GENRAL WASTE DISPOSAL SITE AT THE ESKOM MAJUBA POWER STATION NEAR VOLKSRUST, MPUMALANGA PROVINCE

ENVIRONMENTAL MANAGEMENT PROGRAMME

DFFE Reference No.: 14/12/16/3/3/3/403

August 2022

Prepared for
Eskom Majuba Power Station
Farms Witkoppies 81 HS & Roodekopies 67 HS
Mpumalanga Province

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PROJECT DETAILS

DFFE Reference	:	14/12/16/3/3/3/403
Title	:	Environmental Impact Assessment Process Environmental Management Programme: General Waste Disposal Site at the Eskom Majuba Power Station near Volksrust, Mpumalanga Province
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Applicant	:	Eskom Majuba Power Station
Report Status	:	Environmental Management Programme as part of the Final Environmental Impact Assessment Report submitted for Authority Review and Decision-Making
Date	:	August 2022

Note: Changes made in this EMPr for submission have been underlined for ease of reference.

When used as a reference this report should be cited as: Savannah Environmental (2022). Environmental Management Programme: General Waste Disposal Site at the Eskom Majuba Power Station near Volksrust, Mpumalanga Province

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.

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*.

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1. PROJECT DETAILS

Eskom Majuba Power Station is proposing the development of a new general waste disposal site adjacent to their existing, closed landfill site at the Majuba Power Station, located approximately 13km southwest of Amersfoort and 40km north-northwest of Volksrust, within jurisdiction of the Dr Pixley Ka Isaka Seme Local Municipality, which forms part of the Gert Sibande District Municipality in the Mpumalanga Province (refer to **Figure 1.1**). Access to the site is possible via the N11, onto existing secondary roads that lead to the site.

A project site, with an extent of ~866ha has been identified by Eskom as a technically feasible site for the development of a new general waste disposal site. A development footprint of ~6ha has been identified within the project site by the proponent for the development. The 6ha will accommodate the actual landfill, together with the associated infrastructure that will be required for the operation of the site.

Infrastructure associated with the new general waste disposal site will include the following:

- Fencing with appropriate signage.
- An adequate access road (gravel or surfaced).
- An access control gate.
- A guard house with an ablution facility.
- A conservancy tank connected to the ablution facility.
- Covered parking facilities.
- A designated area for parking and servicing of plant and machinery.
- Sorting and storage facilities for recyclables.
- Adequate water and electricity connection from the existing rising mains.
- Stormwater drainage network and a stormwater evaporation pond for the stormwater entering the site through the waste body.
- A leachate management system and a leachate evaporation pond.

A summary of the details and dimension of the planned infrastructure associated with the proposed general waste disposal site is provided in **Table 1.1**.

Table 1.1: Details or infrastructures proposed as part of the general waste disposal site

Infrastructure	Footprint and dimensions
Capacity of landfill (all cells)	250 000m^3 Footprint: 30 525.7m^2 or 3ha
Leachate evaporation pond	Capacity: 100m^3 Footprint: 2 480m^2 or 0.248ha The leachate evaporation pond will be lined with a 200-micron HDPE liner and will be linked to the cells via a 250-diameter polyvinyl chloride (PVC) leachate drainage pipe.
Stormwater evaporation pond	Footprint: 1 085m^2 or 0.1085ha The stormwater evaporation pond will be lined with a 200-micron HDPE liner and will be linked to the cells via a 750-diameter polycarbonate (PC) stormwater pipe.

Infrastructure	Footprint and dimensions
	Stormwater from the stormwater evaporation pond will be drained out via a 450-diameter stormwater outlet pipe.
Fencing	Up to 3m high
Roads	» The site can be accessed via an existing gravel road. The access road will be resurfaced (either gravel or surfaced) depending on the cost. » A 6m ring road is proposed around and general about 1.5m above the sloping landfill platform.
Other infrastructure (guardhouse; parking facility; plant parking, maintenance and wash bay; sorting and storage facilities for recyclables)	Footprint: ~2.5ha

Two (2) alternative sites are being considered for establishment of the general waste disposal site, namely Alternative A, located on Portion 6 of the Farm Witkoppies 81HS and Alternative B, located on Portions 1 and 2 of the Farm Witkoppies 81HS. Both sites are contained within Eskom-owned land.

Table 1.2 provides a summary of the properties associated with the proposed project.

Table 1.2: Detailed description of the project site for the general waste disposal site

Province	**Mpumalanga Province**
District Municipality	Gert Sibande District Municipality
Local Municipality	Dr Pixley Ka Isaka Seme Local Municipality
Ward Number (s)	Ward 6
Nearest town(s)	Amersfoort (~13km south-west) and Volksrust (~40km north-northwest)
Affected Properties: Farm name(s), number(s) and portion numbers	Alternative A: Portion 6 of the Farm Witkoppies 81HS
	Alternative B: Portions 1 and 2 of the Farm Witkoppies 81HS
SG 21 Digit Code (s)	» Portion 1 of the Farm Witkoppies 81HS: TOHS0000000008100001 » Portion 2 of the Farm Witkoppies 81HS: TOHS0000000008100002 » Portion 6 of the Farm Witkoppies 81HS: TOHS0000000008100006
Current zoning	Industrial
Site Coordinates (centre of project site)	27°06'52.8"; S 29°46'20.7"E
Site Coordinates (corner points of project site)	Corner 1: 27° 6'4.34"S; 29°45'1.74"E Corner 2: 27° 6'7.62"S; 29°45'39.16"E Corner 3: 27° 6'4.05"S; 29°47'2.89"E Corner 4: 27° 6'12.40"S; 29°47'18.43"E Corner 5: 27° 7'12.12"S; 29°47'5.90"E Corner 6: 27° 7'32.55"S; 29°47'7.74"E Corner 7: 27° 7'41.35"S; 29°47'10.41"E Corner 8: 27° 7'45.04"S; 29°46'0.07"E Corner 9: 27° 7'40.92"S; 29°45'52.30"E Corner 10: 27° 7'11.47"S; 29°45'54.33"E Corner 11: 27° 6'30.29"S; 29°45'0.79"E
Alternative A Coordinates	Corner 1: 27° 7'3.96"S; 29°46'22.15"E Corner 2: 27° 7'3.85"S; 29°46'32.05"E Corner 3: 27° 7'10.55"S; 29°46'32.09"E Corner 4: 27° 7'10.52"S; 29°46'21.93"E
Alternative B Coordinates	Corner 1: 27° 7'16.70"S; 29°46'12.22"E

	Corner 2: 27° 7'12.67"S; 29°46'24.12"E Corner 3: 27° 7'18.92"S; 29°46'25.99"E Corner 4: 27° 7'23.99"S; 29°46'15.59"E

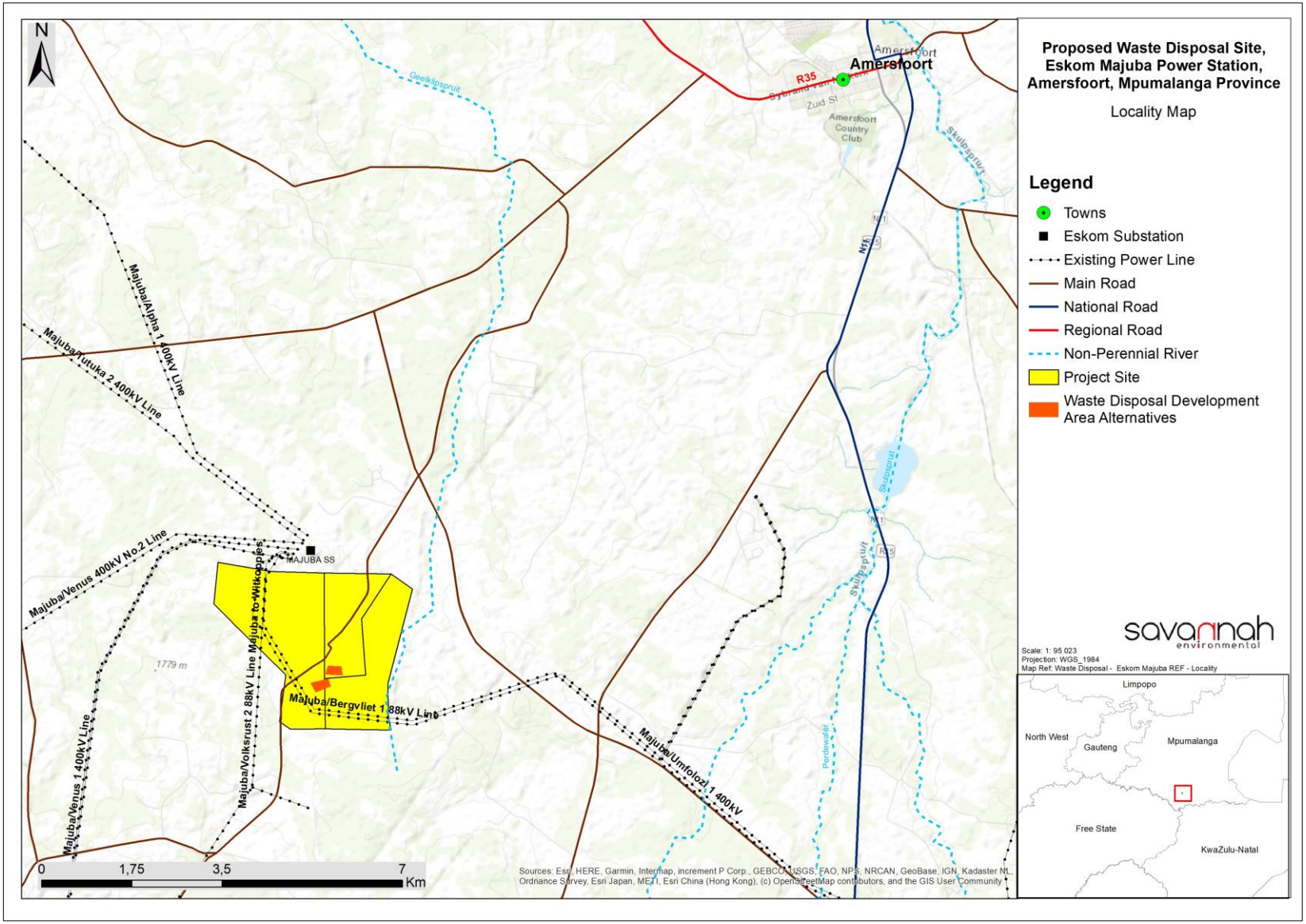

Figure 1.1: Locality map showing the development footprint alternatives proposed for the establishment of the general waste disposal site

A preliminary plan and design for the new general waste disposal site has been prepared in accordance with the Norms and Standards for Disposal of Waste to Landfill (GG3678. GN R.636 of 23 August 2013) and the Minimum Requirements for Waste Disposal by Landfill (DWAF, 1998 2nd Edition) (refer to **Figure 1.2**). As per the preliminary plan and design (**Figure 1.2**), the new general waste disposal site will comprise four (4) cells, namely, Cell C1, Cell C2, Cell C3, and Cell C4, with Cell C4 further divided into three sub-cells, namely Cell C4a, Cell C4b and Cell C4c. Cells C1 to C4 will have a combined estimated capacity of 250 000m^3 and will be landfilled in sequence and separated from unfilled areas by temporary internal berms that will be removed for reuse of the soil fill as landfilling is extended to cover the locations of the temporary internal berms.

The cells will be linked to a leachate evaporation pond via a 250-diameter polyvinyl chloride (PVC) leachate drainage pipe which will be utilised for the storage of leachate. The gate valve along this pipe will only be opened to allow the release of leachate into the leachate evaporation pond once waste placement has commenced in Cell C4c. The valve might also be temporarily opened at earlier stages if necessary to allow excess leachate on the Landfilling Platform to drain to the leachate evaporation pond to take advantage of its additional evaporation area to avoid the necessity to tanker leachate off site. The leachate collection pond will have a capacity of approximately 100m^3 and will be lined with a 200-micron HDPE liner. The leachate pond will have adequate freeboard (to be determined based on the 1:100-year flood event rainfall figure) to ensure that it does not overflow during high rainfall events. A borehole will be established downslope of the leachate pond for groundwater contamination monitoring purposes. The leachate evaporation pond will have no outlet and therefore, leachate will be disposed of therefrom by evaporation or tankered off site.

The cells will also be linked to a stormwater attenuation pond via a 750-diameter polycarbonate (PC) stormwater pipe, the purpose of which will be to slow the flow of water to prevent downstream flooding and erosion. Potentially contaminated stormwater runoff from uncapped portions of the waste body and the ring road will be retained on the Landfill Platform to evaporate as for leachate. Concentrated, uncontaminated runoff from capped portions of the waste body will drain into the stormwater attenuation pond during and shortly after rain and thereafter through the outlet or over the emergency spillway to the adjacent existing road drain. In the absence of rainfall, the stormwater attenuation pond will remain empty. The rate of discharge will be limited by the relatively small diameter (450mm) of the outlet pipe from the pond, plus by temporary storage of excess volume therein. As with the leachate pond, the stormwater attenuation pond will be lined with a 200-micron HDPE liner.

Since the proposed general waste disposal site has been preliminarily classified as a Class B Landfill in accordance with the National Norms and Standards for Disposal of Waste to Landfill (GG3678. GN R.636 of 23 August 2013), the facility will require stricter lining criteria. **Figure 1.3** below indicates the containment barrier engineering design requirements for a Class B Landfill. This liner requirement will be used in the design due to the proximity of the site to sensitive environmental features such as wetlands. Procurement of sufficient volumes of readily accessible clay that exhibits the necessary grading and low permeability properties required for the Compacted Clay Layer specified in **Figure 1.3** may be difficult or impractical close to the site. Geosynthetic Clay Liner[1] is consequently proposed as a permissible alternative. The necessary, impervious containment barrier will be placed over the entire Landfilling Platform at the outset before any waste placement commences.

[1] Geosynthetic Clay Liner comprises a thin layer (a few millimetres thick) of dehydrated bentonite clay in powder form sandwiched between 2 sheets of synthetic, polyethylene geotextile, needle-punched to bind the opposing sheets together. Such Geosynthetic Clay Liner is rendered watertight when the bentonite clay becomes hydrated by contact with water.

Leachate that potentially leaks (if any) through the containment barrier will drain within the under-drainage layer down to the inlets of pipes under the low points of each cell and become evident where it discharges through the various leak detection walls.

Landfilling is proposed to be carried out in six (6) phases so as to provide, during each phase:

- 6m wide ramps up the side of the waste body in Cells C1 and C2 that are not steeper than 1:6 to allow delivery of waste to the envisaged top thereof, which requires that Cells C1 and C2 cover the full width of the Landfilling Platform.
- Sufficiently wide surface areas for storage and effective evaporation of leachate on the lower, eastern part of the Landfilling Platform, such that the area of exposed uncapped waste is never more than 1.45x such available evaporation area.
- Adequate storage volume, also on the lower portion of the Landfilling Platform, to accommodate excess leachate during periods of greater rainfall and/or reduced evaporation.

It will be necessary after completion of Phase 4 to place an intermediate capping over the partial waste filling over Cells C3 and Cell C4a before proceeding to place waste over Cell C4b. Similarly, it will be necessary to subsequently place such intermediate capping over the partially filled Cell C4b before waste is placed in Cell C4c while leachate is released to and evaporated from the leachate evaporation pond. Requirements for either intermediate and/or final capping over the waste body are not stipulated in the National Norms and Standards for Disposal of Waste to Landfill published in 2013. Reference may however be made to the earlier Minimum Requirements for Waste Disposal by Landfill published in 2005, which recommend **Figure 1.4** below as appropriate final capping for G:S:B+ or G:C:B+ landfills, as it is taken to be applicable to the proposed new general waste disposal site.

The respective purposes of the layers stipulated in **Figure 1.4** are:

- Topsoil – growth of vegetation
- Compacted clay layer – to limit infiltration and the consequent generation of leachate.
- Geotextile – to avoid internal erosion of the capping soil down into the waste.

Procurement of sufficient volumes of readily accessible clay that exhibits the necessary grading and low permeability properties required for the Compacted Clay Layer specified in **Figure 1.4** may again be difficult or impractical close to the site. Geosynthetic Clay Liner is again consequently proposed as a permissible alternative as it can substitute for both the clay layer and the geotextiles as it can serve both purposes.

The general waste disposal site will also have recyclable waste unload and sort binds, recyclable waste sort and reload bins, an office, guardhouse, carports and a plant parking, maintenance and wash bay (refer to **Figure 1.2**).

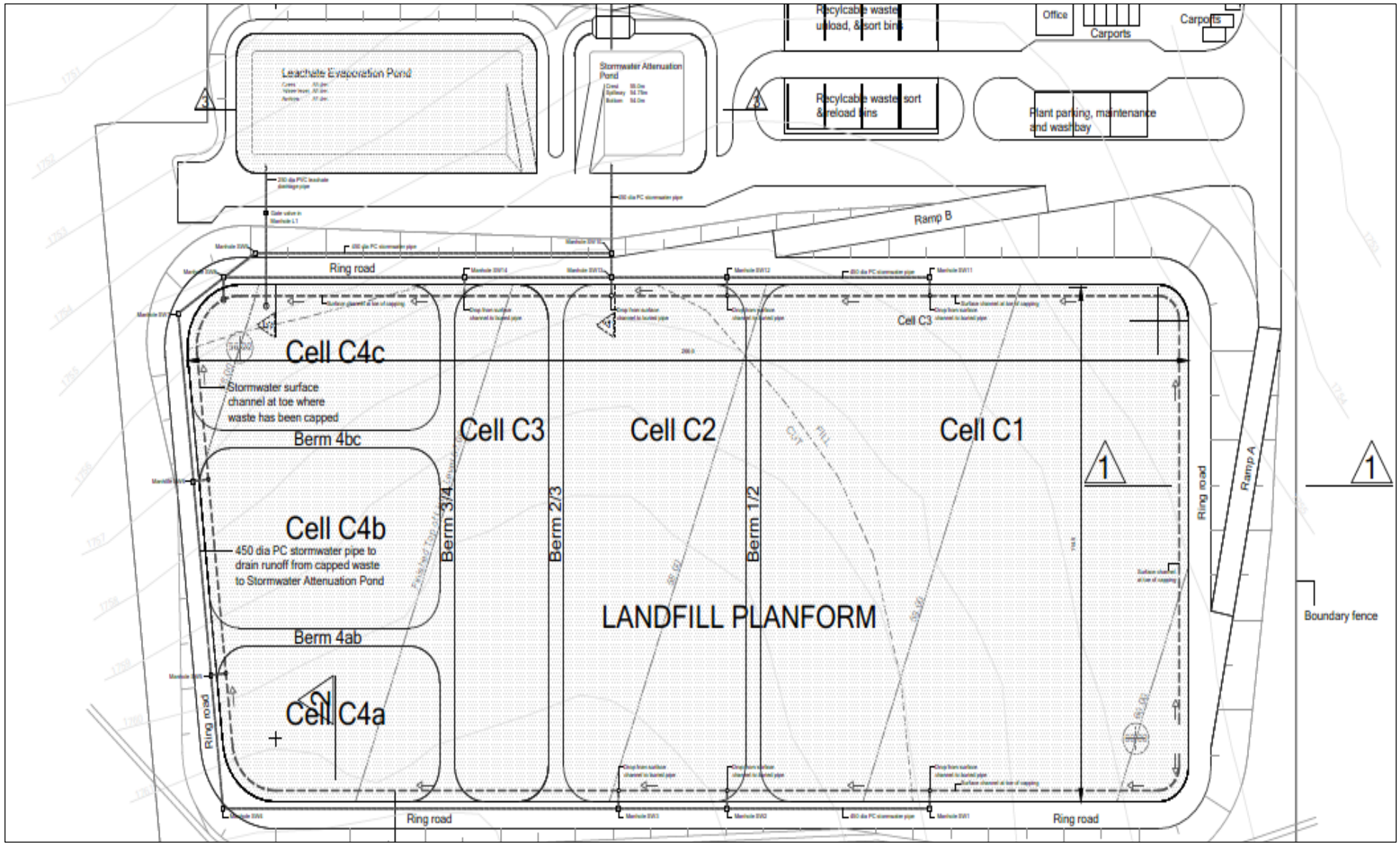

Figure 1.2: Preliminary layout for the proposed new general waste disposal site

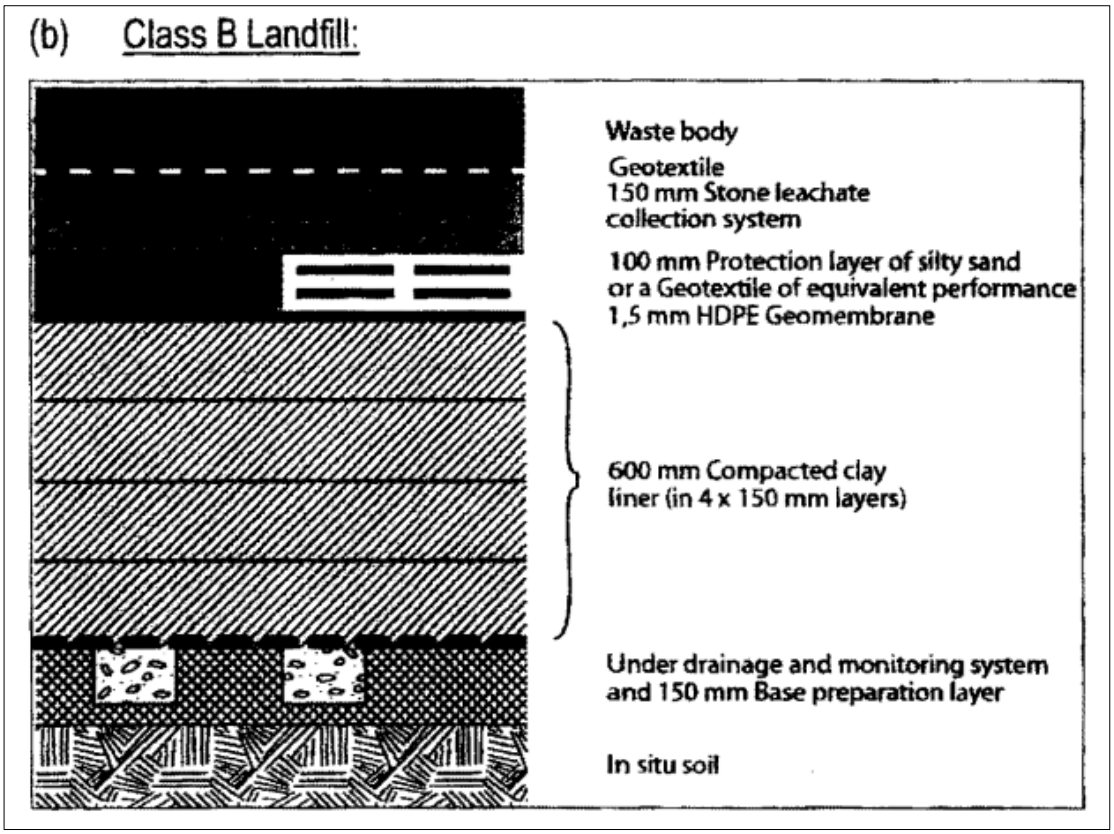

Figure 1.3: Liner requirements for a Class B Landfill site

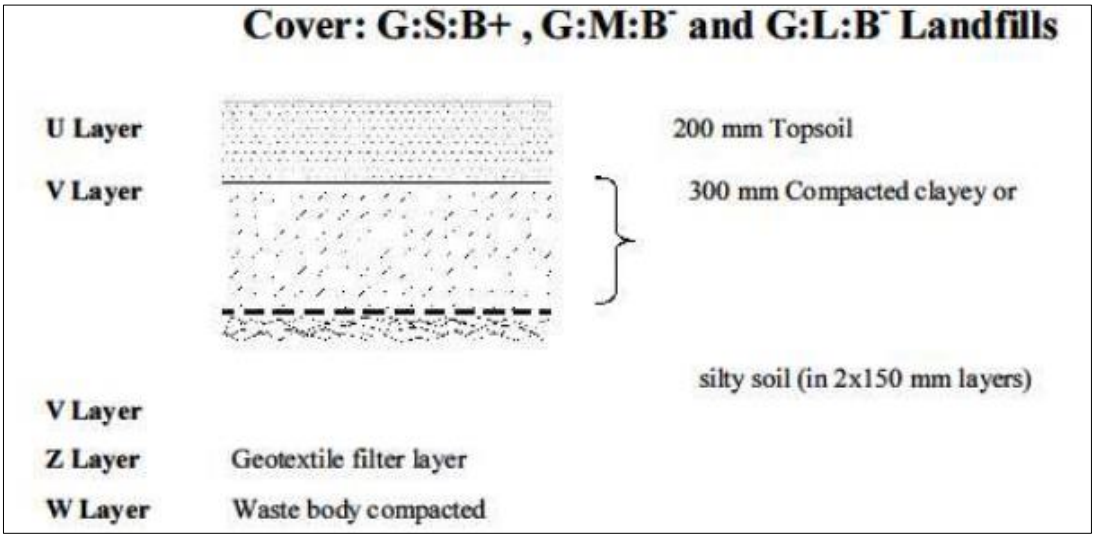

Figure 1.4: Appropriate final capping for G:S:B+ landfills

2. FINDINGS OF THE ENVIRONMENTAL IMPACT ASSESSMENT (EIA)

2.1. Impacts Identified and Assessed through the EIA Process

An Environmental Impact Assessment (EIA) was undertaken for the proposed project in accordance with the requirements of the EIA Regulations, 2014 (as amended). The EIA Report, together with the specialist studies contained within **Appendices D-K** of the EIA Report, provide a detailed assessment of the potential impacts that may result from the development of the general waste disposal site.

No environmental fatal flaws were identified in the detailed specialist assessments conducted subject to implementation of the recommended mitigation measures. Implementation of the recommended mitigation measures would reduce impacts to acceptable levels. The potential environmental impacts associated with the general waste disposal site identified and assessed through the EIA process include:

- Impacts on terrestrial biodiversity (including flora and fauna).
- Impacts on delineated wetlands and aquatic biodiversity.
- Impacts on groundwater resources.
- Impacts on heritage resources.
- Impacts on palaeontological heritage.
- Impacts on air quality.

The environmental sensitivities identified by the relevant specialists for the development footprint alternatives are illustrated in **Figure 2.1**. The development footprint alternatives, as assessed, have been overlain with the relevant environmental sensitivities.

2.1.1 Impacts on Terrestrial Biodiversity (including flora and fauna)

The project site within which the development footprint for the general waste disposal site and associated infrastructure will be located is mapped as falling within the Amersfoort Highveld Clay Grassland, which is considered Vulnerable, but is not listed as a Threatened Ecosystem according to Notice 1002 of Government Gazette 34809, 9 December 2011.

The DFFE Environmental Screening Tool indicates that the development footprint alternatives have a High Animal Theme, Medium Plant Theme and Very High Terrestrial Biodiversity Theme. The main drivers of these assessments are several potentially occurring threatened and near threatened (NT) plant and animal species as well as the area being assessed as Critical Biodiversity Area (CBA): Irreplaceable in the Mpumalanga Biodiversity Sector Plan (MBSP). However, due to the high disturbance levels and degraded habitats, very few threatened and NT plant and animal species are likely to occur. The macro-scale assessment of the conservation importance of natural vegetation in Mpumalanga does not allow for small discrepancies where vegetation is disturbed or degraded, such as is present within the development footprint alternatives. A re-assessment, using a finer scale, may well result in a revision of the CBA assessment. However, a greater portion of Alternative A falls outside this classification and within Heavily or Moderately Modified areas and is the more ecologically compromised site of the two.

Two vegetation communities were identified within the development footprint alternatives, namely Short Grassland, which dominates Alternative B, and Secondary Grassland, which dominates Alternative A. The Site

Ecological Importance for Short Grassland is Medium, while that of Secondary Grassland is Low. Clearing for construction of the landfill will result in the destruction of 6ha of historically disturbed natural vegetation.

The proposed general waste disposal site will have impacts of medium to low significance on terrestrial biodiversity. All impacts can be reduced to low significance following the implementation of mitigation measures. Provided the recommendations suggested in the Terrestrial Biodiversity Impact Assessment are followed, and the developer complies with all relevant legislation pertaining to the development activities (such as the National Environmental Management Act (NEMA) and National Environmental Management: Biodiversity Act (NEMBA),) there is no objection to the proposed development from an ecological perspective. Alternative A is preferred, while Alternative B is considered acceptable.

2.1.2 Impacts on Delineated Wetlands and Aquatic Biodiversity

Numerous hillslope seepage wetlands, which cover ~17% of the 500m study boundary, were identified, with areas of seasonal and permanent saturation. The closest seasonal wetlands are some 80 m from the nearest proposed landfill, while the closest permanent wetland is some 320 m from the nearest proposed landfill. A 30m buffer has been recommended around these wetland features. The aim of the buffer zone is to maintain the ecological integrity and functioning of the seepage wetlands by minimising indirect impacts that could be associated with the proposed landfill. There are no aquatic habitats within the two proposed footprint areas, so the proposed development will have no direct impacts on aquatic biodiversity.

The two proposed development options will have no direct impacts on aquatic ecosystems and as such, there was no justification for a management plan for alien invasive vegetation with respect to aquatic ecosystems. An alien invasive management plan is included in the Specialist Report on Terrestrial Biodiversity. There was also no justification for a wetland offset as the two proposed development options will have no direct impacts on aquatic ecosystems. Furthermore, potential indirect impacts can be managed, and the two proposed development options are unlikely to have measurable impacts on aquatic ecosystems.

The proposed general waste disposal site will have impacts of medium to low significance on freshwater resources. All impacts, with the exception of impacts on water quality due to seepage and stormwater runoff from the landfill, can be reduced to low significance following the implementation of mitigation measures. There is no preference in terms of alternatives considered. Authorisation of either of the two proposed waste disposal site alternatives in terms of risks to aquatic biodiversity is recommended.

2.1.3 Impacts on Groundwater Resources

The water quality of the nine (9) sampling points scattered around the site are, with the exception of one data point (i.e., BH2), currently indicative of an unpolluted water regime.

The landfill site is characterised by an aquifer of low significance and can only be used for monitoring purposes, confirming the fact that the site is not located in an area characterised by aquifers with a potentially strategic value. Furthermore, the surrounding area is seemingly devoid of groundwater boreholes and stock watering is not an issue as there is sufficient surface sources available.

The proposed general waste disposal site will have impacts of medium to low significance on groundwater resources. All impacts can be reduced to low significance following the implementation of mitigation measures. Alternative A is preferred while Alternative B is considered to be fatally flawed from a groundwater perspective; reason being Alternative B intersects the spring line and is partially stripped of cover soils required

for interlayering and capping and as such, pollution of groundwater sources is highly probable over the long term on this site. Given the potential hydrogeological impacts, the development of Alternative A can only be viable if the mitigation measures are implemented and adhered to. Groundwater monitoring is imperative and necessary in order to detect groundwater contamination before impacting nearby receptors. From a groundwater perspective, it is the specialist's opinion that the project can be authorised for Alternative A, provided the recommended mitigation measures are implemented and adhered to.

2.1.4 Impacts on Heritage Resources

A field survey was conducted on 03 April 2018 according to generally accepted archaeological practices, and was aimed at locating possible sites, objects, and structures of archaeological significance within the project site and development footprint. The field survey identified no sites, features or objects of archaeological significance within the project site and development footprint alternatives dating to the Stone Age, Iron Age and Historic Period.

As no sites, features or objects of cultural historic significance have been identified in the project area, there would be no impact as a result of the proposed development regardless of the development footprint alternative selected. From a heritage point of view, it is recommended that the proposed project be allowed to continue on acceptance of the conditions proposed for inclusion in the project's EMPr.

2.1.5 Impacts on Palaeontological Heritage

The proposed development footprint alternatives are primarily underlain by Jurassic dolerite while surrounding areas are underlain by potentially fossiliferous sedimentary rocks of the Early Permian Volksrust Formation (Ecca Group, Karoo Supergroup). However, recent Shape files updates (Council for Geosciences, Pretoria) indicate that the proposed waste disposal site is entirely underlain by the Volksrust Formation (Ecca Group, Karoo Supergroup). According to the PalaeoMap on the South African Heritage Resources Information System (SAHRIS) database, the palaeontological sensitivity of Jurassic dolerite is zero as it is igneous in origin and does not contain fossils while that of the Volksrust Formation is High.

Numerous impact assessments of the area have been conducted over the years with several site investigations - no fossils heritage was uncovered on the Majuba footprint. Although fossil heritage in this area is uncommon, fossil finds would be significant if found.

The proposed general waste disposal site will have an impact of medium significance on fossil heritage which can be reduced to low significance following the implementation of mitigation measures. As the geology and palaeontology of the proposed development footprint alternatives is similar, there would be no preferences on the grounds of palaeontological fossil heritage for any specific alternative under consideration. An overall low palaeontological sensitivity is allocated to the development footprint. It is therefore considered that the proposed development is deemed appropriate and will not lead to detrimental impacts on the palaeontological reserves of the area.

2.1.6 Impacts on Air Quality

The Air Quality Impact Assessment assessed baseline meteorological and ambient air quality data from the Eskom Majuba Air Quality Monitoring Station, located approximately 2.5km east-northeast of the proposed general waste disposal site for the period January 2016 to December 2019.

The operation of the waste disposal site will result in the emission of landfill gas. Landfill gas emissions from the general waste disposal site gradually increase to reach a maximum during the operation of the last cell, when the maximum amount of waste is in place, whereafter it gradually decreases after closure of the landfill. During operation of the last cell when emissions are at a maximum, an estimated 6 m³/hr of landfill gas will be generated.

Decomposition of the compacted waste continues after the landfill is closed and capped, but since no more waste is deposited, the decomposable material becomes gradually less and less, resulting in a gradual decrease in the amount of landfill gas generated. Therefore, the maximum landfill gas generation (and emission) rate occurs just as, or very soon after, the maximum amount of waste is in place.

While landfill gas generation gradually decreases as the decomposable material is depleted, the "tail" of the LFG generation is quite long, with landfill gas generation only nearing zero after about 100 years. This has been annotated in the graph below.

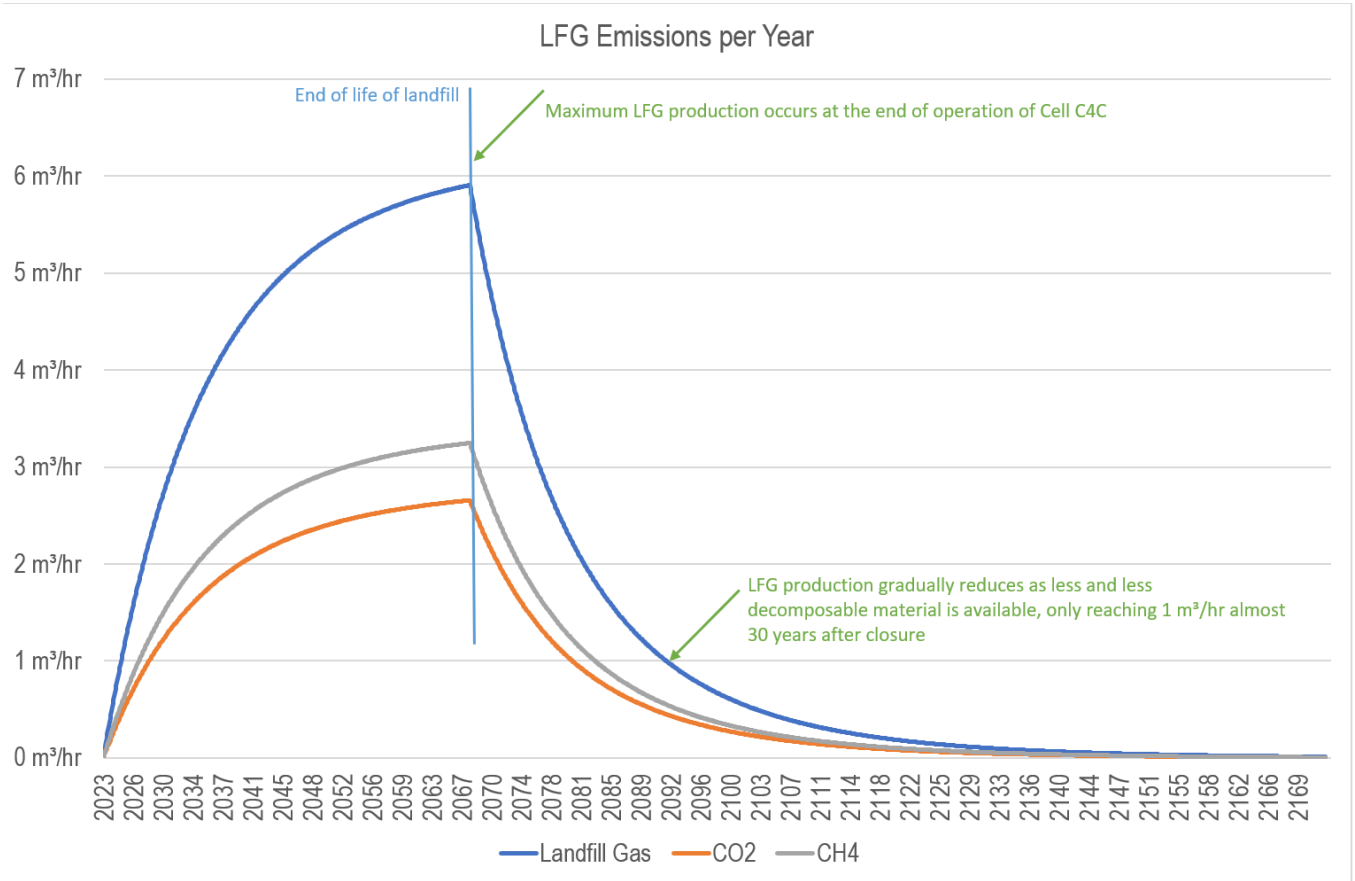

Figure 2.1: Estimated landfill gas emission rate

In terms of greenhouse gas emissions, over its lifetime, the general waste disposal site is estimated to result in a lifetime total of 2 030 tonnes of CO_2 and 740 tonnes of CH_4 emissions. Annual greenhouse gas emissions are expected to reach a maximum during the operation of the last cell. The maximum annual greenhouse gas emissions were estimated at 42.7 tonnes of CO_2/annum and 15.6 tonnes of CH_4 per annum.

From an air quality perspective, there is no need to mitigate or measure post-closure methane emissions, as emissions and their resultant impacts will be insignificant (with the exception of greenhouse gas impacts,

which could be more significant). The landfill designers will need to stipulate if there are any management / monitoring measures to prevent methane build-up which could lead to fires or explosions.

Simulated PM_{10}, $PM_{2.5}$ and benzene concentrations are in compliance with the SA National Ambient Air Quality Standards (NAAQS) for all areas outside the landfill site, and negligible for all areas outside the property boundary and at all sensitive receptor locations. Simulated dust fallout rates due to the operation of the general waste disposal site are below the SA National Dust Control Regulation (NDCR) limits for all areas outside the landfill site, and negligible at all areas outside the property boundary, including at all sensitive receptor locations.

The combined hazard index for all non-carcinogenic pollutant emissions from the general waste disposal site is below 0.1 for all areas outside the landfill site for all pollutants considered. The simulated cancer risk for all areas outside the property boundary, including at all sensitive receptor location, is negligible (less than 1:1 000 000 000 or one in a billion increased risk). Simulated concentrations of all odorous compounds considered were below 10% of the odour detection threshold for all areas, including within the landfill site.

The proposed general waste disposal site has a simulated low impact on air quality, including health impacts, cancer risk and odour impacts at all areas outside the landfill site, with a negligible impact at all identified sensitive receptor locations. There is no preference in terms of alternative considered. From an air quality perspective, it is the opinion of the specialist that the project be authorised subject to implementation of the specified recommendations.

2.1.7 Assessment of Cumulative Impacts

Cumulative impacts are expected to occur with the development of the general waste disposal site during 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 general waste disposal site in combination with other similar land uses within the area. The significance of the cumulative impacts associated with the development of the landfill is expected to be low. There are no impacts or risks identified to be considered as unacceptable with the development of the general waste disposal site 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 a desirable location for the proposed project, provided that environmental impacts are mitigated to suitable standards as recommended within this EIA Report.

2.1.8 Comparative Assessment of the Development Footprint Alternatives

This assessment considered the development of a general waste disposal site at the Eskom Majuba Power Station. Two (2) alternative sites are being considered for establishment of the general waste disposal site, namely Alternative A, located on Portion 6 of the Farm Witkoppies 81HS and Alternative B, located on Portions 1 and 2 of the Farm Witkoppies 81HS.

From the specialist studies undertaken, the following conclusions were made regarding the development footprint alternatives:

Specialist Study	Alternative A	Alternative B
Terrestrial Biodiversity	Preferred	Acceptable
Aquatic Biodiversity	Acceptable	Acceptable
Geohydrology	Preferred	Fatally Flawed
Heritage	Acceptable	Acceptable
Palaeontology	Acceptable	Acceptable
Air Quality	Acceptable	Acceptable

From the above summary of the specialist findings, it was determined that Alternative A is the preferred option from a terrestrial biodiversity and groundwater perspective as it is dominated by Secondary Grassland, which is regarded to be of Low Site Ecological Importance, while Alternative B is dominated by Short Grassland, which is regarded to be of Medium Site Ecological Importance and also because the uppermost spring-line is some 9m below the crest of Alternative A and the 3m deep excavation for the landfill is sufficiently shallow to prevent interference with the phreatic line. Alternative A also has sufficient interlayer and capping material available on site and mitigation measures will reduce risk of contamination between low and medium for Alternative A.

Alternative B is considered acceptable from an aquatic biodiversity, heritage, palaeontology and air quality perspective and is fatally flawed from a groundwater perspective. Both alternatives are acceptable from an aquatic, heritage, palaeontology and air quality perspective. This is because Alternative B intersects the spring line and is partially stripped of cover soils required for interlayering and capping and as such, pollution of groundwater sources is highly probable over the long term on this site.

Considering the above findings, it can be concluded that Alternative A can be considered for implementation as it is not regarded as fatally flawed based on the specialist findings.

2.2. Environmental Sensitivity Mapping

The development footprint alternatives are located within two untransformed vegetation communities, namely, *Aristida congesta – Heteropogon contortus* Short Grassland and *Hyparrhenia hirta* Secondary Grassland. The Site Ecological Importance for Short Grassland is Medium, while that of Secondary Grassland is Low. Sensitive features in the form of permanent and seasonal wetlands were identified within the 500m regulated area of the development footprint alternatives. None of these wetlands encroach into the development footprint alternatives (refer to **Figure 2.2**). The closest seasonal wetlands are some 80m from the nearest proposed landfill, while the closest permanent wetland is some 320m from the nearest proposed landfill. A 30m buffer no-go has been recommended around these wetland features. The aim of the buffer zone is to maintain the ecological integrity and functioning of the seepage wetlands by minimising indirect impacts that could be associated with the proposed landfill. Both alternatives are located outside of this buffer.

Alternative A is situated within an area classified as Heavily or Moderately Modified and a CBA: Irreplaceable by the MBSP. Alternative B is mostly situated within an area classified as CBA: Irreplaceable by the MBSP, with the eastern section of the site being situated within an area classified as Heavily or Moderately Modified. There are no sites, features or objects of archaeological significance within the project site and development

footprint alternatives dating to the Stone Age, Iron Age and Historic Period. The palaeontological sensitivity of the project site ranges from insignificant to high.

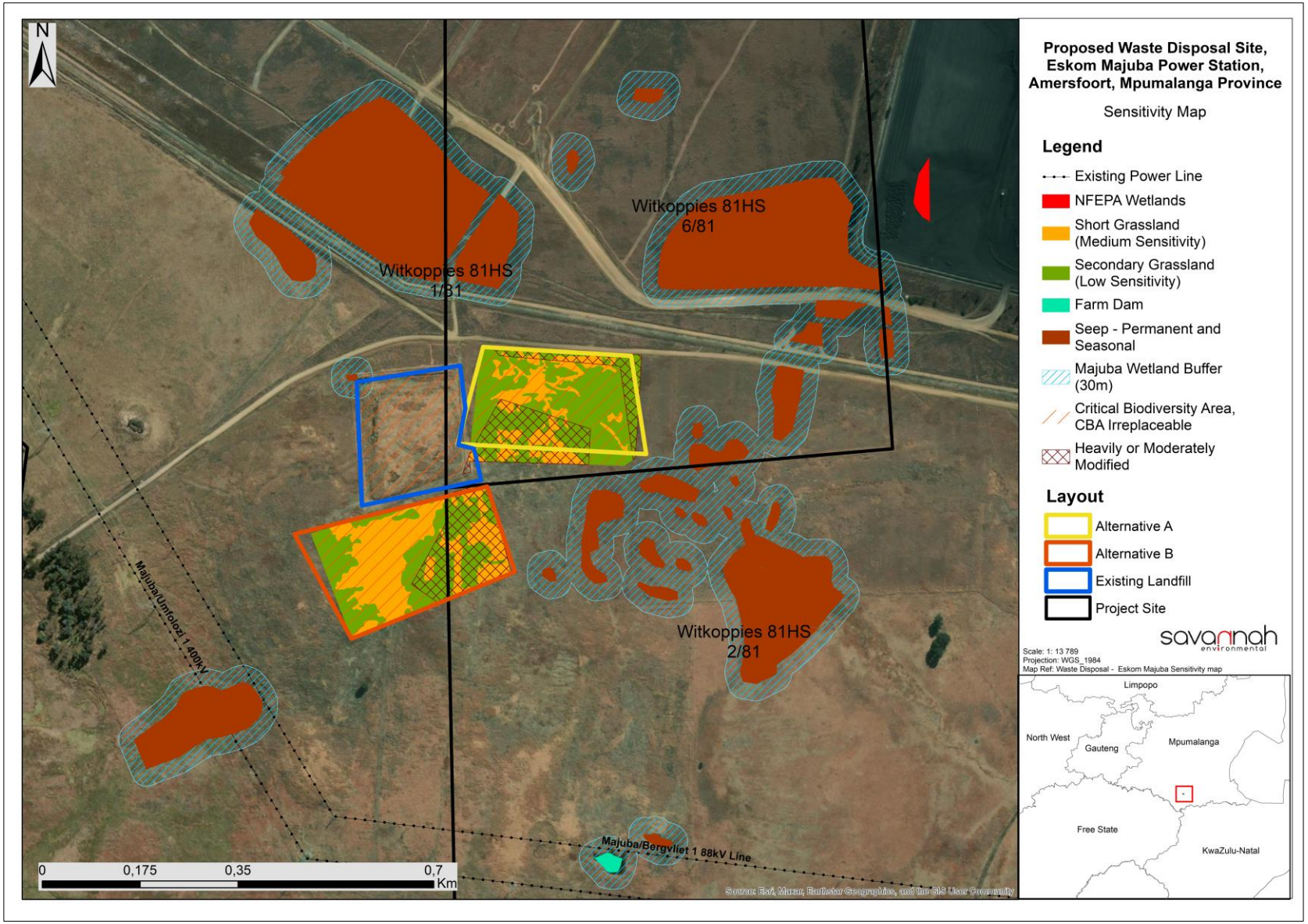

Figure 2.2: The project site and development footprint alternatives overlain by the identified environmental sensitivities.

2.3. Overall Conclusion (Impact Statement)

The construction and operation of the general waste disposal site on a site located approximately 13km southwest of Amersfoort and 40km north-northwest of Volksrust, within jurisdiction of the Dr Pixley Ka Isaka Seme Local Municipality, which forms part of the Gert Sibande District Municipality in the Mpumalanga Province is proposed by Eskom Majuba Power Station.

Two (2) alternative sites are being considered for establishment of the general waste disposal site, namely Alternative A, located on Portion 6 of the Farm Witkoppies 81HS and Alternative B, located on Portions 1 and 2 of the Farm Witkoppies 81HS. The development footprint alternatives were assessed as part of the EIA process by independent specialists, and their findings have informed the results of this EIA Report.

Through a review of relevant policy and planning documentation, it was concluded that the proposed project is aligned with the local and provincial developmental policies and spatial frameworks.

The developer has proposed a technically viable and suitable layout for the project and associated infrastructure. The specialist findings have indicated that there are no identified environmental fatal flaws associated with the development of the general waste disposal site at either site considered. Sensitive features in the form of permanent and seasonal wetlands were identified within the 500m regulated area of the development footprint alternatives; however, none of these wetlands encroach into the development footprint alternatives. A 30m no-go buffer has been recommended around these wetland features to maintain the ecological integrity and functioning of the seepage wetlands by minimising indirect impacts that could be associated with the proposed landfill. Both alternatives are located outside of this buffer.

From the results of the specialist studies undertaken, it can be concluded that all impacts associated with the project can be mitigated to acceptable levels through implementation of the recommended mitigation measures. The layout map (including all associated infrastructure) provided in this EIA Report (**Figure 1.2**) is considered to be the preferred layout of the general waste disposal site for implementation.

Through the assessment of the development of the general waste disposal site within the development footprint alternatives, it can be concluded that the development of the waste disposal site is environmentally acceptable subject to the implementation of the recommended mitigation measures.

Based on the comparative assessment undertaken, it was determined that Alternative A is the preferred option from a terrestrial biodiversity and groundwater perspective as it is dominated by Secondary Grassland, which is regarded to be of Low Site Ecological Importance, while Alternative B is dominated by Short Grassland, which is regarded to be of Medium Site Ecological Importance and also because the uppermost spring-line is some 9m below the crest of Alternative A and the 3m deep excavation for the landfill is sufficiently shallow to prevent interference with the phreatic line. Alternative A also has sufficient interlayer and capping material available on site and mitigation measures will reduce risk of contamination between low and medium for Alternative A.

Alternative B is considered acceptable from an aquatic biodiversity, heritage, palaeontology and air quality perspective and is fatally flawed from a groundwater perspective. Both alternatives are acceptable from an aquatic, heritage, palaeontology and air quality perspective. This is because Alternative B intersects the spring line and is partially stripped of cover soils required for interlayering and capping and as such, pollution of groundwater sources is highly probable over the long term on this site.

Considering the above findings, it can be concluded that Alternative A can be considered for implementation as it is not regarded as fatally flawed based on the specialist findings.

2.4. Overall Recommendation

Considering the findings of the independent specialist studies, the impacts identified, and the development footprint alternatives proposed, it is the reasoned opinion of the EAP that the development of the general waste disposal site is acceptable within the landscape and can reasonably be authorised for Alternative A (**Figure 1.2**). The recommended validity period of the integrated EA is 10 years.

The authorisation should include the approval of the layout reflected in **Figure 1.2**, and described in the engineering design report (refer to **Appendix K** of the EIA Report) which includes the following main infrastructure:

- Fencing with appropriate signage.
- An adequate access road (gravel or surfaced).
- An access control gate.
- A guard house with an ablution facility.
- A conservancy tank connected to the ablution facility.
- Covered parking facilities.
- A designated area for parking and servicing of plant and machinery.
- Sorting and storage facilities for recyclables.
- Adequate water and electricity connection from the existing rising mains.
- Stormwater drainage network and a stormwater evaporation pond for the stormwater entering the site through the waste body.
- A leachate management system and a leachate evaporation pond.

The key conditions required to be included within an authorisation issued for the proposed general waste disposal site are listed in Chapter 7 of the EIA Report.

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 project 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 (soil stabilisation, re-vegetation) 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 phases of the general waste disposal site. 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, and operation 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 this EMPr, ensuring the minimisation of adverse environmental impacts to an acceptable level.

Eskom Majuba Power Station 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; and
» Operation 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.: » General waste disposal site. » Fencing with appropriate signage. » An adequate access road (gravel or surfaced). » An access control gate. » A guard house with an ablution facility. » A conservancy tank connected to the ablution facility. » Covered parking facilities. » A designated area for parking and servicing of plant and machinery. » Sorting and storage facilities for recyclables. » Adequate water and electricity connection from the existing rising mains. » Stormwater drainage network and a stormwater evaporation pond for the stormwater entering the site through the waste body. » A leachate management system and a leachate evaporation pond.
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 an Integrated Environmental Authorisation (EA) and Waste Management License (WML) for the general waste disposal site. 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 17 February 2022. It provides recommended management and mitigation measures with which to minimise impacts and enhance benefits associated with the project.

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

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

Requirement	Location in this EMPr
(1) An EMPr must comply with section 24N of the Act and include – (a) Details of – (i) The EAP who prepared the EMPr. (ii) The expertise of that EAP to prepare an EMPr, including a curriculum vitae.	Section 4.2.1 Appendix A
(b) A detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description.	Chapter 1

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

An overview of the contents of this EMPr, as prescribed by DFFE's Acceptance of the Scoping Report dated 17 February 2022, 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
(v) A construction and operational phase EMPr that includes mitigation and monitoring measures must be submitted with the final EIAr.	This construction and operational phase EMPr that includes mitigation and monitoring measures as recommended in the EIA process for the project has been included as Appendix N to the EIAr. The EMPr will be updated as relevant following the 30-day draft EIAr comment and review period, and 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 as the independent environmental consultant responsible for managing the Integrated Application for EA and WML and the supporting EIA process. The Integrated Application for EA and WML and the EIA process, are 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:** the principal author of this EMPr, holds a B.Sc. Honours in Geochemistry from the University of the Witwatersrand and 4 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 Professional Natural Scientist with the South African Council for Natural Scientific Professions (SACNASP), Registration Number: 126748 and an Environmental Assessment Practitioner with the Environmental Assessment Practitioners Association of South Africa, Number 2019/260.

» **Jo-Anne Thomas:** the principal EAP on this project, is a registered EAP with the Environmental Assessment Practitioners Association of South Africa (EAPASA – 2019/726) and a Registered Natural Scientist with

SACNASP (Registration number: 400024/00). She holds an M.Sc. in Botany from the University of the Witwatersrand. She provides technical input for projects in the environmental management field, specialising in Strategic Environmental Advice, Environmental Impact Assessment studies, environmental auditing and monitoring, environmental permitting, public participation, Environmental Management Plans and Programmes, environmental policy, strategy and guideline formulation, and integrated environmental management. Her key focus is on integration of the specialist environmental studies and findings into larger engineering-based projects, strategic assessment, and providing practical and achievable environmental management solutions and mitigation measures. Responsibilities for environmental studies include project management (including client and authority liaison and management of specialist teams); review and manipulation of data; identification and assessment of potential negative environmental impacts and benefits; review of specialist studies; and the identification of mitigation measures.

Curricula Vitae (CVs) detailing the Savannah Environmental team's expertise and relevant experience are provided in **Appendix A** 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

Specialist	Area of Expertise
Duncan McKenzie of Digital Earth (Pty) Ltd	Terrestrial Ecology (including flora and fauna)
Robert Palmer of Nepid Consultants CC	Wetlands
JA van Schalkwyk	Heritage (including archaeology)
Elize Butler of Banzai Environmental	Palaeontology
Nick Grobler of Airshed Planning Consultants	Air Quality
Paul Hansmeyer of Engeolab (Pty) Ltd	Geohydrology
Clive Wilson of WSM Group	Engineering Design

CVs detailing the independent specialist consultant's expertise and relevant experience are included in their respective specialist reports which are attached as **Appendix D-K** to 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;
» Facility (waste disposal site) 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 integrated EA (once issued), the requirements of all other relevant environmental permits and the specifications of the EMPr during all phases of the project.

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 integrated EA (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 integrated EA. The ECO will only be responsible for overseeing the site establishment activities.

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 conditions of the integrated EA and that environmental impacts are kept to a minimum during site establishment;
- Be fully knowledgeable of the contents of the EIA;
- Be fully knowledgeable of the contents of the integrated 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 integrated 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 integrated EA (once issued), 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 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, 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 EO will only be responsible for overseeing the day-to-day on-site implementation of this EMPr during site establishment.

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:

- Facility (waste disposal site) Manager; and
- Waste Management Officer

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) Facility (waste disposal site) Manager

The Facility (waste disposal site) Manager will:

» Ensure that adequate resources (human, financial, etc.) 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) Waste Management Officer

The Waste Management Officer will:

» Develop and Implement an Environmental Management System (EMS) for the general waste disposal site and associated infrastructure;
» Manage and report on the waste disposal site'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 and conservation authorities) on environmental performance and other issues;
» Conduct environmental training and awareness for the employees who operate the waste disposal site;
» 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 general waste disposal site 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 general waste disposal site; and
- Enables the general waste disposal site 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	» General waste disposal site. » Fencing with appropriate signage. » An adequate access road (gravel or surfaced). » An access control gate. » A guard house with an ablution facility. » A conservancy tank connected to the ablution facility. » Covered parking facilities. » A designated area for parking and servicing of plant and machinery. » Sorting and storage facilities for recyclables. » Adequate water and electricity connection from the existing rising mains. » Stormwater drainage network and a stormwater evaporation pond for the stormwater entering the site through the waste body. » A leachate management system and a leachate evaporation pond.
Potential Impact	» Design fails to respond optimally to the environmental considerations.
Activities/Risk Sources	» Positioning of all project components.
Mitigation: Target/Objective	» To ensure that the design of the general waste disposal site responds to the identified environmental constraints and opportunities.

Mitigation: Action/Control	Responsibility	Timeframe
A buffer zone of no development within 30m from the outer edge of the seepage wetlands must be implemented.	Project Developer Design Engineer	Pre-construction
It is recommended that Alternative A be selected for development and Alternative B be left undeveloped to minimise	Project Developer	Pre-construction

Mitigation: Action/Control	Responsibility	Timeframe
impacts on loss of habitat with a very high terrestrial biodiversity theme, a CBA: Irreplaceable conservation status and a medium site ecological importance.		
The liner of the landfill must be in accordance with the containment barrier engineering design requirements for a Class B Landfill stipulated in the National Norms and Standards for Disposal of Waste to Landfill (GG3678. GN R.636 of 23 August 2013).	Project Developer Design Engineer	Pre-construction
The landfill design must comply with the specifications of the Design Report contained in Appendix K of the EIA Report.	Project Developer Design Engineer	Pre-construction
A leachate management system must be installed as per the engineering design report included as Appendix K of the EIA Report to minimise impacts on groundwater resources.	Project Developer Design Engineer	Pre-construction
All existing and proposed roads should contain adequate stormwater drainage and erosion control measures	Project Developer Design Engineer	Pre-construction
The minimum requirements for waste disposal (DWAF 2005b), should be adhered to.	Project Developer Design Engineer	Pre-construction

Performance Indicator	» Design responds to the mitigation measures and recommendations in the EIA Report.
Monitoring	» Review of the design by the Project Manager and the ECO prior to the commencement of construction.

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

Project Component/s	» General waste disposal site. » Fencing with appropriate signage. » An adequate access road (gravel or surfaced). » An access control gate. » A guard house with an ablution facility. » A conservancy tank connected to the ablution facility. » Covered parking facilities. » A designated area for parking and servicing of plant and machinery. » Sorting and storage facilities for recyclables. » Adequate water and electricity connection from the existing rising mains. » Stormwater drainage network and a stormwater evaporation pond for the stormwater entering the site through the waste body. » A leachate management system and a leachate evaporation pond.
Potential Impact	» Impact on identified sensitive areas.
Activities/Risk Sources	» Positioning of all project components.
Mitigation: Target/Objective	» To ensure that the relevant permits are obtained and that site-specific plans are put in place prior to construction

Mitigation: Action/Control	Responsibility	Timeframe
Obtain all other mandatory and environmental permits for the project, as required.	Suitably qualified person appointed by the Project Developer	Pre-construction
To improve the ecological integrity of Alternative B and offset the destruction of vegetation in Alternative A, an integrated management plan must be compiled for this area. This must include alien plant control.	Suitably qualified person appointed by the Project Developer	Pre-construction
A Stormwater Management Plan must be developed for the proposed development and the associated access road. The design of the stormwater system must aim to reduce risks of sediment transport and water quality deterioration by: o Design and operation to ensure zero seepage of leachate into the receiving watercourse. o Separation of clean and dirty stormwater runoff. o Clean stormwater runoff from the proposed landfill must be managed to avoid elevated peak flows from impacting on watercourses. High water velocity greatly increases the erosion risk so drains that convey such water should contain energy brakes, such as lining with stones, concrete, grass or gabions to reduce the water velocity and therefore erosion. o Use of multiple smaller discharges rather than a few large discharges. o Dirty stormwater must be captured by inner perimeter drains and contained in a leachates sump or sumps with sufficient capacity to hold runoff 1:100 year flood event. o Appropriate diversion of stormwater runoff from existing and proposed access to avoid siltation of watercourses. o Retention ponds, where appropriate, to reduce the magnitude of stormwater flows. o Swales, where appropriate, to improve the quality of seepage water.	Suitably qualified person appointed by the Project Developer	Pre-construction
A landfill site maintenance plan must be compiled for implementation during the operation phase.	Suitably qualified person appointed by the Project Developer	Pre-construction
Develop and implement an emergency preparedness plan for the construction and operational phase of the general waste disposal site.	Suitably qualified person appointed by the Project Developer	Pre-construction

Performance Indicator	» Permits are obtained and relevant conditions complied with. » Relevant management plans/procedures prepared and implemented.
Monitoring	» Monitor ongoing compliance with the EMPr.

OBJECTIVE 3: Ensure appropriate planning is undertaken by contractors and ensure compliance of required mitigation measures and recommendations by contractors

Project Component/s	» General waste disposal site. » Fencing with appropriate signage. » An adequate access road (gravel or surfaced). » An access control gate. » A guard house with an ablution facility. » A conservancy tank connected to the ablution facility. » Covered parking facilities. » A designated area for parking and servicing of plant and machinery. » Sorting and storage facilities for recyclables. » Adequate water and electricity connection from the existing rising mains. » Stormwater drainage network and a stormwater evaporation pond for the stormwater entering the site through the waste body. » A leachate management system and a leachate evaporation pond.
Potential Impact	» Impact on identified sensitive area.
Activities/Risk Sources	» Positioning of all project components. » Positioning of temporary sites. » Pre-construction activities.
Mitigation: Target/Objective	» To ensure that the pre-construction activities are undertaken in an environmentally friendly manner and in compliance with the conditions of the integrated EA and the mitigation measures as detailed in the EMPr.

Mitigation: Action/Control	Responsibility	Timeframe
The terms of this EMPr and the integrated EA 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. Contractors must be made aware of the "no-go" areas to be avoided.	EO	Pre-construction
Contractor must sign and undertake to comply with environmental specifications.	Contractor	Pre-construction
It is recommended that vegetation clearing be conducted in the dry months between April and September, prior to the onset of the rains. The seasonal arrival of the rain season subsequent to construction will then allow for the natural re-vegetation of bare areas, from the seedbank within the soil.	Contractor	Planning and Construction
An independent Environmental Compliance Officer (ECO) must be appointed by the developer to monitor compliance with the Environmental Authorisation during construction. The ECO must be appointed prior to commencement of construction and be involved in all aspects of project planning that can influence environmental conditions on the site. Where possible, the ECO must attend relevant project meetings, conduct inspections to assess compliance with the Environmental Authorisation and relevant Health and Safety regulations, and be responsible for providing feedback on potential environmental problems associated with construction	Project Developer	Pre-construction

Performance Indicator	» Conditions of the EMPr form part of all contracts. » Pre-construction activities are carried out in an environmentally friendly manner.
Monitoring	» Monitor ongoing compliance with the EMPr and method statements.

OBJECTIVE 4: Ensure effective communication mechanisms

It is important to maintain on-going communication with the public (including the identified sensitive receptors and other relevant stakeholders within the area) during the construction and operation phases of the general waste disposal site. Any issues and concerns raised must be addressed as far as possible in as short a timeframe as possible.

Project component/s	» General waste disposal site. » Fencing with appropriate signage. » An adequate access road (gravel or surfaced). » An access control gate. » A guard house with an ablution facility. » A conservancy tank connected to the ablution facility. » Covered parking facilities. » A designated area for parking and servicing of plant and machinery. » Sorting and storage facilities for recyclables. » Adequate water and electricity connection from the existing rising mains. » Stormwater drainage network and a stormwater evaporation pond for the stormwater entering the site through the waste body. » A leachate management system and a leachate evaporation pond.
Potential Impact	» Impacts on surrounding landowners, and sensitive receptors
Activity/risk source	» Activities associated with construction » Activities associated with operation
Mitigation: Target/Objective	» Effective communication with surrounding landowners, sensitive receptors 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 general waste disposal site. 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 and operation 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, sensitive receptors and adjacent landowners can lodge complaints regarding	EO	Pre-construction

Mitigation: Action/control	Responsibility	Timeframe
construction activities. Ideal location would be security post at point of site access.		

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

7. MANAGEMENT PROGRAMME: CONSTRUCTION

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

- Ensures that construction activities are appropriately managed in respect of environmental aspects and impacts;
- Enables construction activities to be undertaken without significant disruption to other land uses and activities in the area;
- Minimise impacts on the indigenous natural vegetation;
- Minimise impacts on fauna (including birds) in the study area;
- Minimises the impact on ambient air quality;
- Minimise impacts on groundwater resources;
- Minimises the impact on archaeological heritage and palaeontological resources, should they be uncovered.

This construction EMPr must be implemented each time are new cell is established.

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	» General waste disposal site. » Fencing with appropriate signage. » An adequate access road (gravel or surfaced). » An access control gate. » A guard house with an ablution facility. » A conservancy tank connected to the ablution facility. » Covered parking facilities. » A designated area for parking and servicing of plant and machinery. » Sorting and storage facilities for recyclables. » Adequate water and electricity connection from the existing rising mains. » Stormwater drainage network and a stormwater evaporation pond for the stormwater entering the site through the waste body. » A leachate management system and a leachate evaporation pond.
Potential Impact	» Hazards to Eskom personnel and construction employees. » Substantially increase damage to vegetation. » Security of the materials. » Impacts on the surrounding environment due to inadequate sanitation and waste removal facilities.
Activities/Risk Sources	» Any unintended or intended open excavations. » Movement of construction vehicles and employees in the area and on-site.

Mitigation: Target/Objective	» To secure the site against unauthorised entry. » To protect Eskom personnel and construction employees. » No loss of damage to sensitive vegetation in areas outside the immediate development footprint. » Intact vegetation cover outside of the immediate construction work areas.

Mitigation: Action/Control	Responsibility	Timeframe
The footprint area of the construction should be kept to a minimum. The footprint area must be clearly demarcated to avoid unnecessary disturbances to adjacent areas.	Contractor	Construction
A comprehensive employee induction programme which covers land access protocols must be prepared and implemented during construction.	EO	Construction
Toilets at the recommended Health and Safety standards must be provided. These should be emptied regularly, to prevent staff from using the surrounding vegetation.	Contractor	Construction
Secure site, working areas and excavations in an appropriate manner.	Contractor	Site establishment, and duration of construction
Site access must be controlled and no unauthorised persons must be allowed onto the site.	Contractor	Construction
All unattended open excavations must be adequately demarcated and/or fenced.	Contractor	Construction
The Contractor must take all reasonable measures to ensure the safety of its employees. Where the construction employees could be exposed to danger by any of the works or site activities, suitable flagmen, barriers and/or warning signs in English and any other relevant indigenous languages, all to the approval of the Site Manager must be provided.	Contractor	Construction

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

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

Project Component/s	» General waste disposal site. » Fencing with appropriate signage. » An adequate access road (gravel or surfaced). » An access control gate. » A guard house with an ablution facility. » A conservancy tank connected to the ablution facility. » Covered parking facilities.

	» A designated area for parking and servicing of plant and machinery. » Sorting and storage facilities for recyclables. » Adequate water and electricity connection from the existing rising mains. » Stormwater drainage network and a stormwater evaporation pond for the stormwater entering the site through the waste body. » A leachate management system and a leachate evaporation pond.
Potential Impact	» Pollution/contamination of the environment. » Impact of heavy construction vehicles on road surfaces, and possible increased risk in accidents involving people and animals. » Damage to vegetation and fauna. » Impact on surface and groundwater resources. » Damage to and/or loss of topsoil (i.e. pollution, compaction etc.). » Damage to archaeological heritage and palaeontological resources, should they be uncovered.
Activities/Risk Sources	» Access to and from the equipment storage area/s. » Vegetation clearing and levelling. » Ablution facilities. » Waste management. » Contractors not aware of the requirements of the EMPr, leading to unnecessary impacts on the surrounding environment. » Construction vehicle movement.
Mitigation: Target/Objective	» 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. » Limit equipment storage within demarcated designated areas.

Mitigation: Action/Control	Responsibility	Timeframe
To minimise impacts on the surrounding environment, contractors must be required to adopt a 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 integrated EA, 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
Ensure that construction workers are clearly identifiable. All workers must carry identification cards and wear identifiable clothing.	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
Ensure waste storage facilities are maintained and emptied on a regular basis.	Contractor	Duration of construction
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	Contractor	Duration of construction

Mitigation: Action/Control	Responsibility	Timeframe
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.		
Ensure ablution facilities are appropriately maintained. Ablutions must be cleaned regularly and associated waste disposed of at a registered/permitted waste disposal site. Ablutions must be removed from site when construction is completed.	Contractor and sub-contractor/s	Duration of construction
Cooking and eating of meals must take place in a designated area. No fires are allowed on site. No firewood or kindling may be gathered from the site or surrounds.	Contractor and sub-contractor/s	Duration of contract
All litter must be deposited in a clearly marked, closed, animal-proof disposal bin in the construction area. Particular attention needs to be paid to food waste.	Contractor and sub-contractor/s	Duration of contract
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
Maintain the general appearance of the site as a whole.	Contractor	Construction
Regular toolbox talks must be undertaken, to ensure appropriate levels of environmental awareness.	Contractor	Construction

Performance Indicator	» Ablution and waste removal facilities are in a good working order and do not pollute the environment due to mismanagement. » 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.
Monitoring	» Regular audits of the construction camps and areas of construction on site by the EO. » Proof of disposal of sewage at an appropriate licensed wastewater treatment works. » Proof of disposal of waste at an appropriate licensed waste disposal facility. » An incident reporting system must be used to record non-conformances to the EMPr. » Observation and supervision of Contractor practices throughout the construction phase by the EO. » Complaints must be investigated and, if appropriate, acted upon.

OBJECTIVE 3: Protection of water resources (surface and groundwater), vegetation/flora, fauna (including birds) and soils

Project Component/s	» General waste disposal site. » Fencing with appropriate signage. » An adequate access road (gravel or surfaced). » An access control gate. » A guard house with an ablution facility. » A conservancy tank connected to the ablution facility.

	» Covered parking facilities. » A designated area for parking and servicing of plant and machinery. » Sorting and storage facilities for recyclables. » Adequate water and electricity connection from the existing rising mains. » Stormwater drainage network and a stormwater evaporation pond for the stormwater entering the site through the waste body. » A leachate management system and a leachate evaporation pond.
Potential Impact	» Impacts on fauna (including birds). » Loss of vegetation due to construction activities and vegetation clearing. » Impacts on soil. » Loss of topsoil. » Erosion. » Impacts on sensitive areas.
Activities/Risk Sources	» Vegetation clearing. » Site preparation and earthworks. » Excavations. » Construction of infrastructure. » Stockpiling of topsoil, subsoil and spoil material.
Enhancement: Target/Objective	» To minimise the development footprint as far as possible. » To minimise impacts on surrounding sensitive areas. » To minimise impacts on fauna (including birds). » Minimise erosion potential.

Mitigation: Action/Control	**Responsibility**	**Timeframe**
The landfill site must be adequately fenced off to prevent access to surrounding untransformed vegetation.	Contractor	Construction
Vegetation clearing must be conducted in the dry months between April and September, prior to the onset of the rains. The seasonal arrival of the rain season subsequent to construction will then allow for the natural re-vegetation of bare areas, from the seedbank within the soil.	Contractor	Construction
A sturdy, mammal-proof fence of at least 3 m in height should be constructed around the perimeter of the site to prevent unwanted access from small mammals, cattle and people as well as prevent plastics from being blown out. This fence must be regularly inspected for damage or forced entry.	Contractor	Construction
A buffer zone of no development within 30m from the outer edge of the seepage wetlands must be implemented for the duration of construction.	Contractor	Construction
No trapping, killing, or poisoning of any animals is to be allowed.	Contractor	Construction
Any excavations or holes must be conducted in a progressive manner. Should the holes/excavations stay open overnight they must be covered temporarily, to ensure no small fauna species fall in.	Contractor	Construction
Speed limits must be put in place to reduce erosion and fauna mortality.	Contractor	Construction
Vehicles and equipment must travel within demarcated areas and not outside of the construction footprint.	Contractor	Construction

Mitigation: Action/Control	Responsibility	Timeframe
No storage of vehicles or equipment will be allowed outside of the designated project areas.	Contractor	Construction
Signs of erosion must be addressed immediately to prevent further erosion.	Contractor	Construction
Where possible, existing access routes and walking paths must be made use of.	Contractor	Construction
Regular housekeeping inspections by the Environmental Compliance Officer (ECO) are recommended during construction. The recommended frequency of such inspections during initial construction is weekly, but the frequency of inspections may be changed, pending the severity of impacts identified. The aim of the inspections is to ensure that the control measures detailed in the integrated EA are adhered to. All watercourses within the potential Area of Influence must be inspected for signs of sediment transport and deposition, and water quality deterioration, especially after storm events. Immediate corrective action must be taken if inspections identify any failures to comply.	ECO	Construction
A leachate management system must be installed as per the engineering design report included as Appendix K of the EIA Report to minimise impacts on groundwater resources.	Contractor	Construction
The landfill area should be lined.	Contractor	Construction
A leak detection and monitoring system should be installed and implemented.	Contractor	Construction
The site must be lined with appropriate lining material as recommended in the Engineering Design Report attached as Appendix K to the EIA Report	Contractor	Construction
Excavate to down to 3m depth only to safeguard the phreatic surface.	Contractor	Construction
Overburden soil must be stockpiled for re-use as interlayer material.	Contractor	Construction

Performance Indicator	» No disturbance outside of designated work areas. » Minimised clearing of existing vegetation. » Vegetation loss restricted to infrastructure footprint. » No poaching etc. of fauna by construction personnel during construction. » Removal to safety of fauna encountered during construction. » Low mortality of fauna due to construction machinery and activities. » Limited soil erosion, compaction and pollution around site. » No activity in restricted areas.
Monitoring	» Contractor's EO to provide supervision and oversight of vegetation clearing activities. » Supervision of all clearing and earthworks by the ECO. » Ongoing monitoring of erosion management measures within the site by the ECO. » An incident reporting system will be used to record non-conformances to the EMPr. This will be done by the EO.

OBJECTIVE 4: Minimise the establishment and spread of alien invasive plants

Major factors contributing to invasion by alien invader plants include high disturbance activities and negative grazing practices. Consequences of this may include:

- Loss of indigenous vegetation.
- Change in vegetation structure leading to change in various habitat characteristics.
- Change in plant species composition.
- Change in soil chemical properties.
- Loss of sensitive habitats.
- Loss or disturbance to individuals of rare, endangered, endemic, and/or protected species.
- Fragmentation of sensitive habitats.
- Change in flammability of vegetation, depending on alien species.
- Hydrological impacts due to increased transpiration and runoff.

Project Component/s	» General waste disposal site. » Fencing with appropriate signage. » An adequate access road (gravel or surfaced). » An access control gate. » A guard house with an ablution facility. » A conservancy tank connected to the ablution facility. » Covered parking facilities. » A designated area for parking and servicing of plant and machinery. » Sorting and storage facilities for recyclables. » Adequate water and electricity connection from the existing rising mains. » Stormwater drainage network and a stormwater evaporation pond for the stormwater entering the site through the waste body. » A leachate management system and a leachate evaporation pond.
Potential Impact	» Invasion of natural vegetation surrounding the site by declared weeds or invasive alien species. » Impacts on soil. » Impact on faunal habitats.
Activities/Risk Sources	» Transport of construction materials to the development footprint. » Movement of construction vehicles, machinery and personnel. » Site preparation and earthworks causing disturbance to indigenous vegetation. » Construction of main access road. » Stockpiling of topsoil, subsoil and spoil material.
Mitigation: Target/Objective	» To significantly reduce the presence of weeds and eradicate alien invasive species. » To avoid the introduction of additional alien invasive plants to the site. » To avoid distribution and thickening of existing alien plants in the site. » To complement existing alien plant eradication programs in gradually causing a significant reduction of alien plant species throughout the site.

Mitigation: Action/Control	Responsibility	Timeframe
To improve the ecological integrity of Alternative B and offset the destruction of vegetation in Alternative A, an integrated	Contractor	Construction

Mitigation: Action/Control	Responsibility	Timeframe
management plan must be compiled for this area and implemented during the construction phase. This must include alien plant control.		
To comply with the National Environmental Management: Biodiversity Act (Act No. 10 of 2004), all listed invasive exotic plants as indicated in Appendix 1 of the Terrestrial Biodiversity Impact Assessment must be targeted and controlled. This is especially relevant to the many alien invasive tree and shrub species present, and may require the compilation of an alien plant control plan.	Contractor	Construction
All woody alien plants within a 200 m radius of the site must be immediately destroyed using appropriate techniques.	Contractor	Construction
Where weed control involves the use of herbicides, it must be managed correctly to reduce the impact on the adjacent natural vegetation. Regular inspections must be conducted to determine if any additional alien plants have established.	Contractor	Construction
Avoid creating conditions in which alien plants may become established: » Keep disturbance of indigenous vegetation to a minimum. » Rehabilitate disturbed areas as quickly as possible. » Do not import soil from areas with alien plants.	Contractor	Construction
No planting or importing any listed invasive alien plant species (all Category 1a, 1b and 2 invasive species) to the site for landscaping, rehabilitation or any other purpose must be undertaken.	Contractor	Construction

Performance Indicator	» Low abundance of alien plants. For each alien species: number of plants and aerial cover of plants within the site and immediate surroundings.
Monitoring	» On-going monitoring of area by EO during construction. » Annual audit of development footprint and immediate surroundings by qualified botanist. Reporting frequency depends on legal compliance framework.. » If any alien invasive species are detected then the distribution of these should be mapped (GPS co-ordinates of plants or concentrations of plants), number of individuals (whole site or per unit area), age and/or size classes of plants and aerial cover of plants. The results should be interpreted in terms of the risk posed to sensitive habitats within and surrounding the site. The environmental manager/site agent should be responsible for driving this process.

OBJECTIVE 5: Protection of heritage resources

No heritage resources were identified within the overall project site and development footprint. From a palaeontological perspective, the study site is underlain by geological strata with insignificant and high palaeontological significance. The palaeontological desktop assessment (**Appendix I** of the EIA Report), supported by the fieldwork concluded by the 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	» General waste disposal site. » Fencing with appropriate signage. » An adequate access road (gravel or surfaced). » An access control gate. » A guard house with an ablution facility. » A conservancy tank connected to the ablution facility. » Covered parking facilities. » A designated area for parking and servicing of plant and machinery. » Sorting and storage facilities for recyclables. » Adequate water and electricity connection from the existing rising mains. » Stormwater drainage network and a stormwater evaporation pond for the stormwater entering the site through the waste body. » A leachate management system and a leachate evaporation pond.
Potential Impact	» Loss of archaeological and fossil heritage.
Activity/Risk Source	» Site preparation and earthworks. » Foundations or excavations. » Mobile construction equipment movement on site.
Mitigation: Target/Objective	» To ensure that any archaeological or palaentological material exposed during construction is treated appropriately and in accordance with the relevant legislation.

Mitigation: Action/control	**Responsibility**	**Timeframe**
<u>If there are any new heritages resources are discovered during construction and operation phases of the proposed development, then a professional archaeologist or palaeontologist, depending on the nature of the finds, must be contracted as soon as possible to inspect the findings at the expense of the developer.</u>	Contractor EO	Construction
The chance find procedure must be implemented: o If a chance find is made the person responsible for the find must immediately stop working and all work that could impact that finding must cease in the immediate vicinity of the find. o 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 Control Officer (ECO) or site manager. The ECO or site manager must report the find to the relevant Heritage Agency (South African Heritage Research Agency, SAHRA). (Contact details: SAHRA, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa. Tel: 021 462 4502. Fax: +27 (0)21 462 4509. Web: www.sahra.org.za). The information to the Heritage Agency must include photographs of the find, from various angles, as well as the GPS co-ordinates. o 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. o Photographs (the more the better) of the discovery must be of high quality, in focus, accompanied by a scale. It	Contractor EO	Construction

Mitigation: Action/control	Responsibility	Timeframe
is also important to have photographs of the vertical section (side) where the fossil was found. o Upon receipt of the preliminary report, the Heritage Agency will inform the ECO (or site manager) whether a rescue excavation or rescue collection by a palaeontologist is necessary. o The site must be secured to protect it from any further damage. No attempt should be made to remove material from their environment. The exposed finds must be stabilized and covered by a plastic sheet or sand bags. The Heritage agency will also be able to advise on the most suitable method of protection of the find. o In the event that the fossil cannot be stabilized, the fossil may be collected with extreme care by the ECO (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. o Once Heritage Agency has issued the written authorization, the developer may continue with the development on the affected area. o The ECO will close off the chance find procedure and would be required to implement any requirements issued by the Authority and to add it to the operational management plan.		
In the event that fossils are uncovered during construction then construction must cease within the immediate vicinity, a buffer of 30 m must be established, and a palaeontologist called in to inspect the finds. The palaeontologist must obtain a section 35(4) permit in terms of the National Heritage Resources Act (NHRA) and Chapter IV NHRA Regulations, before any fossils are collected.	Contractor EO	Construction
If the newly discovered heritage resources prove to be of archaeological or palaeontological significance, a Phase 2 rescue operation may be required at the expense of the developer. Mitigation will only be carried out after the archaeologist or palaeontologist obtains a permit in terms of section 35 of the NHRA (Act 25 of 1999). You may contact SAHRA APM Unit for further details: (Nokukhanya Khumalo/Phillip Hine 021 202 8654).	Contractor EO	Construction
If any unmarked human burials are uncovered and the archaeologist called in to inspect the finds and/or the police find them to be heritage graves, then mitigation may be necessary and the SAHRA Burial Grounds and Graves (BGG) Unit must be contacted for processes to follow (Thingahangwi Tshivhase/Ngqalabutho Madida 012 320 8490).	Contractor EO	Construction

Performance Indicator	» No loss of archaeological and fossil heritage. » All chance finds are dealt with as per the legislative guidelines.
Monitoring	» Due care taken during earthworks and disturbance of land by all staff and any heritage objects found reported.

	» Observation and monitoring of excavation activities and earthworks by ECO throughout the construction phase. » Appropriate permits obtained from SAHRA prior to the disturbance or destruction of heritage sites (if required). » An incident reporting system will be used to record non-conformances to the EMPr.

OBJECTIVE 6: Minimise impact on ambient air quality through effective management, mitigation, and monitoring during construction phase

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

Mitigation: Action/control	Responsibility	Timeframe
To minimise dust from wind erosion, exposed areas must be revegetated/rehabilitated as soon as possible.	Contractor	Construction
Appropriate dust suppression measures (such as water sprays) must be employed on unpaved road surfaces and to exposed areas when periods of high wind speeds are anticipated.	Contractor	Construction
Heavy vehicles and construction equipment must be road worthy and regularly maintained.	Contractor(s), transportation contractor(s) and EO	Construction
All vehicles leaving site with loose material must have load-bins covered with tarpaulins.	Contractor(s) and EO	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	Construction

Mitigation: Action/control	Responsibility	Timeframe
Investigate inadequate mitigation and control measures if monitoring or complaints potential issues are indicated by non-conformance with performance indicators	Contractor(s) and EO	Construction

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

OBJECTIVE 7: Appropriate Stormwater Management

Stormwater management is covered under the Pre-construction and Construction Phase management, but aspects thereof will also continue into the Operation Phase. It is important that the engineers and contractors responsible for the detailed design of the stormwater systems take into account the requirements of this EMPr, as well as the recommendations by the participating specialists.

Project Component/s	» Alteration of natural areas into hard surfaces impacting on the local hydrological regime of the area.
Potential Impact	» Poor stormwater management and alteration of the hydrological regime. » Erosion. » Downstream sedimentation.
Activities/Risk Sources	» Placement of hard engineered surfaces.
Mitigation: Target/Objective	» Reduce the potential increase in surface flow velocities and the impact on localised drainage systems.

Mitigation: Action/Control	Responsibility	Timeframe
Investigate inadequate mitigation and control measures if monitoring or complaints potential issues are indicated by non-conformance with performance indicators	Contractor(s) and EO	Construction
All existing and proposed roads should contain adequate stormwater drainage and erosion control measures.	Contractor	Construction
A Stormwater Management Plan must be developed for the proposed development and the associated access road for implementation during the construction phase. The design of	Contractor	Construction

Mitigation: Action/Control	Responsibility	Timeframe
the stormwater system must aim to reduce risks of sediment transport and water quality deterioration by: o Design and operation to ensure zero seepage of leachate into the receiving watercourse. o Separation of clean and dirty stormwater runoff. o Clean stormwater runoff from the proposed landfill must be managed to avoid elevated peak flows from impacting on watercourses. High water velocity greatly increases the erosion risk so drains that convey such water should contain energy brakes, such as lining with stones, concrete, grass or gabions to reduce the water velocity and therefore erosion. o Use of multiple smaller discharges rather than a few large discharges. o Dirty stormwater must be captured by inner perimeter drains and contained in a leachates sump or sumps with sufficient capacity to hold runoff 1:100 year flood event. o Appropriate diversion of stormwater runoff from existing and proposed access to avoid siltation of watercourses. o Retention ponds, where appropriate, to reduce the magnitude of stormwater flows. o Swales, where appropriate, to improve the quality of seepage water.		

Performance Indicator	» No impacts due to runoff. » Minimise erosion as far as possible. » Appropriate storm water management system in place.
Monitoring	» Ongoing monitoring of erosion management measures within the site by the EO and ECO. » Monthly inspections of sediment control devices by the EO. » An incident reporting system will be used to record non-conformances to the EMPr.

OBJECTIVE 8: Conservation of the soil resource within the site and in the adjacent areas

The natural soil on the site needs to be preserved as far as possible to minimise impacts on the environment. Soil degradation, including erosion (by wind and water) and subsequent deposition elsewhere is of a concern. Uncontrolled run-off relating to construction activities (excessive wetting, etc.) will also lead to accelerated erosion. Degradation of the natural soil profile due to excavation, stockpiling, compaction, pollution and other construction activities will affect soil forming processes and associated ecosystems.

A set of strictly adhered to mitigation measures are required to be implemented in order to effectively limit the impact on the environment. The disturbed areas where human impact is likely are the focus of the mitigation measures laid out below.

Project component/s	» General waste disposal site. » Fencing with appropriate signage. » An adequate access road (gravel or surfaced).

	» An access control gate. » A guard house with an ablution facility. » A conservancy tank connected to the ablution facility. » Covered parking facilities. » A designated area for parking and servicing of plant and machinery. » Sorting and storage facilities for recyclables. » Adequate water and electricity connection from the existing rising mains. » Stormwater drainage network and a stormwater evaporation pond for the stormwater entering the site through the waste body. » A leachate management system and a leachate evaporation pond.
Potential Impact	» Erosion and soil loss.
Activities/risk sources	» Rainfall and wind erosion of disturbed areas. » Excavation, stockpiling and compaction of soil. » Concentrated discharge of water from construction activity. » Stormwater run-off from sealed surfaces. » Mobile construction equipment movement on site. » Roadside drainage ditches. » Project related infrastructure, such as buildings and fences.
Mitigation: Target/Objective	» To minimise erosion of soil from site during construction. » To minimise damage to vegetation by erosion or deposition. » To retain all topsoil with a stable soil surface

Mitigation: Action/control	Responsibility	Timeframe
Vegetation clearing must occur in a phased manner to minimise erosion and/or run-off.	Contractor	Construction
Topsoil must be removed and stored separately from subsoil. Topsoil must be reapplied where appropriate as soon as possible in order to encourage and facilitate rapid regeneration of the natural vegetation on cleared areas.	Contractor	Construction
Stockpile topsoil for re-use in the rehabilitation phase. Maintain stockpile shape and protect from erosion.	Contractor	Construction
Storing topsoil: » Viability of stored topsoil depends on moisture, temperature, oxygen, nutrients and time stored. » Rapid decomposition of organic material in warm, moist topsoil rapidly decreases microbial activity necessary for nutrient cycling, and reduces the amount of beneficial micro-organisms in the soil. » Stockpile location must ideally be in a disturbed but weed-free area. » Storage of all topsoil that is disturbed must be of a maximum height of 2m and the maximum length of time before re-use is 18 months. » Topsoil handling must be reduced to stripping, piling (once), and re-application. Between the stockpiling and reapplication, stored topsoil must not undergo any further handling except control of erosion and (alien) invasive vegetation. » Where topsoil can be reapplied within six months to one year after excavation, it will be useful to store the topsoil as close	Contractor	Construction

Mitigation: Action/control	Responsibility	Timeframe
as possible to the area of excavation and re-application, e.g. next to cabling trenches. » Do not mix overburden with topsoil stockpiles, as this will dilute the proportion of fertile soil (with less fertile subsoil or rock material). » Employ wind nets made from Hessian or similarly fibrous and biodegradable material, where required, to stabilise newly placed topsoil stockpiles and to reduce wind erosion. » In cases where topsoil has to be stored longer than 6 months or during the rainy season, soils must be kept as dry as possible and protected from erosion and degradation by: * Preventing ponding on or between heaps of topsoil * Covering topsoil berms * Preventing all forms of contamination or pollution * Preventing any form of compaction * Monitoring the establishment of all invasive vegetation and removing such if it appears * Keeping slopes of topsoil at a maximal 2:1 ratio * Monitoring and mitigating erosion where it appears » Where topsoil needs to be stored in excess of one year, it is recommended to either cover the topsoil or allow an indigenous grass cover to grow on it – if this does not happen spontaneously, seeding must be considered.		
Regular monitoring of the site (minimum of twice annually) must be undertaken to identify possible areas of erosion, particularly after large summer thunder storms have been experienced. Problem areas must receive follow-up monitoring by the EO to assess the success of the remediation.	Contractor	Construction
Any erosion problems observed to be associated with the project infrastructure must be rectified as soon as possible and monitored thereafter to ensure that they do not re-occur.	Contractor	Construction
Re-instate as much of the eroded area to its pre-disturbed, "natural" geometry (no change in elevation and any banks not to be steepened) where possible.	Contractor	Construction
Erosion control measures such as silt fences (for areas of works) and gravel strips may be considered at the impact zone where water falls from the solar panels onto the soil surface (due to deterioration in natural grassland because of poor maintenance or lack of solar radiation).	Contractor	Construction
Silt traps must be used where there is a danger of topsoil eroding and entering lower lying wetland resources.	Contractor	Construction
Construction of gabions and other stabilisation features must be undertaken to prevent erosion, if deemed necessary.	Contractor	Construction
Level any remaining soil removed from excavation pits that remained on the surface instead of allowing small stockpiles of soil to remain on the surface.	Contractor	Construction
Reapplying topsoil: » Spoil materials and subsoil must be back-filled first, then covered with topsoil.	Contractor	Construction

Mitigation: Action/control	Responsibility	Timeframe
» Immediate replacement of topsoil after the undertaking of construction activities within an area. » Generally, topsoil must be re-applied to a depth slightly greater than the topsoil horizon of a pre-selected undisturbed reference site. » The minimum depth of topsoil needed for re-vegetation to be successful is approximately 20 cm. » If the amount of topsoil available is limited, a strategy must be devised to optimise re-vegetation efforts with the topsoil available. » Reapplied topsoil must be landscaped in a way that creates a variable microtopography of small ridges and valleys that run parallel to existing contours of the landscape. The valleys become catch-basins for seeds and act as run-on zones for rainfall, increasing moisture levels where the seeds are likely to be more concentrated. This greatly improves the success rate of re-vegetation efforts. » To stabilise reapplied topsoil and minimise raindrop impact and erosion: * Use organic material from cleared and shredded woody vegetation where possible * Alternatively, suitable geotextiles or organic erosion mats can be used as necessary » Continued monitoring will be necessary to detect any sign of erosion early enough to allow timeous mitigation.		
Re-applied topsoil needs to be re-vegetated as soon as possible.	Contractor	Construction

Performance Indicator	» Minimal level of soil erosion around site. » Minimal level of soil degradation. » No activity outside demarcated areas. » Acceptable state of excavations. » No activity in restricted areas. » Acceptable state of excavations, as determined by EO and ECO. » No indications of visible topsoil loss.
Monitoring and Reporting	» Continual inspections of the site by the EO. » Reporting of ineffective sediment control systems and rectification as soon as possible. » If soil loss is suspected, acceleration of soil conservation and rehabilitation measures must be implemented.

OBJECTIVE 9: Appropriate handling and management of waste during site establishment activities

The construction of the general waste disposal site 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 related to vehicle and machinery use

» Inert waste (rock and soil)

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

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

Mitigation: Action/Control	Responsibility	Timeframe
Documentation (waste manifest) must be maintained detailing the quantity, nature, and fate of any regulated waste. Waste disposal records must be available for review at any time.	Contractor	Construction
Regularly serviced chemical toilet facilities and/or septic tank must be used to ensure appropriate control of sewage. Daily inspection of all chemical toilets and septic tanks must be performed by environmental representatives on site.	Contractor	Construction
Under no circumstances may waste be burnt or buried on site.	Contractor	Construction
Litter generated by the construction crew must be collected in rubbish bins and disposed of weekly, or at an appropriate frequency, at registered waste disposal sites.	Contractor	Construction
Upon the completion of construction, the area must be cleared of potentially polluting materials (including chemical toilets). Spoil stockpiles must also be removed and appropriately disposed of or the materials re-used for an appropriate purpose.	Contractor	Construction
Corrective action must be undertaken immediately if a complaint is made, or potential/actual leak or spill of polluting/toxic substance identified. This includes stopping the contaminant from further escaping, cleaning up the affected environment as much as practically possible and implementing preventative measures.	Contractor	Construction

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

OBJECTIVE 10: Appropriate handling and storage of chemicals, hazardous substances

The construction phase may involve the storage and handling of a variety of chemicals including oils and paints.

Project Component/s	» General waste disposal site. » Fencing with appropriate signage. » An adequate access road (gravel or surfaced). » An access control gate. » A guard house with an ablution facility. » A conservancy tank connected to the ablution facility. » Covered parking facilities.

	» A designated area for parking and servicing of plant and machinery. » Sorting and storage facilities for recyclables. » Adequate water and electricity connection from the existing rising mains. » Stormwater drainage network and a stormwater evaporation pond for the stormwater entering the site through the waste body. » A leachate management system and a leachate evaporation pond.
Potential Impact	» Release of contaminated water from contact with spilled chemicals. » Generation of contaminated wastes from used chemical containers. » Pollution of the surrounding environment through inappropriate materials management and practices.
Activity/Risk Source	» Construction activities. » Hydrocarbon spills by vehicles and machinery during levelling, vegetation clearance and transport of materials and equipment, and fuel storage tanks. » Accidental spills of hazardous chemicals. » Polluted water from wash bays and workshops.
Mitigation: Target/Objective	» To ensure that the storage and handling of chemicals and hydrocarbons on-site does not cause pollution to the environment or harm to persons. » To ensure that the storage and maintenance of machinery on-site does not cause pollution of the environment or harm to persons. » Prevent and contain hydrocarbon leaks. » Undertake proper waste management. » Store hazardous chemicals safely in a bunded area.

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 from further escaping, cleaning up the affected environment as much as practically possible and implementing preventive measures. Where required, a NEMA Section 30 report must be submitted to DFFE within 14 days of the incident.	Contractor	Duration of contract

Mitigation: Action/Control	Responsibility	Timeframe
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
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
Upon completion of construction, the area must be cleared of potentially polluting materials.	Contractor	Completion of Construction

Performance Indicator	» No chemical spills outside of designated storage areas. » No water or soil contamination by spills. » Safe storage of hazardous chemicals. » Proper waste management. » Provision of all appropriate waste manifests of all waste streams.
Monitoring	» Observation and supervision of chemical storage and handling practices and vehicle maintenance throughout construction phase. » 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 11: 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 during site establishment activities:
  - 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 during site establishment activities (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 12: 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 integrated EA.
- 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 EO 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 13: 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 integrated EA (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 integrated EA, 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.

7.4.1. 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.

7.4.2. Monitoring Reports

A monitoring report (for the duration of the site establishment activities) 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.

7.4.3. Audit Reports

The holder of the integrated EA must, for the period during which the integrated EA and EMPr remain valid, ensure that project compliance with the conditions of the integrated EA 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 annually 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 integrated EA conditions and the requirements of the EMPr.

8. MANAGEMENT PROGRAMME: OPERATION

Overall Goal: To ensure that the operation of the general waste disposal site 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 waste disposal site in a way that:

» Ensures that operation activities are properly managed in respect of environmental aspects and impacts.
» Enables the operation activities to be undertaken without significant disruption to other land uses in the area.

8.1. Objectives

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

OBJECTIVE 1: Protection of water resources (surface and groundwater), flora, fauna (including avifauna), and soils; appropriate stormwater management; and minimise the establishment of alien invasive species

Project component/s	» All project components. » Areas disturbed during the construction phase and subsequently rehabilitated at its completion.
Potential Impact	» Impacts on water resources (surface and groundwater). » Disturbance to or loss of flora and fauna. » Alien plant invasion. » Soil pollution. » Erosion, soil loss and downstream sedimentation due to poor stormwater management.
Activity/Risk Source	» Movement of employees and vehicles within and around site.
Mitigation: Target/Objective	» Maintain minimised footprints of disturbance of vegetation/ habitats on-site. » Ensure and encourage plant regrowth in non-operational areas of post-construction rehabilitation. » Minimise soil erosion and pollution. » Minimise invasion by alien invasive plants. » Minimise impacts on flora and fauna. » Minimise impacts on water resources (surface and groundwater).

Mitigation: Action/Control	Responsibility	Timeframe
A buffer zone of no development within 30m from the outer edge of the seepage wetlands must be implemented for the duration of operation.	Operator WMO	Operation
The landfill area should be lined and linings should be monitored.	Operator WMO	Operation
A leak detection and monitoring system should be installed and implemented.	Operator	Operation

Mitigation: Action/Control	Responsibility	Timeframe
The site must be lined with appropriate lining material as recommended in the Engineering Design Report attached as Appendix K to the EIA Report.	Operator WMO	Operation
All existing and proposed roads should contain adequate stormwater drainage and erosion control measures.	Operator	Operation
A Stormwater Management Plan must be developed for the proposed development and the associated access road for implementation during the operation phase. The design of the stormwater system must aim to reduce risks of sediment transport and water quality deterioration by: o Design and operation to ensure zero seepage of leachate into the receiving watercourse. o Separation of clean and dirty stormwater runoff. o Clean stormwater runoff from the proposed landfill must be managed to avoid elevated peak flows from impacting on watercourses. High water velocity greatly increases the erosion risk so drains that convey such water should contain energy brakes, such as lining with stones, concrete, grass or gabions to reduce the water velocity and therefore erosion. o Use of multiple smaller discharges rather than a few large discharges. o Dirty stormwater must be captured by inner perimeter drains and contained in a leachates sump or sumps with sufficient capacity to hold runoff 1:100 year flood event. o Appropriate diversion of stormwater runoff from existing and proposed access to avoid siltation of watercourses. o Retention ponds, where appropriate, to reduce the magnitude of stormwater flows. o Swales, where appropriate, to improve the quality of seepage water.	Operator	Operation
Periodic housekeeping inspections by the developer are recommended during operation. The recommended frequency of such inspections during initial operation is 6-monthly, but the frequency of inspections may be changed, pending the severity of impacts identified. The aim of the inspections is the same as for the Construction Phase (refer to Objective 3, Mitigation Action 12). Immediate corrective action must be taken if inspections identify any failures to comply.	Operator	Operation
Dirty stormwater must be captured by inner perimeter drains and contained in a leachates sump or sumps with sufficient capacity to hold runoff 1:100 year flood event.	Operator	Operation
No trapping, killing, or poisoning of any animals is to be allowed.	Operator	Operation
Speed limits must still be enforced to ensure that road killings and erosion are limited.	Operator	Operation
Continuously monitor erosion and compaction on site.	Operator	Operation
To improve the ecological integrity of Alternative B and offset the destruction of vegetation in Alternative A, an integrated management plan must be compiled for this area and	Operator	Operation

<table>
<tr><th>Mitigation: Action/Control</th><th>Responsibility</th><th>Timeframe</th></tr>
<tr><td>implemented during the operation phase. This must include alien plant control.</td><td></td><td></td></tr>
<tr><td>To comply with the National Environmental Management: Biodiversity Act (Act No. 10 of 2004), all listed invasive exotic plants as indicated in Appendix 1 of the Terrestrial Biodiversity Impact Assessment must be targeted and controlled. This is especially relevant to the many alien invasive tree and shrub species present, and may require the compilation of an alien plant control plan.</td><td>Operator</td><td>Operation</td></tr>
<tr><td>All woody alien plants within a 200 m radius of the site be immediately destroyed using appropriate techniques.</td><td>Operator</td><td>Operation</td></tr>
<tr><td>Where weed control involves the use of herbicides, be managed correctly to reduce the impact on the adjacent natural vegetation. Regular inspections must be conducted to determine if any additional alien plants have established.</td><td>Operator</td><td>Operation</td></tr>
<tr><td>Avoid creating conditions in which alien plants may become established:
» Keep disturbance of indigenous vegetation to a minimum.
» Rehabilitate disturbed areas as quickly as possible.
» Do not import soil from areas with alien plants.</td><td>Operator</td><td>Operation</td></tr>
<tr><td>No planting or importing any listed invasive alien plant species (all Category 1a, 1b and 2 invasive species) to the site for landscaping, rehabilitation or any other purpose must be undertaken.</td><td>Operator</td><td>Operation</td></tr>
<tr><td>Waste should periodically be covered with layers of soil obtained from an authorised borrow pit to allow for physical and chemical stability of the waste and create a sustainable future land use or ecological function; and</td><td>Operator</td><td>Operation</td></tr>
<tr><td>All leachate must be directed to the Leachate Evaporation Pond. All leachate must be considered as hazardous and disposed of accordingly. Appropriate methods of disposal of leachate are detailed by Schoeman et al. (2003). Leachate with low salinity (<50 g/ℓ) should be treated using reserve osmosis (Scheoman et al. 2003). Leachate with high salinity (>50 g/ℓ) should be pre-treated with adsorbents, absorbents (ash), or flocculants prior to electrodialysis desalinisation, followed by reserve osmosis (Scheoman et al. 2003). Discharge of untreated leachate from the disposal site shall not be allowed.</td><td>Operator</td><td>Operation</td></tr>
<tr><td>All dirty stormwater must be directed to the Stormwater Evaporation Pond. All dirty stormwater must be considered as hazardous and disposed of accordingly.</td><td>Operator</td><td>Operation</td></tr>
<tr><td>Implement a groundwater monitoring programme to ensure water remains compliant with the DWAF Minimum Requirements for Waste Disposal by Landfill (2nd Edition, 1998) Boreholes to be monitored includes BH1, BH2, BH3 & BH4.
<table>
<tr><th>Borehole No.</th><th>Southings</th><th>Eastings</th><th>Monitoring Frequency</th></tr>
</table>
</td><td>Operator</td><td>Operation</td></tr>
</table>

Mitigation: Action/Control	Responsibility	Timeframe
<table><tr><td>BH1</td><td>S27º 07' 05.4''</td><td>E029º 46' 14.8''</td><td rowspan="4">Quarterly</td></tr><tr><td>BH2</td><td>S27º 07' 21.6''</td><td>E029º 46' 16.0''</td></tr><tr><td>BH3</td><td>S27º 07' 17.1''</td><td>E029º 46' 29.4''</td></tr><tr><td>BH4</td><td>S27º 07' 03.4''</td><td>E029º 46' 27.5''</td></tr></table> The suggested parameters for detection monitoring are tabulated below and should be compiled on a quarterly basis. <table><tr><td>Alkalinity (Total Alkalinity)</td><td>Calcium (Ca)</td></tr><tr><td>Ammonia (NH3) as N</td><td>Fluoride as F</td></tr><tr><td>Chemical Oxygen Demand (COD)</td><td>Magnesium (Mg)</td></tr><tr><td>Chloride as Cl</td><td>Sodium as Na</td></tr><tr><td>Electrical Conductivity</td><td>Sulphate as SO4</td></tr><tr><td>Nitrate (NO_3) as N</td><td></td></tr><tr><td>Nitrite (NO2) as N</td><td></td></tr><tr><td>pH – Value</td><td></td></tr><tr><td>Potassium (K)</td><td></td></tr><tr><td>Total Dissolved Solids</td><td></td></tr></table>		
Implement inter layering with soil lenses.	Operator	Operation
Ensure surface run-off is contained and treated before disposal.	Operator	Operation

Performance Indicator	» No further disturbance to vegetation or terrestrial faunal habitats (including avifauna). » No soil erosion and pollution problems resulting from operational activities within the solar facility. » Low abundance of alien plants within affected areas. » Maintenance of a ground cover that resist erosion. » Continued improvement of rehabilitation efforts. » No impacts to wetland features. » No disturbance and pollution of surface and groundwater resources. » No impacts due to runoff. » Appropriate storm water management system in place.
Monitoring	» Observation of vegetation on-site by environmental manager. » Regular inspections to monitor plant regrowth/performance of rehabilitation efforts and weed infestation compared to natural/undisturbed areas. » Annual monitoring with records of alien species presence and clearing actions. » Annual monitoring with records of erosion problems and mitigation actions taken with photographs. » Monitoring of groundwater quality.

OBJECTIVE 2: Minimise impact on ambient air quality through effective management, mitigation, and monitoring during the operational phase.

Project Component/s	» All project components.
Potential Impact	» The operation of the general waste disposal site will result in the emission of landfill gas.
Activities/Risk Sources	» Operation of the general waste disposal site. » Vehicle entrainment from on-site unpaved roads.
Mitigation: Target/Objective	» Ensure compliance with ambient air quality and dustfall standards at the property boundary.

Mitigation: Action/Control	Responsibility	Timeframe
To minimise LFG emissions and the impact thereof on the receiving environment, inactive areas should be capped with the final cap as soon as possible.	Operator	Operation
A complaints register should be kept on site and complaints should be proactively acted upon to minimise similar future impacts on the nearby communities.	Operator	Operation
Once-off H_2S sampling, using passive diffusive samplers, must be conducted on the western and eastern edges of the landfill site to confirm dispersion modelling results. Since the generation of H_2S is expected to increase with time, it is recommended that this sampling be conducted after 5 years of operation, i.e. when the first cell is capped and filling of the second cell starts.	Operator	Operation
The existing dust fallout monitoring network at the Majuba Power Station must be extended to include a sampling location to the south of the landfill site.	Operator	Operation
Appropriate dust suppression (such as water sprays) must be employed on unpaved road surfaces and to exposed areas when periods of high wind speeds are anticipated.	Operator	Operation

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

OBJECTIVE 3: Prevention of fires during the operation phase of the waste disposal site

Project Component/s	» Operation and maintenance of the general waste disposal site. » Storage of dangerous substances (such as Diesel at the plant parking, maintenance and wash bay)
Potential Impact	- Fires risk at the waste disposal site.
Activities/Risk Sources	» Fuel Storage and Offloading.
Mitigation: Target/Objective	» To avoid or minimise the risk of impacts to workers, surrounding landowners and communities.

Mitigation: Action/Control	Responsibility	Timeframe
Implement emergency response arrangements and systems, such as alarms to allow for personnel to muster in case of emergency, as well as fire-fighting systems and cooperation with emergency responders.	Operator	Operation
Provide adequate firefighting equipment on site and establish a fire-fighting management plan during operation.	Operator	Operation
Provide fire-fighting training to selected operation and maintenance staff.	Operator	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.).	Operator	Operation
Contact details of emergency services must be prominently displayed on site.	Operator	Operation

Performance Indicator	» Firefighting equipment and training provided before the operation phase commences. » Appropriate fire breaks in place. » Appropriate emergency response arrangements and systems in place.
Monitoring	» The Facility (waste disposal site) Manager must monitor indicators listed above to ensure that they have been met.

OBJECTIVE 4: Appropriate handling and management of hazardous substances, waste and dangerous goods during the operation of the facility

The operation of the general waste disposal site will involve the storage of chemicals and hazardous substances at the plant parking, maintenance and wash bay. During operation, the waste coming into the facility will have to be handled and managed accordingly.

Project Component/s	» All project components.
Potential Impact	» Poor handling and management of hazardous substance and waste coming into the facility.
Activity/Risk Source	» Operation staff not aware of the relevant procedures for handling and managing hazardous substances and waste coming into the facility.
Mitigation: Target/Objective	» Comply with waste management legislation. » Ensure appropriate waste handling and management. » Avoid environmental harm from waste disposal at the facility.

	» Ensure appropriate storage of chemicals and hazardous substances at the plant parking, maintenance and wash bay.

Mitigation: Action/Control	Responsibility	Timeframe
All waste coming into the facility should be weighed and classified; in addition the waste register should be maintained.	Operator	Operation
Details of the waste register must include, but not limited to waste type, date of waste coming in or out (to recycling facilities), details of the collector or producer.	Operator	Operation
Visual inspections should be done frequently at the disposal site to ensure that waste coming into the site is properly disposed off or sorted, at designated areas.	WMO	Operation
Waste disposal should be done in accordance with the NEM:WA standard for Disposal of Waste to Landfill.	Operator	Operation
Hazardous substances at the plant parking, maintenance and wash baymust 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.	Operator EO/WMO	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
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.	Operator WMO	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 WMO	Operation

Performance Indicator	» Waste coming into the facility is handled and managed accordingly. » Internal site audits identifying that waste segregation recycling and reuse is occurring appropriately. » No contamination as a result of accidental spills.
Monitoring	» Waste registers for waste coming into the facility must be completed and available for inspection. » Observation and supervision of the site by the EO/WMO to ensure that waste is being disposed off, or sorted at designated areas. » Observation and supervision of chemical storage and handling practices and vehicle maintenance throughout the operation phase. » An incident reporting system must be used to record non-conformances to the EMPr. » Monitor hydrocarbon spills from vehicles and machinery during operation continuously and record volume and nature of spill, location and clean-up actions.

9. MANAGEMENT PROGRAMME: DECOMMISSIONING AND CLOSURE

A decommissioning and closure EMPr will be drafted and complied with at the decommissioning and closure stage of the project lifecycle. Decommissioning and closure activities are to comply with the legislation relevant at the time.

The following mitigation actions must be considered for inclusion in the decommissioning and closure EMPr.

- Ensure adequate lining and drainage systems as well as leachate pits are installed.
- Ensure that surface run-off is contained and treated before disposal.
- Adequate storm water measures must be implemented.
- Groundwater monitoring must be undertaken to ensure early detection of pollution.
- Capping material must be grassed over.

The following rehabilitation plan can be utilized should any contamination be detected during monitoring.

- Source:
  - Identify the source of contamination.
  - Identify the nature and extent of contamination.
  - Eliminate or control source of contamination (if possible).
- Exposure Pathways:
  - Establish preferential flow paths.
- Receptor (current receptors include animals and plants):
  - Identify risk to potential receptors.
  - Ensure end-users are aware of potential contamination.
  - Conduct quality analysis to ensure water remains within quality guidelines for intended use.

Routine maintenance of stormwater canals and catch pits, leachate dams, monitoring boreholes etc. should be conducted on a regular basis. Any potential contamination detected should be reported. If present, down gradient users should be notified of the potential concern and remedial measures should be implemented.

APPENDIX A: LAYOUT

NORTH

250 thick gabion mattress lined Emergency Spillway

450 dia stormwater outlet pipe to drain onto gabion mattress

Leachate Evaporation Pond
Crest 53.0m
Water level 52.5m
Bottom 51.0m

Stormwater Attenuation Pond
Crest 55.0m
Spillway 54.75m
Bottom 54.0m

Recylcable waste unload, & sort bins

Office

Carports

Guardhouse

Carports

Recylcable waste sort & reload bins

Plant parking, maintenance and washbay

250 dia PVC leachate drainage pipe

450 dia PC stormwater pipe

Gate valve in Manhole L1

Ramp B

Manhole SW9

Manhole SW10

450 dia PC stormwater pipe

Ring road

Manhole SW8

Manhole SW14

Manhole SW13

Manhole SW12

450 dia PC stormwater pipe

Manhole SW11

Manhole SW7

Surface channel at toe of capping

Drop from surface channel to buried pipe

Drop from surface channel to buried pipe

Drop from surface channel to buried pipe

Cell C3

Surface channel at toe of capping

Drop from surface channel to buried pipe

Cell C4c

266.6

Stormwater surface channel at toe where waste has been capped

Berm 4bc

Cell C3

Cell C2

Cell C1

CUT

FILL

Manhole SW6

Cell C4b

450 dia PC stormwater pipe to drain runoff from capped waste to Stormwater Attenuation Pond

Finished Top of Liner Level 57.00

Berm 3/4

Berm 2/3

Berm 1/2

114.5

Surface channel at toe of capping

Ring road

Ramp A

Berm 4ab

Manhole SW5

Cell C4a

LANDFILL PLANFORM

Boundary fence

Ring road

Drop from surface channel to buried pipe

Drop from surface channel to buried pipe

Drop from surface channel to buried pipe

Surface channel at toe of capping

Manhole SW4

Ring road

Manhole SW3

Manhole SW2

450 dia PC stormwater pipe

Manhole SW1

Ring road

Boundary security fence

Stormwater diversion berm and channel

Stormwater diversion berm and channel

Shaded area indicates lining

0m 10m 20m 30m 40m 50m 100m

PLAN

Cells C1 to C4 to be landfilled in sequence. Cells being landfilled to be separated from unfilled area by temporary internal berms that are to be removed for reuse of the soil fill as landfilling is extended to cover their locations.

PRELIMINARY FOR ESKOM CONSIDERATION

Consulting Company: WSM Geotechnical Engineering, a division of WSM Group

The Employer: Eskom

Project: **NEW GENERAL WASTE DISPOSAL FACILITY AT MAJUBA POWER STATION**

Drawing Title: **GENERAL ARRANGEMENT**

Drawing Number: wsm-maj-01

Revision: D

Date: 16 March 2022

D.O.	REV.	DATE	FIRST ISSUE / ** REVISION ** / INDEX REFERENCE	REV BY	CHKD BY	AUTH BY	KKS APP	0·__ REFERENCE DRAWINGS
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DRG REGISTER

APPROVED BY

AUTHORISED BY

KKS APP.

AUTH BY

CHKD BY

DRAWN BY

SCALE

ESKOM HOLDINGS LTD. REG. No. 2002/015527/06

Eskom 0·__/_____ REV

SIZE A0

APPENDIX B: EIA PROJECT CONSULTING TEAM

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Woodlands Drive, Woodmead
Johannesburg, South Africa

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

CURRICULUM VITAE OF MMAKOENA MMOLA

Profession : Senior Environmental Assessment Practitioner

Specialisation: Environmental Permitting, Environmental Assessments, and Compliance

Work Experience: 5 years

VOCATIONAL EXPERIENCE

Mmakoena is an Environmental Consultant with 5 years of experience in the environmental field. She holds a B.Sc. (Hons) in Geochemistry from the University of the Witwatersrand and is currently completing her B.Sc. (Hons) in Environmental Management with the University of South Africa. She is registered as a Professional Natural Scientist with the South African Council for Natural Scientific Professions (SACNASP), Registration Number: 126748 and an Environmental Assessment Practitioner with the Environmental Assessment Practitioners Association of South Africa, Number 2019/260.

Mmakoena's experience includes Environmental Impact Assessment (EIA) permitting for a variety of projects, ranging from infrastructure (transport services and localised infrastructure), mining, waste management services, and renewable energy. These include Environmental Authorisations (Basic Assessments and Scoping and Environmental Impact Assessments), Water Use Authorisations, compliance auditing and mining permitting. She therefore has a wide ranging experience with various legislation including the National Environmental Management Act (NEMA), National Heritage Resources Act (NHRA), National Environmental Management Waste Management Act (NEM:WA), National Environmental Management Biodiversity Act (NEM:BA), the Mineral and Petroleum Resources Development Act (MPRDA) and the National Water Act (NWA), having applied them for numerous small, medium and large-scale projects across various industries. Mmakoena also has experience beyond the permitting sphere through screening assessments for potential developers, including pre-feasibility desktop screening and regulatory and permitting approval screening.

SKILLS BASE AND CORE COMPETENCIES

- Environmental management, environmental impacts assessments, environmental permitting and compliance monitoring
- Project management
- Public participation and stakeholder engagement
- Field work skills
- Adaptability and ability to handle pressure
- Organisational skills
- MS Office Package (Word, PowerPoint and Excel)
- Google Earth
- ArcGIS (basic)

EDUCATION AND PROFESSIONAL STATUS

Degrees:

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

Short Courses and Workshops Attended:

- Environmental Law Update Webinar, 2021, Inlexso
- Environmental Management and Regulations, 2018, Kuvimbika
- Research Methodology and Report Writing, 2017, Imsimbi Training

Professional Society Affiliations:

- Professional Natural Scientist, Environmental Science, South African Council for Natural and Scientific Professions – Registration Number: 126748
- Environmental Assessment Practitioner with the Environmental Assessment Practitioners Association of South Africa - Number 2019/260.

EMPLOYMENT

Date	Company	Roles and Responsibilities
2022 - Current	Savannah Environmental (Pty) Ltd	*Senior Environmental Assessment Practitioner* Tasks include: • *Undertake environmental screening assessments, environmental permitting and environmental authorisation applications.* • *Undertake water use authorisation applications on the e-WULAA system.* • *Complete Part 1 and Part 2 EA amendment applications and prepare motivation reports in support of applications for Part 2 EA amendments.* • *Undertake environmental compliance audits and provide ECO services.* • *Efficient and quality report writing to execute and manage the delivery of environmental impact assessment (EIA) reports and Environmental Management Programmes in line with the requirements of the National Environmental Management Act and EIA Regulations.* • *Liaison with relevant environmental authorities.* • *Execution of the public participation process.* • *Professional client liaison.* • *Project management.* • *Manage third parties or sub-consultants to which functions have been outsourced.* • *Preparation of proposals and budgets.* • *Mentoring and advising junior environmental consultants and evaluating their work.*

Date	Company	Roles and Responsibilities
2021 - Current:	Savannah Environmental (Pty) Ltd	*Environmental Assessment Practitioner* Tasks include: • *Undertake environmental screening assessments, environmental permitting and environmental authorisation applications.* • *Undertake water use authorisation applications on the e-WULAA system.* • *Complete Part 1 and Part 2 EA amendment applications and prepare motivation reports in support of applications for Part 2 EA amendments.* • *Undertake environmental compliance audits and provide ECO services.* • *Efficient and quality report writing to execute and manage the delivery of environmental impact assessment (EIA) reports and Environmental Management Programmes in line with the requirements of the National Environmental Management Act and EIA Regulations.* • *Liaison with relevant environmental authorities.* • *Execution of the public participation process.* • *Professional client liaison.* • *Project management.* • *Manage third parties or sub-consultants to which functions have been outsourced.* • *Preparation of proposals and budgets.*
2019 - 2020	Golder Associates Africa (Pty) Ltd	*Junior Environmental Consultant* Tasks included: • *Providing assistance on local environmental and social impact assessments.* • *Completing water use license applications.* • *Undertaking environmental compliance and water use license audits.* • *Providing ECO Services.* • *Conducting annual integrated water and waste management plan updates.* • *Preparing environmental screening reports.* • *Preparing project proposal documents and budgets.* • *Assisting in the compilation of terrestrial ecology and wetland impact assessment reports and mine closure plans.* • *Undertaking field work.* • *Liaising with clients and regulatory authorities.* • *Providing administrative support to project managers.*
2017 - 2019	Shango Solutions	*Junior Consultant* Tasks included: • *Completing environmental authorisation, prospecting and mining permit applications.* • *Completing Section 102 amendment applications.*

Date	Company	Roles and Responsibilities
		• *Conducting performance assessments and financial provisioning assessments in accordance with the Mineral and Petroleum Resources Development Act (MPRDA).* • *Compiling basic assessment reports and synthesizing work from other environmental specialists for inclusion in the basic assessment reports.* • *Identifying potential environmental impacts and preparing environmental management programmes detailing suitable mitigation measures.* • *Identification of key stakeholders, landowners, neighbours, organs of state and other applicable interested and affected parties for specific projects and compilation of Interested and Affected Party (I&AP) databases.* • *Drafting public participation documentation according to regulatory requirements: Background Information Documents; site notices and adverts; letters to stakeholders and/or Interested and Affected Parties; and comments and responses reports.* • *Arranging and facilitating public meetings.* • *Conducting consultations with community leaders, tribal chiefs, affected landowners, etc.* • *Providing administrative support to project managers.*

PROJECT EXPERIENCE

RENEWABLE POWER GENERATION PROJECTS: SOLAR ENERGY FACILITIES AND WIND ENERGY FACILITIES

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	***Client Name***	***Role***
400MW (4x 100MW) Mutsho Solar PV, Limpopo Province	*CRI Eagle*	*EAP*
Angora Wind Energy Facility, Northern Cape Province	*Great Karoo Renewable Energy (Pty) Ltd*	*EAP*
Merino Wind Energy Facility, Northern Cape Province	*Great Karoo Renewable Energy (Pty) Ltd*	*EAP*
Vrede and Rondavel Solar PV Facilities, Free State Province	*Mainstream Renewable Energy Developments (Pty) Ltd*	*Assistant EAP*
40MW Buffelspoort Solar PV Energy Facility, North-West Province	*Buffelspoort Solar Project*	*EAP*
100MW Northam Solar PV Energy Facility, Limpopo Province	*Zondereinde Solar Proprietary Limited*	*EAP*
Ummbila Emoyeni Renewable Farm, Mpumalanga Province	*Emoyeni Renewable Energy Farm (Pty) Ltd*	*EAP*

Basic Assessments

Project Name & Location	***Client Name***	***Role***
Northam Solar Photovoltaic (PV) Facility, Limpopo Province	*Northam Platinum Limited*	*EAP*
Hamlett Wind Energy Facility, Eastern Cape Province (project in progress)	*Hamlett (Pty) Ltd*	*EAP*
19.99MW Becrux Solar PV Facility, Mpumalanga Province	*The SOLA Group*	*EAP*
10MW Becrux Two Solar PV Facility, Free State Province	*The SOLA Group*	*EAP*
Aberdeen Wind Farm cluster - 4x 170MW Wind	*Atlantic Energy Partners (Pty) Ltd*	*EAP*

Screening Studies

Project Name & Location	***Client Name***	***Role***
Environmental Screening for the Proposed Secunda and Sasolburg Solar PV Facilities, Free State Province and Mpumalanga Province	*The SOLA Group*	*EAP*
Pre-feasibility Desktop Screening and Fatal Flaw Scan for wind project near Saldanha, Western Cape	*SaldaWind (Pty) Ltd*	*EAP*

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

Project Name & Location	***Client Name***	***Role***
Biodiversity Permitting and General Authorisation Applications for the Harmony Tshepong, Nyala and Eland Solar PV Facilities, Free State Province	*Nyala Photovoltaic (Pty) Ltd* *Tshepong Photovoltaic (Pty) Ltd* *Eland Photovoltaic (Pty) Ltd*	*EAP*
General Authorisation Application for the Northam Solar PV Facility, Limpopo Province	*Northam Platinum Limited*	*EAP*

Environmental Authorisation Amendment Applications

Project Name & Location	***Client Name***	***Role***
Part I Amendment: Proposed 75MW Sannaspos PV Plant (Phase 1) and its associated infrastructure, Free State Province	*ENGIE BU Africa*	*EAP*
Part I Amendment: Construction of the 140MW Korana Wind Energy Facility, Northern Cape Province	*Mainstream Renewable Energy Developments (Pty) Ltd*	*EAP*
Part I Amendment: Construction of the 75MW Korana Solar Energy Facility, Northern Cape Province	*Mainstream Renewable Energy Developments (Pty) Ltd*	*EAP*
Part I Amendment: Construction of the 140MW Khai-Ma Wind Energy Facility, Northern Cape Province	*Mainstream Renewable Energy Developments (Pty) Ltd*	*EAP*

GRID INFRASTRUCTURE PROJECTS

Basic Assessments

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

Electrical Grid Infrastructure for the Kolkies and Sadawa PV clusters, Western Cape Province	*Mainstream Renewable Energy Developments (Pty) Ltd*	*EAP*
Electrical Grid Infrastructure for the Vrede and Rondavel Solar PV Facilities, Free State Province	*Mainstream Renewable Energy Developments (Pty) Ltd*	*EAP*
Sadawa Collector Substation, Western Cape Province	*Mainstream Renewable Energy Developments (Pty) Ltd*	*EAP*
Main Transmission Substation (MTS) associated with the Choje Wind Farm cluster, Eastern Cape Province (project in progress)	*Wind Relic (Pty) Ltd*	*EAP*
Great Karoo Electrical Grid Infrastructure, Northern Cape Province	*Great Karoo Renewable Energy (Pty) Ltd*	*EAP*
Electrical Grid Infrastructure for the Ummbila Emoyeni Renewable Farm, Mpumalanga Province	*Emoyeni Renewable Energy Farm (Pty) Ltd*	*EAP*
Electrical Grid Infrastructure for the Aberdeen Wind Farm Cluster	*Atlantic Energy Partners (Pty) Ltd*	*EAP*

Environmental Authorisation Amendment Applications

Project Name & Location	***Client Name***	***Role***
Part I Amendment: Construction of a 132kV power lines associated with the Poortjies Wind Energy Facility, Northern Cape Province	*Mainstream Renewable Energy Developments (Pty) Ltd*	*EAP*
Part I Amendment: Construction of a 132kV power lines associated with the Khai-Ma Wind Energy Facility, Northern Cape Province	*Mainstream Renewable Energy Developments (Pty) Ltd*	*EAP*
Part II Amendment: Korana solar power line Part 2 EA amendment, Northern Cape Province	*Mainstream Renewable Energy Developments (Pty) Ltd*	*EAP*

GAS EXPLORATION PROJECTS

Environmental Impact Assessments and Environmental Management Programmes

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

MINING PROJECTS

Environmental Impact Assessments and Environmental Management Programmes

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

Basic Assessments

Project Name & Location	***Client Name***	***Role***
Basic Assessment for the Western Margin Gap West Prospecting Right, Free State Province	*White Rivers Exploration (Pty) Ltd*	*Assistant EAP*

Basic Assessment for the Ventersburg Consolidated Prospecting Right, Free State Province	*White Rivers Exploration (Pty) Ltd*	*Assistant EAP*
Basic Assessment for the Nkunzana Prospecting Right, KwaZulu-Natal Province	*WRE Base Metals (Pty) Ltd*	*Junior EAP*
Basic Assessment for the Kroonstad North Prospecting Right, Free State Province	*White Rivers Exploration (Pty) Ltd*	*Junior EAP*
Basic Assessment for the Vredefort West Extension Prospecting Right, Free State Province	*White Rivers Exploration (Pty) Ltd*	*Junior EAP*
Basic Assessment for the Beisa North Prospecting Right, Free State Province	*Sunshine Mineral Reserves (Pty) Ltd*	*EAP*
Basic Assessment for the Palmietfontein Mining Permit, North-West Province	*Palm Chrome (Py) Ltd*	*Assistant EAP*

Specialist Studies

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

Environmental Compliance, Auditing and ECO

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

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

Specialist Studies

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

Environmental Compliance, Auditing and ECO

Project Name & Location	***Client Name***	***Role***
MWCAP-2A Environmental Management Audit, Limpopo Province	*Nexia SAB&T*	*Auditor*

AGRICULTURE PROJECTS

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

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

OTHER

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	***Client Name***	***Role***
Anglo African Metals Zero Waste Recovery Solution, Mpumalanga Province	*Anglo African Metals (Pty) Ltd*	*EAP*
Eskom Majuba Landfill, Mpumalanga Province (project in progress)	*Eskom*	*EAP*
Expansion of Recreational and Sports Facilities at the Country Club Johannesburg	*Country Club Johannesburg*	*EAP*

savannah environmental

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Johannesburg, South Africa

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CURRICULUM VITAE OF JO-ANNE THOMAS

Profession:	Environmental Management and Compliance Consultant; Environmental Assessment Practitioner
Specialisation:	Environmental Management; Strategic environmental advice; Environmental compliance advice & monitoring; Environmental Impact Assessments; Policy, strategy & guideline formulation; Project Management; General Ecology
Work experience:	Twenty four (24) years in the environmental field

VOCATIONAL EXPERIENCE

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

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

SKILLS BASE AND CORE COMPETENCIES

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

EDUCATION AND PROFESSIONAL STATUS

Degrees:

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

Short Courses:

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

Professional Society Affiliations:

- Registered EAP with the Environmental Assessment Practitioners Association of South Africa (EAPASA) (2019/726)
- Registered with the South African Council for Natural Scientific Professions as a Professional Natural Scientist: Environmental Scientist (400024/00)
- Registered with the International Associated for Impact Assessment South Africa (IAIAsa): 5601
- Member of the South African Wind Energy Association (SAWEA)

EMPLOYMENT

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

PROJECT EXPERIENCE

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

RENEWABLE POWER GENERATION PROJECTS: PHOTOVOLTAIC SOLAR ENERGY FACILITIES

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
Christiana PV 2 SEF, North West	Solar Reserve South Africa	Project Manager & EAP
De Aar PV facility, Northern Cape	iNca Energy	Project Manager & EAP
Everest SEF near Hennenman, Free State	FRV Energy South Africa	Project Manager & EAP
Graafwater PV SEF, Western Cape	iNca Energy	Project Manager & EAP
Grootkop SEF near Allanridge, Free State	FRV Energy South Africa	Project Manager & EAP
Hertzogville PV 2 SEF with 2 phases, Free State	SunCorp / Solar Reserve	Project Manager & EAP

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

Basic Assessments

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

Project Name & Location	Client Name	Role
Sannaspos PV SEF Phase 2 near Bloemfontein, Free State	SolaireDirect Southern Africa	Project Manager & EAP
Solar Park Expansion within the Rooiwal Power Station, Gauteng	AFRKO Energy	Project Manager & EAP
Steynsrus SEF, Free State	SunCorp	Project Manager & EAP
Sirius Solar PV Project Three and Sirius Solar PV Project Four (BA in terms of REDZ regulations), Northern Cape	SOLA Future Energy	Project Manager & EAP
Northam PV, Limpopo Province	Northam Platinum	Project Manager & EAP
Kolkies PV Suite (x 6 projects) and Sadawa PV Suite (x 4 projects), Western Cape	Mainstream Renewable Energy Developments	Project Manager & EAP

Screening Studies

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

Environmental Compliance, Auditing and ECO

Project Name & Location	Client Name	Role
ECO and bi-monthly auditing for the construction of the Adams Solar PV Project Two South of Hotazel,	Enel Green Power	Project Manager

Project Name & Location	Client Name	Role
Northern Cape		
ECO for the construction of the Kathu PV Facility, Northern Cape	REISA	Project Manager
ECO and bi-monthly auditing for the construction of the Pulida PV Facility, Free State	Enel Green Power	Project Manager
ECO for the construction of the RustMo1 SEF, North West	Momentous Energy	Project Manager
ECO for the construction of the Sishen SEF, Northern Cape	Windfall 59 Properties	Project Manager
ECO for the construction of the Upington Airport PV Facility, Northern Cape	Sublanary Trading	Project Manager
Quarterly compliance monitoring of compliance with all environmental licenses for the operation activities at the Kathu PV facility, Northern Cape	REISA	Project Manager
ECO for the construction of the Konkoonsies II PV SEF and associated infrastructure, Northern Cape	BioTherm Energy	Project Manager
ECO for the construction of the Aggeneys PV SEF and associated infrastructure, Northern Cape	BioTherm Energy	Project Manager

Compliance Advice and ESAP Reporting

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

Due Diligence Reporting

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

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

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

RENEWABLE POWER GENERATION PROJECTS: CONCENTRATED SOLAR FACILITIES (CSP)

Environmental Impact Assessments and Environmental Management Programmes

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

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

Environmental Compliance, Auditing and ECO

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

Screening Studies

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

Compliance Advice and ESAP reporting

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

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

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

RENEWABLE POWER GENERATION PROJECTS: WIND ENERGY FACILITIES

Environmental Impact Assessments and Environmental Management Programmes

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

Basic Assessments

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

Screening Studies

Project Name & Location	Client Name	Role
Albertinia WEF, Western Cape	BioTherm Energy	Project Manager & EAP
Koingnaas WEF, Northern Cape	Just Pal Tree Power	Project Manager & EAP
Napier Region WEF Developments, Western Cape	BioTherm Energy	Project Manager & EAP
Tsitsikamma WEF, Eastern Cape	Exxarro Resources	Project Manager & EAP

Project Name & Location	Client Name	Role
Various WEFs within an identified area in the Overberg area, Western Cape	BioTherm Energy	Project Manager & EAP
Various WEFs within an identified area on the West Coast, Western Cape	Investec Bank Limited	Project Manager & EAP
Various WEFs within an identified area on the West Coast, Western Cape	Eskom Holdings Limited	Project Manager & EAP
Various WEFs within the Western Cape	Western Cape Department of Environmental Affairs and Development Planning	Project Manager & EAP
Velddrift WEF, Western Cape	VentuSA Energy	Project Manager & EAP
Wind 1000 Project	Thabo Consulting on behalf of Eskom Holdings	Project Manager & EAP
Wittekleibosch, Snylip & Doriskraal WEFs, Eastern Cape	Exxarro Resources	Project Manager & EAP

Environmental Compliance, Auditing and ECO

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

Compliance Advice

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

Rheboksfontein WEF, Western Cape	Moyeng Energy	Environmental Advisor
Tiqua WEF, Western Cape	Cennergi	Environmental Advisor
Tsitsikamma WEF, Eastern Cape	Cennergi	Environmental Advisor
West Coast One WEF, Western Cape	Moyeng Energy	Environmental Advisor

Due Diligence Reporting

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

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

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

CONVENTIONAL POWER GENERATION PROJECTS (COAL)

Environmental Impact Assessments and Environmental Management Programmes

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

Project Name & Location	Client Name	Role
Waterberg IPP Coal-Fired Power Station near Lephalale, Limpopo	Exxaro Resources	Project Manager & EAP

Basic Assessments

Project Name & Location	Client Name	Role
Coal Stockyard on Medupi Ash Dump Site, Limpopo	Eskom Holdings	Project Manager & EAP
Biomass Co-Firing Demonstration Facility at Arnot Power Station East of Middleburg, Mpumlanaga	Eskom Holdings	Project Manager & EAP

Screening Studies

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

Environmental Compliance, Auditing and ECO

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

Compliance Advice

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

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

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

CONVENTIONAL POWER GENERATION PROJECTS (GAS)

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
Ankerlig OCGT to CCGT Conversion project &400 kV transmission power line between Ankerlig and the Omega Substation, Western Cape	Eskom Holdings SoC Limited	Project Manager & EAP
Gourikwa OCGT to CCGT Conversion project & 400kV transmission power line between Gourikwa & Proteus Substation, Western Cape	Eskom Holdings SoC Limited	Project Manager & EAP
Richards Bay Gas to Power Combined Cycle Power Station, KwaZulu-Natal	Eskom Holdings SoC Limited	Project Manager & EAP
Richards Bay Gas to Power Plant, KwaZulu-Natal	Richards Bay Gas Power 2	Project Manager & EAP
Decommissioning & Recommissioning of 3 Gas Turbine Units at Acacia Power Station & 1 Gas Turbine Unit at Port Rex Power Station to the existing	Eskom Holdings	Project Manager & EAP

Project Name & Location	Client Name	Role
Ankerlig Power Station in Atlantis Industria, Western Cape		
320MW gas-to-power station in Richards Bay, KwaZulu-Natal	Phinda Power Projects	Project Manager & EAP

Screening Studies

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

GRID INFRASTRUCTURE PROJECTS

Environmental Impact Assessments and Environmental Management Programmes

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

Basic Assessments

Project Name & Location	Client Name	Role
Dassenberg-Koeberg Power Line Deviation from the Koeberg to the Ankerlig Power Station, Western Cape	Eskom Holdings	Project Manager & EAP
Golden Valley II WEF Power Line & Substation near Cookhouse, Eastern Cape	BioTherm Energy	Project Manager & EAP
Golden Valley WEF Power Line near Cookhouse, Eastern Cape	BioTherm Energy	Project Manager & EAP
Karoshoek Grid Integration project as part of the Karoshoek Solar Valley Development East of Upington, Northern Cape	FG Emvelo	Project Manager & EAP

Project Name & Location	Client Name	Role
Konkoonsies II PV SEF Power Line to the Paulputs Substation near Pofadder, Northern Cape	BioTherm Energy	Project Manager & EAP
Perdekraal West WEF Powerline to the Eskom Kappa Substation, Westnern Cape	BioTherm Energy	Project Manager & EAP
Rheboksfontein WEF Powerline to the Aurora Substation, Western Cape	Moyeng Energy	Project Manager & EAP
Soetwater Switching Station near Sutherland, Northern Cape	African Clean Energy Developments (ACED)	Project Manager & EAP
Solis Power I Power Line & Switchyard Station near Upington, Northern Cape	Brightsource	Project Manager & EAP
Stormwater Canal System for the Ilanga CSP near Upington, Northern Cape	Karoshoek Solar One	Project Manager & EAP
Tsitsikamma Community WEF Powerline to the Diep River Substation, Eastern Cape	Eskom Holdings	Project Manager & EAP
Two 132kV Chickadee Lines to the new Zonnebloem Switching Station, Mpumalanga	Eskom Holdings	Project Manager & EAP
Electrical Grid Infrastructure for the Kolkies and Sadawa PV clusters, Western Cape	Mainstream Renewable Energy Developments	Project Manager & EAP
Sadawa Collector substation, Western Cape	Mainstream Renewable Energy Developments	Project Manager & EAP
Electrical Grid Infrastructure for the Vrede and Rondavel PV facilities, Free State	Mainstream Renewable Energy Developments	Project Manager & EAP

Environmental Compliance, Auditing and ECO

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

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

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

MINING SECTOR PROJECTS

Environmental Impact Assessments and Environmental Management Programmes

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

Basic Assessments

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

Environmental Compliance, Auditing and ECO

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

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

Project Name & Location	Client Name	Role
Waste Licence Application for the Rare Earth Separation Plant in Vredendal, Western Cape	Rareco	Project Manager & EAP

WULA for the Expansion of the Landfill site at Exxaro's Namakwa Sands Mineral Separation Plant, Western Cape	Exxaro Resources	Project Manager & EAP
S24G & WML for an Aluminium Plant, Gauteng	GfE-MIR Alloys & Minerals	Project Manager & EAP

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

Environmental Impact Assessments and Environmental Management Programmes

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

Basic Assessments

Project Name & Location	Client Name	Role
Harmony Gold WWTW at Doornkop Mine, Gauteng	Harmony Doornkop Plant	Project Manager & EAP
Ofir-ZX Watercourse Crossing for the Solar PV Facility, near Keimoes, Northern Cape	Networx S28 Energy	Project Manager & EAP
Qoboshane bridge & access roads, Eastern Cape	Emalahleni Local Municipality	Project Manager & EAP
Relocation of the Assay Laboratory near Carletonville, Gauteng	Sibanye Gold	Project Manager & EAP
Richards Bay Harbour Staging Area, KwaZulu-Natal	Eskom Holdings	Project Manager & EAP
S-Kol Watercourse Crossing for the Solar PV Facility, East of Keimoes, Northern Cape	Networx S28 Energy	Project Manager & EAP
Sonnenberg Watercourse Crossing for the Solar PV Facility, West Keimoes, Northern Cape	Networx S28 Energy	Project Manager & EAP

Project Name & Location	Client Name	Role
Kruisvallei Hydroelectric Power Generation Scheme, Free State	Building Energy	Project Manager & EAP
Masetjaba Water Reservoir, Pump Station and Bulk Supply Pipeline near Nigel, Gauteng	Naidu Consulting Engineers	Project Manager & EAP
Access Road for the Dwarsug Wind Farm, Northern Cape Province	South Africa Mainsteam Renewable Power	Project Manager & EAP

Screening Studies

Project Name & Location	Client Name	Role
Roodepoort Open Space Optimisation Programme (OSOP) Precinct, Gauteng	TIMAC Engineering Projects	Project Manager & EAP
Vegetable Oil Plant and Associated Pipeline, Kwa-Zulu Natal	Wilmar Oils and Fats Africa	Project Manager & EAP

Environmental Compliance, Auditing and ECO

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

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

Project Name & Location	Client Name	Role
WULA for the Izubulo Private Nature Reserve, Limpopo	Kjell Bismeyer, Jann Bader, Laurence Saad	Project Manager & EAP
WULA for the Masodini Private Game Lode, Limpopo	Masodini Private Game Lodge	Environmental Advisor
WULA for the Ezulwini Private Nature Reserve, Limpopo	Ezulwini Investments	Project Manager & EAP
WULA for the Masodini Private Game Lode, Limpopo	Masodini Private Game Lodge	Project Manager & EAP
WULA for the N10 Realignment at the Ilanga SEF, Northern Cape	Karoshoek Solar One	Project Manager & EAP
WULA for the Kruisvallei Hydroelectric Power Generation Scheme, Free State	Building Energy	Project Manager & EAP

Project Name & Location	Client Name	Role
S24G and WULA for the Ilegal construction of structures within a watercourse on EFF 24 Ruimsig Agricultural Holdings, Gauteng	Sorror Language Services	Project Manager & EAP

HOUSING AND URBAN PROJECTS

Basic Assessments

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

Compliance Advice and reporting

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

Environmental Compliance, Auditing and ECO

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

ENVIRONMENTAL MANAGEMENT TOOLS

Project Name & Location	Client Name	Role
Development of the 3rd Edition Environmental Implementation Plan (EIP)	Gauteng Department of Agriculture and Rural Development (GDARD)	Project Manager & EAP
Development of Provincial Guidelines on 4x4 routes, Western Cape	Western Cape Department of Environmental Affairs and Development Planning	EAP
Compilation of Construction and Operation EMP for the Braamhoek Transmission Integration Project, Kwazulu-Natal	Eskom Holdings	Project Manager & EAP
Compilation of EMP for the Wholesale Trade of Petroleum Products, Gauteng	Munaca Technologies	Project Manager & EAP
Operational Environmental Management Programme (OEMP) for Medupi Power Station, Limpopo	Eskom Holdings	Project Manager & EAP
Operational Environmental Management Programme (OEMP) for the Dube TradePort Site Wide Precinct	Dube TradePort Corporation	Project Manager & EAP
Operational Environmental Management Programme (OEMP) for the Kusile Power Station, Mpumalanga	Eskom Holdings	Project Manager & EAP
Review of Basic Assessment Process for the Wittekleibosch Wind Monitoring Mast, Eastern Cape	Exxaro Resources	Project Manager & EAP
Revision of the EMPr for the Sirius Solar PV	Aurora Power Solutions	Project Manager & EAP

Project Name & Location	Client Name	Role
State of the Environment (SoE) for Emalahleni Local Municipality, Mpumalanga	Simo Consulting on behalf of Emalahleni Local Municipality	Project Manager & EAP
Aspects and Impacts Register for Salberg Concrete Products operations	Salberg Concrete Products	EAP
First State of Waste Report for South Africa	Golder on behalf of the Department of Environmental Affairs	Project Manager & EAP
Responsibilities Matrix and Gap Analysis for the Kruisvallei Hydroelectric Power Generation Scheme, Free State Province	Building Energy	Project Manager
Responsibilities Matrix and Gap Analysis for the Roggeveld Wind Farm, Northern & Western Cape Provinces	Building Energy	Project Manager

PROJECTS OUTSIDE OF SOUTH AFRICA

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

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Johannesburg, South Africa

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CURRICULUM VITAE OF NONDUMISO BULUNGA

Comprehensive CV

Profession : Lead - Social, GIS and Stakeholder Engagement

Specialisation: Social, GIS and Stakeholder Engagement in the environmental field

Work Experience: 8 years in the Environmental field.

VOCATIONAL EXPERIENCE

Nondumiso Bulunga is a Social, GIS and Stakeholder Engagement Specialist at Savannah Environmental. Nondumiso has eight (8) years working experience in project management and facilitation in various industries such as environmental services field including but not limited to recycling, industrial, energy, mining and agriculture.

Working for small and large organisations, Nondumiso has gained exposure in research, collection of data, critical analysis, GIS, and environmental solutions. Nondumiso has worked on projects in South Africa and Malawi.

Nondumiso is very well versed in the IFC Environmental and Social Performance Standards (including IFC PS 2012) and the associated Equator Principles, which have informed the approach and standard for projects regarding ESIA. Nondumiso is skilled at organising and driving effective project teams at a scale relevant to the project's requirements. She has technical experience and can quickly identify the most pertinent issues of a particular project whilst focussing on driving project success by rigorously implementing project management tools.

Nondumiso has experience ranging over several aspects of social research, including the planning and execution of social surveys, participatory rural appraisal, sustainable livelihoods assessments, data management and statistical analysis, capturing and management of spatial data, stakeholder identification and community facilitation. She has worked in local and regional projects taking part in socioeconomic impact assessment, livelihood restoration plans and resettlement plans.

SKILLS BASE AND CORE COMPETENCIES

- Consultation
- Stakeholder Engagement
- Facilitation
- Social Impact Assessments
- Communication
- Project Management
- Project Coordination
- Research
- Training and Development
- Geographical Information Systems, Remote Sensing
- Stakeholder Engagement Plans
- Stakeholder Analysis and Mapping
- IFC Performance Standards
- Comments and Response Reports
- Grievance Mechanism
- Awarness Campaign

EDUCATION AND PROFESSIONAL STATUS

Degrees:

- 2018 : MSC GEOGRAPHICAL INFORMATION SYSTEM and REMOTE SENSING
- 2015 : BAHONS in GEOGRAPHY
- 2013 : BA in GEOGRAPHY AND SOCIOLOGY

Short Courses:

- 2015 One day information session on Modern Technologies and Pathways for the Energetic Use of Biomass
- 2015 One day Public lecture on Climate Change
- 2017 Accredited facilitation certification
- 2017 One day course on Office Management Training
- 2018 Resettlement as part of Impact Assessment

EMPLOYMENT

Duration	Position	Company	Roles and Responsibilities
May 2021 – current ●Permanent	Lead Consultant: Social, Stakeholder Engagement and GIS	Savannah Environmental (Pty) Ltd	Build, lead and manage a Stakeholder Consultation and Engagement team. Advance the Social Impact Assessment reporting service offering. Manage an in-house GIS team and upskill to improve and develop new deliverables for the EIA and Compliance teams. New business development, including development and driving the development of new products and/or services as part of the Savannah Environmental service offering. Manage and mentor staff and critically review and edit reporting/deliverables. Provide strategic input to business and project deliverables.

Duration	Position	Company	Roles and Responsibilities
October 2020 – February 2021 ●Contract	Data Analyst	Community Insights Groups (International)	Desk review of project documentation to inform data collection tools Contribute to the development of monitoring indicators Develop new databases of indicators and consolidate with existing databases from the client Develop household and focus group questionnaires Develop interview/ focus group guidelines Develop fieldwork plan Set up survey software Train local enumerators in the use of the survey software (over ZOOM) Provide remote support to the field team on the survey software Undertake phone KIIs Develop information campaign materials and visual aids for focus groups, KIIs Data organization and quality assurance during the field work (remote) Organize, clean and handover raw data to the client Desktop data analysis – qualitative and quantitative Produce and populate pivot and frequency distribution tables Produce narrative and graphic description of the data for the client report GIS Data Management and Handling Map creation and analysis
November 2019 – March 2021 ●Contract	Policy Coordinator Consultant	International Finance Corporation (International)	Support to the Agri-processing resource efficiency program Coordinate public and private stakeholders to propose specific policy Regulatory and procedural measures to promote improved water efficiency Convening a public-private dialogue process to reach consensus Manage partnerships with local authorities Due Diligence and risk assessment
April 2020 – October 2020 ●Contract	Project Manager	Pax Advisory (Pty) Ltd (South African)	Plan and implement projects Define project scope Help define goals Define deliverables Define tasks and required resources Create schedule Project timeline Manage budget Allocate project resources Track deliverables Support and direct team Lead quality assurance Monitor and report on project progress Present to stakeholders reports on progress as well as problems and solutions Implement and manage change Project data management

Duration	Position	Company	Roles and Responsibilities
March 2017- November 2019 ●Permanent	Environmental Stakeholder Consultant	Digby Wells Environmental (Pty) Ltd (South African)	Addressing issues and needs of communities' Public participation process and communicate Liaise with stakeholders Scientific report writing for social and stakeholder engagement inclusion Assistance is provided in maintaining and updating Interested and Affected database Print / photocopy and the deliver documents to various stakeholders Distribute information (placing posters, posting, mailing, emailing, sending SMS messages, etc.) Assist with the project administration on large and small projects Data collection and inclusion into scientific reports Assist with information material and report compilation material
February 2015 – February 2017 ●Permanent	Environmental Officer	EcoPartners (Pty) Ltd (South African)	Public participation for environmental legal authorisation applications Compiling legal registers and monthly legal update letter Supply all services required for I and APs Write and edit reports Research various environmental aspects. Environmental awareness training Creation of maps for all environmental applications Collection of spatial information Build and Maintain data and information libraries Data collection and analysis Environmental legal authorisation applications
February 2014- September 2014 ●Permanent	Graduate Researcher	Linkd Environmental Services (Pty) Ltd (South African)	Research for projects given as tenders Collecting data from the different forms of information Collecting data for the purpose of controlling it and reporting on it in order to formulate status quo Create reports based on the data, give recommendations for better quality data to be collected Participate in workshop strategy sessions. Help implement policies formulated in strategy sessions and approved by steerco.
October 2014 – December 2014 ●Contract	Researcher and Report Writer	South African Cities Network (Pty) Ltd (South African)	Research Project co-ordination and management Knowledge management Reporting and administrative support GIS support and map analysis Report writing and research gaps

PROJECT EXPERIENCE

Project Name & Location	Client Name	Role
EIA for the Buffelspoort Solar Project, North West Province	Total Eren/Chariot Transitional Power	Social Impact Assessor and Public Participation Consultant
Environmental, Social & Governance (ESG) assessment	Richards Bay Coal Terminal (Pty) Ltd	Social Assessor
To Conduct Study of Sanitation Systems at Two Health Facilities, Swaziland	Ministry of Health, Swaziland	Environmental, Social and Health Specialist

Project Name & Location	**Client Name**	**Role**
Social Impact Assessment - Doornhoek PV Cluster including 132kV line to the Hermes MTS	Atlantic Energy Partners (Pty) Ltd	Social Impact Assessor
Stakeholder engagement for the Socio-economic Impact Assessment for the closure of 3 Eskom power stations	Urban Econ on behalf of Eskom	Project Manager
Exxaro 22-month Resettlement Monitoring Proposal for Phumulani Agri-Village, Mpumalanga	CSG Water & Environmental Consultants on behalf of Exxaro	Report Writer Reviewer, Quality Assurance & Project Support
Environmental Impact Assessment for Agricultural and Pivot Development on various farm portions, Free State Province	Venter Boerdery (Pty) Ltd	Project Manager
Scoping and environmental Impact Report for 175 MW PV, North West	Sibanye Stillwater	Report Writer Reviewer, Quality Assurance & Project Support
EIA Process for Siyanda PV Facilities & BESS	SoLink	Social Impact Assessor and Public Participation Consultant
BA for Hopefield Watercourse Crossing	Umoya Energy (Pty) Ltd	Reviewer & Quality Assurance
BAR for the 10MW Sigma PV Project, Free State	SOLA Group	Social Impact Assessor
SIAs for 2x EIAs for PV & BESS at Siyanda Bakgatla Mine, Limpopo	SoLink	Social Impact Assessor
SIA for 2x 100MW PV south of Hartebeesfontein, North West - in Klerksdorp REDZ	Cape EPrac	Social Impact Assessor
Socio-economic impact assessments (Scoping/EIA) for Pofadder Wind farm cluster, Northern Cape	Atlantic Energy Partners (Pty) Ltd	Social Impact Assessor
Socio-economic impact assessments (Scoping/EIA) for Pofadder Wind farm cluster, Northern Cape	Engie Solar	Reviewer & Quality Assurance
BA for additional area for Grootspruit Solar PV facility, Free State Province	Engie Solar	Reviewer & Quality Assurance
EIA for additional area for Graspan Solar PV facility, Northern Cape Province	Engie Solar	Reviewer & Quality Assurance
EIA for additional area for Sannaspos Solar PV facility, Free State Province	Engie Solar	Reviewer & Quality Assurance
EIA for 225MW San Solar PV on a site north west of Kathu, Northern Cape Province	San Solar Energy (Pty) Ltd	Social Impact Assessor
SIA for a Battery Energy Storage System (BESS) within the authorised footprint of Hotazel Solar - amendment application	Cape EPrac	Social Impact Assessor
BA processes for 3x Kheis PV facilities	AGV Projects	Social Impact Assessor
Screening of sites for the placement of PV facilities near Northam, Limpopo Province	SoLink	GIS Specialist
BAR for the 10MW Sigma PV Project, Free State	SOLA Group	Social Impact Assessor
Land sensitivity analysis on the identified land for the Merafong Solar Farm Cluster Project	Gauteng Infrastructure Financing Agency	Social and GIS Specialist
EIA/WML for Majuba waste disposal facility	Eskom – Majuba Power Station	Reviewer & Quality Assurance
P2 amendment for Poortjies Wind Energy Facility	Mainstream Renewable Power	Reviewer & Quality Assurance
EIAs for 2x 100MW PV on a site west of Lichtenburg, North West	Atlantic Energy Partners (Pty) Ltd	Reviewer & Quality Assurance
EIA processes for the Great Karoo Renewable Energy Cluster	Great Karoo Renewable Energy	Reviewer & Quality Assurance
Proposed Grid Connection Infrastructure for the Woodhouse 1 and Woodhouse 2 Solar Energy Facilities	Genesis Eco-Energy Developments (Pty) Ltd	Report Writer Reviewer, Quality Assurance & Project Support
Environmental Impact Assessment And Public Participation Process For The Proposed Development Of The Nama Solar East Facility And Nama Solar West Solar Facility With Associated	Nama Solar East (Pty) Ltd and Nama Solar West (Pty) Ltd.	Reviewer, Quality Assurance & Project Support

Project Name & Location	**Client Name**	**Role**
Infrastructure, Northern Cape		
Proposed Development of a New Waste Disposal Site at the Eskom Majuba Power Station near Amersfoort, Dr Pixley Ka Seme Local Municipality, Mpumalanga Province	Eskom Holdings Ltd	Report Writer, Quality Assurance & GIS Support
The Construction of the 100MW Nku Solar Photovoltaic Facility (PV1), on portion 96 of the Farm Rondavel 85 and Farm Annex Rondavel, near Richmond, Northern Cape Province	Great Karoo Renewable Energy (Pty) Ltd	Reviewer, Quality Assurance & Project Support
Environment, Social & Governance (ESG) Assessment and Development of ESG Policy	Richards Bay Coal Terminal Proprietary Limited	Report Writer and Assessment Practitioner
Environmental Impact Assessment Process for 2X 100MW Solar PV Facilities	Atlantic Energy Partners (Pty) Ltd	Report Writer - Social Impact Assessment Quality Assurance/Reviewer
Moeding Solar PV Facility and Tiger Kloof Solar Facility with nearby settlements	Kabi (Pty) Ltd	Geographical Information Systems Specialist (GIS) & Reviewer/Quality Assurance
Solar PV Screening, Kathu Northern Cape Province	AGV Projects (Pty) Ltd	Report Writer, Researcher & Quality Assurance & GIS Support
Solar PV Screening/and or Wind Projects, Vredendal Western Cape Province	ABO Wind (Pty) Ltd	Report Writer, Researcher & Quality Assurance & GIS Support
Komsberg West Wind Energy Northern and Western Cape Provinces Revised Environmental Management Programme and Final Layout	Gunstfontein Wind Farm (Pty) Ltd,	Reviewer, Quality Assurance & Project Support
Grid Connection Infrastructure for the Namas Wind Farm	Genesis Namas Wind (Pty) Ltd	Reviewer, Quality Assurance & Project Support
Grid Connection Infrastructure for the Zonnequa Wind Farm	Gensis Zonnequa Wind (Pty) Ltd	Reviewer, Quality Assurance & Project Support
Proposed 10mw Northam Solar Pv Facility Near Thabazimbi, Limpopo Province	Northam Platinum Limited	Reviewer, Quality Assurance & Project Support
Amendment of the Environmental Authorisation for the Proposed Construction of The Gunstfontein Switching Station, 132kv Overhead Power Line And Ancillary Infrastructure For The Proposed Gunstfontein Wind Farm	Gunstfontein Wind Farm (Pty) Ltd	Geographical Information Systems Specialist (GIS) & Reviewer/Quality Assurance
Grid Connection Infrastructure, including 132kv Overhead Powerline, Switching Station And Ancillaries, For The Great Karoo Wind Farm, Northern Cape	Great Karoo Wind Farm (Pty) Ltd	Geographical Information Systems Specialist (GIS)
Perdekraal West Wind Energy Facility and Associated Infrastructure, Located in the Witzenburg Local Municipality Within The Western Cape Province	Perdekraal West Wind Farm (Pty) Ltd	Reviewer, Quality Assurance & Project Support
Pienaarspoort Wind Energy Facility 1, Western Cape Province	Pienaarspoort Wind Energy Facility 1 (Pty)	Reviewer, Quality Assurance & Project Support
Environmental Impact Assessment And Public Participation Process Bergriver Wind Farm, Western Cape Province	FE Berg River (Pty) Ltd	Stakeholder Engagement and Reviewer, Quality Assurance
Construction and operation of the 100MW Rondavel PV facility, BESS and associated infrastructure near Kroonstad, Free State Province	South Africa Mainstream Renewable Power Developments (Pty) Ltd	Reviewer, Quality Assurance & Project Support
Kolkies and Sadawa PV and EGI Suite of projects, Western Cape	South Africa Mainstream Renewable Power Developments (Pty) Ltd	Reviewer, Quality Assurance & Project Support
Cluster Of Renewable Energy Facilities And Redz 3 Power Corridor 400 Main Transmission Substation Between Somerset East And Makhanda, Eastern Cape Province	Wind Relic (Pty) Ltd	Reviewer, Quality Assurance & Project Support

Project Name & Location	**Client Name**	**Role**
Wind Garden Wind Farm And Fronteer Wind Farm Near Makhanda, Eastern Cape Province	Wind Garden (Pty) Ltd & Fronteer (Pty) Ltd	Reviewer, Quality Assurance & Project Support
Environmental Authorisation required for Prospecting Right Application on various Portions of the Farm Schaapkopje 194 HT, 5km North of Vryheid Town in the AbaQulusi Local Municipality, KwaZulu Natal	Tuutuuka Resources Proprietary Limited	Report Writer and Project Administrator, Stakeholder Engagement & GIS Support
Social Impact Assessment for the Proposed Infrastructure Amendments Environmental Authorisation and Water Use License	Seriti Power (Pty) Ltd	Report Writer- Stakeholder Engagement & GIS Support
Social Impact Assessment for the Proposed Middelburg Mining Services (MMS) Boschmanskrans Section Implementation of Wetland Mitigation and Offset Strategy	Seriti Power (Pty) Ltd	Report Writer- Stakeholder Engagement & GIS Support
Environmental Authorisation And Integrated Water Use Licence Application For The Proposed Liquid Mist Trading Beneficiation Plant Expansion Project	Liquid Mist (Pty) Ltd	Report Writer and GIS Support
Basic Assessment Process In Support Of The Proposed The Construction Of Doornpoort Pumping Main And Pumpstation, Emalahleni Local Municipality In The Mpumalanga Province	Lefatshe Infrastructure Services (Pty) Ltd	Report Writer and Project Administrator & GIS Support
Water Use Licence Renewal Application for the Inyanda Coal Wash Plant, on the Portions 2, 20 And 21 Of Farm Kalbasfontein 284 JS & Portion 4 of Farm Mooifontein 285 JS Near Witbank in the eMalahleni Local Municipality, Mpumalanga	Inyanda Mining Holdings	Report Writer and Project Administrator
Social Impact Assessment for the Proposed Ikwezi Vanadium Mining Project	Ikwezi Vanadium (Pty) Ltd	Report Writer – Social Impact & Project Administrator
Environmental Authorisation (EIA) for the proposed Giyani Renewable Energy Solar Photovoltaic Power	Giyani Renewable Energy	Report Writer- Stakeholder Engagement & GIS Support
Environmental Authorisation required for Prospecting Right Application on farm Mooihoek and various farm portions of farm Pivaanspoort	Pivaanspoort (Pty) Ltd	Report Writer
Draft Basic Assessment Report For The Proposed Upgrade Of Weltevreden Wetland Interventions	Seriti Power (Pty) Ltd	Report Writer
Social and Labour Plan for the Straffontein Colliery	Mnambithi Mining (Pty) Ltd	Report Writer – Social Impact and Social Labour Plans & GIS Support
Social and Labour Plan for the existing operational expansion Leeuwfontein Colliery Mining Right Amendment Applications	Zomhlaba Resources (Pty) Ltd	Report Writer – Social Impact and Social Labour Plans & GIS Support
Social and Labour Plan for the existing operational expansion Lakeside Colliery Mining Right Amendment Applications	Zomhlaba Resources (Pty) Ltd	Report Writer – Social Impact and Social Labour Plans & GIS Support
Social Impact Assessment for the Proposed Aangewys Coal Mine Mining Right Application	National Treasure Minerals (Pty) Ltd	Report Writer – Social Impact and Social Labour Plans & GIS Support
Environmental Impact Assessment And Water Use Licence Application In Support Of The Proposed Grootlaagte Open Cast Mining, Mpumalanga – Arnot Opco (Pty) Ltd	Arnot OpCo	Report Writer- Stakeholder Engagement & GIS Support
Malawi Solar Projects, Livelihood restoration and social performance monitoring and planning	JCM Power	Data Analyst
750 AMPED Campaign	Health Wellness SETA	Project Manager
Integrity Due Diligence Reports	Various (South African Poultry Industry, Centre of Industrial Scientific Research; SA Milk Producers	Policy Coordinator/ Report Writer
Policy Component for agri-processing projects	eThekwini Municipality	Policy Coordinator/ Report Writer

Project Name & Location	**Client Name**	**Role**
Alignment of EIA's and WUL's	South 32	Social Specialist/Report Writer
Environmental Authorisation for Klipspruit Colliery	South 32	Social Specialist/Report Writer
Expansion and Development of Sun City Resorts	Sun International	Social Specialist/Report Writer
Environmental Authorisation for a Regulatory Environmental Process	Blyvoor Gold	Social Specialist/Report Writer
Mooikraal Road Diversion Project	Sasol (Pty) Ltd	Social Specialist/Report Writer
Pretorius Park Housing Development	Luengo Consulting	Social Specialist/Report Writer
Grave Relocation Project	Exxaro Resources	Social Specialist/Report Writer
Syferfontein Housing Development	LTE Consulting	Social Specialist/Report Writer
Leeuwpan Lifex Project	Exxaro Resources	Social Specialist/Report Writer
Environmental Authorisation required for Proposed Palmietkuilen Colliery near Springs	Canyon Resources (Pty) Ltd	Social Specialist/Report Writer
Environmental Authorisation required for the Agnes Gold Mine, Barberton	Galaxy Gold Reefs (Pty) Limited	Social Specialist/Report Writer
Environmental Authorisation for the Proposed Hendrina Underground Coal Mine, Mpumalanga	Glencore Operations South Africa (Pty) Ltd	Social Specialist/Report Writer
Environmental authorisation applications(Waste management, Water use license, EMP)	Various	Social Specialist/Report Writer
Environmental Authorisation Applications related to the Construction of Power Station, Associated Infrastructure, and Coal Mine near Colenso, KZN	Dunrose Investments 244 for Colenso Power (Pty) Ltd	Project Administrator/ Social Specialist
Environmental Awareness Training	Various	Facilitator
Legal register	Various	Report Compiler
Dynamics and Incidence of Child Abuse, Neglect and Exploitation(DICANE)	Department of Social Development	Facilitator
The Alexandra Environment Public Upgrade-management of the public participation process	Johannesburg Development Agency	Project Administrator
Cities Green Transport Programme	South African Cities Network	Project Researcher
Project Management of the EPWP Construction of the Mvoti Regional Landfill	Department of Environmental Affairs	Project Researcher
Development of climate change adaptation and mitigation programme	Department of Agriculture Forestry and Fisheries	Project Researcher
Capacity Building in spatial transformation	South African Cities Network	Project Researcher