting Consultant			
Age:	33 years			
Nationality:	South African			
		Read	**Write**	**Speak**
Language:	Afrikaans –	Excellent	Excellent	Excellent
	English –	Excellent	Excellent	Excellent
Position:	Senior Environmental Assessment Practitioner (Permitting)			
Parent Firm:	Savannah Environmental			
Specialisation:	Environmental Impact Assessments, Water Use Licencing, Waste Licencing, Environmental Compliance Officer, Ecological Specialist, Wetland Specialist, GIS, MPRDA permitting			
Work Experience:	6.5 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 a Senior Environmental Consultant at Coastal and Environmental Services (CES), conducting environmental authorisations applications (NWA, NEMA, MPRDA), Public Participation Processes, GIS specialisation — as well as Ecological and Wetland specialist studies. Previously, Gideon previously worked as the Monitoring & Evaluation Project Manager for the City of Cape Town's invasive species unit (Environmental Resources Management Department).

Gideon's experience includes EIA permitting for ~94 different projects, ranging from infrastructure, mining, energy, housing, renewable energy and the conservation industries. These include Environmental Authorisations (BAR, S&EIR), Water Use Licencing, Waste Licencing, Environmental Compliance Officer auditing, GIS studies and MPRDA permitting. He therefore has wide ranging experience with various legislation including NEMA, NHRA, NEM:WA, NEM:BA, MPRDA and NWA regulations, having applied them for numerous private and public sector clients across various industries for small, medium and large projects. Gideon is also an experienced Ecological & Wetland Specialist having conducted ~23 specialist studies, and has been accredited with SACNASP as a professional natural scientist (*Pr.Sci.Nat*) since 2017. Gideon also has experience beyond the permitting sphere through numerous screening assessments for potential developers, including fatal flaw screenings, regulatory and permitting approval screening as well as ecological and hydrological sensitivity screening. Gideon has also served in an advisory role for various infrastructure and mining projects, assisting with environmental due diligence, bankable feasibility study input and assistance towards financial close, most recently in the Renewable Energy sphere under the Risk Mitigation Independent Power Producer Procurement Programme (RMIPPPP) and towards the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) round 5 bid compliance.

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)
- Due diligence and financial close advisory services

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	Senior Environmental and Permitting Consultant Tasks include: 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.
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 and maintenance of a user database and account management system.

PROJECT EXPERIENCE IN GENERAL ENVIRONMENTAL ASSESSMENT PRACTITIONER WORK

Please note: the following duties and responsibilities are in each instance relevant to the roles assigned below.

A. Environmental Consultant:
- Review of the project scope and advisory input into project approach;
- Report writing;
- Report reviewing;
- Site assessments;
- Competent authority liaison, client liaison;
- Specialist reports review;
- Quality control of specific and overall project deliverables; and
- Compliance auditing, report writing and audit report reviews;

B. Specialist (ecological and wetland):
- Project scope determination and development of terms of reference;
- Specialist field assessment;
- Sampling collection and interpretation of results (soil and water samples) where necessary;
- Specialist report writing; and
- Specialist input regarding public input or appeals;

C. Project manager:
- Project team liaison (engineers, subconsultants, financiers where applicable);
- Contracting and appointment of specialists or subcontractors;
- Client liaison, public liaison, project team and specialist liaison;
- Financial management (contracts, invoicing, cashflow). This includes but is not limited to:
    - Bid document preparation (where applicable) and development of terms of reference;
    - Determining applicable rates and budget for the environmental team;
    - Management of appointments, development of contracts;
    - Development of invoicing schedule and invoicing agreement;
    - Responsible for assigning invoice values and dates to coincide with relevant partial or whole deliverables;
    - Management or variations (internal and external);
    - Evaluation of claims from subcontractors;
    - Quality control of subcontractor deliverables;
    - Ensuring timeous payment on invoices and appropriate payments are made to qualifying subcontractors;
- Schedule management (approach, deliverables, timeframes and resourcing). This includes but is not limited to:
    - Determining project approach and parties required;
    - Assessment of regulatory timeframes applicable for all aspects of the environmental work;
    - Development of an overall programme for all environmental work, including subcontractors;
    - Progress meetings with the project team, including regular schedule updates;
    - Variation management and crisis meetings, where applicable;
    - Deliverable management and close-out reporting;
- Due diligence inputs towards financial close; and
- Project assessment of environmental risk;

D. Public Participation:
- Identification of key stakeholders, landowners & neighbours, organs of state and other applicable interested and affected parties;
- Compilation and review of all public material (information documents, notices, advertisements) according to regulatory requirements;
- Public liaison, and client consultation;
- Compilation of public comments and response reports and reporting on public participation;
- Management of appeals;

E. Environmental Control Officer:
- Compliance audits;
- Development of checklists and document control sheets;
- Compliance audit reporting and report reviews;
- Authority liaison (DEA EMI's); and
- Liaison with project steering committee and Environmental Officer;

No.	Project Name & Location	Client Name	Role	Dates & Duration	Sector
94	Highveld Steel ZeroWaste Solution EIA, eMalahleni, Mpumalanga	Anglo African Metals (Pty) Limited	Project Manager, Environmental Consultant	August 2020 – current	Waste
93	Heuningspruit Financial Close, Arbeid, Free State	Cronimet Mining Power Solutions SA (Pty) Ltd	Project Manager, Environmental Consultant	February 2020 – current	Renewable Energy
92	Steynsrus Solar PV Financial Close, Arbeid, Free State	Cronimet Mining Power Solutions SA (Pty) Ltd	Project Manager, Environmental Consultant	February 2020 – current	Renewable Energy
91	Gunstfontein Wind Farm OHL BAR Sutherland, Northern Cape	African Clean Energy Developments (Pty) Ltd	Project Manager, Environmental Consultant	April 2020 – current	Renewable Energy
90	Tronox Namakwa Prospecting Right closure certificate, Garies, Northern Cape	African Clean Energy Developments (Pty) Ltd	Project Manager, Environmental Consultant	May 2020 – current	Mining
89	100 MW Vrede Solar Energy Facility EIA, Kroonstad, Free State	Mainstream Renewable Power SA, (Pty) Ltd	Project Manager, Environmental Consultant	June 2020 – current	Renewable Energy
88	100 MW Rondavel Solar Energy Facility EIA, Kroonstad, Free State	Mainstream Renewable Power SA, (Pty) Ltd	Project Manager, Environmental Consultant	June 2020 – current	Renewable Energy
87	Grid infrastructure BAR for Vrede SEF, Kroonstad, Free State	Mainstream Renewable Power SA, (Pty) Ltd	Project Manager, Environmental Consultant	June 2020 – current	Renewable Energy

No.	Project Name & Location	Client Name	Role	Dates & Duration	Sector
86	Grid infrastructure BAR for Rondavel SEF, Kroonstad, Free State	Mainstream Renewable Power SA, (Pty) Ltd	Project Manager, Environmental Consultant	June 2020 – current	Renewable Energy
85	Energy Group Wadeville ECO, Wadeville, Gauteng	Energy Group (Pty) Ltd	Project Manager, Environmental Consultant	August 2020 – current	Infrastructure
84	Energy Group Nigel ECO, Nigel, Gauteng	Energy Group (Pty) Ltd	Project Manager, Environmental Consultant	September 2020 – current	Infrastructure
83	Great Karoo Battery Energy Storage System BAR, Sutherland, Northern Cape	African Clean Energy Developments (Pty) Ltd	Project Manager, Environmental Consultant	June 2020 – current	Renewable Energy
82	Gunstfontein Battery Energy Storage System BAR, Sutherland, Northern Cape	African Clean Energy Developments (Pty) Ltd	Project Manager, Environmental Consultant	June 2020 – current	Renewable Energy
81	Richards Bay 1250MW Combined Cycle Gas to Power Station EIA, Richards Bay, kwaZulu-Natal	Richards Bay Gas Power 2 (Pty) Ltd / Phakwe Group (Pty) Ltd	Project Manager, Environmental Consultant	August 2020 – current	Energy
80	Richards Bay 400MW Simple Cycle Gas to Power Station Part II amendment, Richards Bay, kwaZulu-Natal	Richards Bay Gas Power 2 (Pty) Ltd / Phakwe Group (Pty) Ltd	Project Manager, Environmental Consultant	April 2020 – current	Energy
79	Great Karoo Wind Farm OHL BAR, Sutherland, Northern Cape	African Clean Energy Developments (Pty) Ltd	Environmental Consultant	September 2020 – current	Renewable Energy
78	Dorper Wind Energy Facility Section 54 compliance audit, Molteno, Eastern Cape	Dorper Wind Farm RF (Pty) Ltd	Project Manager, Environmental Consultant, ECO	2019: 2 months	Renewable Energy
77	Rainmaker Malabar, Spreeukloof, Spinning Head and Loperberg Section 54 compliance audits (x4), Molteno, Eastern Cape	Rainmaker Energy (Pty) Ltd	Project Manager, Environmental Consultant, ECO	2019: 2 months	Renewable Energy
76	Togo Blita 40MW Solar Energy Facility ESMP Peer Review	OCA Global (Testing, Inspection and Certification) South Africa (Pty) Ltd	Environmental Consultant	2020: 3 months	Renewable Energy
75	Marubeni AMDA Straussheim 3 x Solar Energy Facility Peer	Marubeni Middle-East &	Environmental Consultant	2020: 4 months	Renewable Energy

No.	Project Name & Location	Client Name	Role	Dates & Duration	Sector
	Review, Kenhardt, Northern Cape	Africa Power (Pty) Ltd			
74	Perdekraal PI Amendment	Perdekraal West Wind Farm (Pty) Ltd	Project Manager, Environmental Consultant	2020: 2 months	Renewable Energy
73	TAP desktop Palaeontological study, Vuwani, Limpopo	Trans African Projects (Pty) Ltd	Project Manager	2020: 3 months	Infrastructure
72	Kenhardt Solar PV Part I amendments, Kenhardt, Northern Cape	Biotherm Energy (Pty) Ltd	Project Manager, Environmental Consultant	2020: 2 months	Renewable Energy
71	Harmony Rietpan LILO & Switching substation BAR, Welkom, Free State	BBEntropie (Pty) Ltd	Ecological specialist	February 2020 – June 2020	Renewable Energy
70	Harmony Nyala Solar PV grid connection BAR, Welkom, Free State	BBEntropie (Pty) Ltd	Ecological specialist	February 2020 – June 2020	Renewable Energy
69	Harmony Eland Solar PV grid connection BAR, Welkom, Free State	BBEntropie (Pty) Ltd	Ecological specialist	February 2020 – June 2020	Renewable Energy
68	Engie Rheboksfontein Part II amendment, Darling, Western Cape	Engie South Africa (Moyeng Energy)	Project Manager	July 2019 – January 2020: 8 months	Renewable Energy
67	APSA Liquid Natural Gas Vanderbijlpark, Vanderbijlpark, Gauteng	Air Products South Africa (Pty) Ltd	Project Manager	2019 – current: 8 months	Infrastructure
66	APSA Coega hazardous storage BAR, Coega IDZ, Eastern Cape	Air Products South Africa (Pty) Ltd	Project Manager	2019 – current: 8 months	Infrastructure
65	Korana WEF Part II amendment, Pofadder, Northern Cape	South African Mainstream Renewable Power Developments (Pty) Ltd	Project Manager	2019: 8 months	Renewable Energy
64	Khai-Ma WEF Part II amendment, Pofadder, Northern Cape	South African Mainstream Renewable Power Developments (Pty) Ltd	Environmental Consultant	2019: 8 months	Renewable Energy
63	Eskom Matla power station Reverse Osmosis Unit BAR, Emalahleni, Mpumalanga	Eskom SOC ltd	Project Manager, Environmental Consultant	2019 – current: 8 months	Infrastructure
62	Prana Sekaname (Kalahari Energy) 100MW coalbed-methane wellfield and	Prana energy (Pty) Ltd	Project Manager, Environmental Consultant	2019 – current: 36 months	Mining & Energy

No.	Project Name & Location	Client Name	Role	Dates & Duration	Sector
	gas power station ESIA, Mmashoro, Bostwana				
61	Solink Heineken Sedibeng PV plant GPEMF registration and ecological screening assessment, Sedibeng, Gauteng	Solink Power Procurement (Pty) Ltd	Project Manager, Environmental Consultant	2019 – current: 6 months	Renewable Energy
60	ENGP Neopak environmental screening, Rosslyn, Gauteng	Energy Group (Pty) Ltd	Project Manager, Environmental Consultant	2019: 3 months	Infrastructure
59	ENGP Nigel compressed gas pipeline General Authorisation, BAR, Ecological Specialist Study, Due Diligence advisory, Nigel, Gauteng	Energy Group (Pty) Ltd	Project Manager, Environmental Consultant, Ecological Specialist	2019: 10 months	Infrastructure
58	Rainmaker Malabar, Spreeukloof and Spinning Head Wind Farm Part II amendments, Molteno, Eastern Cape	Rainmaker Energy (Pty) Ltd	Project Manager, Environmental Consultant	2019 – current: 12 months	Renewable Energy
57	Eskom Kriel asbestos decommissioning BAR, Emalahleni, Mpumalanga	Eskom SOC ltd	Project Manager, Environmental Consultant	2019: 6 months	Infrastructure
56	Wilmar Richards Bay vegetable oil pipeline BAR, General Authorisation and freshwater specialist study, Richards Bay, KwaZulu Natal	Wilmar SA (Pty) Limited	Project Manager, Environmental Consultant, Freshwater Specialist	2019: 10 months	Infrastructure
55	Great Karoo WEF Part II amendment	African Clean Energy Developments (Pty) Ltd	Project Manager,	2019: 8 months	Renewable Energy
54	Gunstfontein WEF Part II amendment	African Clean Energy Developments (Pty) Ltd	Environmental Consultant	2019: 8 months	Renewable Energy
53	Aggeneys Solar PV & gridline freshwater specialist reports (x2), Aggeneys, Northern Cape	Biotherm Energy (Pty) Ltd	Freshwater specialist	2019: 4 months	Renewable Energy
52	SANRAL Polokwane N1 Ring Road Upgrade Basic Assessment,	SANRAL SOC Ltd & KBK Engineers	Environmental consultant	2018: 8 months	Infrastructure

No.	Project Name & Location	Client Name	Role	Dates & Duration	Sector
	Polokwane, Limpopo Province				
51	Boshoek Loop Rail Upgrade BAR and water use licence application, Rustenburg, North-West Province	Transnet SOC Ltd	Project Manager, Environmental consultant, Wetland specialist, Public Participation, Wetland specialist	2018: 8 months	Infrastructure
50	Heysterkrand Loop Rail Upgrade BAR, Rustenburg, North-West Province	Transnet SOC Ltd	Project Manager, Environmental consultant, Public Participation	2018: 8 months	Infrastructure
49	VMC Mining permit renewal application, Rust De Winter, Gauteng	Vergenoeg Mining Company (Pty) Ltd	Environmental consultant	2018: 4 months	Mining
48	Wijnberg Trust Dam 2 expansion Aquatic Impact Assessment, Greyton, Western Cape	Wijnberg Trust	Aquatic specialist	2018: 4 months	Infrastructure
47	Zesfontein PV pre-feasibility screening and fatal flaw screening, Ekurhuleni, Gauteng	Genesis Eco-Energy Developments (Pty) Ltd	Environmental consultant	2018: 3 months	Renewable Energy
46	Ancuabe baseline vegetation monitoring assessment and programme, Ancuabe, Cabo Del Gado Province, Mozambique	Grafex Limitada Mozambique	Botanical specialist	2018: 3 months	Mining
45	Prospecting pit rehabilitation programme, Ancuabe, Cabo Del Gado Province, Mozambique	Grafex Limitada Mozambique	Botanical specialist, Environmental consultant	2018: 3 months	Mining
44	ENGP Wadeville environmental Screening report and heritage exemption application, Due Diligence Advisory, Wadeville, Gauteng	Energy Group (Pty) Ltd	Project Manager, Environmental Consultant	2018: 2 months	Energy
43	Eskom Kriel lime treatment plant BAR, Emalahleni, Mpumalanga	Eskom SOC ltd	Project Manager, Environmental Consultant	2018: 6 months	Infrastructure
42	Atmospheric Emissions Licence, Section 24G for the ER Galvanizing plant and operations, Johannesburg, Gauteng	ER Galvanizers Pty Ltd	Project Manager, Environmental consultant, Public Participation	2018/2019: 8 months	Manufacturing

No.	Project Name & Location	Client Name	Role	Dates & Duration	Sector
41	Corner Berg and Drooge Street township development BAR, Zeerust, North-West Province	Ramotshere Moiloa Local Municipality	Project Manager, Environmental consultant, Public Participation	2018/2019: 8 months	Housing
40	Corner Kort and Bree Street township development BAR, Zeerust, North-West Province	Ramotshere Moiloa Local Municipality	Project Manager, Environmental consultant, Public Participation	2018/2019: 8 months	Housing
39	Basic Assessment and 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	2018/2019: 8 months	Housing
38	Thabazimbi Local Municipality Integrated Waste Management Plan, Thabazimbi, Limpopo Province	Thabazimbi Local Municipality & Anglo American Plc	Environmental consultant	2018/2019: 8 months	Waste
37	Aggeneys ADSS General Authorisation, Aggeneys, Northern Cape	Biotherm Energy Pty Ltd	Environmental consultant	2018/2019: 8 months	Infrastructure
36	Kruisvallei Hydro Environmental and Social Management System (ESMS), Bethlehem, Free State	Building Energy South Africa (Pty) Ltd	Environmental Consultant	2018/2019: 6 months	Renewable Energy
35	Transnet Depot and Siding compliance auditing programme, Johannesburg, Gauteng & Rustenburg, North-West Province	Transnet SOC Ltd	ECO	2018/2019: 4 months	Infrastructure
34	ENGP Clayville environmental Screening and due diligence advisory, Clayville, Gauteng	Energy Group (Pty) Ltd	Project Manager Environmental Consultant	2018/2019: 4 months	Energy
33	Transalloys coal-fired power station PII amendment, Water Use Licence and Atmospheric Emissions Licence, Emalahleni, Mpumalanga	Transalloys (Pty) Ltd	Project Manager, Environmental Consultant	2018/2019: 16 months	Energy

No.	Project Name & Location	Client Name	Role	Dates & Duration	Sector
32	SANRAL Masekwaspoort N1 Road Upgrade BAR, water use licence application, Louis Trichardt, Limpopo Province	SANRAL SOC Ltd & Knight Piésold Consulting	Project Manager, Environmental consultant, Public Participation	2018/2019: 12 months	Infrastructure
31	S&EIR authorisation and Water use licence for the SANRAL Zandkraal-Windburg N1 road upgrade, Windburg, Free State Province	SANRAL SOC Ltd & SMEC Consulting Engineers	Project Manager, Environmental consultant, Public Participation	2018/2019: 12 months	Infrastructure
30	Masetjaba water reservoir Ecological Impact Assessment and General Authorisation, Nigel, Gauteng	Naidu Consulting Engineers (Pty) Ltd & City of Ekurhuleni	Environmental Consultant, Ecological Specialist, Wetland Specialist	2018/2019: 12 months	Infrastructure
29	Dwarsrug access road BAR, Loeriesfontein, Northern Cape	South African Mainstream Renewable Power Developments (Pty) Ltd	Project Manager, Environmental Consultant	2018/2019: 8 months	Renewable Energy
28	Hope Village township development BAR, Johannesburg, Gauteng	Door of Hope Charity Organisation	Project Manager, Environmental consultant, Public Participation	2018/2019	Housing
27	Kibler Park Church Development ecological assessment, Johannesburg, Gauteng	Riverside Community Church	Project Manager, Ecological specialist	2017: 2 months	Housing
26	SANRAL Bierspruit R510 Borrow Pit authorisation, road upgrade Basic Assessment and water use licence, Thabazimbi, Limpopo Province	SANRAL SOC Ltd & Royal HaskoningDHV South Africa	Project Manager, Environmental consultant, Ecological specialist, Public Participation	2017: 12 months	Infrastructure
25	Diamond Park Township Development Section 24G, Kimberley, Northern Cape	Sol Plaatje Local Municipality	Project Manager, Environmental consultant, Public Participation	2017/2018: 6 months	Housing
24	Construction monitoring and DMR environmental authorisation, Hendrina, Mpumalanga Province	SANRAL SOC Ltd & Leo consulting engineers	Project Manager, ECO,	2017/2018: 24 months	Infrastructure
23	Triton Minerals Limited Ancuabe and Nicanda Hills EPDA, Ancuabe, Cabo Del Gado Province, Mozambique	Triton Minerals Ltd	Environmental consultant	2017/2018: 12 months	Mining

No.	Project Name & Location	Client Name	Role	Dates & Duration	Sector
22	City of Johannesburg nature reserve proclamation (Phase II), Johannesburg, Gauteng	City of Johannesburg SOC Ltd	Project Manager, Environmental consultant, Public Participation, Botanical specialist	2017/2018: 12 months	Conservation
21	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	2017/2018: 12 months	Conservation
20	G7 Renewable Energy 132kV BAR & EMPr, Matjiesfontein, Northern Cape	G7 Renewable Energy (Pty) Ltd	Project Manager, Environmental consultant, Public Participation	2016: 8 months	Renewable Energy
19	DEA Quoin Point dune specialist assessments, Gansbaai, Western Cape	Department of Environmental Affairs (national)	Project Manager, Environmental consultant	2016: 6 months	Conservation
18	ACSA Jones Road Filling Station Basic Assessment, Johannesburg, Gauteng	Airports Company South Africa SOC Ltd	Project Manager, Environmental consultant, Public Participation	2016/2017: 8 months	Infrastructure
17	SANRAL Caledon N2 Section 3 road upgrade project Basic Assessment, General Authorisation and ecological specialist report, Caledon, Western Cape Province	JG Afrika Engineering	Project Manager, Environmental consultant, Ecological specialist, ECO	2016/2017: 8 months	Infrastructure
16	Barberton IAPS Waste Water Treatment Works development BAR and SASS 5 assessment, Barberton, Mpumalanga Province	Umjindi Local Municipality and Rhodes University	Project Manager, Environmental consultant, Public Participation, Aquatic specialist	2016/2017: 10 months	Infrastructure
15	City of Johannesburg nature reserve proclamation boundary verification (Phase I), Johannesburg, Gauteng	City of Johannesburg SOC Ltd	Environmental consultant, GIS specialist	2016/2017: 12 months	Conservation
14	Almenar tin prospecting BAR, Carnarvon, Northern Cape	Almenar Property Investments (Pty) Ltd	Environmental consultant	2015: 8 months	Mining
13	iGas integrated biodiversity screening, Saldanha, Western Cape	Central Energy Fund - iGas (subsidiary)	Environmental consultant, Faunal specialist (assistant)	2015: 6 months	Energy

No.	Project Name & Location	Client Name	Role	Dates & Duration	Sector
12	Biotherm Energy Golden Valley Wind Energy Facility ESAP, Bedford, Eastern Cape	Biotherm Energy Pty Ltd	Environmental consultant	2015: 2 months	Renewable Energy
11	Ancuabe graphite mine Environmental and Social Impact Assessment (ESIA), Cabo Del Gado Province, Mozambique	Grafex Limitada Mozambique	Environmental consultant	2015: 12 months	Mining
10	Mayfield Quarry rehabilitation plan, Grahamstown, Eastern Cape	Mayfield Quarry	Environmental consultant	2015: 1 month	Mining
9	Enel Paleisheuwel Solar compliance auditing, Paleisheuwel, Northern Cape	Enel Green Power RSA (EGP RSA)	Environmental consultant	2015: 6 months	Renewable Energy
8	Boschendal Wine Estate hydro-electric power station Water Use Licence and S24G application, Stellenbosch, Western Cape	Boschendal Wine Estate	Environmental consultant	2015/2016: 8 months	Renewable Energy
7	G7 Brandvalley S&EIR, Matjiesfontein, Northern Cape	G7 Renewable Energy (Pty) Ltd	Environmental consultant	2015/2016: 12 months	Renewable Energy
6	G7 Rietkloof S&EIR, Matjiesfontein, Northern Cape	G7 Renewable Energy (Pty) Ltd	Environmental consultant	2015/2016: 12 months	Renewable Energy
5	Zirco Resources Kamiesberg heavy mineral sand mine water use licence, Kamiesberg, Northern Cape	Zirco Roode Heuwel (Pty) Ltd	Environmental consultant	2015/2016: 12 months	Mining
4	PRDW Cape Town harbour breakwater rehabilitation EMPr, Cape Town, Western Cape	PRDW Consulting port and Coastal Engineers	Project Manager, Environmental consultant	2014: 8 months	Infrastructure
3	Mosselbay Energy EA Amendment (Part II), Mosselbay, Western Cape	Mosselbay Energy IPP (Pty) Ltd	Environmental consultant	2014: 6 months	Renewable Energy
2	PRDW Bushman's Estuary dune encroachment project management, Kenton-on-sea, Eastern Cape	PRDW Consulting port and Coastal Engineers	Environmental consultant	2014: 6 months	Infrastructure

No.	Project Name & Location	Client Name	Role	Dates & Duration	Sector
1	Bloekombos (Kraaifontein) hospital water use licence application and botanical baseline and impact assessment, Cape Town, Western Cape	Western Cape Provincial Government (PGWC)	Project Manager, Environmental consultant, Botanical specialist, Wetland specialist	2014/2015: 10 months	Housing

	SPECIALIST STUDIES			
No.	**Project Name & Location**	**Client Name**	**Role**	**Sector**
23	Aggeneys PV1 &2 PII specialist impact statement, Aggeneys, Northern Cape	ABO Wind Aggeneys 1 & 2 PV (Pty) Ltd	Freshwater Specialist	Renewable Energy
22	Rietvallei Ecological Status Quo Report, Randfontein, Gauteng	Africa Vision Holdings (Pty) Ltd	Ecological specialist	Infrastructure
21	Harmony Rietpan LILO & Switching substation BAR, Welkom, Free State	BBEntropie (Pty) Ltd	Ecological specialist	Renewable Energy
20	Harmony Nyala Solar PV grid connection BAR, Welkom, Free State	BBEntropie (Pty) Ltd	Ecological specialist	Renewable Energy
19	Harmony Eland Solar PV grid connection BAR, Welkom, Free State	BBEntropie (Pty) Ltd	Ecological specialist	Renewable Energy
18	RBGP2 AEL, MHI & Botanical Walkthrough, Richards Bay, KwaZulu Natal	Richards Bay Gas Power 2 (Pty) Ltd	Ecological specialist	Renewable Energy
17	Solink Heineken Sedibeng PV plant GPEMF registration and ecological screening assessment, Sedibeng, Gauteng	Solink Power Procurement (Pty) Ltd	Ecological specialist	Renewable Energy
16	ENGP Nigel compressed gas pipeline General Authorisation, BAR, Ecological Specialist Study, Due Diligence advisory, Nigel, Gauteng	Energy Group (Pty) Ltd	Ecological specialist	Infrastructure
15	Wilmar Richards Bay vegetable oil pipeline BAR, General Authorisation and freshwater specialist study, Richards Bay, KwaZulu Natal	Wilmar SA (Pty) Limited	Freshwater Specialist	Infrastructure
14	Aggeneys Solar PV & gridline freshwater specialist reports (x2), Aggeneys, Northern Cape	Biotherm Energy Pty Ltd	Freshwater specialist	Renewable Energy
13	Ancuabe baseline vegetation monitoring assessment and programme, Ancuabe, Cabo Del Gado Province, Mozambique	Grafex Limitada Mozambique	Botanical specialist	Mining
12	Prospecting pit rehabilitation programme, Ancuabe, Cabo Del Gado Province, Mozambique	Grafex Limitada Mozambique	Botanical specialist	Mining
11	Masetjaba water reservoir Ecological Impact Assessment and General Authorisation, Nigel, Gauteng	Naidu Consulting Engineers (Pty) Ltd & City of Ekurhuleni	Ecological Specialist, Freshwater Specialist	Infrastructure

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

savannah environmental

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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*

CURRICULUM VITAE OF MMAKOENA MMOLA

Profession : Environmental Consultant

Specialisation: Environmental Permitting, Environmental Assessments, and Compliance

Work Experience: 3.5 years

VOCATIONAL EXPERIENCE

Mmakoena is an Environmental Consultant with 3 years of experience in the environmental field. She holds a B.Sc. (Hons) in Geochemistry from the University of the Witwatersrand, and is currently completing her B.Sc. (Hons) in Environmental Management with the University of South Africa.

Mmakoena's experience includes undertaking basic assessments (BAs), providing assistance on local environmental impact assessments (EIAs), environmental authorisation applications (EAs), water use licence applications (WULAs), public participation, environmental compliance auditing and providing environmental control officer (ECO) services. Mmakoena has a well-developed knowledge of environmental legislation (National Environmental Management Act, National Water Act, etc.), and has successfully managed a number of basic assessments from the application phase through to receipt of environmental authorisation. She also has experience in preparing proposal documents and budgets in response to requests for quotations/proposals and tenders.

SKILLS BASE AND CORE COMPETENCIES

- Well-developed communication and report writing skills
- Adaptability and ability to handle pressure
- Organisational skills
- Ability to build and maintain client relationships
- Loyalty, dedication and dependability
- Ability to coordinate and synthesize environmental information
- Ability to work to tight deadlines and on multiple projects
- Thorough knowledge of environmental legislation and the environmental impact assessment
- process
- Quality focus and attention to detail
- Ability to deliver high quality work to agreed budgets
- MS Office Package (Word, PowerPoint and Excel)
- Adobe Acrobat
- Google Earth
- ArcGIS

EDUCATION AND PROFESSIONAL STATUS

Degrees:

- Bachelor of Science (Hons) Environmental Management, in progress, University of South Africa
- Bachelor of Science (Hons) Geochemistry, 2016, University of the Witwatersrand
- Bachelor of Science Geology, 2015, University of the Witwatersrand

Short Courses:

- Environmental Management and Regulations, 2018, Kuvimbika
- Research Methodology and Report Writing, 2017, Imsimbi Training

Professional Society Affiliations:

- Candidate Natural Scientist, Environmental Science, South African Council for Natural and Scientific Professions – Registration Number: 126748

EMPLOYMENT

Date	Company	Roles and Responsibilities
2021 - Current:	Savannah Environmental (Pty) Ltd	*Environmental Consultant* Tasks include: • *Environmental permitting and Environmental Authorisation applications* • *Environmental Authorisation amendment applications* • *Liaison with clients and competent authorities* • *Public participation process* • *Preparation of proposals and budgets* • *Report writing (Environmental Impact Assessment reports, Basic Assessment report, motivation reports and Environmental Management Programmes)* • *Project Management* • *Management of sub-consultants*
2019 - 2020	Golder Associates Africa (Pty) Ltd	*Junior Environmental Consultant* Tasks included: • *Water use license applications* • *Environmental compliance and water use license audits* • *Environmental control officer services* • *Annual integrated water and waste management plan updates* • *Assist with wetland assessments* • *Assist with mine closure and rehabilitation plans* • *Liaise with clients and competent authorities* • *Provide assistance on local environmental and social impact assessments* • *Undertake site visits* • *Compile environmental reports* • *Generate environmental screening reports*

Date	Company	Roles and Responsibilities
		• *Undertake administrative tasks*
2017 - 2019	Shango Solutions	*Junior Consultant* Tasks included: • *Conduct environmental compliance and financial provision audits for prospecting sites as per the MPRDA* • *Environmental authorisation applications* • *Prospecting right and mining permit applications* • *Basic assessment reports* • *Environmental management programmes/plans* • *Execute the public participation process* • *Section 102 amendment applications as per the MPRDA* • *Prepare maps* • *Liaise with sub-consultants/specialists* • *Undertake administrative tasks*

PROJECT EXPERIENCE

Project experience includes environmental impact assessments and permitting for mining, exploration and prospecting projects.

GAS PROJECTS

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	***Client Name***	***Role***
Kroonstad Gas Exploration Right and Environmental Authorisation, Free State Province	*Western Allen Ridge Gold Mines (Pty) Ltd*	*Assistant EAP and Public Participation Consultant*

MINING SECTOR PROJECTS

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	***Client Name***	***Role***
Pure Source Mine Mining Right Application, Free State Province	*Monte Cristo Commercial Park (Pty) Ltd*	*Assistant EAP and Public Participation Consultant*

Basic Assessments

Project Name & Location	***Client Name***	***Role***
Basic Assessment for Western Margin Gap West Prospecting Right, Free State Province	*White Rivers Exploration (Pty) Ltd*	*Assistant EAP*
Basic Assessment for Ventersburg Consolidated Prospecting Right, Free State Province	*White Rivers Exploration (Pty) Ltd*	*Assistant EAP*
Basic Assessment for Nkunzana Prospecting Right, KwaZulu-Natal Province	*WRE Base Metals (Pty) Ltd*	*Junior EAP*
Basic Assessment for Kroonstad North Prospecting Right, Free State Province	*White Rivers Exploration (Pty) Ltd*	*Junior EAP*
Basic Assessment for Vredefort West Extension Prospecting Right, Free State Province	*White Rivers Exploration (Pty) Ltd*	*Junior EAP*

Basic Assessment for Beisa North Prospecting Right, Free State Province	*Sunshine Mineral Reserves (Pty) Ltd*	*EAP*
Basic Assessment for Palmietfontein Mining Permit, North West Province	*Palm Chrome (Py) Ltd*	*Assistant EAP*

Specialist Studies

Project Name & Location	***Client Name***	***Role***
New Largo Mine Closure and Rehabilitation Plan, Mpumalanga Province	*Seriti Coal*	*Junior Environmental Consultant*
Smarty Minerals Integrated Environmental Authorisation: Wetland Impact Assessment Report, Limpopo Province	*Smarty Minerals Investment (Pty) Ltd*	*Junior Environmental Consultant*
Glencore Water Treatment Plant Pipeline: Wetland Monitoring, Mpumalanga Province	*Glencore*	*Junior Environmental Consultant*

Environmental Compliance, Auditing and ECO

Project Name & Location	***Client Name***	***Role***
Glencore Merafe Wonderkop Smelter, Regulation 34 Audit, North West Province	*Glencore*	*Auditor*
Tshipi Borwa Mine Water Use Licence Audit, Northern Cape Province	*Tshipi Borwa Mine*	*Auditor*
Samancor Middelburg Ferrochrome: Construction of ore dryer, Mpumalanga Province	*Samancor Middelburg Ferrochrome*	*ECO*
Various Annual Financial Provision and Environmental Compliance Audits for prospecting sites as per the MPRDA, Free State and KwaZulu-Natal Province	*White River's Exploration (Pty) Ltd*	*Auditor*
Impala Platinum Limited – Springs annual external Water Use Licence Audit, Gauteng Province	*Impala Platinum Limited*	*Auditor*
Grootegeluk Water Use Licence Audits, Limpopo Province	*Exxarro*	*Auditor*

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

Project Name & Location	***Client Name***	***Role***
Turvflakte Water Use Licence Application, Limpopo Province	*Exxarro*	*Junior Environmental Consultant (providing assistance)*

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

Specialist Studies

Project Name & Location	***Client Name***	***Role***
Closure cost model estimate and closure cost report for Proposed Surface Pipeline and Associated Infrastructure, Gauteng Province	*AngloGold Ashanti*	*Junior Environmental Consultant*

Wetland Impact Assessment report for Proposed Surface Pipeline and Associated Infrastructure, Gauteng Province	*AngloGold Ashanti*	*Junior Environmental Consultant*

AGRICULTURE PROJECTS

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

Project Name & Location	***Client Name***	***Role***
Dew Crisp Water Use Licence Application, Gauteng Province	*Dew Crisp(Pty) Ltd*	*Junior Environmental Consultant (providing assistance)*