
ANGLO AFRICAN METALS ZERO WASTE RECOVERY SOLUTION, MPUMALANGA PROVINCE

ENVIRONMENTAL MANAGEMENT PROGRAMME

April 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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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 the Remaining Extent of the Farm Highveld Industrial Park No. 1230 JS, 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 4 ha in extent and is contained within the EVRAZ Highveld Steel and Vanadium property¹. 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.

Table 1.1: 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: » Remaining Extent of the Farm Highveld Industrial Part No. 1230 JS
SG 21 Digit Code (s)	» T0JS0000000012300000
Current zoning	Waste recovery plant: » Industrial Use
Current land use	General Industrial

¹ As of June 2021, Highveld Industrial Park (Pty) Ltd will be the landowner

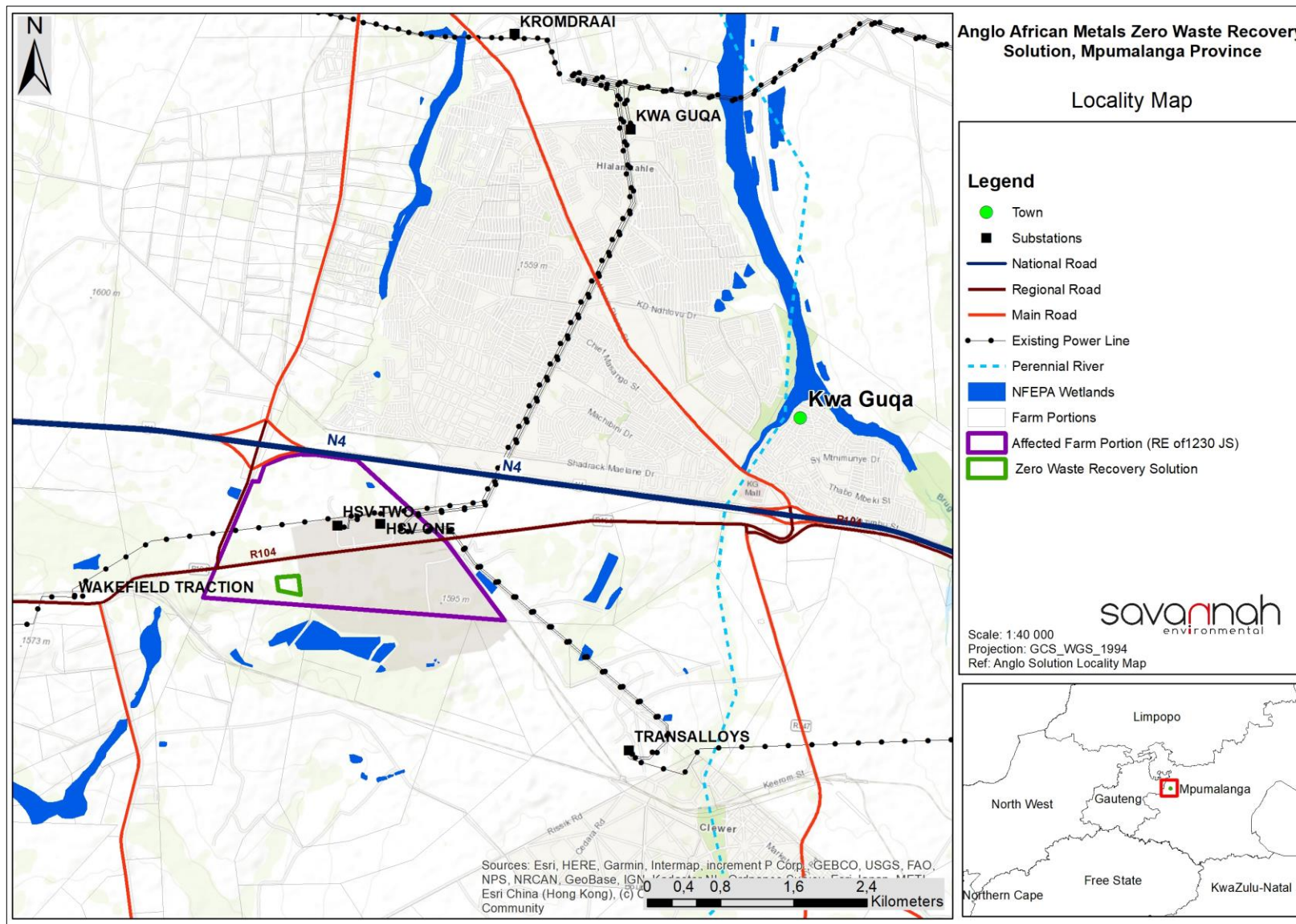


Figure 1.1: Locality map showing the area proposed for the establishment of the Anglo African Metals Zero Waste Recovery Solution

The main infrastructure associated with the facility includes the following (refer to Error! Reference source not found. for an indicative layout):

- » 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 70m³ 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.

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.

Table 1.2 provides details of the proposed project, including the main infrastructure and services.

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

Location of the site	Remaining Extent of the Farm Highveld Industrial Part No. 1230 JS
Landowner	EVRAZ Highveld Steel and Vanadium ²
Municipal Jurisdiction	Nkangala District Municipality and eMalahleni Local Municipality
Plant processing capacity	2 000 tons of tailings/slag per month
Proposed technology	Pyrometallurgical and hydrometallurgical patented extraction process for high-purity titanium dioxide production as well as vanadium, aluminium and magnesium.
Extent of preferred project site	Approximately 350 ha
Extent of the project development footprint	Approximately 4 ha
Stack dimensions (Site elevation: 155 m above mean sea)	<ul style="list-style-type: none"> » Stack 1: 20 m above ground » Stack 2: 13 m above ground
Fuel Sources	LPG will be used to fuel the kiln
Site access	Main access to the project site will be via the existing access from the R104 to Highveld Steel
Associated infrastructure	<ul style="list-style-type: none"> » Internal roads » Internal water, air and gas pipelines

² As of June 2021, Highveld Industrial Park (Pty) Ltd will be the landowner

	<ul style="list-style-type: none"> » 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 										
<p>Services required</p>	<ul style="list-style-type: none"> » 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 										
<p>Dangerous Goods Storage</p>	<ul style="list-style-type: none"> » Coal is stored in bin of 3 m³ » Sodium carbonate stored in bin of 4 m³ » Ammonium sulphate stored in bin of 4 m³ » Sulphuric acid in 2 tanks of 30 m³ (60 m³) » Lime is slurried in a 6 m³ tank » Sodium hydroxide into solution stored in tank of 20 m³ » A fuel storage tank (or multiple tanks, as required) of up to 70 m³ for the bulk storage of gas (LPG or similar type) utilised in the waste recovery process <p>All storage areas will be bunded.</p>										
<p>Raw/Process-Water Storage Reservoir</p>	<ul style="list-style-type: none"> » Process water stored on site in a tank of 20 000 m³. Process water will be recycled, and no process water effluent will be discharged » Potable water is to be stored in 2 tanks of 5 m³ 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 m³ tanks 										
<p>Coordinates of the development footprint</p>	<p>The following development footprint coordinates are proposed:</p> <table border="1" data-bbox="683 1458 1166 1659"> <thead> <tr> <th>Latitude</th> <th>Longitude</th> </tr> </thead> <tbody> <tr> <td>25°52'58.26"S</td> <td>29° 4'47.58"E</td> </tr> <tr> <td>25°52'56.83"S</td> <td>29° 4'55.73"E</td> </tr> <tr> <td>25°53'2.34"S</td> <td>29° 4'57.16"E</td> </tr> <tr> <td>25°53'3.63"S</td> <td>29° 4'48.86"E</td> </tr> </tbody> </table>	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
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25°53'2.34"S	29° 4'57.16"E										
25°53'3.63"S	29° 4'48.86"E										



Figure 1.2: Proposed layout of the plant.

1.1. Overview of the Technology

The technology developed by Anglo African Metals includes the following approximate process³:

- » 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.

³ 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

- » 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 SO₂ gases or fumes given out during leaching or roasting are scrubbed off.
- » Iron, magnesium and TiO₂ are recovered from solution via precipitation steps.
- » Precipitated TiO₂ 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.

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 (SO₂) and nitrogen dioxide (NO₂) 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 SO₂, NO₂ 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 (SO₂ and NO₂), 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:
 - 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
- » 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 property⁴ 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**).

⁴ As of June 2021, Highveld Industrial Park (Pty) Ltd will be the landowner

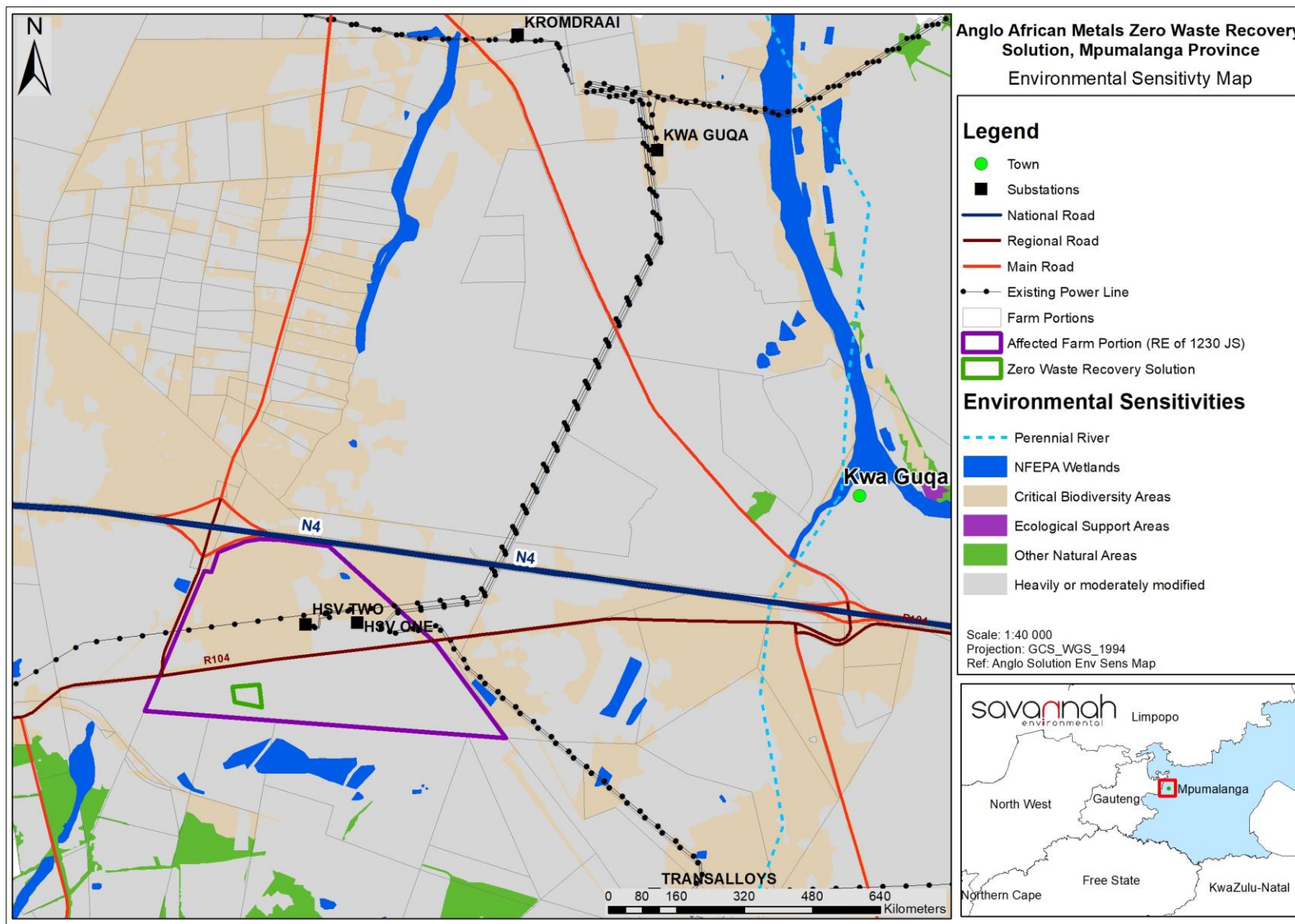


Figure 2.1: Final preferred layout map overlain by the environmental sensitivities for the Project site.

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.: <ul style="list-style-type: none"> » 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 –	Chapter 6-9	
(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.		
(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 –	Chapter 7	
(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.		
(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 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	<ul style="list-style-type: none"> » 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	<ul style="list-style-type: none"> » Design fails to respond optimally to the environmental considerations. » Positioning of temporary laydown areas.
Activities/Risk Sources	<ul style="list-style-type: none"> » Positioning of all project components.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » 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
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	<ul style="list-style-type: none"> » Design and layouts respond to the mitigation measures and recommendations in the EIA Report. »
Monitoring	<ul style="list-style-type: none"> » 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	<ul style="list-style-type: none"> » 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	<ul style="list-style-type: none"> » Impact on identified sensitive areas. » Design fails to respond optimally to the environmental considerations.
Activities/Risk Sources	<ul style="list-style-type: none"> » Positioning of all project components. » Positioning of laydown areas.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » 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: <ul style="list-style-type: none"> * 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	<ul style="list-style-type: none"> » Permits are obtained and relevant conditions complied with. » Relevant management plans/procedures prepared and implemented.
Monitoring	<ul style="list-style-type: none"> » 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	<ul style="list-style-type: none"> » 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.
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	» 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.
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	<ul style="list-style-type: none"> » 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	<ul style="list-style-type: none"> » Activities associated with construction » Activities associated with operation
Mitigation: Target/Objective	<ul style="list-style-type: none"> » 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	<ul style="list-style-type: none"> » 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	<ul style="list-style-type: none"> » 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	<ul style="list-style-type: none"> » Any unintended or intended open excavations (foundations and cable trenches). » Movement of construction vehicles in the area and on-site.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » 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	Site establishment

Performance Indicator	<ul style="list-style-type: none"> » 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	<ul style="list-style-type: none"> » 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	<ul style="list-style-type: none"> » 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	<ul style="list-style-type: none"> » 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	<ul style="list-style-type: none"> » 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	<ul style="list-style-type: none"> » 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/permited 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	<ul style="list-style-type: none"> » 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	<ul style="list-style-type: none"> » 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	<ul style="list-style-type: none"> » Construction activities associated with the establishment of the zero waste recovery plant. » Procurement of equipment and services.
Potential Impact	<ul style="list-style-type: none"> » The opportunities and benefits associated with the creation of local employment and business should be maximised.
Activities/Risk Sources	<ul style="list-style-type: none"> » 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	<ul style="list-style-type: none"> » 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	<ul style="list-style-type: none"> » 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	<ul style="list-style-type: none"> » 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	<ul style="list-style-type: none"> » 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	<ul style="list-style-type: none"> » Possible loss of fossil heritage.
Activity/Risk Source	<ul style="list-style-type: none"> » Site preparation and earthworks. » Foundations or plant equipment installation. » Mobile construction equipment movement on site.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » 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	<ul style="list-style-type: none"> » No loss of fossil heritage. » All chance finds are dealt with as per the legislative guidelines.
Monitoring	<ul style="list-style-type: none"> » 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	<ul style="list-style-type: none"> » All project components.
Potential Impact	<ul style="list-style-type: none"> » Heavy vehicles and construction equipment can generate dust and fine particulate matter and release air pollutants (NO₂, CO, PM, SO₂) 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	<ul style="list-style-type: none"> » 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	<ul style="list-style-type: none"> » Minimise potential particulate matter impacts associated with vehicles and construction equipment use.

	<ul style="list-style-type: none"> » 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.
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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 store 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	<ul style="list-style-type: none"> » Appropriate dust suppression measures are implemented during construction phase. 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	<ul style="list-style-type: none"> » The performance indicators listed above should be met during the construction phase by the responsible parties. » Any potential or actual issues that could result 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	<ul style="list-style-type: none"> » 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	<ul style="list-style-type: none"> » Packaging. » Other construction wastes. » Hydrocarbon use and storage. » Spoil material from excavation, earthworks and site preparation.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » 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 on-site for collection, separation, and storage of waste streams (such as wood, metals, general refuse etc.).	Contractor	Construction

Mitigation: Action/Control	Responsibility	Timeframe
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	<ul style="list-style-type: none"> » 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	<ul style="list-style-type: none"> » 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	<ul style="list-style-type: none"> » Zero Waste Recovery Plant. » Associated Infrastructure.
Potential Impact	<ul style="list-style-type: none"> » 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.
Activity/Risk Source	<ul style="list-style-type: none"> » 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	<ul style="list-style-type: none"> » 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.

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
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	Contractor	Duration of contract

Mitigation: Action/Control	Responsibility	Timeframe
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.		
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

Performance Indicator	<ul style="list-style-type: none"> » No chemical spills outside of designated storage areas. » No water or soil contamination by spills. » Safe storage of hazardous chemicals.
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	<ul style="list-style-type: none"> » Proper waste management. » Provision of all appropriate waste manifests of all waste streams.
Monitoring	<ul style="list-style-type: none"> » 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.

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 V ₂ O ₅ and TiO ₂ . » 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 ASTM D1739 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	<ul style="list-style-type: none"> » 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	<ul style="list-style-type: none"> » The performance indicators listed above should be met during the operational phase by the responsible parties. » Any potential or actual issues that could result 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 ASTM D1739 standard method.

OBJECTIVE 2: Ensure the implementation of appropriate emergency response plans

Project Component/s	<ul style="list-style-type: none"> » Operation and maintenance of the facility and associated infrastructure. » Storage of dangerous substances (such as Diesel and LPG). »
Potential Impact	<ul style="list-style-type: none"> » Loss of containment of hazardous components at the proposed resulting in exposure to: <ul style="list-style-type: none"> • Thermal radiation from fires.
Activities/Risk Sources	<ul style="list-style-type: none"> » LPG installation. » Fuel Storage and Offloading.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » 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	<ul style="list-style-type: none"> » 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	<ul style="list-style-type: none"> » 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	<ul style="list-style-type: none"> » 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	<ul style="list-style-type: none"> » The opportunities and benefits associated with the creation of local employment and business should be maximised.
Activities/Risk Sources	<ul style="list-style-type: none"> » 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	<ul style="list-style-type: none"> » 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 from the local communities as possible.	Project proponent	Operation

Performance Indicator	<ul style="list-style-type: none"> » 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.
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	<ul style="list-style-type: none"> » 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	<ul style="list-style-type: none"> » 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	<ul style="list-style-type: none"> » Gas turbines. » Stacks. » Access roads. » Fuel offloading areas and storage tanks. » Associated infrastructure.
Potential Impact	<ul style="list-style-type: none"> » 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	<ul style="list-style-type: none"> » Substation, transformers, switchgear and supporting equipment. » Workshop / control room.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » 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	<ul style="list-style-type: none"> » 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	<ul style="list-style-type: none"> » 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	<ul style="list-style-type: none"> » 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	<ul style="list-style-type: none"> » Compliance with South African Labour Legislation relevant at the time. » Successful rehabilitation of the site. 	
Monitoring	<ul style="list-style-type: none"> » 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**