

AMENDED DRAFT ENVIRONMENTAL IMPACT REPORT

PROPOSED DEVELOPMENT OF A NEW LANDFILL SITE (CLASS B) AND ASSOCIATED
INFRASTRUCTURE ON THE REMAINING EXTENT OF PORTION 1 OF THE FARM MELK SPRUIT NO. 12,
WALTER SISULU LOCAL MUNICIPALITY, EASTERN CAPE PROVINCE
(REF No: JG/B/M/001/2025)



VOLUME 1 OF 3

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Document purpose	The amended Draft Environmental Impact Assessment Report forms part of a series of reports and information sources that are being provided during the integrated environmental authorisation (Environmental Authorisation and Waste Management Licence Application) for the proposed new Class B landfill site on the remaining extent of Portion 1 of the farm Melk Spruit No. 12, Walter Sisulu Local Municipality. The report is prepared in accordance with the Environmental Impact Assessment Regulation, 2014, as amended, which was promulgated in terms of Section 24 of the National Environmental Management Act, 1998 (Act No. 107 of 1998). The objective of the Environmental Impact Assessment process is to, through a consultative process— (a) Determine the policy and legislative context within which the activity is located and document how the proposed activity complies with and responds to the policy and legislative context; (b) Describe the need and desirability of the proposed activity, including the need and desirability of the activity in the context of the development footprint on the approved site as contemplated in the accepted scoping report; (c) Identify the location of the development footprint within the approved site as contemplated in the accepted scoping report based on an impact and risk assessment process inclusive of cumulative impacts and a ranking process of all the identified development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects of the environment; (d) Determine the— (i) Nature, significance, consequence, extent, duration and probability of the impacts occurring to inform identified preferred alternatives; and (ii) the degree to which these impacts— (aa) can be reversed; (bb) may cause irreplaceable loss of resources, and (cc) can be avoided, managed or mitigated; (e) Identify the most ideal location for the activity within the development footprint of the approved site as contemplated in the accepted scoping report based on the lowest level of environmental sensitivity identified during the assessment; (f) Identify, assess, and rank the impacts the activity will impose on the development footprint on the approved site as contemplated in the accepted scoping report through the life of the activity; (g) Identify suitable measures to avoid, manage or mitigate identified impacts; and (h) Identify residual risks that need to be managed and monitored. The amended Draft EIA Report will be available to all stakeholders for a 30-day review period (04/09/2026 – 05/10/2026). All comments on the PPP (submitted within the 30-day review period) will be considered in the preparation of the Final EIA Report, which will be submitted to the Eastern Cape Department of Economic Development, Environment, Conservation and Tourism for decision-making.
Project title	PROPOSED DEVELOPMENT OF A NEW LANDFILL SITE (CLASS B) AND ASSOCIATED INFRASTRUCTURE ON THE REMAINING EXTENT OF PORTION 1 OF THE FARM MELK SPRUIT NO. 12, WALTER SISULU LOCAL MUNICIPALITY, EASTERN CAPE PROVINCE
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Applicant	Walter Sisulu Local Municipality
Report Status	Amended Draft EIA Report
Submission Date	4 September 2026
Development type	Landfill Development
Associated infrastructure	Water and sewer provisions (i.e. septic tanks) Offices Roads Stormwater systems
Broad-scale locality	Maletswai, Walter Sisulu Local Municipality
Fine-scale locality	THE REMAINING EXTENT OF PORTION 1 OF THE FARM MELK SPRUIT NO. 12, WALTER SISULU LOCAL MUNICIPALITY

EXECUTIVE SUMMARY

This Amended Draft Environmental Impact Assessment Report has been prepared in support of the integrated Environmental Authorisation and Waste Management Licence application for the proposed development of a new Class B landfill site and associated infrastructure on the remaining extent of Portion 1 of the Farm Melk Spruit No. 12, within the Walter Sisulu Local Municipality, Eastern Cape Province. The proposed development is intended to provide a legally compliant and environmentally managed waste disposal facility to serve the Maletswai area and surrounding communities over a projected 20-year operational period.

The proposed landfill will comprise phased engineered landfill cells with a total gross airspace requirement of approximately 460 881 m³, including allowances for daily and intermediate cover, settlement, operational inefficiencies, and final capping. The facility will include supporting infrastructure such as leachate and evaporation dams, stormwater management infrastructure, access roads, a weighbridge, offices, a workshop, security infrastructure, material recovery and sorting facilities, and associated service infrastructure.

The EIA process assessed the potential environmental, social, and technical implications of the proposed development in accordance with the Environmental Impact Assessment Regulations, 2014, as amended, promulgated under the National Environmental Management Act, 1998. The assessment considered the policy and legislative context, the need and desirability of the project, site alternatives, environmental sensitivities, specialist study findings, potential impacts, mitigation measures, and residual risks associated with the construction, operational, and decommissioning phases of the project.

The specialist studies undertaken for the proposed Maletswai Landfill indicate that the Preferred Site is generally acceptable for development, provided that all recommended mitigation, monitoring and management measures are incorporated into the Environmental Management Programme and implemented throughout construction, operation, closure and post-closure. Across the ecological, aquatic, heritage, palaeontological, agricultural, geohydrological, geotechnical and air quality assessments, no fatal flaws were identified that would prevent the project from proceeding.

The ecological and aquatic assessments confirmed that the broader area falls within the Eastern Upper Karoo vegetation type, which is classified as least concern. No floral or faunal species of conservation concern were recorded during the field surveys, although Secretarybirds are known from the wider area. No wetlands occur within or near the three alternatives. The Preferred Site contains a small artificial out-of-stream impoundment, while Options 1 and 2 are closer to more natural drainage features and therefore present greater potential risks to aquatic systems. The Preferred Site is therefore supported from an ecological and aquatic perspective, subject to implementation of 32 m watercourse buffers, stormwater controls, fencing, alien plant control and rehabilitation measures.

The heritage and palaeontological assessments identified no archaeological material within the project footprint, although one historical dam wall and one active cemetery were recorded in the broader study area. Fossil sensitivity is regarded as high to very high because the area is underlain by Beaufort Group sediments, but surface fossil material was limited and mostly comprised imprints. The development may proceed with caution, provided that chance-find procedures, permit requirements, ECO awareness, photographic recording and SAHRA/ECPHRA notification protocols are followed. ECPHRA has confirmed that there are no objections to the development, provided that the specialists' recommendations are adhered to.

The agricultural assessment found that all three candidate sites are used mainly for livestock grazing and have moderate agricultural capability. No active crop cultivation was observed during the field assessment, and none of the alternatives overlaps mapped protected agricultural areas. Although landfill development will permanently transform soil and grazing resources within the approved footprint, this impact is not considered sufficient to preclude development. The Preferred Site is supported as the overall preferred alternative, subject to topsoil management, erosion control, pollution prevention, rehabilitation, fencing and post-rehabilitation monitoring.

The geohydrological study confirmed relatively deep groundwater levels, low-permeability mudstone conditions and no perched groundwater within the upper soil profile. The principal groundwater risk relates to possible leachate migration if landfill containment systems are not properly designed, operated and monitored. This risk can be reduced to low to moderate significance through engineered liners, leachate collection, perimeter monitoring boreholes, regular water quality sampling and emergency response procedures. The geotechnical assessment identified suitable development conditions subject to removal of unsuitable hillwash material, appropriate foundation design, compaction requirements, erosion controls and construction-phase monitoring.

The air quality assessment found generally good ambient air quality across the broader study area, with localised waste-related impacts around the existing disposal environment. The Preferred Site is favoured because surrounding vegetation and elevated terrain offer comparatively better natural screening than Options 1 and 2. Potential dust, odour, landfill-gas and windblown-litter impacts are manageable through dust suppression, waste compaction and covering, landfill-gas and leachate management, litter control, complaints management and routine monitoring. Overall, the specialist studies support authorisation of the proposed landfill at the Preferred Site, provided that all prescribed mitigation, monitoring and compliance measures are implemented and enforced.

The findings of the assessment indicate that the most significant potential impacts relate primarily to geohydrology, hydrology, air quality and the visual environment. These impacts are considered capable of being avoided, reduced, or managed through the implementation of the mitigation measures recommended in this report, associated specialist reports and the Environmental Management Programme. Key management requirements include the construction and maintenance of an engineered containment system, effective stormwater and leachate management, implementation of a groundwater monitoring programme, erosion and sediment control, protection of sensitive environmental features, and ongoing compliance monitoring.

The assessment further notes that the existing landfill site is currently constrained by inadequate stormwater management, inadequate leachate management, and insufficient remaining airspace to meet future waste disposal requirements. If the current situation remains unchanged, the Municipality may be unable to achieve compliance with applicable legislative, regulatory, guideline, and permit requirements. The proposed development is therefore considered necessary to address current operational constraints and to provide a controlled, engineered, and compliant waste disposal solution.

Subject to the implementation of the Environmental Management Programme, the recommendations of the specialist studies, and the conditions of authorisation (if authorised), the proposed development is considered environmentally acceptable. It is therefore recommended that the proposed Class B landfill site and associated infrastructure be authorised and that a Waste Management Licence be granted, provided that all proposed mitigation measures are implemented and that appropriate environmental monitoring, reporting, and compliance mechanisms are implemented throughout the full life cycle of the project as outlined in this report and associated annexures.

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C2 – Background Information Documents and Proof of Distribution

C3 – Site Notices and Proof of Placement

C4 – Comments from I&APs on Scoping Report

C5 – Comments from I&APs on the EIA Report

C6 – Minutes of any public and/or stakeholder meetings

C7 – Communications to and from interested and affected parties

C8 – Comments from I&APs on amendments to the EIA Report

C9 – Comments and Responses Report

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D2 – Aquatic Impact Assessment Study

D3 – Air Quality Impact Assessment Study

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D5 – Agricultural Impact Assessment Study

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D8 – Civil Aviation Compliance Statement

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Appendix G – Environmental Management Programme

Appendix H – Other Related Permits

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I1 – EAP CV, Qualifications and Registrations

I2 – Title Deeds

I3 – DFFE Environmental Screening Tool Report

I4 – Site Sensitivity Report

ENVIRONMENTAL IMPACT ASSESSMENT REPORT REQUIREMENTS AS PER APPENDIX 3 OF GNR 326 OF NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998 (ACT NO. 107 OF 1998)

Contents of the Environmental Impact Assessment Report	Relevant section in the report
(a) details of— (i) the EAP who prepared the report; and (ii) the expertise of the EAP, including a curriculum vitae;	Section 2.3 and I1
(b) the location of the development footprint of the activity on the approved site as contemplated in the accepted scoping report, including: (i) the 21-digit Surveyor General code of each cadastral land parcel; (ii) where available, the physical address and farm name; and (iii) where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties;	Section 2.2
(c) a plan which locates the proposed activity or activities applied for as well as the associated structures and infrastructure at an appropriate scale, or, if it is— (i) a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; (ii) on land where the property has not been defined, the coordinates within which the activity is to be undertaken;	Appendix A
(d) a description of the scope of the proposed activity, including— (i) all listed and specified activities triggered and being applied for; and (ii) a description of the associated structures and infrastructure related to the development;	Section 1
(e) a description of the policy and legislative context within which the development is located, and an explanation of how the proposed development complies with and responds to the legislation and policy context;	Section 3
(f) a motivation for the need and desirability for the proposed development, including the need and desirability of the activity in the context of the preferred development footprint within the approved site as contemplated in the accepted scoping report;	Section 2.4
(g) a motivation for the preferred development footprint within the approved site as contemplated in the accepted scoping report;	
(h) a full description of the process followed to reach the proposed development footprint within the approved site as contemplated in the accepted scoping report, including: (i) details of the development footprint alternatives considered; (ii) details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs; (iii) a summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them; (iv) the environmental attributes associated with the development footprint alternatives, focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects; (v) the impacts and risks identified, including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts— (aa) can be reversed; (bb) may cause irreplaceable loss of resources; and (cc) can be avoided, managed or mitigated; (vi) the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks; (vii) positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	Section 1, 2.4 and 5

(viii) the possible mitigation measures that could be applied and level of residual risk; (ix) if no alternative development footprints for the activity were investigated, the motivation for not considering such; and (x) a concluding statement indicating the location of the preferred alternative development footprint within the approved site as contemplated in the accepted scoping report;	
(i) a full description of the process undertaken to identify, assess and rank the impacts the activity and associated structures and infrastructure will impose on the preferred development footprint on the approved site as contemplated in the accepted scoping report through the life of the activity, including– (i) a description of all environmental issues and risks that were identified during the environmental impact assessment process; and (ii) an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures;	Section 7
(j) an assessment of each identified potentially significant impact and risk, including– (i) cumulative impacts; (ii) the nature, significance and consequences of the impact and risk; (iii) the extent and duration of the impact and risk; (iv) the probability of the impact and risk occurring; (v) the degree to which the impact and risk can be reversed; (vi) the degree to which the impact and risk may cause irreplaceable loss of resources; and (vii) the degree to which the impact and risk can be mitigated;	Section 9
(k) where applicable, a summary of the findings and recommendations of any specialist report complying with Appendix 6 to these Regulations and an indication as to how these findings and recommendations have been included in the final assessment report;	Section 8, 9 and 10
(l) an environmental impact statement which contains– (i) a summary of the key findings of the environmental impact assessment; (ii) a map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred development footprint on the approved site, as contemplated in the accepted scoping report, indicating any areas that should be avoided, including buffers; and (iii) a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives;	
(m) based on the assessment, and where applicable, recommendations from specialist reports, the recording of proposed impact management outcomes for the development for inclusion in the EMP, as well as for inclusion as conditions of authorisation;	
(n) The final proposed alternatives, which respond to the impact management measures, avoidance, and mitigation measures identified through the assessment;	
(o) any aspects which were conditional on the findings of the assessment, either by the EAP or specialist, which are to be included as conditions of authorisation;	
(p) a description of any assumptions, uncertainties and gaps in knowledge which relate to the assessment and mitigation measures proposed;	
(q) a reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation;	
(r) where the proposed activity does not include operational aspects, the period for which the Environmental authorisation is required and the date on which the activity will be concluded and the post-construction monitoring requirements finalised;	N/A
(s) an undertaking under oath or affirmation by the EAP in relation to - (i) the correctness of the information provided in the reports;	Section 11

(ii) the inclusion of comments and inputs from stakeholders and I&APs; (iii) the inclusion of inputs and recommendations from the specialist reports where relevant; and (iv) any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested or affected parties	
(t) where applicable, details of any financial provision for the rehabilitation, closure, and ongoing post-decommissioning management of negative environmental impacts;	N/a
(u) an indication of any deviation from the approved scoping report, including the study plan, including— (i) any deviation from the methodology used in determining the significance of potential environmental impacts and risks; and (ii) a motivation for the deviation;	
(v) any specific information that may be required by the competent authority; and	
(w) any other matters required in terms of section 24(4)(a) and (b) of the Act	
(2) Where a government notice by the Minister provides for any protocol or minimum information requirement to be applied to an environmental impact assessment report, the requirements as indicated in such notice will apply.	Throughout the report

The objective of the Environmental Impact Assessment process is to, through a consultative process—

- (a) Determine the policy and legislative context within which the activity is located and document how the proposed activity complies with and responds to the policy and legislative context;
- (b) Describe the need and desirability of the proposed activity, including the need and desirability of the activity in the context of the development footprint on the approved site as contemplated in the accepted scoping report;
- (c) Identify the location of the development footprint within the approved site as contemplated in the accepted scoping report based on an impact and risk assessment process inclusive of cumulative impacts and a ranking process of all the identified development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects of the environment;
- (d) Determine the—
 - (i) Nature, significance, consequence, extent, duration and probability of the impacts occurring to inform identified preferred alternatives; and
 - (ii) the degree to which these impacts—
 - (aa) can be reversed;
 - (bb) may cause irreplaceable loss of resources, and
 - (cc) can be avoided, managed or mitigated;
- (e) Identify the most ideal location for the activity within the development footprint of the approved site as contemplated in the accepted scoping report based on the lowest level of environmental sensitivity identified during the assessment;
- (f) Identify, assess, and rank the impacts the activity will impose on the development footprint on the approved site as contemplated in the accepted scoping report through the life of the activity;
- (g) Identify suitable measures to avoid, manage or mitigate identified impacts; and
- (h) Identify residual risks that need to be managed and monitored.

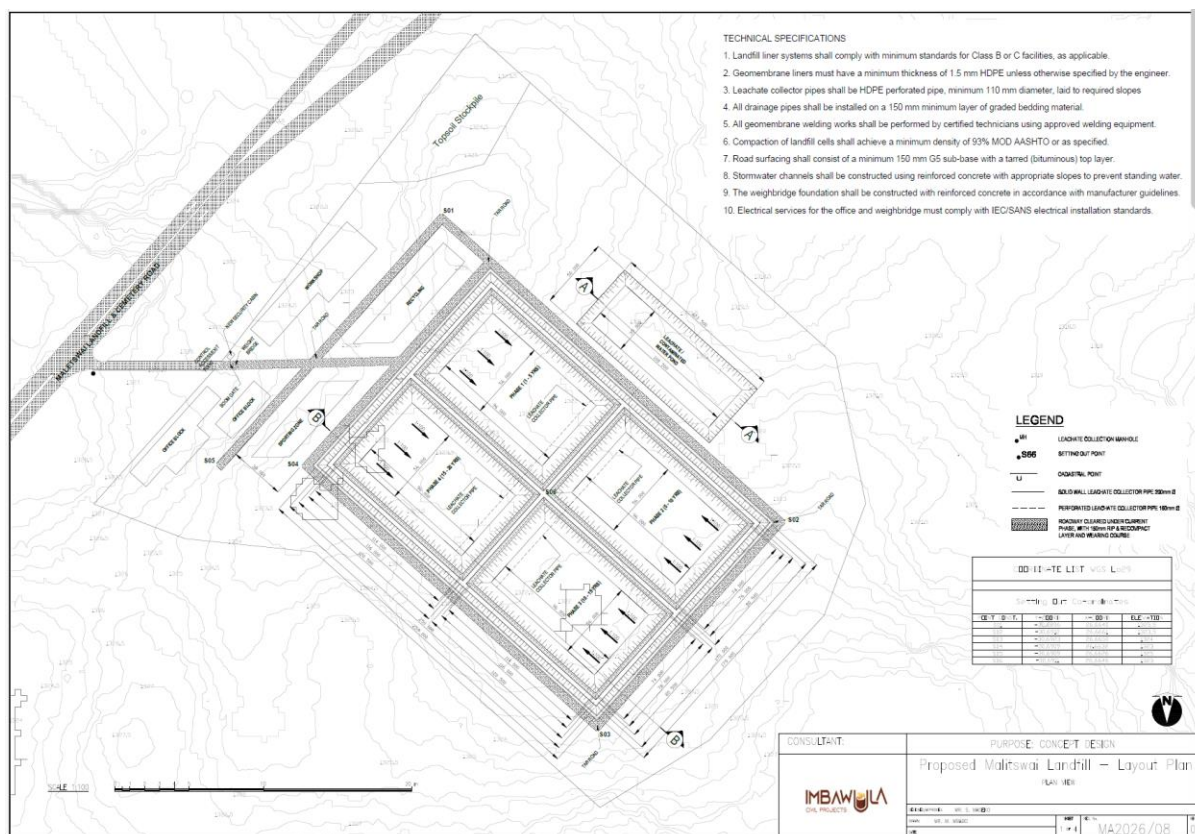
1 PROJECT DESCRIPTION

1.1 Project Description

The proposed development entails the establishment of a new Class B landfill site with a total gross landfill airspace of approximately 460 881 m³, inclusive of allowances for daily and intermediate cover, final capping, settlement, and operational inefficiencies. The facility is designed for a 20-year operational horizon, with phased in operation of four (4) engineered landfill cells ($\pm 115\,220$ m³ each). Each cell will be constructed with a composite Class B liner system (Geosynthetic Clay Liner and a 2.0 mm textured HDPE geomembrane, adopted following geotechnical investigations which confirmed that suitable clay materials are not available on site for construction of a conventional compacted clay liner) in compliance with the National Norms and Standards for Disposal of Waste to Landfill (GN 636 of 2013, as amended 2024).

The associated infrastructure, as confirmed in the **Proposed Layout Plan (Figure 1, Appendix A)**, will include:

- Leachate & Evaporation dams
- Leachate monitoring and collection system (Leachate collector pipes will consist of HDPE perforated pipe, minimum 110 mm diameter, laid to required slopes and all drainage pipes shall be installed on a minimum 150 mm layer of graded bedding material).
- Stormwater Management System (to manage the dirty water channels and cut-off drain)
- Material Recovery and Sorting Facility
- Access roads
- Office buildings
- Electric Connection
- Workshop
- Weighbridge (reinforced concrete foundation)
- Security Perimeter Fence
- Access control/Security House
- Topsoil stockpile and designated storage pits



The landfill will operate in four (4) operational phases (Phase 1: 1–5 years; Phase 2: 5–10 years; Phase 3: 10–15 years; Phase 4: 15–20 years), with progressive rehabilitation and capping. The preferred option consists of landfill cells with an effective height of approximately 13 m (10 m above ground, 3 m below ground). This configuration provides a compact footprint of 3.55 ha (cells only), expanding to ± 6 ha with ancillary infrastructure, balancing airspace efficiency with reduced visual impact, stability, and windblown litter risk.

Coordinates of the preferred site boundary:

- Point No. 1: 30°41'29.43"S, 26°39'58.18"E
- Point No. 2: 30°41'35.28"S, 26°39'52.11"E
- Point No. 3: 30°41'27.44"S, 26°39'41.94"E
- Point No. 4: 30°41'21.06"S, 26°39'48.92"E

1.2 Supporting Infrastructure and Services

1.2.1 Site Access and Roads

Access to the proposed site is planned via an existing gravel access road designed for **20–25 tonne compactor and haul trucks**, with appropriate drainage and erosion control. Internal roads will run along the perimeter of the footprint and provide all-weather access to the active tipping face, constructed from compacted gravel with a tarred wearing course. Roads will be 6 m wide with adequate turning radii for compaction and haulage equipment.

Stormwater side drains and reinforced concrete channels will be provided to prevent ponding and minimise maintenance requirements.

1.2.2 Weighbridge Facility

A **weighbridge and control office** is proposed at the site entrance to record all incoming waste loads, supporting billing, municipal reporting, and compliance with the National Waste Information Regulations, 2012 (GN R.625 of 13 July 2012, promulgated under the National Environmental Management: Waste Act, 2008). The weighbridge system will include electronic recordkeeping, ensuring accurate monitoring of waste inflows and available airspace utilisation.

1.2.3 Laboratory and Testing Facilities

A small on-site laboratory is proposed for **quality control of construction materials** such as cover soils, including routine compaction, density, and moisture testing. Limited leachate quality tests may also be conducted. More complex chemical analyses of leachate and groundwater will be outsourced to accredited laboratories.

1.2.4 Perimeter Security (Fencing)

The site will be enclosed by a **1.8 - 2.4 m high steel/concrete palisade or chain-link fence topped with barbed wire**, with a controlled access gate at the entrance. Security will include guard facilities and lighting to prevent unauthorised access, illegal dumping, or scavenging. Security personnel will also safeguard municipal infrastructure and fencing materials. The fence surrounding the ponds and landfill area is to be regularly inspected for damage and timeously repaired to restrict unauthorised access. The lower part of the fence will have litter-proof net to ensure collection of any wind-blown litter from the operational areas.

1.2.5 Water Supply and Sewer Provision

1.2.5.1 Water Demand and Supply

Water for **dust suppression, wheel washing, cover soil conditioning, and construction activities** will be supplied via a borehole¹. On-site storage tanks will ensure a continuous supply. A separate water supply is proposed for potable use in administrative and staff facilities. An on-site treatment system based on borehole water is considered, given the limited bulk systems in the area and over-allocation of water from the Orange River.

The water demand has been calculated for a maximum operational population of 50 persons. A domestic water demand of 70 L/person/day is adopted for drinking, ablution, handwashing, kitchen use and other normal domestic requirements. For 50 persons, this corresponds to a domestic demand of 3,500 L/day, or 3.50 m³/day. An additional allowance of 20 L/person/day is provided for minor operational requirements associated with staff facilities,

¹ the proposed site is located outside the Urban Edge, as such, no municipal services exist.

cleaning and related activities. For 50 persons, this corresponds to 1,000 L/day, or 1.00 m³/day. The resulting base demand is therefore 4.50 m³/day. A 15% allowance is then applied to account for minor system losses, leakage, operational variation and uncertainty. The resulting design demand is approximately 5.18 m³/day. The adopted average daily water demand is therefore **5.2 m³/day**, equivalent to approximately **5.2 kL/day**.

A preliminary fire-water reserve of 9.0 m³ is provided in addition to the normal operational storage. The resulting total calculated storage requirement is approximately 19.35 m³. A total storage capacity of 20 m³ is therefore proposed, comprising two 10 m³ tanks.

Groundwater will constitute the primary water source for the proposed landfill facility. The available borehole investigation records provide site-specific evidence that groundwater can be abstracted from the underlying aquifer. The required average site water demand is approximately 5.18 m³/day. This is equivalent to approximately 5,175 L/day. Even the lower recorded borehole pumping capacity of approximately 750 L/h would theoretically provide approximately 6,000 L over an eight-hour pumping period.

- For Borehole No. 1, the recorded pump yield of approximately 3,500 L/h provides substantial capacity relative to the calculated average domestic demand. At this rate, approximately 5.18 m³ of water could theoretically be abstracted in approximately 1.5 hours of pumping. The borehole does not, however, need to operate continuously at this rate because the proposed storage tanks will allow water abstraction to be scheduled according to demand and borehole recovery.
- Borehole No. 2 is also approximately 60 m deep; however, the available test record indicates a considerably lower production capability. The record identifies an allowed pumping rate of approximately 500 L/h and a pump yield of approximately 750 L/h. The borehole results therefore indicate that the groundwater resource available at the site is variable between boreholes.

1.2.5.2 Sewer Provision

Domestic wastewater will be generated from the administration facilities, ablution facilities, kitchen/canteen facilities, handwashing facilities and associated domestic activities. The domestic wastewater system shall remain completely independent from the landfill leachate and contaminated-stormwater systems. The 90% of the adopted water demand is assumed to return to the wastewater system. Based on the design water demand of approximately 5.175 m³/day, the resulting wastewater generation is approximately 4.66 m³/day. The adopted design wastewater flow is therefore 4.7 m³/day.

The above wastewater flow excludes water used for activities that do not discharge to the domestic wastewater system, such as dust suppression and road wetting. The internal drainage system shall also consider peak instantaneous flows resulting from simultaneous use of toilets, wash basins, showers and other plumbing fixtures.

1.2.5.2.1 Septic Tank

In the absence of a municipal sewer connection, domestic wastewater shall be treated through a dedicated septic tank Figure 2 below, followed by sealed wastewater storage and off-site disposal by an approved vacuum tanker. No soakaway, infiltration trench, French drain, subsurface infiltration system or other ground-disposal system shall be permitted.

The adopted design population is 50 persons, with an average wastewater flow of approximately 4.7 m³/day. A minimum preliminary liquid-retention period of 24 hours is adopted for the septic tank, resulting in a minimum hydraulic treatment volume of approximately 4.7 m³. The hydraulic treatment volume alone does not provide adequate allowance for sludge and scum accumulation. A larger tank capacity is therefore required to maintain effective treatment conditions during operation.

A 10 m³ septic tank is consequently adopted for preliminary design. A two-compartment arrangement is recommended. The first compartment shall comprise approximately two-thirds of the total capacity, while the second compartment shall comprise approximately one-third. For the proposed 10 m³ tank, this corresponds to approximately 6.7 m³ in the first compartment and 3.3 m³ in the second compartment.

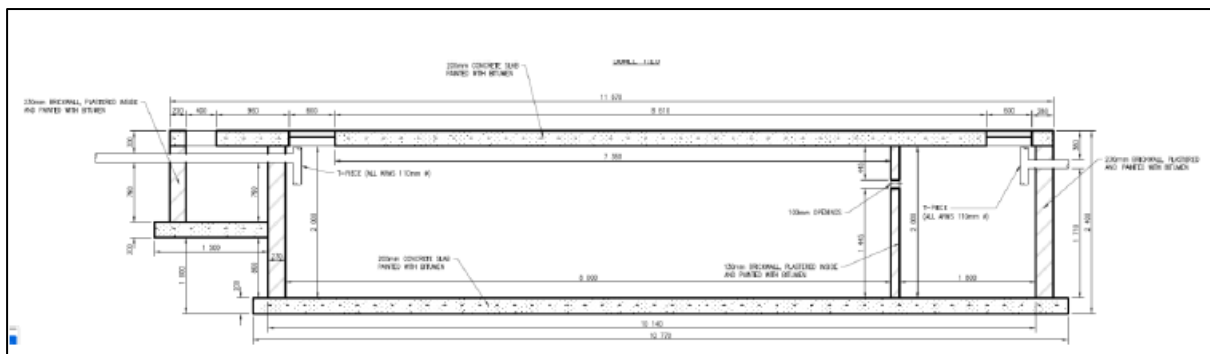


Figure 2: Proposed Septic Tank

1.2.6 Electricity Provision

Electricity will be supplied by a **connection to the Eskom distribution grid**. There are power lines in the proximity of the proposed site, as shown in the figure below. Power will serve the weighbridge, leachate pumping systems, offices, and security installations. A standby diesel generator will provide backup to ensure the uninterrupted operation of critical systems during load-shedding or power outages. Confirmation of services will be provided in the Final EIA Report.



Figure 3: Picture showing the existing electrical infrastructure observed onsite.

1.2.7 Staff and Administrative Facilities

Administrative and support facilities include a **control office, staff ablution block, waste area, changing rooms, and a small meeting room are proposed for the development.** These are located near the entrance for easy access and oversight of incoming vehicles and operations. The layout is designed to separate staff areas from the active landfill footprint for safety.

1.2.8 Plant and Equipment Maintenance

A dedicated **maintenance yard and workshop** is provided for daily servicing of landfill equipment such as compactors, dozers, and loaders. Parking bays and a washing area are included to ensure plant readiness and minimise breakdowns.

1.3 Waste Characterisation, Calculation and Management

The proposed landfill site is intended to accommodate general (non-hazardous) municipal solid waste generated within the Walter Sisulu Local Municipality service area, which includes Maletswai (formerly Aliwal North) and surrounding settlements. The waste stream is dominated by domestic refuse, but also includes commercial and institutional waste, limited quantities of light industrial waste, garden and park refuse, and construction and demolition debris.

Hazardous waste, health-care risk waste, and significant industrial sludges are not accepted and must be managed through specialised regional facilities in accordance with the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) and 2013 National Norms and Standards as amended in 2024 (Regulation 5523 and 5524 of the 07 November 2024) for Disposal of Waste to Landfill.

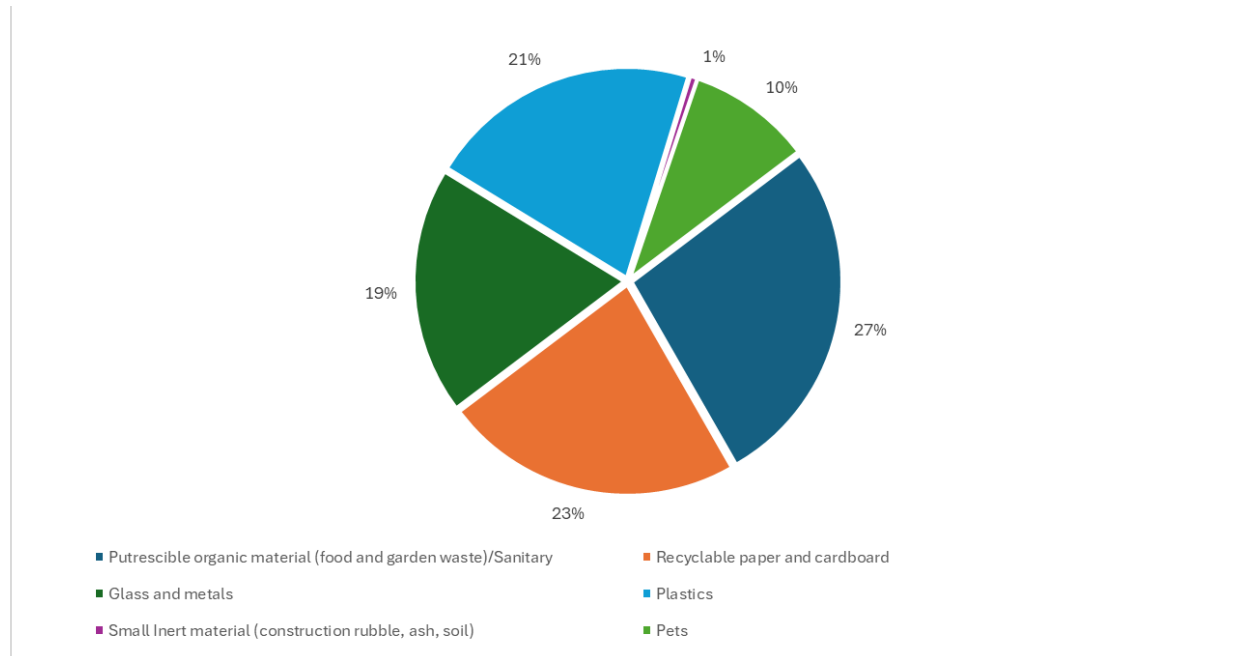


Figure 4: Existing Waste Category in Percentage for Maletswai (Source IWMP 2024-2026, page 88)

Preliminary characterization, drawn from regional averages and the Walter Sisulu Integrated Waste Management Plan (2024–2029), indicates that putrescible organic material (food and garden waste)/ sanitary typically represents 27 % of the total mass, recyclable paper and cardboard around 23%, plastics 21%, glass and metals 19%, inert material (construction rubble, ash, soil) 1% and non-infectious animals waste 10%. Seasonal variations are expected, with higher waste volumes during summer and peak season months.

Based on population growth projections of 1.5% per annum and current collection records, the combined Maletswai catchment is estimated in the year 2027 to generate 12 780.6 tonnes of general waste per year, with the base year of this data being 2024, generating 12 250.7 tonnes per year. This equates to a per-capita generation rate of approximately 0.6–0.8 kg per person per day, consistent with other semi-urban municipalities in the Eastern Cape. Allowing for a 20-year design life and a conservative annual growth factor of 1.5%, and 25% settlement, the total required landfill airspace is estimated at 460 881 m³, inclusive of daily and intermediate cover, settlement allowance and final capping layers.

Recycling and diversion initiatives such as the planned materials recovery facility (MRF) at the new site are expected to reduce final disposal tonnages over time. Nevertheless, the design will size waste cells, leachate collection systems, stormwater controls, and access infrastructure to handle the full projected 20-year demand without reliance on unproven diversion rates. Continuous monitoring of incoming waste quantities and composition,

in line with the 2013 Waste Information Regulations, as amended in 2024, must be integrated into operations to verify these assumptions and adjust cell-development sequencing as required.

1.3.1 Current volumes

The current volumes for the Maletswai waste disposal were sourced from the Integrated Waste Management Plan 2024-2029, which presented the total disposal volumes for the whole local municipality of Walter Sisulu. Table 1 below provides a summary of the estimated annual disposal volumes per landfill site.

Table 1: Showing estimated waste volumes in each landfill site- (Source: WSLM, IWMP2024-2029 pg 65).

Landfill Site	Estimated Volumes of Waste (tons)
Maletswai	12 225,67
Burgersdorp	5 606,83
Steynsburg	1 828,9
James Calata	784
Venterstad	735

Using Table 1 above, it was estimated that 12,225.67 tons of waste per year are disposed of on the existing and fill areas, as discussed above, with the base year 2024 and based on 260 days, which yields a rate of 47.13 tons per day in 2024. Escalating with 1.5% growth rate to the year in which the proposed first filling is estimated to start in 2027, the estimated volume will be 12 780.6 tons/year, translated to an Initial Rate of Deposition of 66.1 tons per day.

The next section illustrates the method of calculation of the estimated initial rate of deposition and the maximum rate of deposition after 20 years.

1.3.2 Sizing of the Landfill

The estimated size of the generated waste stream, as discussed, was based on the Integrated Waste Management Plan (IWMP) 2024–2029 for Walter Sisulu Local Municipality, with an Initial Rate of Deposition (IRD) of 49.1 tons/day (2027), inclusive of public and private disposal in the area.

Table 2; Landfill Size Classification (Maximum Rate of Deposition, 1998)

Lanfill Size Class	Maximum Rate of Deposition (MRD)(Tonnes per day), 1998
Communal	<25
Small	>25 <150
Medium	>150 <500
Large	>500

The size of the Landfill is calculated as follows:

- $MRD = (IRD)(1+d)^t$
- $IRD - (\text{Initial rate of deposition on site in ton/day}) = 49.1 (2027)$
- $d - (\text{Expected annual development rate}) = 1.5\%$

- t - (years since deposition started at IRD) = 20
- MRD –(Maximum rate of Deposition after t years) = 66.1 tons/day

The maximum rate of deposition (MRD) for the Maletswai site is calculated as follows:

$$49.1 \text{ tons /day} \times (1+0.015)^{20} = 66.1 \text{ tons/ day}$$

Based on **Table 2**, the Maletswai site is classified as a small landfill site, as the MRD falls within the > 25 – < 150 tons/day range.

1.3.3 Conceptual Design of Landfill Facility

The conceptual design process considered both the current waste volumes at Maletswai and expected growth over a 20-year design life of the facility. Key factors included daily and annual waste intake, compaction methods, cover material requirements, and site geometry (including side slopes, excavation depth, and final height above ground level). Operational assumptions, such as the use of landfill compactors and the anticipated ratio of cover to waste, were incorporated to provide a realistic estimate of airspace requirements and overall site capacity.

The Site Sensitivity Verification Report places a portion (less than 40%) of the landfill's footprint within an ESA2 (Ecological Support Area), confirming that the proposed landfill is compatible with municipal service infrastructure, provided that ecological processes and buffer zones are maintained. The Aquatic Impact Assessment further notes that while ephemeral drainage lines occur in the vicinity, the preferred site is sufficiently buffered from the Orange River and Melkspruit, provided that stormwater diversion channels, fencing, and regulated buffer zones are implemented.

Importantly, the Heritage Impact Assessment have identified a 30m buffer zone around the dam wall, and this is incorporated within the designs. Additionally, it requires that chance-find procedures have been prepared for observation during the construction phase. This ensures that any palaeontological or heritage discoveries encountered within the excavation depth are managed in accordance with the National Heritage Resources Act, 1999 (Act No. 25 of 1999).

The conceptual layout of the proposed Maletswai landfill has been designed to optimise the use of available airspace while ensuring safe, environmentally compliant operations. The Design Report confirms that the landfill will be constructed in phased cells, each designed to provide approximately five years of operational capacity, thereby achieving the required 20-year horizon.

The Layout Plan attached as Annexure A and in Figure 1 translates these design parameters into a detailed engineering drawing. The plan view shows the overall site development of the landfill cells, with the phased in cells usages, with precise dimensions and boundary lines. Ancillary infrastructure is also clearly indicated, including:

- Office block and workshop facilities;
- Security cabin and weighbridge for access control;
- Recycling and sorting area to support waste diversion;
- Stormwater and leachate ponds for contaminated water management;
- Internal access roads and outlet drainage to ensure proper site circulation and runoff control.

Together, the Design Report and the Layout Plan (Annexure A) confirm that the landfill footprint of approximately 3.55 ha net ($\approx$ 6 ha gross with ancillary infrastructure) is sufficient to accommodate the projected 460 881 m³ of airspace required over the 20-year operational life. The phased approach allows for progressive development, operational flexibility, and integration of environmental safeguards such as stormwater diversion channels, buffer zones, and leachate collection systems.

The preference for multiple engineered cells over one mega single cell on the same 3.55 Ha is motivated by the considerations below.

- Leachate Control and Management – with a single mega cell, the volume of leachate can be massive, resulting in difficulty in dealing with it, while the smaller multiple cells utilise distinct collection systems and the leachate is isolated from the active vs closed cells. Also, the smaller engineered multiple cells promote sealing of one cell once the space is fully utilised, while the active cells remain active. The sealing of used cells minimised rainwater entering the waste area, thus increasing the leachate generation within the cells.
- Pollution Risks – in a single cell, should there be a liner failure or leaks, the entire volume of waste will threaten groundwater pollution, while in smaller cells, contamination due to leaks or liner failures would be restricted to specific cells, thus protecting the areas with functional cells.
- Ambient Air Pollution – with smaller cells, completed cells are capped early, allowing targeted gas management, while in mega-cell scenarios, large quantities of ambient air pollutants (such as methane, hydrogen sulfide, etc.) would escape widely before any final capping of the landfill site. The capping of individual cells creates oxygen-free zones that optimise gas production, should there be interest in further exploration of various gas harvesting activities.
- Operation Management – smaller cells result in organised waste disposal sequentially from the first cell up to cell no. four (4). These would allow for easy compaction of waste tightly and ensure daily soil cover to reduce pests, vectors, dust and odours.

1.3.3.1 Disposals need / Airspace required

The airspace utilisation calculations for the proposed Maletswai landfill are based on projected waste generation volumes for the Maletswai service area. The base year waste generation was 12,225.67 t in 2024, which, assuming a waste density of 0.8 t/m³, corresponds to approximately 15,282 m³. An annual growth rate of 1.5% was applied to project future waste volumes.

Although the base year is 2024, the landfill is anticipated to become operational in January 2027, meaning the first actual disposal year is 2027. Using the growth rate, the waste volume in 2027 is projected to be approximately 15,960 m³:

$$\text{Waste}_{2027} = 15,282.1 \times (1.015)^3 = 15,960 \text{ m}^3$$

In addition to the waste itself, an allowance was made for daily and final cover material. A cover-to-waste ratio of 1:4 was applied, resulting in a total airspace requirement equal to 1.25 times the waste volume.

The projected waste generation volumes, cumulative waste volumes, and total airspace utilisation over the 20-year design life are summarised in **Table 3**. Based on these projections, the Maletswai landfill will require a total airspace of approximately 460,881 m³, including cover. These calculations provide the basis for preliminary site layout and design, ensuring sufficient capacity for the projected growth in waste disposal.

Table 3: Waste Generation Volumes and Airspace Required

No.	Year	Waste Volume Generated (m ³)	Cumulative Waste (m ³)	Total Airspace Used (m ³)
1	2027	15,960	15,960	19,950
2	2028	16,199	32,159	40,199
3	2029	16,441	48,600	60,750
4	2030	16,686	65,286	81,607
5	2031	16,936	82,222	102,778
6	2032	17,190	99,412	124,265
7	2033	17,447	116,859	146,073
8	2034	17,708	134,567	168,209
9	2035	17,973	152,540	190,675
10	2036	18,241	170,781	213,476
11	2037	18,513	189,294	236,618
12	2038	18,788	208,082	260,103
13	2039	19,067	227,149	283,936
14	2040	19,349	246,498	308,123
15	2041	19,635	266,133	332,667
16	2042	19,923	286,056	357,570
17	2043	20,215	306,271	382,839
18	2044	20,511	326,782	408,478
19	2045	20,810	347,592	434,490
20	2046	21,113	368,705	460,881

From Table 3 above, it can be deduced that, for a landfill site life of 20 years, a total airspace of approximately 460 881 m³ is required. These values are approximate and depend on several operational variables, including compaction efficiency, waste composition, and settlement of the waste mass over time.

1.3.3.2 Available airspace

A conceptual landfill cell layout was developed to determine the available airspace for the Maletswai site. The disposal cell footprint area measures approximately 46,985 m², and the design parameters are:

- Excavation to approximately 3 m below ground level.
- A final landfill height of approximately 10 m above ground level.
- Side slopes of 1:3 (vertical: horizontal);
- Sufficient working area on the top platform for vehicle manoeuvring.

The total available airspace was calculated using:

$$\begin{aligned}\text{Gross volume} &= \text{Footprint area} \times (\text{Final height} + \text{excavation depth}) \times \text{Slope factor} \\ &= 46,985 \times 13 \times 0.85 = 519\,184 \text{ m}^3\end{aligned}$$

This gross airspace includes the full landfill volume and accounts for the slope factor to reflect the side slopes of the cell. The calculation demonstrates that the proposed Maletswai landfill has sufficient capacity to accommodate projected waste disposal volumes, including allowance for cover material, over its 20-year operational life.

The Design Report confirms that the 10 m above-ground configuration (effective 13 m with excavation) provides the optimal balance between footprint efficiency, stability, and reduced visual impact. Compared with shallower fills, this configuration significantly reduces stability problems and wind-blow effects, while fitting comfortably within the required 5–8 ha development footprint.

The Site Sensitivity Verification Report further supports the suitability of the footprint, noting that the site lies within an ESA2, which is compatible with municipal service infrastructure, provided that ecological processes and buffer zones are maintained.

In summary, the conceptual design integrates projected waste volumes, available airspace, specialist input, and phased cell development into a coherent plan that ensures both operational efficiency and environmental compliance. The detailed operational sequence for implementing this design is illustrated in the Flow Chart of Operations (Figure 3), presented in Section 1.3.4.

1.3.4 Flow Chart of Operations

The figure below summarises the flow chart for the operations:

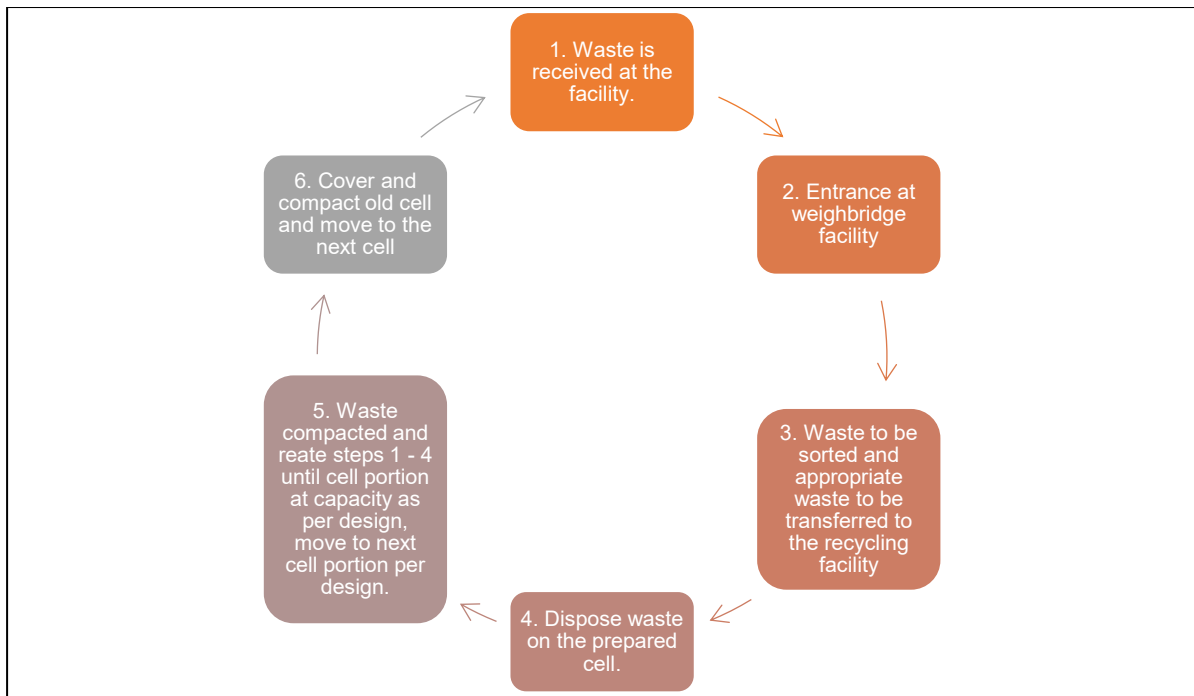


Figure 5: Flow Chart of Operations

1.3.5 Liner Material Selection

1.3.5.1 Design objective and regulatory context

The primary objective of the barrier selection is to provide a long-term, low-permeability basal system that prevents the downward migration of leachate into the foundation soils and groundwater, in full compliance with the 2024 amendments of the National Norms and Standards (GN 636 of 2013, as amended 2024) for Disposal of Waste to Landfill. Accordingly, the preferred design for the Maletswai site is a Class B barrier system, which provides an appropriate level of environmental protection for general waste disposal facilities.

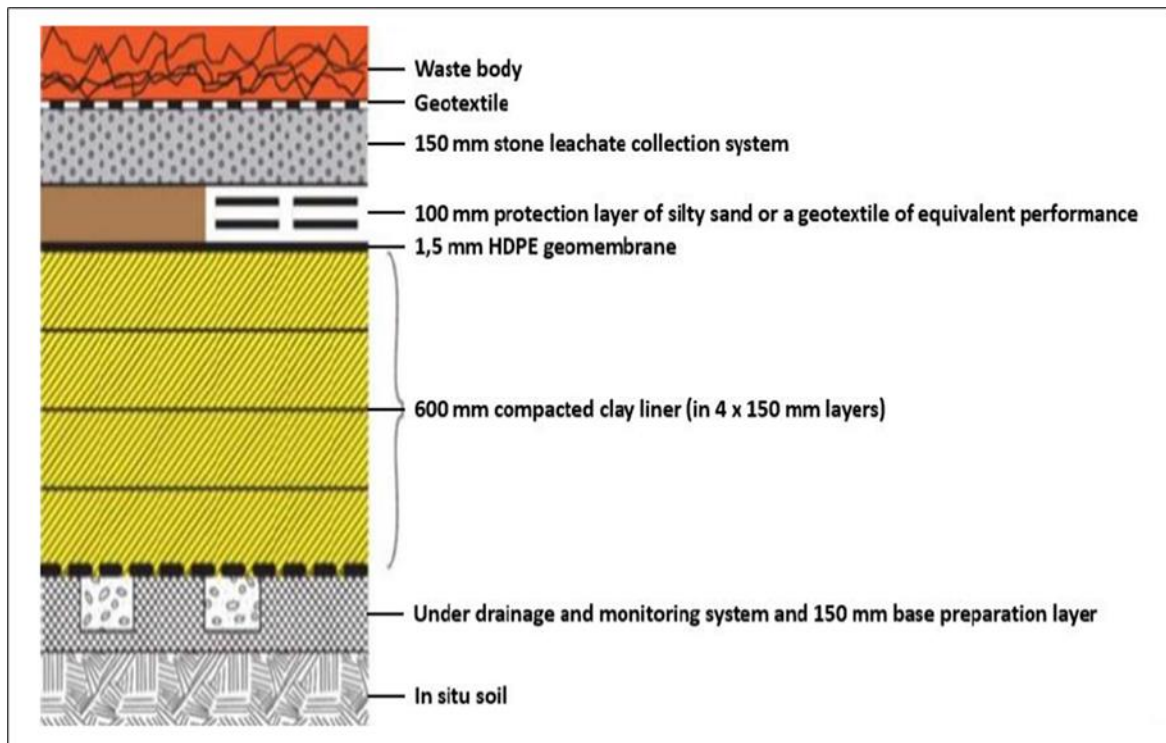


Figure 6: Class B containment system

The engineering solution must be durable, demonstrably verifiable through field and laboratory testing, compatible with the anticipated leachate chemistry and feasible given the available site materials, access and construction resources. Although the Maletswai site exhibits a low climatic leachate generation potential, the historical evidence of groundwater impacts at the older landfill necessitates a conservative and redundant approach.

A design report was prepared for the proposed development. One of the key objectives of the investigation was to determine whether suitable low-permeability materials exist on site for use within the landfill containment system. While the site is predominantly underlain by silty sands and sandy silts, additional laboratory testing demonstrated that selected compacted materials achieved hydraulic conductivity values ranging between 9.12×10^{-10} m/s and 1.75×10^{-9} m/s. These values indicate that certain site-derived materials possess sufficiently low permeability to contribute to landfill containment performance when properly compacted and quality-controlled during construction. The permeability results suggest that a compacted low-permeability layer may be technically feasible using selected borrow materials sourced from suitable horizons within the site. However, variability in material properties across the site and the need to ensure consistent compliance with landfill performance criteria necessitate the adoption of a robust composite liner system.

Accordingly, the recommended landfill liner system comprises a Geosynthetic Clay Liner (GCL) overlain by a 2.0 mm textured High-Density Polyethylene (HDPE) geomembrane. This configuration provides a multiple-barrier containment system that exceeds the performance requirements of a conventional compacted clay liner and is widely regarded as international best practice for modern landfill facilities. Geotechnical investigations have

confirmed that suitable clay materials are not available on site for the construction of a conventional compacted clay liner.

The direct shear test results further support the proposed landfill design. Measured friction angles of between 39.2° and 44.3° indicate excellent shear resistance and favourable stability characteristics for landfill embankments, side slopes and stormwater drainage infrastructure. Cohesion values ranging from 1.9 kPa to 32.1 kPa further contribute to overall slope stability and erosion resistance.

Groundwater conditions were also considered favourable for landfill development. No perched groundwater was encountered during the geotechnical investigation, and regional hydrogeological information indicates groundwater levels are likely to occur at depths exceeding 5–6 m below ground level. Given that the proposed landfill excavation depth is approximately 3 m, a substantial unsaturated zone will remain between the base of the landfill and the groundwater table throughout the operational life of the facility.

1.3.5.2 Long-Term Performance of the GCL-HDPE Composite Liner System

a) Hydraulic Performance

The selected containment system consists of a reinforced sodium bentonite Geosynthetic Clay Liner (GCL) overlain by a 2.0 mm textured HDPE geomembrane. The combination of these two components forms a composite barrier system that provides substantially better containment performance than either component operating independently.

The HDPE geomembrane functions as the primary hydraulic barrier and effectively prevents advective flow through the liner system. The underlying GCL acts as a secondary barrier and provides additional protection in the event of defects, punctures or seam imperfections occurring within the geomembrane. The sodium bentonite component of the GCL hydrates upon wetting, producing extremely low hydraulic conductivity values typically ranging between 1×10^{-11} and 5×10^{-11} m/s. This hydraulic performance exceeds the minimum requirements generally specified for compacted clay liners and significantly reduces leakage through localised defects.

b) Diffusive Contaminant Transport

Although hydraulic leakage is often the primary consideration for design, contaminant migration may also occur through diffusion. Diffusion is the movement of dissolved contaminants from areas of high concentration within landfill leachate toward areas of lower concentration beneath the liner system.

The HDPE geomembrane provides the principal resistance to diffusive transport due to its dense polymer structure. In addition, the bentonite layer within the GCL provides adsorption and attenuation mechanisms that further reduce

contaminant migration. The bentonite possesses a high cation exchange capacity and can retain many dissolved contaminants through sorption processes.

Consequently, the composite GCL-HDPE liner substantially increases contaminant travel times and reduces contaminant flux to underlying groundwater. The combined effect of hydraulic containment and diffusive resistance provides long-term protection of groundwater resources beneath the landfill footprint.

c) Chemical Compatibility

The long-term effectiveness of a GCL is influenced by the chemical composition of the leachate to which it is exposed. Municipal solid waste leachate commonly contains elevated concentrations of dissolved salts, ammonia, organic compounds, chlorides, sulphates and trace metals.

The HDPE geomembrane exhibits excellent chemical resistance and is generally unaffected by the constituents typically present in municipal landfill leachate. The GCL component may be affected by cation exchange reactions where calcium and magnesium ions replace sodium ions within the bentonite structure. Excessive cation exchange can reduce bentonite swelling capacity and increase hydraulic conductivity.

However, because the GCL is protected beneath the HDPE geomembrane, direct exposure to aggressive leachate is significantly reduced. For municipal waste applications such as the proposed Maletswai Landfill, long-term chemical degradation of the composite liner system is not anticipated to be significant. Nevertheless, periodic groundwater and leachate monitoring will be undertaken throughout the operational life of the facility to verify containment performance.

d) Service Life of the HDPE Geomembrane

The durability of HDPE geomembranes has been extensively studied internationally. Long-term performance is governed primarily by antioxidant depletion, oxidative induction and eventual polymer degradation.

Modern 2.0 mm HDPE geomembranes manufactured for landfill applications contain stabilisers and antioxidants specifically designed to resist oxidation and chemical attack. When buried beneath waste and protected from ultraviolet radiation, the degradation process occurs very slowly.

Based on published research and international landfill experience, the anticipated service life of a 2.0 mm HDPE geomembrane under municipal waste conditions is typically in excess of 100 years and may exceed 150 years under favourable conditions. The relatively moderate climatic conditions at Maletswai are expected to contribute positively to geomembrane longevity.

e) Service Life of the Geosynthetic Clay Liner

The bentonite contained within the GCL is a naturally occurring mineral with excellent long-term stability. Provided that the GCL remains confined and hydrated beneath the geomembrane, its hydraulic performance is expected to remain largely unchanged over extended periods. International studies indicate that properly installed GCL systems can maintain hydraulic conductivities below 1×10^{-10} m/s for many decades. Because the bentonite layer possesses self-sealing properties, minor punctures or localised defects may be partially mitigated through bentonite swelling. The expected service life of GCL is therefore considered to exceed the active operating life of the landfill and extend well into the post-closure period.

f) Containment Life of the Composite Liner System

The overall containment life of the landfill is governed by the combined performance of the HDPE geomembrane and GCL. The composite liner provides:

- A primary impermeable barrier through the HDPE geomembrane.
- A secondary low-permeability barrier through the GCL.
- Resistance to diffusive contaminant transport.
- Chemical attenuation and adsorption.
- Self-healing characteristics are associated with bentonite hydration.
- Redundancy against localised defects.

Based on current international experience and published performance assessments, the selected GCL-HDPE composite liner is expected to provide effective containment for a period exceeding 100 years and potentially approaching 150–200 years under municipal landfill conditions. This containment period substantially exceeds the 20-year operational life of the proposed Maletswai Landfill and provides a high degree of confidence in long-term environmental protection.

1.3.5.3 Climatic Water Balance

The potential for significant leachate generation at a landfill site is governed primarily by the site water balance. This balance is controlled by regional climatic conditions, together with site-specific factors such as the moisture content of incoming waste and the potential ingress of surface water runoff or groundwater into the waste body. In accordance with the Minimum Requirements for Waste Disposal by Landfill, the climatic water balance provides the basis for assessing whether a landfill is likely to generate significant quantities of leachate and for assigning the appropriate B- or B+ classification.

The climatic water balance (B) for the proposed Maletswai Landfill site has been calculated using the standard equation:

$$B = R - E$$

where:

- **B** is the climatic water balance (mm),
- **R** is the mean annual rainfall (mm), and
- **E** is evaporation from a soil surface (mm), taken as either $0.7 \times$ A-pan evaporation or $0.88 \times$ S-pan evaporation, in accordance with the Minimum Requirements.

Climatic data for the Maletswai area indicate a mean annual rainfall of approximately **493 mm**, while mean annual S-pan evaporation is approximately **1,675 mm**, resulting in an estimated soil evaporation of approximately 1340mm (**1675mm x 0.8**). On this basis, the calculated long-term climatic water balance for the site is strongly negative:

$$B = 493 - 1340 = -847 \text{ mm}$$

The Minimum Requirements require that the climatic water balance be evaluated for the wet season of the wettest year on record and then reassessed for successive drier years to determine whether the balance is positive for more than one year in five. Based on available regional climatic records, the water balance for the Maletswai area is negative in the majority of years, indicating that evaporation significantly exceeds rainfall under normal conditions.

Table 4: Rainfall Information for the 10 wettest years (source:SAWS, 2025)

Year (Wettest Years)	Rainfall (mm) (R)	Evaporation (mm) (E)	Climatic Balance (B)
1966/67	578.3	863.28	- 284.98
1973/74	742.8	907.76	- 164.96
1975/76	688.3	996.88	- 308.58
1987/88	636.9	1156.72	- 519.82
2001/02	580.3	1069.04	- 488.74
2005/06	578.1	1057.68	- 479.58
2009/10	483	1074.4	- 591.4
2010/11	591	1024.4	- 433.4
2021/22	639.1	1221.36	- 582.26
2022/23	492.3	1197.6	- 705.3

Where the climatic water balance is negative for more than four out of five years, the landfill is classified as **B-**, and significant leachate generation is not expected under properly designed and operated conditions. In such cases, the Minimum Requirements indicate that a leachate management system may not be strictly necessary from a climatic perspective alone.

Notwithstanding the B- climatic classification, other site-specific factors must also be considered. These include the moisture content of incoming waste, the potential for stormwater ingress, and the need to protect groundwater resources in accordance with the National Environmental Management: Waste Act, 2008. For the Maletswai Landfill, no significant volumes of high-moisture waste are anticipated, and the design includes perimeter diversion drains and surface water management measures to prevent the ingress of upslope runoff onto the waste body.

1.3.6 Landfill Design Philosophy

1.3.6.1 General Approach

The design adopts a phased vertical development strategy within a single landfill footprint. This ensures that the facility is developed incrementally, with each 5-year vertical phase constructed, filled, and temporarily capped before the next lift is developed. This approach minimises the exposed tipping area, reduces rainfall infiltration, and allows for early environmental protection through progressive rehabilitation.

1.3.6.2 Capping of Waste Cells

The Maletswai landfill, once decommissioned, will be closed and capped using a final cover system consisting of GCL, a geomembrane, a drainage layer, and a vegetative soil cover. This intervention will reduce infiltration, improve environmental compliance, and allow for integration of the old site into the new facility's operational framework.

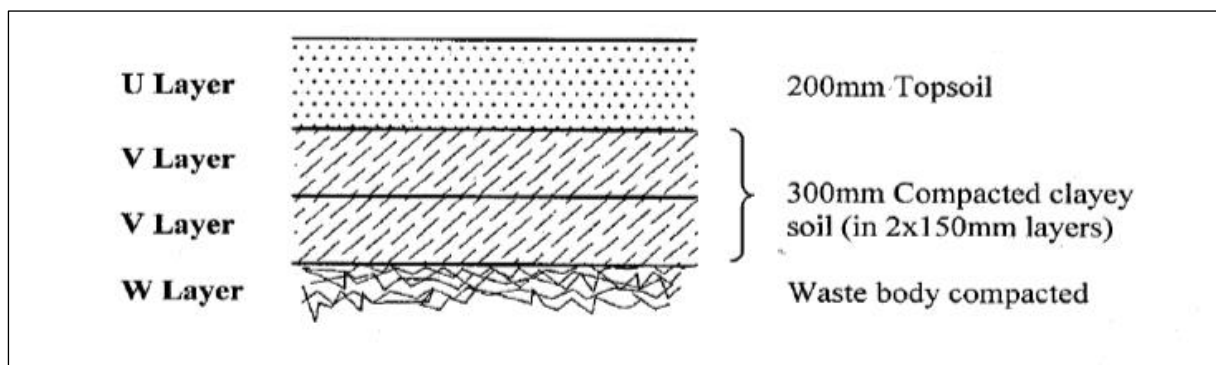


Figure 7: Proposed Capping Layer

1.3.6.3 Landfill Gas Generation and Management

Landfill gas (LFG) is generated through the anaerobic biodegradation of organic waste within the landfill body, producing primarily methane (CH_4) and carbon dioxide (CO_2), with trace quantities of volatile organic compounds and hydrogen sulphide (IPCC, 2006). The rate and quantity of gas generation vary throughout the landfill's lifespan and are influenced by several factors, including waste type, waste depth, moisture content, degree of compaction, pH, temperature, and time since deposition (EPA, 2003). Due to these interacting variables, accurate prediction of gas quantities carries a high level of uncertainty and must be refined through ongoing field monitoring and data evaluation during landfill operation (DWAF, 1998).

Models such as the IPCC first-order decay model and USEPA LandGEM can be applied to estimate gas generation potential at the design stage. These estimates should later be validated through gas sampling, pumping trials, and subsurface investigations once waste placement commences (USEPA, 2005). Several approaches exist for estimating LFG production, including rule-of-thumb methods, field pumping tests, and computer-based modelling. According to the EPA Landfill Site Design Guide (Gregory et al., 1991; EPA, 2003), as a rule of thumb, every ton of degradable waste can produce approximately 6 m^3 of landfill gas per year for up to ten years after deposition, under typical conditions. Under optimum conditions with high moisture content, one ton of degradable waste can

theoretically generate 400–500 m³ of landfill gas, although practical yields are much lower—often 200 m³ or less per wet ton of municipal waste.

A comprehensive survey of 262 landfill sites conducted by Gregory et al. (1991) reported an average cumulative landfill gas yield of 146 m³/t (wet waste), of which approximately 70% could be recovered for utilisation, equating to an achievable yield of about 102 m³/t over the life of a landfill. However, in semi-arid regions such as Maletswai, the actual gas yield is typically less than 10% of these values, owing to limited waste moisture and a negative climatic water balance (DWAF, 1998 and Jones & Wagener, 2010).

Based on these findings and applying the IPCC (2006) methodology for the Maletswai site, the theoretical methane generation potential is approximately 270,000 m³ CH₄ per year, but due to the semi-arid climate and small operational scale, the effective gas generation rate is expected to range between 27,000 m³ and 54,000 m³ per year. This equates to about 37–75 m³/day of methane, confirming that active extraction, flaring, or energy recovery systems are not technically or economically warranted.

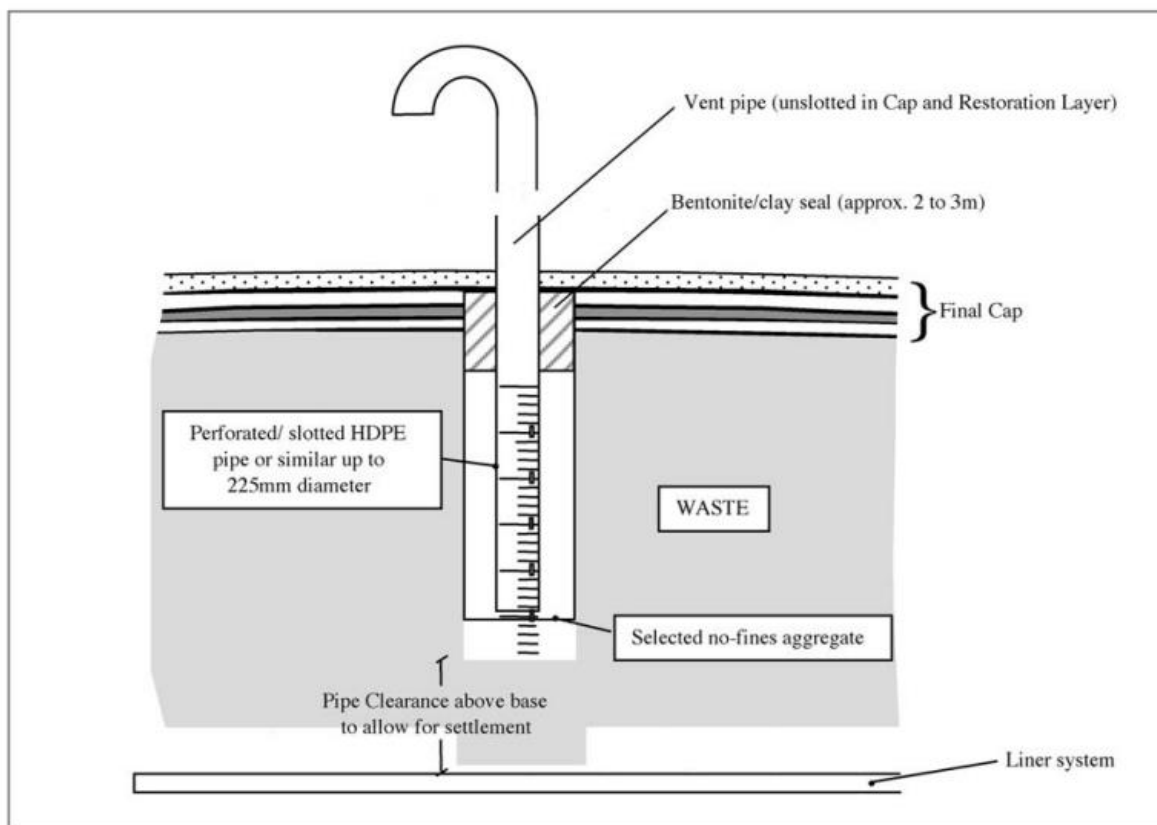


Figure 8: Passive gas control system to atmosphere (EPA, 2003).

The recommended management approach is passive gas control figure below, allowing natural venting through the working face during early operations. As final cover systems are installed based on Figure 7, gas venting infrastructure comprising vertical vent pipes connected to subsurface perforated collection trenches will be implemented to prevent gas build-up. To enhance passive ventilation, “whirly bird” ventilators may be installed on

selected vents. These low-cost systems use wind-driven rotation to draw gases upward while carbon or biofilters remove odorous compounds before release (Koerner & Koerner, 2012).

Routine gas monitoring will form part of the environmental management programme. Quarterly sampling must be undertaken from perimeter wells and vent pipes to verify methane and carbon dioxide concentrations and to ensure compliance with the National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004) and the 2013 National Norms and Standards for Disposal of Waste to Landfill as amended in 2024 (DFFE, 2024).

The Maletswai Landfill is expected to generate low volumes of landfill gas due to its small size, dry climatic setting, and reduced organic fraction. Passive venting, supported by simple mechanical ventilators and odour filtration, provides a safe, cost-effective, and environmentally compliant solution for landfill gas management.

1.3.6.4 Leachate Management System

The preferred containment system for the proposed Maletswai Landfill comprises a composite liner consisting of a Geosynthetic Clay Liner (GCL) overlain by a 2.0 mm textured High-Density Polyethylene (HDPE) geomembrane. The selection of this liner configuration is based on the outcomes of the geotechnical investigation, laboratory permeability testing, environmental risk assessment and the requirements of the National Norms and Standards for Disposal of Waste to Landfill (2024).

Although laboratory testing demonstrated that selected site-derived materials were capable of achieving hydraulic conductivity values ranging between 9.12×10^{-10} m/s and 1.75×10^{-9} m/s under controlled conditions, variability in soil composition across the site raises concerns regarding the ability to consistently achieve the required permeability standard over the entire landfill footprint. Consequently, the GCL-HDPE composite liner was selected as the preferred containment system as it provides a more reliable and robust barrier by combining the self-sealing properties of bentonite with the excellent chemical resistance and durability of HDPE geomembranes.

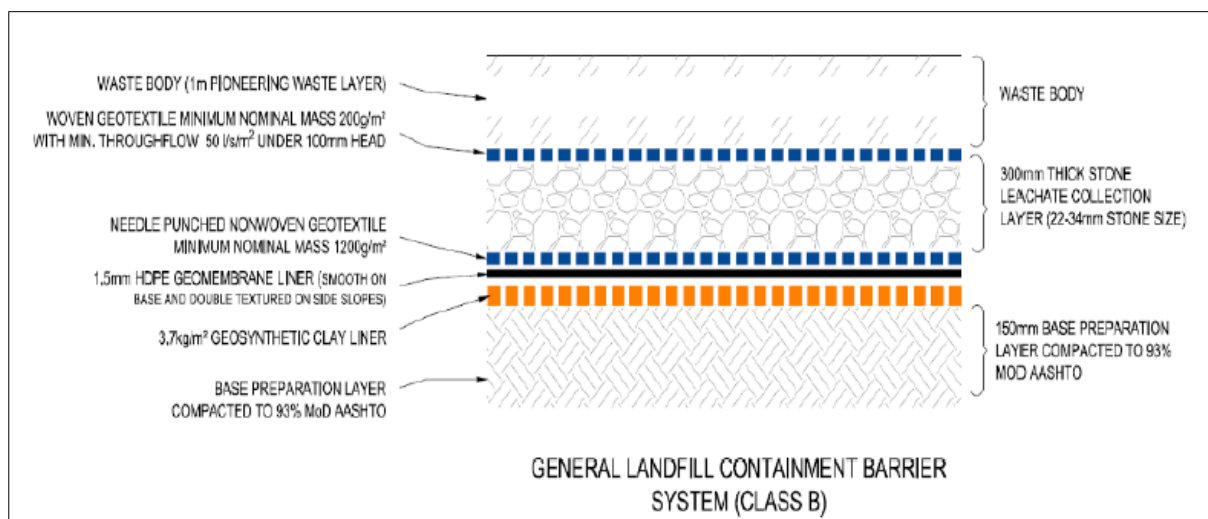


Figure 9: General Landfill Containment Barrier System for Class B landfill site

For the detailed design purposes, the active landfill cell footprint has been taken as approximately 35 500 m² (3.55 ha). Above the composite liner, a granular drainage blanket and leachate collection system will be installed to ensure that the leachate head on the liner does not exceed 300 mm, thereby reducing hydraulic loading and limiting potential seepage through the containment system.

The leachate management system has been designed to achieve the following objectives:

- Minimise leachate generation through effective stormwater control measures.
- Rapidly collect and remove leachate from the landfill base.
- Maintain leachate heads below 300 mm across the liner surface.
- Prevent contamination of underlying groundwater resources.
- Provide adequate storage, monitoring and operational flexibility.
- Ensure compliance with the National Water Act and National Environmental Management: Waste Act.

1.3.6.4.1 Leakage Assessment of the GCL-HDPE Composite Liner

The strongly negative water balance discussed in the section above indicates that evaporation significantly exceeds rainfall over the long term. As a result, net infiltration into the landfill body is expected to be relatively low and long-term leachate generation will be limited. Nevertheless, short-duration storm events and operational activities can still result in measurable leachate production and must therefore be accounted for in the design. For this engineering assessment, the following conservative assumptions were adopted below Table 7:

Table 5: Summary of Design Parameters Adopted for Leachate Generation and Composite Liner Leakage Assessment

Parameter	Value
Cell footprint	35 500 m ²
Mean annual rainfall	493 mm
Maximum leachate head	0.30 m
Defect density	1 defect/ha
GCL hydraulic conductivity	5×10^{-11} m/s
GCL thickness	6 mm
HDPE geomembrane thickness	2.0 mm
Interface transmissivity	1×10^{-6} m ² /s
Wrinkle half-width	0.05 m
Wrinkle half-length	10 m

The principal pathway for leakage through a modern composite liner system is through isolated defects or imperfections within the geomembrane. The magnitude of leakage is influenced by the size and number of defects, the hydraulic head acting on the liner, the transmissivity of the interface between the geomembrane and underlying layer, and the hydraulic conductivity of the secondary barrier.

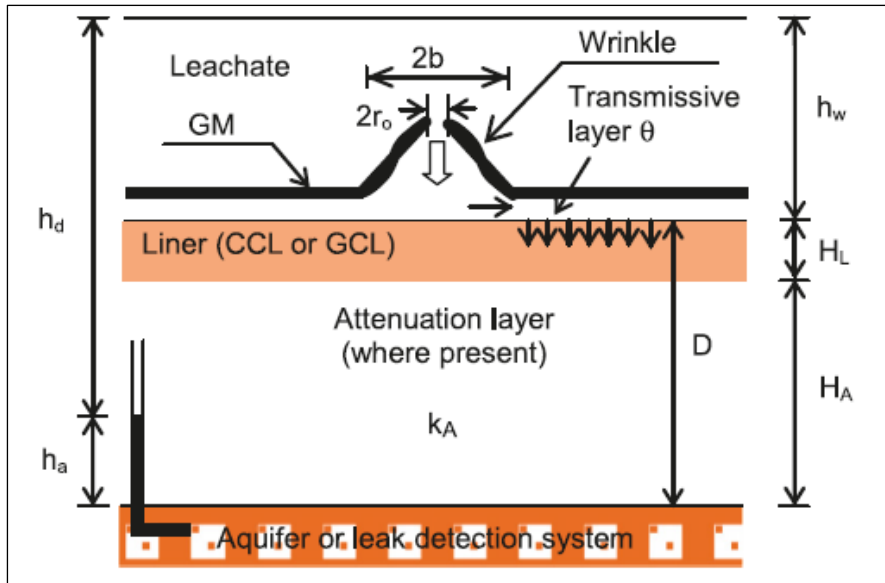


Figure 10: Conceptual representation of leakage through a defect and wrinkle in a composite landfill liner system (Rowe, 2012).

To evaluate potential leakage, the composite liner leakage methodology developed by Rowe (2012) was adopted. This method is widely accepted internationally and provides a realistic assessment of leakage associated with wrinkle-hole interactions within geomembrane systems.

For the selected liner system:

$$D = 0.006 \text{ m}$$

$$\theta = 1 \times 10^{-6} \text{ m}^2/\text{s}$$

The transmissive leakage component is determined as:

$$\sqrt{kD\theta}$$

Substituting the design values:

$$\begin{aligned} & \sqrt{(5 \times 10^{-11})(0.006)(1 \times 10^{-6})} \\ & = 5.48 \times 10^{-10} \end{aligned}$$

The calculated value is substantially lower than that associated with a conventional CCL-HDPE composite liner, confirming the superior hydraulic performance of the selected GCL-HDPE system.

Applying the Rowe model yields an estimated leakage rate of:

$$Q \approx 5.5 \times 10^{-9} \text{ m}^3/\text{s}$$

for a single wrinkle-hole interaction.

Converting this value to a daily leakage rate:

$$Q_{\text{day}} = Q \times 86400$$

$$Q_{\text{day}} = 0.000475 \text{ m}^3/\text{day}$$

which is equivalent to approximately:

$$0.48 \text{ L/day}$$

per defect.

Assuming a conservative defect density of one defect per hectare and a landfill footprint of 3.55 ha:

$$\begin{aligned} &0.48 \times 3.55 \\ &= 1.7 \text{ L/day} \end{aligned}$$

Accordingly, the estimated total leakage through the composite liner system is approximately 1.7 litres per day across the entire landfill cells.

1.3.6.4.2 Interpretation of Leakage Results

The leakage assessment demonstrates the excellent containment performance of the selected GCL-HDPE composite liner system. Even under conservative design assumptions, the predicted leakage rate is less than 2 litres per day across the full landfill footprint.

This level of leakage is considered negligible when compared with the anticipated leachate collection volumes generated during routine landfill operations and is well below internationally accepted performance thresholds for engineered landfill facilities.

The assessment confirms that the selected composite liner system provides a highly effective barrier against contaminant migration and will offer long-term protection of underlying soil and groundwater resources throughout both the operational and post-closure phases of the facility.

The results also emphasise the importance of rigorous Construction Quality Assurance (CQA) procedures during installation. Particular attention must be given to:

- Geomembrane welding and seam testing.
- Defect identification and repair.
- Minimisation of geomembrane wrinkles.
- Correct installation of protection geotextiles.
- Proper placement and overlap of GCL panels.
- Preparation and approval of the underlying subgrade.

Provided that these measures are implemented effectively, the predicted leakage rates are considered environmentally insignificant and fully acceptable from a regulatory perspective.

1.3.6.4.3 Gross Leachate Generation from Climatic and Operational Sources

Although the regional climate exhibits a strongly negative water balance, leachate generation cannot be assumed to be negligible. Rainfall falling directly onto active disposal areas, working faces, temporary stockpiles and intermediate cover surfaces will generate contaminated runoff and limited infiltration into the waste mass.

For design purposes, a conservative assumption was adopted whereby 10% of the annual rainfall incident on the active landfill footprint infiltrates the waste body and becomes collectable leachate.

The annual rainfall volume falling on the selected cell is calculated as:

$$V = P \times A$$

Where:

- $P = 0.493 \text{ m/year}$
- $A = 35\,500 \text{ m}^2$

Therefore:

$$V = 0.493 \times 35\,500$$

$$V = 17\,501.5 \text{ m}^3/\text{year}$$

If 10% of this volume infiltrates and becomes leachate:

$$L = 0.10 \times 17\,501.5$$

$$L = 1\,750 \text{ m}^3/\text{year}$$

The corresponding average daily leachate generation rate is:

$$\begin{aligned} & \frac{1750}{365} \\ & = 4.8 \text{ m}^3/\text{day} \end{aligned}$$

The leachate collection and storage system should therefore be designed to accommodate a baseline leachate production rate of approximately 5 m³/day under average operating conditions.

In addition to routine leachate generation, adequate contingency storage must be provided to accommodate contaminated stormwater runoff generated during extreme rainfall events. Consequently, the Pollution Control Dam, leachate sumps and associated pumping infrastructure should be designed to safely contain and manage both operational leachate and runoff generated during the selected 1:50-year design storm event.

1.3.6.4.4 Diffusive Transport Through the Composite Liner

Even where no measurable leakage occurs, dissolved contaminants may migrate through liner systems via molecular diffusion. Diffusion occurs when contaminants move from areas of high concentration within the landfill leachate to areas of lower concentration beneath the liner system.

Unlike hydraulic leakage, diffusion is independent of hydraulic head and may occur even when the geomembrane remains intact. The process is governed by Fick's Law, whereby contaminant movement is proportional to the concentration gradient across the barrier.

The HDPE geomembrane provides the primary resistance to diffusion. Research undertaken by Rowe, Sangam, Muller and other international landfill researchers has demonstrated that HDPE geomembranes exhibit extremely low diffusion coefficients for most inorganic contaminants, including heavy metals commonly associated with municipal waste leachate.

The underlying GCL further enhances containment performance by providing:

- Additional contaminant attenuation.
- Sorption of dissolved metals.
- Reduction in contaminant flux.
- Increased contaminant travel times.

The bentonite component within the GCL possesses a high cation exchange capacity, allowing many dissolved contaminants to be adsorbed before reaching underlying groundwater.

For the proposed Maletswai Landfill, the combined HDPE-GCL barrier is expected to reduce contaminant migration to negligible levels for several decades after closure.

2 OVERVIEW OF THIS ENVIRONMENTAL IMPACT ASSESSMENT (EIA) PROCESS

An EIA is an effective planning and decision-making tool for the project developer as it allows for the identification and management of potential environmental impacts. It provides the opportunity for the developer to be forewarned of potential environmental issues and allows for the resolution of the issues reported on in the Scoping and EIA reports, as well as dialogue with interested and affected parties (I&APs). In terms of the EIA Regulations of December 2014 (as amended) published in terms of the NEMA, 1998 (Act No. 107 of 1998) as amended, the construction and operation of the landfill site is a listed activity requiring Environmental Authorisation (EA) and Waste Management Licence. The application for EA and WUL is required to be supported by an Environmental Impact Assessment process based on the capacity of the proposed landfill site, which triggers Activities 27 and 28 of Listing Notice 1 (GN R983 in GG 38282 of 4 December 2014, as amended by GN 327 in GG 40772 of 7 April 2017, GN 706 in GG 41766 of 13 July 2018 and GN 517 in GG 44701 of 11 June 2021) and Activity B8&10 and C1 of NEMWA Listed activities.

The EIA process comprises two (2) phases (i.e., Scoping and Impact Assessment) and involves the identification and assessment of potential environmental impacts through the undertaking of independent specialist studies, as well as public participation. The processes followed in these two phases are as follows:

- The **Scoping Phase** includes the identification of potential issues associated with the project through a desktop study (considering existing information), limited field work, and consultation with interested and affected parties and key stakeholders. This phase considers the broader project site in order to identify and delineate any environmental fatal flaws, no-go and/or sensitive areas. Following a public review of the Draft Scoping Report, this phase culminates in the submission of a final Scoping Report and Plan of Study for the EIA to the CA for consideration and acceptance.
- The **EIA Phase** involves a detailed assessment of the potentially significant positive and negative impacts (direct, indirect, and cumulative) identified in the Scoping Phase. This phase considers a proposed development footprint within the project site and includes detailed specialist investigations as well as public consultation. Following a public review period of the Draft EIA Report (and subsequent amended Draft), this phase culminates in the submission of a final EIA Report and an Environmental Management Programme (EMPr), including recommendations of practical and achievable mitigation and management measures, to the CA for final review and decision-making.

A comprehensive consultation process has been designed and implemented to cater for the undertaking of a full-scale, innovative public participation process which includes I&APs, the competent authority, directly impacted landowners/occupiers, adjacent landowners/occupiers, relevant Organs of State departments, ward councillors and other key stakeholders, while remaining within the limits as stipulated by the National Government. This chapter

outlines the process that was followed during the Scoping Phase of the EIA process. The EIA process is illustrated in Figure 11 below.

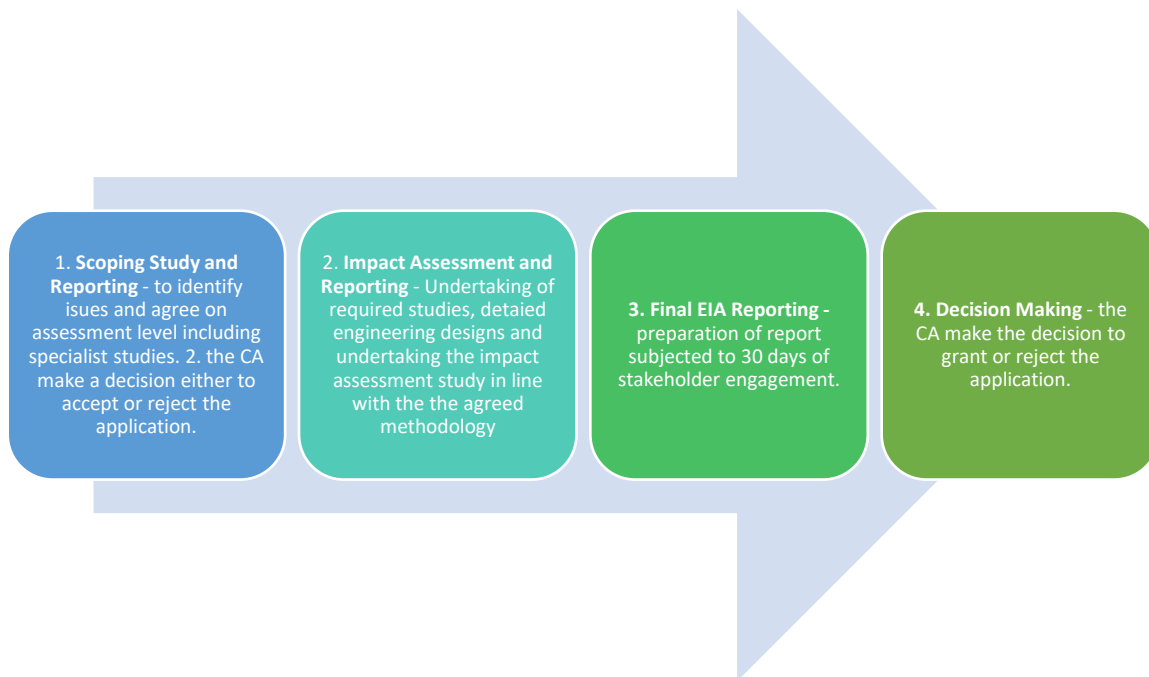


Figure 11: The Phases of an Environmental Impact Assessment (EIA) Process

2.1. Project Location

The proposed landfill site is located on the remaining extent of portion 1 of the farm Melk Spruit No. 12, Walter Sisulu Local Municipality. The central coordinates of the preferred site are situated at the following coordinates: 30°41'27.97" S 26°39'46.43" E.

Refer to the locality map below.

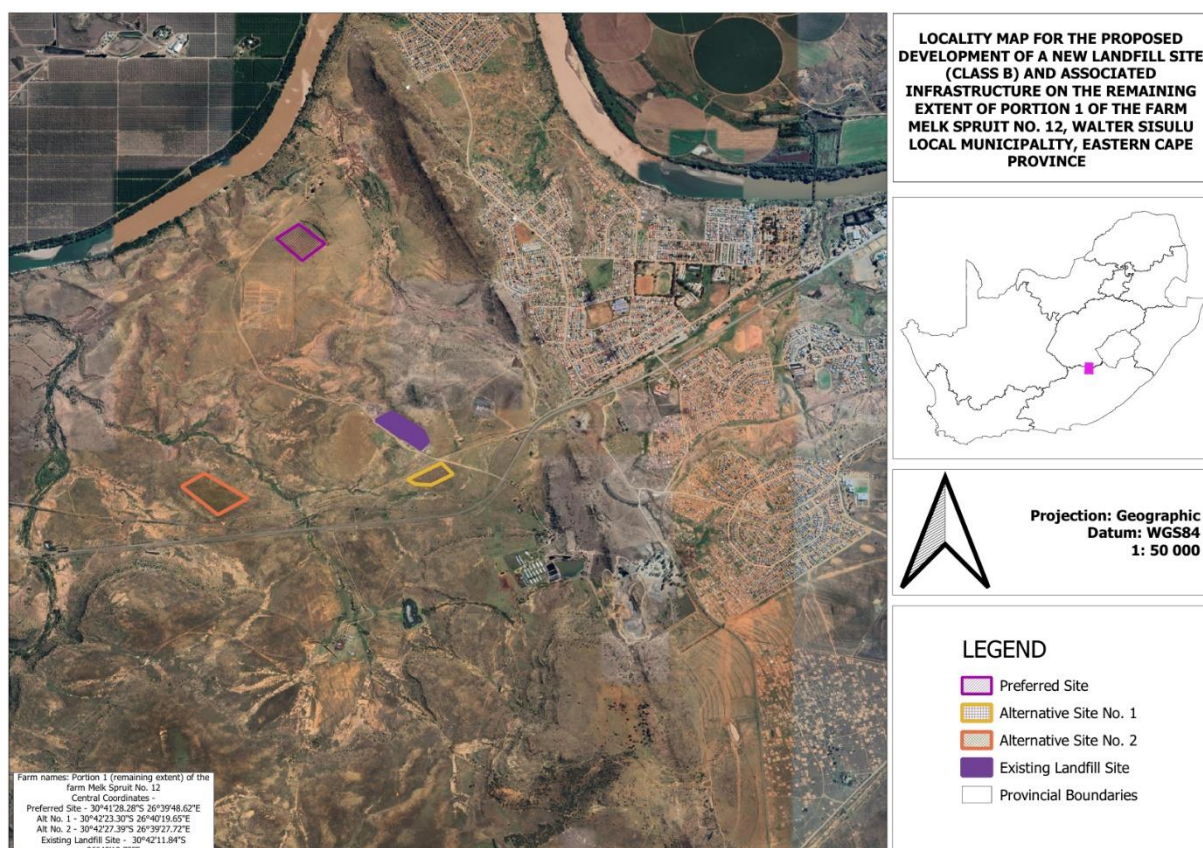


Figure 12: Locality Map of the Project

2.2. Description of the Property

Table 6: Property Information

Farm names:	The remaining extent of portion 1 of the farm Melk Spruit No. 12.
Central coordinates	30°41'27.97" S 26°39'46.43" E
Application area (ha)	Approximately 06 Ha
Property Size (ha)	681.76 Ha
Magisterial District:	Joe Qgabi District Municipality
Local Municipality:	Walter Sisulu Local Municipality
Distance and direction to the nearest town	Approximately 05 km northeast of the Maletswai CBD.
SG Codes	C0050000000001200001
Title Deeds No.	T55629/1996
Land Owner	Walter Sisulu Local Municipality

2.3. Project Team

In accordance with Regulation 12 of the 2014 EIA Regulations (GNR 326), **Rambuda Consultants (Pty) Ltd** has been appointed by **Imbawula Civil Projects (Pty) Ltd (On behalf of Walter Sisulu Local Municipality)**, as an independent environmental practitioner to facilitate the **Scoping & Environmental Impact Assessment (S&EIA)** process required in terms of the National Environmental Management Act, 1998 (NEMA, Act 107 of 1998 as amended) and National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) for the **proposed**

landfill site which is located on the remaining extent of portion 1 of the farm Melk Spruit No. 12, Walter Sisulu Local Municipality of Joe Qgabi District Municipality, Eastern Cape Province.

Rambuda Consultants (Pty) Ltd is the independent environmental consultant responsible for managing the Application for EA and supporting Scoping and Environmental Impact Assessment (S&EIA) process, inclusive of comprehensive, independent specialist studies. The application for the EA and S&EIA process will be managed in accordance with the requirements of NEMA, the 2014 EIA Regulations (GNR 326), and all other relevant legislation. Neither Rambuda Consultants (Pty) Ltd nor any of its specialists are subsidiaries or affiliated with the applicant. Furthermore, Rambuda Consultants (Pty) Ltd does not have any interest in secondary developments that may arise out of the authorisation of the proposed facility.

Rambuda Consultants (Pty) Ltd is compliant with the definition of an EAP as defined in Regulation 13 (GNR 982) as amended. This includes, inter alia, the requirement that Rambuda Consultants (Pty) Ltd:

- Is objective and independent;
- Has expertise in conducting EIAs and Environmental Construction Monitoring;
- Complies with the NEMA, the EIA Regulations and all other applicable legislation;
- Takes into consideration all relevant factors relating to the application; and
- Is a private and independent environmental management consulting firm with more than ten (10) years' experience in conducting EIAs. The CV of the EAP that compiled this EIA report is appended and provides details on previous experience and qualifications.

Table 7: Details of EAP

Name of the EAP	Roles	Educational Background	Years of Experience
Kabedi Mashilo (Reg EAP) – 2019/1263	EAP	• Postgraduate Diploma in Water Management • BSc (Hons) Environmental Monitoring and Modelling • Bachelor of Science (BSc) in Environmental Management • Diploma in Occupational Health and Safety	14

Mr Mashilo is Environmental Scientist with more than fourteen (14) years of experience in integrated environmental management, informal settlement upgrading, waste management, and geographical information systems. I hold a BSc (Hons) in Environmental Monitoring and Modelling and a BSc in Environmental Management: Chemistry Stream, both from the University of South Africa; as well as a Postgraduate Diploma in Water Management from IIEMSA; and a Diploma in Occupational Health and Safety from Oxbridge Academy (Pty) Ltd. I have also completed ISO 9001:2015 Development and Implementation training, which focuses on workplace quality management.

He has advocated for environmental protection and waste management, with practical experience applying the National Environmental Management Act, National Environmental Management: Waste Act, Environmental Impact Assessment Regulations, 2014 as amended, Mineral and Petroleum Resources Development Act, National Water Act, Occupational Health and Safety Act, and related environmental legislation. My experience has strengthened my management, communication, research, negotiation, coordination, and stakeholder engagement capabilities. I work well under pressure, enjoy learning, and value strong professional relationships with clients, colleagues, and graduates I have mentored in the environmental management field.

He has worked for various construction, consulting companies and government and gaining extensive experience in integrated environmental and waste management. I later joined Rambuda Consultants (Pty) Ltd as a Senior Environmental Scientist and Geographic Information System Specialist. My responsibilities include environmental education, implementation of RODs and EMPs, environmental project management, environmental impact assessments, environmental management plans, water use licensing, waste management licence applications, water resource management planning, Environmental Compliance Officer duties, mining permit applications, tree removal permits, supervision of two (2) personnel, and the use of ArcGIS V10.4 and Quantum GIS 2.18.

To ensure the scientific rigour of the EIA process as well as a robust assessment of impacts, Rambuda Consultants (Pty) Ltd was assisted by various specialists and specialist assessments to comprehensively identify both potentially positive and negative environmental impacts (social and biophysical) associated with the project and, where possible, mitigate the potentially negative impacts and enhance the positive impacts.

The following specialist studies have been conducted for the proposed project from 2023 to 2025, through the previously appointed EAP (Afroteam Consultants) (Table 8).

Table 8: Specialist studies undertaken through the Afroteam Consultants

Specialist Study	PSP
Geotechnical Investigations Studies	Geo-Soils Laboratory (Pty) Ltd.
Desktop Geohydrological Studies	Geoseed Consulting (Pty) Ltd
Agricultural Potential Assessment For	Maanakana Projects and Consulting (Pty) Ltd
Terrestrial Biodiversity Impact Assessment	

In addition to the above specialist studies, the following reports have been prepared in support of the EIA study (Table 9):

Table 9: Specialist studies undertaken for EIA Study

Specialist Study	PSP
Terrestrial Biodiversity Impact Assessment	Flori Scientific Services cc
Aquatic Impact Assessment Study	

Heritage Impact Assessment	Mr Francois Coetzee
Paleontological Impact Assessment Study	Dr Heide Fourie
Geohydrological Impact Assessment Study	Mahura Group (Pty) Ltd
Engineering Designs	Imbawula Civil Projects (Pty) Ltd
Agricultural Impact Assessment Study	KMG Environmental Solutions Services (Pty) Ltd
Air Quality Impact Assessment Study	KMG Environmental Solutions Services (Pty) Ltd
Updated Geotechnical Investigation on the preferred site (covering additional parameters for detailed design stage).	EartInvLab (Pty) Ltd

Table 10: Details of the Applicant's Contact Person

Walter Sisulu Local Municipality	
Contact person:	Mr Khaya Gashi
Position in the company	Municipal Manager
Postal address:	P O Box 13, Burgersdorp
Postal code:	9744
Telephone:	051 653 1777
E-mail:	sivuyile.mbobo@wslm.gov.za

Table 11: Design Engineer

Imbawula Civil Projects (Pty) Ltd	
Contact person:	Mr B. Citwa (Project Engineer)
Postal address:	P O Box 719, Butterworth,
Postal code:	4960
Telephone:	Tel: (012) 372 3708
E-mail:	bulelani@imbawulacp.co.za

2.4. Need and desirability of the proposed project

According to Appendix 2, Section 2(b), of the 2014 EIA Regulations (as amended in 2017, 2021), an Environmental Impact Assessment Report must include "a motivation for the need and desirability for the development, including the need and desirability of the activity in the context of the preferred location."

In the context of Environmental Impact Assessment (EIA) guidelines in South Africa, the terms "need" and "desirability" refer to the justification for a project. Need refers to the requirement or necessity for the project, based on factors such as economic, social, or environmental considerations. For example, a project may be deemed necessary to meet the growing energy demand or to address a specific environmental issue. Desirability refers to the extent to which the project is preferred or favoured, based on its potential benefits and positive impacts. For example, a proposed project may be desirable because it is expected to create jobs, generate economic growth, or improve the quality of life.

Together, the concepts of need and desirability are used to evaluate the overall justification for a proposed project and to determine whether the potential benefits of the project outweigh its potential negative impacts. This is an important aspect of the EIA process, as it helps to ensure that projects are planned and executed responsibly and sustainably.

See below a breakdown of various factors which influence the need and desirability of the proposed development project in line with the Sustainable Development pillars.

2.4.1. The need and desirability for the proposed development in line with the three pillars of sustainable development.

It is of paramount importance in the EIA Process to assess the need and desirability of the proposed project in line with the provisions of the Need and Desirability Guidelines published by the National Department of Environmental Affairs (DEA) (now operating as the Department of Forestry, Fisheries and Environment (DFFE)) in 2017. The guidelines list specific questions necessary to determine the need and desirability of proposed developments. The questions are in a checklist format, which is a useful tool in addressing specific questions relating to the need and desirability of a project and assists in explaining that need and desirability in the provincial and local context. Need and desirability address the question of whether the activity is being proposed at the right time and in the right place. The following considers the three (3) pillars of sustainable development (economic, social, and environmental).

Table 6: Need and Desirability as per DFFE Guidelines of 2017

Question	Response
1. How will this development (and its separate elements/aspects) impact on the ecological integrity of the area?	
How were the following ecological integrity considerations taken into account? - Threatened Ecosystems, - Sensitive, vulnerable, highly dynamic or stressed ecosystems, such as coastal shores, estuaries, wetlands, and similar systems, require specific attention in management and planning procedures, especially where they are subject to significant human resource usage and development pressure. - Critical Biodiversity Areas ("CBAs") and Ecological Support Areas ("ESAs"),	Site assessment was undertaken on the preferred site to identify terrestrial and aquatic sensitivities present within the project site. Based on the assessment, the proposed site is located on previously cultivated land, with general vegetation abundant in the region. Moreover, the site is not located within Sensitive, vulnerable, highly dynamic or stressed ecosystems. According to the provincial Biodiversity Conservation Sectoral Plan, the site is located within the Ecological Support Areas (ESA) 2; however, the proposed development is not excluded or incompatible with the land uses associated with ESA 2. The proposed area will cover approximately 6 ha of the 681-ha farm. While the potential impacts are minimal, proper planning,

Question	Response
• Conservation targets, • Ecological drivers of the ecosystem, • Environmental Management Framework, • Spatial Development Framework, and • Global and international responsibilities relating to the environment (e.g. RAMSAR sites, Climate Change, etc.).	especially in relation to the future project, will have to be managed.
How will this development disturb or enhance ecosystems and/or result in the loss or protection of biological diversity? What measures were explored to firstly avoid these negative impacts, and where these negative impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?	The proposed development will have impacts on the area classified as ESA, thus considered sensitive. Three (3) site location options were considered; however, the areas were found to have undisturbed and diverse biodiversity in addition to other environmental encumbrances. Three (3) size alternatives were further assessed to minimise the area to be transformed by the proposed landfill site. Due to the limited impact area and the least-concerned ecosystem affected by the proposed development, offset options are considered unnecessary. Further mitigation measures to avoid, remedy, mitigate and manage impacts will be included in the Environmental Management Programme (EMPr) that will be compiled during the EIA Phase and included within the EIA Report.
How will this development pollute and/or degrade the biophysical environment? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?	The proposed development has the potential to degrade/pollute the biophysical environment; however, several actions and mitigations are being explored to minimise the potential impact of the proposed development on the environment. The site selection considered the geological setting of the proposed site, such as the lower permeability and groundwater table of the area, an adequate and appropriate containment layer for the landfill site, including the leachate and stormwater management system. Other mitigation measures are outlined throughout the report and will be further expanded on during the EIA phase. The above measures are considered adequate to address any negative impacts emanating from the proposed development, thus promoting environmental protection.
What waste will be generated by this development?	The facility will generate limited waste, such as office waste and

Question	Response
What measures were explored to firstly avoid waste, and where waste could not be avoided altogether; what measures were explored to minimise, reuse and/or recycle the waste? What measures have been explored to safely treat and/or dispose of unavoidable waste?	leachate from the waste cells. However, the proposed project is a landfill site which will be receiving waste from the municipal service areas in and within Maletswai Town. The proposed facility will also include the development of a Material Recovery and Sorting Facility with the intention of diverting the quantity of waste which will be finally disposed of within the landfill site. Additionally, mitigation measures to avoid, remedy, mitigate or manage waste will be included within the EMPr that will be compiled during the EIA Phase and included within the EIA Report. Waste generated on site will be disposed of at a licenced landfill site by a competent and accredited service provider.
How will this development disturb or enhance landscapes and/or sites that constitute the nation's cultural heritage? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?	During the desktop and site assessment, no artefacts/landscape or site that can be considered the nation's cultural heritage was observed; as such, the proposed development will not affect such an area. Additionally, Terrestrial, Aquatic, Heritage and Paleontological Impact Assessment Studies have been undertaken, and all identified buffer zones have been included in the final layout plan of the proposed development.
How will this development use and/or impact non-renewable natural resources? What measures were explored to ensure responsible and equitable use of the resources? How have the consequences of the depletion of non-renewable natural resources been considered? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?	Detailed sites assessment has confirmed that the proposed development will not detrimentally impact to the non-renewable natural resources. Additionally, further mitigation measures to avoid, remedy, mitigate or manage impacts on non-renewable natural resources is included in the EMPr as part of the EIA Report.

Question	Response
How will this development use and/or impact renewable natural resources and the ecosystem of which they are part? Will the use of the resources and/or impact on the ecosystem jeopardise the integrity of the resource and/or system, taking into account carrying capacity restrictions, limits of acceptable change, and thresholds? What measures were explored to firstly avoid the use of resources, or if avoidance is not possible, to minimise the use of resources? What measures were taken to ensure responsible and equitable use of the resources? What measures were explored to enhance positive impacts? - Does the proposed development exacerbate the increased dependency on increased use of resources to maintain economic growth, or does it reduce resource dependency (i.e., dematerialised growth)? (Note: Sustainability requires that settlements reduce their ecological footprint by using less material and energy demands and reduce the amount of waste they generate, without compromising their quest to improve their quality of life.) - Does the proposed use of natural resources constitute the best use thereof? Is the use justifiable when considering intra- and intergenerational equity, and are there more important priorities for which the resources should be used (i.e., what are the opportunity costs of using these resources of the proposed development alternative?) - Do the proposed location, type and scale of development promote a reduced dependency on resources?	The potential impacts from the proposed development (landfill site) will be limited in terms of the renewable natural resources and the ecosystem. Due to the limited extent of the proposed site, the proposed development is considered to have limited impacts on the ecosystem; it could not jeopardise the integrity of the resource and/or system, taking into account carrying capacity restrictions, limits of acceptable change, and should include the project mitigation measures as outlined by the environmental reporting for the project. Several actions and mitigations are being explored to minimise the potential impact of the proposed development on the environment. The site selection considered the geological setting of the proposed site, such as the lower permeability and a groundwater table of the area, an adequate and appropriate containment layer for the landfill site, including the leachate and stormwater management system. Other mitigation measures are outlined throughout the report and are further expanded in this report (EIA phase). Lastly, the development type and scale do not promote dependency on the renewable natural resources and the ecosystem, and based on the factors considered above, the proposed use of natural resources constitutes the best use considering the pillars of sustainable development.
How were risk-averse and cautious approach applied in terms of ecological impacts?: What are the limits of current knowledge (note: the gaps, uncertainties and assumptions must	Several specialist studies have been undertaken to identify the any sensitive environments which need to be considered and protected as part of the development. A risk-averse and cautious approach was adopted during site selection, considering the biophysical

Question	Response
be clearly stated)? • What is the level of risk associated with the limits of current knowledge? • Based on the limits of knowledge and the level of risk, how and to what extent was a risk-averse and cautious approach applied to the development?	environment, including the temporal analyses of all three (3) alternative sites considered. The site, which scored higher on all three pillars of sustainable development, was selected as the preferred site. The gaps, uncertainties and assumptions must be clearly stated and have been included in the report.
How will the ecological impacts resulting from this development impact on people's environmental rights in terms following: • Negative impacts: e.g. access to resources, opportunity costs, loss of amenity (e.g. open space), air and water quality impacts, nuisance (noise, odour, etc.), health impacts, visual impacts, etc. What measures were taken to firstly avoid negative impacts, but if avoidance is not possible, to minimise, manage and remedy negative impacts? • Positive impacts: e.g., improved access to resources, improved amenity, improved air or water quality, etc. What measures were taken to enhance positive impacts?	The potential impacts from the proposed development (landfill site) will be limited in extent and at the ecosystem level. Due to the limited extent of the proposed site, the proposed development is considered to have limited impacts on biodiversity; it could not jeopardise the integrity of the resource and/or ecosystem, taking into account carrying capacity restrictions, limits of acceptable change, and should include mitigation measures as outlined by the environmental reporting for the project be implemented. Several actions and mitigations were explored to minimise the potential impact of the proposed development on the environment. The site selection considered the geological setting of the proposed site, such as the lower permeability and a groundwater table of the area, an adequate and appropriate containment layer for the landfill site, including the leachate and stormwater management system. A risk-averse and cautious approach was adopted during site selection, considering the biophysical environment, including the temporal analyses of all three (3) alternative sites considered. One of the major considerations was the potential air quality impacts on the sensitive receptors within the 5,00 km radius. The site, which scored higher on all three pillars of sustainable development, was selected as the preferred site.
Describe the linkages and dependencies between human wellbeing, livelihoods and ecosystem services applicable to the area in question and how the development's ecological impacts will result in socio-economic impacts (e.g., on livelihoods, loss of heritage site, opportunity costs, etc.)?	In addition to the proposed site being considered for ESA, the site is also used for communal grazing. Therefore, the proposed project will also have an impact on the availability of land for grazing purposes. However, balancing the needs of the proposed development vis-à-vis the potential impact, the potential positive impact outweighs the negative impacts. The proposed project will result in positive impacts associated with the continuous poor

Question	Response
	landfill practices within the Maletswai area, several temporary job opportunities (resulting in improvements in livelihoods), during the construction phase and some permanent job opportunities for the operation phase of the landfill site.
Based on all of the above, how will this development positively or negatively impact the ecological integrity objectives/targets/considerations of the area?	With the information already available, the impacts on ecological integrity are very low, considering the risk-averse approach adopted earlier in the environmental impact assessment. This has resulted in a balanced option which has been put forward as the preferred site and landfill layout setting option.
Considering the need to secure ecological integrity and a healthy biophysical environment, describe how the alternatives identified (in terms of all the different elements of the development and all the different impacts being proposed), resulted in the selection of the "best practicable environmental option" in terms of ecological considerations?	The potential impacts from the proposed development (landfill site) will be limited in extent and at the ecosystem level. Due to the limited extent of the proposed site, the proposed development is considered to have limited impacts on the biodiversity; it could not jeopardise the integrity of the resource and/or ecosystem, taking into account carrying capacity restrictions, limits of acceptable change, and should include mitigation measures as outlined by the environmental reporting for the project be implemented. Several actions and mitigations were explored to minimise the potential impact of the proposed development on the environment. The site selection considered the geological setting of the proposed site, such as the lower permeability and a groundwater table of the area, an adequate and appropriate containment layer for the landfill site, including the leachate and stormwater management system. Issues such as the proposed site's proximity to a watercourse and visual impacts were also considered. A risk-averse and cautious approach was adopted during site selection, considering the biophysical environment, including the temporal analyses of all three (3) alternative sites considered. One of the major considerations was the potential air quality impacts on the sensitive receptors within the 5,00 km radius. The site, which scored higher on all three pillars of sustainable development, was selected as the preferred site.
Describe the positive and negative cumulative ecological/biophysical impacts bearing in mind the size, scale, scope and nature of the project in relation	Several negative impacts, such as loss of indigenous vegetation, visual, and water quality, etc., can emanate from the proposed development. However, the site selection process was guided by

Question	Response
to its location and existing and other planned developments in the area?	balancing the needs and desirability of the project against the receiving environment. Moreover, the limited extent of the disturbed area will mitigate some of the potential impacts from the proposed development. The potential positive impacts which will emanate from the proposed development will include job opportunities, considering the poverty level of the area. Also, the new landfill site will address the poor waste practices currently being undertaken on the existing landfill site and associated impacts such as littering, visual impact and underground water quality.
1.2. What is the socio-economic context of the area, based on, amongst other considerations, the following considerations?	
The IDP (and its sector plans' vision, objectives, strategies, indicators and targets) and any other strategic plans, frameworks of policies applicable to the area,	The proposed project is covered in the municipal IDP and is aimed at complying with several statutory requirements, including compliance with NEM: Waste Act (Act 59 of 2008) (e.g., Section 20: duty to close and remediate old landfill), alignment with the National Environmental Management Act (NEMA) principles, and meeting municipal obligations for waste disposal and service delivery. Also, the existing landfill site has received a directive and, as such, must be closed within the next two (2) years.
Spatial priorities and desired spatial patterns (e.g., need for integration of segregated communities, need to upgrade informal settlements, need for densification, etc.),	According to the information available, the proposed site was set aside for municipal services such as a graveyard and the landfill site. The graveyards are already in existence. The location is ideal for the proposed development due to the following reasons, among others: • Having a limited visual impact on the sensitive receptors within a 5 km radius. • Rated higher in terrestrial, aquatic, and air quality assessments. • The natural topography directs any potential poor air quality away from the potential sensitive receptors. • The preferred site was disturbed previously, with no disturbance observed on the two (2) alternative sites considered, especially alternative no. 2.
Spatial characteristics (e.g., existing land uses, planned land uses, cultural landscapes, etc.)	Although the site is vacant, it was previously used for the cultivation of maize; however, it is currently used for grazing

Question	Response
	purposes. The adjacent land uses include small broiler farming, cattle kraals and medium size graveyard. The proposed site is not visible from most of the cardinal sides (directions). As such, based on the limited extent of the site, the prevailing land uses around the site, and the project's impacts on the spatial characteristics are limited and could be mitigated to an acceptable level.
Municipal Economic Development Strategy ("LED Strategy").	Part of the proposed development includes the Material Recovery Area to be operated by the locals, and as such, it will contribute to it the local economic development. Additionally, during the construction phase, the proposed development will result in SMMEs being subcontracted to provide various services for the development of the landfill site.
Considering the socio-economic context, what will the socio-economic impacts be of the development (and its separate elements/aspects), and specifically also on the socio-economic objectives of the area? Will the development complement the local socio-economic initiatives (such as local economic development (LED) initiatives), or skills development programs?	Additionally, job opportunities will be created as part of the proposed development. This has positive impacts on the socio-economic situation of the affected communities.
How will this development address the specific physical, psychological, developmental, cultural and social needs and interests of the relevant communities?	
Will the development result in equitable (intra- and inter-generational) impact distribution, in the short- and long term? Will the impact be socially and economically sustainable in the short- and long-term?	The proposed development is planned for the medium to long term. The facility should have been operated for more than 20 years, thus supporting city development while promoting proper waste management. With regards to the employment opportunities, the construction phase will result in short-term work opportunities; however, due to the limited capacity of the waste management department of the municipality, permanent job opportunities will also be created for the operation phase of the facility.
1.3. In terms of location, describe how the placement of the proposed development will:	
Result in the creation of residential and employment opportunities near or integrated with each other,	The proposed development will not result in the direct development of residential opportunities; however, support sustainable township development by ensuring the availability of facilities to support municipal services provision.

Question	Response
	With regards to the employment opportunities, the construction phase will result in short-term work opportunities; however, due to the limited capacity of the waste management department of the municipality, permanent job opportunities will also be created for the operation phase of the facility.
Reduce the need for transport of people and goods,	Not Applicable
Result in access to public transport or enable non-motorised and pedestrian transport (e.g. will the development result in densification and the achievement of thresholds in terms public transport),	
Compliment other uses in the area,	Although the site is vacant, it was previously used for the cultivation of maize; however, it is currently used for grazing purposes. The adjacent land uses include small broiler farming, cattle kraals and medium size graveyard. The proposed site is not visible from most of the cardinal sides (directions). As such, based on the limited extent of the site, the prevailing land uses around the site, and the project's impacts on the spatial characteristics are limited and could be mitigated to an acceptable level.
Be in line with the planning for the area,	
For urban related development, make use of the underutilised land available with the urban edge,	
Optimise the use of existing resources and infrastructure,	
Opportunity costs in terms of bulk infrastructure expansions in non-priority areas (e.g., not aligned with the bulk infrastructure planning for the settlement that reflects the spatial reconstruction priorities of the settlement),	The operation of the facility depends on limited bulk services. The bulk electricity supply is available onsite; water provision will depend on the borehole use, due to the limited water supply in the area and overallocation of the Orange River. Due to the size of the landfill site, the expanded operation staff will be fewer than 10 people; therefore, no bulk water line is necessary, as onsite systems will be cost-effective and efficient.
Discourage "urban sprawl" and contribute to compaction/densification,	The proposed development will not result in the direct development of residential opportunities; however, support sustainable township development by ensuring the availability of facilities to support municipal services provision.
Contribute to the correction of the historically distorted spatial patterns of settlements and to the optimum use of existing infrastructure, more than current needs.	
Encourage environmentally sustainable land development practices and processes,	
Take into account special locational factors that might	The preferred site considered several factors, such as closure of

Question	Response
favour the specific location (e.g. the location of a strategic mineral resource, access to the port, access to rail, etc.),	the Maizefield Landfill and resulting service gaps, Limited capacity of existing landfills (James Calata, Steynsburg) and distance-related issues, Inefficiencies or environmental risks of current waste disposal practices (e.g., illegal dumping, leachate, pollution) and Social impacts of inadequate waste services (health risks, aesthetic issues).
The investment in the settlement or area in question will generate the highest socio-economic returns (i.e., an area with high economic potential),	The municipal investment in the proposed development will contribute to several benefits, which should result with highest socio-economic returns: • Job creation during construction and operation. • Local economic development opportunities (e.g., recycling enterprises, waste sorting facilities). • Service delivery improvements and contribution to community well-being. • Cost-effectiveness of a local landfill versus transporting waste to distant sites.
Impact on the sense of history, sense of place and heritage of the area and the socio-cultural and cultural-historic characteristics and sensitivities of the area, and	Heritage Impact Assessment and Paleontological Impact Assessment Studies have been undertaken, which have identified areas of importance. Adequate buffer zones are considered in line with the recommendation. The reports were further approved by the Competent Authority.
In terms of the nature, scale and location of the development, promote or act as a catalyst to create a more integrated settlement?	Not applicable.
1.4. How was a risk-averse and cautious approach applied in terms of socio-economic impacts?	
What are the limits of current knowledge (note: the gaps, uncertainties and assumptions must be clearly stated)?	Several specialist studies have been undertaken to identify the sensitive environments which need to be considered and protected as part of development. A risk-averse and cautious approach was adopted during site selection, considering the biophysical environment, including the temporal analyses of all three (3) alternative sites considered. The site, which scored higher on all three pillars of sustainable development, was selected as the preferred site.
What is the level of risk (note: related to inequality, social fabric, livelihoods, vulnerable communities, critical resources, economic vulnerability and sustainability) associated with the limits of current knowledge?	
Based on the limits of knowledge and the level of risk,	The gaps, uncertainties and assumptions must be clearly stated

Question	Response
how and to what extent was a risk-averse and cautious approach applied to the development?	and have been included in the report.
1.5. How will the socio-economic impacts be resulting from this development impact on people's environmental rights in terms of the following:	
Negative impacts: e.g., health (e.g., HIV-Aids), safety, social ills, etc. What measures were taken to firstly avoid negative impacts, but if avoidance is not possible, to minimise, manage and remedy negative impacts?	Construction activities have potential to bring a lot of people from outside the project area. This brings risks to the receiving communities. As part of a risk-averse and cautious approach recommendation are made to prioritise the local municipalities in job and business opportunities to regulate the influx of people into the receiving communities. These recommendations will be taken forward into the EIAR phase.
Positive impacts. What measures were taken to enhance positive impacts?	Labour-intensive methods are encouraged to enhance the job and business opportunities from the proposed development. Also, the engineering designs have considered various containment options, which will result in adequate protection of the underground water resources while being cost-effective.
Considering the linkages and dependencies between human wellbeing, livelihoods, and ecosystem services, describe the linkages and dependencies applicable to the area in question and how the development's socioeconomic impacts will result in ecological impacts (e.g., overutilisation of natural resources, etc.)?	This development will provide a well-planned and managed landfill site that is likely to result in closing the gap resulted from the closure of the Maizefield Landfill site, improving the limited capacity of existing landfills (James Calata, Steynsburg) and distance-related issues, dealing with the current Inefficiencies or environmental risks of current waste disposal practices (e.g., illegal dumping, leachate, pollution), Social impacts of inadequate waste services (health risks, aesthetic issues), Job creation during construction and operation, Local economic development opportunities (e.g., recycling enterprises, waste sorting facilities), Service delivery improvements and contribution to community well-being and cost-effectiveness of a local landfill versus transporting waste to distant sites..
What measures were taken to pursue the selection of the "best practicable environmental option" in terms of socio-economic considerations?	
What measures were taken to pursue environmental justice so that adverse environmental impacts shall not be distributed in such a manner as to unfairly discriminate against any person, particularly vulnerable and disadvantaged persons (who are the beneficiaries and is the development located appropriately)? Considering the need for social equity	The potential impacts from the proposed development (landfill site) will be limited in extent and at the ecosystem level. Due to the limited extent of the proposed site, the proposed development is considered to have limited impacts on biodiversity; it could not jeopardise the integrity of the resource and/or ecosystem, taking into account carrying capacity restrictions and limits of acceptable change, and should include mitigation measures as outlined by the

Question	Response
and justice, do the alternatives identified, allow the "best practicable environmental option" to be selected, or is there a need for other alternatives to be considered?	environmental reporting for the project to be implemented.
What measures were taken to pursue equitable access to environmental resources, benefits and services to meet basic human needs and ensure human wellbeing, and what special measures were taken to ensure access thereto by categories of persons disadvantaged by unfair discrimination?	Several actions and mitigations were explored to minimise the potential impact of the proposed development on the environment.
What measures were taken to ensure that the responsibility for the environmental health and safety consequences of the development has been addressed throughout the development's life cycle?	The site selection considered the geological setting of the proposed site, such as the lower permeability and groundwater table of the area, and an adequate and appropriate containment layer for the landfill site, including the leachate and stormwater management system. Issues such as the proposed site's proximity to a watercourse and visual impacts were also considered. A risk-averse and cautious approach was adopted during site selection, considering the biophysical environment, including the temporal analyses of all three (3) alternative sites considered. One of the major considerations was the potential air quality impacts on the sensitive receptors within the 5,00 km radius. The site, which scored higher on all three pillars of sustainable development, was selected as the preferred site. This development will provide a well-planned and managed landfill site that is likely to result in closing the gap resulted from the closure of the Maizefield Landfill site, improving the limited capacity of existing landfills (James Calata, Steynsburg) and distance-related issues, dealing with the current Inefficiencies or environmental risks of current waste disposal practices (e.g., illegal dumping, leachate, pollution), Social impacts of inadequate waste services (health risks, aesthetic issues), Job creation during construction and operation, Local economic development opportunities (e.g., recycling enterprises, waste sorting facilities), Service delivery improvements and contribution to community well-being and cost-effectiveness of a local landfill versus transporting waste to distant sites..
1.6. What measures were taken to:	
Ensure the participation of all interested and affected parties,	The Public Participation Process (PPP) is being undertaken as part of this EIA Phase. All the information about the public participation process is included in the scoping report and the EIA Report. The process will describe various methods to notify potential I&APs of the proposed project and the opportunity to
Provide all people with an opportunity to develop the understanding, skills, and capacity necessary for achieving equitable and effective participation,	

Question	Response
Ensure participation by vulnerable and disadvantaged persons,	comment on the Draft EIA Report, namely, through notices in the local newspaper, site notices, emails, as well as sms text messages. Interested and Affected Parties will also be notified of the opportunity to comment on the Draft EIA Report (this report), which will be released for a 30-day commenting period. Various languages spoken within the area were utilised to achieve maximum participation. Four (4) newspaper adverts will be made in total between the two (2) phases in three (3) different languages. The EIA process will take cognisance of all interests, needs and values adopted by all I&APs. All issues raised or input from the local community will be addressed as part of the public participation.
Promote community wellbeing and empowerment through environmental education, the raising of environmental awareness, the sharing of knowledge and experience and other appropriate means,	
Ensure openness and transparency, and access to information in terms of the process,	
Ensure that the interests, needs and values of all interested and affected parties were considered and that adequate recognition was given to all forms of knowledge, including traditional and ordinary knowledge,	
Ensure that the vital role of women and youth in environmental management and development is recognised and their full participation therein is promoted.	
Considering the interests, needs and values of all the interested and affected parties, describe how the development will allow for opportunities for all the segments of the community (e.g. a mixture of low-, middle-, and high-income housing opportunities) that is consistent with the priority needs of the local area (or that is proportional to the needs of an area)?	
What measures have been taken to ensure that current and/or future workers will be informed of work that potentially might be harmful to human health or the environment or of dangers associated with the work, and what measures have been taken to ensure that the right of workers to refuse such work will be respected and protected?	An EMPr will be developed to address health and safety concerns. An Environmental Control Officer (ECO) will be appointed to monitor compliance with the EMPr and EA during the construction and operational phases. Other labour and occupational health and safety issues will be handled in terms of the provisions of the labour and OHS laws.
1.7. Describe how the development will impact job creation in terms of, amongst other aspects:	
Whether the labour available in the area will be able to	In line with EPWP requirements, and the proposed project being

Question	Response
take up the job opportunities (i.e., do the required skills match the skills available in the area),	municipal-owned, all general workers will be from the neighbouring communities. The SMME backlog will be developed once a skill audit has been undertaken during the construction phase.
The distance from where labourers will have to travel,	The nearest communities are within a 3.00 km radius of the proposed development
The location of job opportunities versus the location of impacts (i.e., equitable distribution of costs and benefits),	The potential negative impacts of the project will be felt by the receiving communities, which are benefiting from this project.
The opportunity costs in terms of job creation (e.g., a mine might create 100 jobs, but impact on 1000 agricultural jobs, etc.).	The proposed project will result with positive impacts associated with the continuous poor landfill practices within the Maletswai area, several temporary job opportunities (resulting in improvements in livelihoods), during the construction phase and also permanent opportunities will be created due to the limited capacity within the municipality's waste department. Additionally, Labour-intensive methods are encouraged to enhance the job and business opportunities from the proposed development. Also, engineering designs have considered various containment options, which will result in adequate protection of the underground water resources while being cost-effective.
1.8. What measures were taken to ensure:	
That there was intergovernmental coordination and harmonisation of policies, legislation and actions relating to the environment,	The different government departments have been listed as I&APs and are allowed to comment on the Draft Scoping Report and will be allowed to comment on the Draft EIA Report during the 30-day public participation period.
Were actual or potential conflicts of interest between organs of state resolved through conflict resolution procedures?	Ongoing engagements are undertaken to ensure that all concerns are identified and addressed before the submission of the final EIA Report.
What measures were taken to ensure that the environment will be held in public trust for the people, that the beneficial use of environmental resources will serve the public interest, and that the environment will be protected as the people's common heritage?	The proposed project adheres to the principles of environmental management. Measures taken to ensure adherence to the principles of NEMA as determined in the EIA Phase. The EMPr will include such measures.
Are the mitigation measures proposed realistic, and	The practicality of mitigation measures will be determined during

Question	Response
what long-term environmental legacy and managed burden will be left?	the EIA Phase. The proposed mitigation measures to be included in the EMPr that will be included in the EIA Report will be informed by the specialist studies undertaken. This will include a detailed assessment of the environment as well as the impacts associated with the proposed development.
What measures were taken to ensure that the costs of remedying pollution, environmental degradation and consequent adverse health effects and of preventing, controlling or minimising further pollution, environmental damage or adverse health effects will be paid for by those responsible for harming the environment?	The EMPr (to be included in the EIA Report) of this proposed project must form part of the contractual agreement and be adhered to by both the contractors/workers and the Project Applicant.
Considering the need to secure ecological integrity and a healthy bio-physical environment, describe how the alternatives identified (in terms of all the different elements of the development and all the different impacts being proposed), resulted in the selection of the best practicable environmental option in terms of socio-economic considerations?	The proposed project would be more robust in terms of economic viability and profitability while also being largely uninfluenced by climate change variables. The proposed project will also contribute to local socio-economic upliftment through job creation and waste services provision.
Describe the positive and negative cumulative socio-economic impacts, bearing in mind the size, scale, scope, and nature of the project in relation to its location and other planned developments in the area?	The potential cumulative impacts resulting from the proposed project can only be objectively determined at the end of the EIA process. These are assessed as part of the EIA Phase. The cumulative impacts of similar types of projects that have received EA or whose EA status is pending were assessed in the EIA Report.

The need and desirability of the proposed development can be summarised as follows:

- **Legislative and Regulatory Need**

- Compliance with **NEM: Waste Act (Act 59 of 2008)** (e.g., Section 20: duty to close and remediate old landfill).
- Alignment with the **National Environmental Management Act (NEMA)** principles.
- Fulfilment of **municipal obligations** for waste disposal and service delivery.
- The proposed development of a landfill site is necessary to address poor landfill practices at the now closed Maizefield Landfill site (JG/A/14/001/2022), the closure licence gave the municipality a five (5) year period to ensure that the old landfill site is closed. The closure of the old landfill site has created a need to develop a new landfill site to cater for the Maletswai Town and

associated settlements. While the municipality has two (2) licensed landfill sites at James Calata and Steynsburg towns, these are far from the Maletswai Area, thus resulting in higher haulage-related impacts (economic and environmental impacts). The project aims to:

- ✓ To replace the old Maizefield Landfill Site, which is in the process of closure.
- ✓ Provide facilities for improved waste management practices, such as proper water quality monitoring, landfill development with all required mitigation measures for pollution control and management.
- ✓ Provide a facility for sorting and recycling of waste, thus reducing the amount of waste being disposed of in the landfill site.
- ✓ Provide for the required alternative disposal site for general waste.

- **Current Waste Management Challenges**

- According to the Walter Sisulu Local Municipality Integrated Waste Management Plan (IWMP 2024–2029), current waste generation in Maletswai is approximately 12 225 t/year, projected to increase to 15 000 t/year by 2030.
- Closure of the Maizefield Landfill and resulting service gaps.
- Waste composition includes municipal solid waste, recyclables, and limited hazardous fractions.
- Population growth and urban expansion in Maletswai and surrounding settlements will increase demand for local disposal capacity.
- Limited capacity of existing landfills (James Calata, Steynsburg) and distance-related issues.
- Inefficiencies or environmental risks of current waste disposal practices (e.g., illegal dumping, leachate, pollution).
- Social impacts of inadequate waste services (health risks, aesthetic issues).

- **Population and Waste Generation Needs**

- Projected population growth and urban expansion in Maletswai and surrounding settlements.
- Current and projected waste volumes and composition (municipal solid waste, recyclables).
- Trends in waste generation and the municipality's capacity to handle it.

- **Socio-Economic Justification (Desirability)**

- Job creation during construction and operation.
- Local economic development opportunities (e.g., recycling enterprises, waste sorting facilities).
- Service delivery improvements and contribution to community well-being.
- Cost-effectiveness of a local landfill versus transporting waste to distant sites.

- **Site-Specific Justification**

- The Site Sensitivity Verification Report (2025) confirmed the footprint lies within an Ecological Support Area 2 (ESA2), compatible with municipal landfill use. Suitability of the proposed location (distance from sensitive areas, accessibility, geology, hydrology).
- Air Quality, Geotechnical and hydrological investigations confirmed suitable geology and groundwater protection measures.
- Reduced haulage and related environmental impacts.
- Integration with existing infrastructure (roads, water, monitoring systems).

The Project is therefore both necessary to meet current and future infrastructure demands and desirable for promoting safe, sustainable, and efficient waste management practices within the region. It addresses regulatory obligations, closes service gaps, supports socio-economic development, and ensures environmental protection, while reducing haulage impacts and strengthening municipal service delivery.

2.4.2. Conclusions on Need and Desirability

From the details presented in this chapter, it is clear that the need and desirability for the project are supported from a planning and policy perspective on a national, provincial, district, and local level, as well as from a technical perspective. The closure of the Maizefield Landfill has created a statutory and service delivery obligation for the Municipality, while the Integrated Waste Management Plan (IWMP 2024–2029) confirms rising waste generation volumes that necessitate a compliant local facility.

It is equally important to consider the potential impacts and benefits that the proposed facility may have for the affected site and surrounding area from both a biodiversity sustainability perspective and a socio-economic perspective. Specialist inputs — including the Site Sensitivity Verification Report, Geotechnical Investigation, Geohydrological Investigation, Terrestrial and Aquatic Impact Assessment, and the socio-economic analysis — confirm that the proposed site is environmentally compatible, that leachate and gas management systems can mitigate pollution risks, and that the project will generate local employment and recycling opportunities.

Therefore, the assessment being undertaken for the project must evaluate the proposal not only from a policy and planning perspective, but also from biodiversity and socio-economic perspectives. The EIA process aims to ensure a balance between these three spheres and to ensure that conclusions regarding the proposed project draw on both the positive and negative consequences of development. This includes consideration of cumulative impacts, where the facility and its associated infrastructure may interact with other developments in the area.

In conclusion, the proposed Maletswai Landfill is both necessary to meet statutory and service delivery obligations and desirable for promoting safe, sustainable, and efficient waste management practices. The project supports

national and local policy objectives, addresses biodiversity safeguards, and contributes to socio-economic development, while ensuring that cumulative impacts are assessed and managed through the EIA process.

2.5. Project Development Phases Associated with the Maletswai Landfill Site

Table 12: Details of the landfill site development project development phases (i.e., construction, operation, and decommissioning)

Construction Phase	
Requirements	• Project receives Integrated Environmental Authorisation from the EC-DEDEA, inclusive of a positive ROD and Water Use Licence from the Department of Water and Sanitation. • Create direct employment opportunities: Up to 50 employment opportunities are expected to be created. • Temporary accommodation will be provided on site, mainly for the security staff. Overnight on-site worker presence would be limited to security staff. • All waste, which cannot be reused, will be managed and disposed of in accordance with the local regulatory standards. All debris, spoilt materials, rubbish and other waste must be cleared from the site during construction and disposed of accordingly at Municipal designated dump/landfill sites for such wastes. • Electricity required for construction activities will be generated by a generator. Where low-voltage connections are possible, these will be considered. • Water required for the construction phase will be supplied by the municipality. In addition, where possible, borehole water will be used (with WUL in place as per point no. 1 above). • Water from onsite boreholes will be utilised for the construction purposes. • Chemical toilets/septic tanks will be utilised for the construction phase.
Activities to be undertaken	
Conduct surveys prior to construction	• Including, but not limited to, a geotechnical survey, site survey and confirmation of the landfill cell footprint, and survey of the on-site substation site to determine and confirm the locations of all associated infrastructure.
Establishment of access roads to the Site	• Main access to and Internal access roads within the site will be established at the commencement of construction. The main access will be through the existing gravel road; however, upgrades will be required. • Existing access roads will be utilised, where possible, to minimise impact. • Main access road will be approximately 6m wide and will also accommodate side drainage, etc. • Internal service road alignment with the perimeter fence as well as the landfill cells.
Undertaking site preparation	• Including the clearance of vegetation at all cells and supporting infrastructure, the establishment of the laydown areas, and the establishment of internal access roads and excavations for foundations for the supporting infrastructure. • Stripping of topsoil to be stockpiled for use during cell covering. • Vegetation clearance to be undertaken systematically to reduce the risk of exposed ground being subjected to erosion. • Include search and rescue of floral species of concern (where required) and the identification and excavation of any sites of cultural/heritage value (where required).

Establishment of laydown areas	• A laydown area for the storage of civil engineering construction equipment and associated construction materials. • The laydown will also accommodate building materials and equipment associated with the construction of buildings. • No borrow pits are planned for the site. Infilling or depositing materials will be sourced from licensed borrow pits within the surrounding areas (if required).
Construct foundation and landfill cell no. 1	• Excavations to be undertaken mechanically. • Depending on geological conditions, the use of alternative foundations may be considered
Transport of components and equipment to and within the site	• The components for the facility and onsite station will be transported to the site by road. Transportation will take place via appropriate National and Provincial roads, and the dedicated access/haul road to the site. • Typical civil engineering construction equipment will need to be brought to the site (e.g. excavators, trucks, graders, compaction equipment, cement trucks, etc.) as well as components required for the support structures, construction of the substation and site preparation.
Establishment of ancillary infrastructure	• Site offices and maintenance buildings, including workshop areas for maintenance and storage, will be required. • Establishment will require the clearing of vegetation, levelling, and the excavation of foundations prior to construction.
Undertake site rehabilitation	• Commence with rehabilitation efforts once construction is completed in an area, and all construction equipment is removed. • On commissioning, access points to the site not required during the operation phase will be closed and prepared for rehabilitation.
<u>Operation Phase</u>	
Requirements	• Duration: at least 20 years. • Requirements for security and maintenance of the project. • Compliance with the environmental legislation and associated permits. • Employment opportunities relating mainly to operational activities and maintenance • At least 10 employees will be required during the operational phase of the landfill. This is in addition to the existing municipal complement. • There will also be contractors and temporary workers with a staff complement estimated at 50 for both water and wastewater planning.
Activities to be undertaken	
Operation and Maintenance	• Full-time security, maintenance, and control room staff. • Incoming general waste monitoring, disposal, daily covers, etc. • Waste sorting and storage activities for future collection to recycling facilities outside the municipal areas. • Ongoing leachate and stormwater system maintenance and management to ensure optimum usage.

	• The material recovery areas and workshops will need cleaning and disinfection during the operational phase using clean water with no cleaning products or using non-hazardous biodegradable cleaning products. • Disposal of waste products (e.g., oil) in accordance with relevant waste management legislation. • Areas which were disturbed during the construction phase should be utilised, should a laydown area be required during operation. Especially as a soil bank for waste covering activities. • Waste disposal, levelling, and covering daily. • Sequencing preparation of the new landfill cells and final covering of the filled cells based on the need on-site. • Ongoing environmental monitoring (air, water, land, etc.) and associated reporting
<u>Decommissioning Phase</u>	
Requirements	• Decommissioning of the facility infrastructure at the end of its economic life. • Potential for expansion of the facility, depending on the condition of the facility and need at the time. • Expected lifespan of at least years (with maintenance) before decommissioning is required. This will include the final cell covers. • Decommissioning activities to comply with the legislation relevant at the time. • The expected lifespan of the facility is at least 20 years, after which decommissioning will include final cell covers and rehabilitation, in line with GN 636 (2013, amended 2024).
Activities to be undertaken	
Site preparation	• Confirming the integrity of site access to the site to accommodate the required decommissioning equipment. • Preparation of the site (e.g., laydown areas and construction platform). • Mobilisation of construction equipment. • The expected lifespan of the facility is at least 20 years, after which decommissioning will include final cell covers and rehabilitation, in line with GN 636 (2013, amended 2024).
Final Cell Cover	• Components to be reused, recycled, or disposed of in accordance with regulatory requirements. • The design adopts a phased vertical development strategy within a single landfill footprint. This ensures that the facility is developed incrementally, with each 5-year vertical phase constructed, filled, and temporarily capped before the next lift is developed. This approach minimises the exposed tipping area, reduces rainfall infiltration, and allows for early environmental protection through progressive rehabilitation. • The landfill, once decommissioned, will be closed and capped using a final cover system consisting of GCL, a geomembrane, a drainage layer, and a vegetative soil cover. This intervention will reduce infiltration, improve environmental compliance, and allow for integration of the old site into the new facility's operational framework.

3 LEGISLATION, GUIDELINES AND POLICIES CONTEXT

3.1. Introductions

According to Appendix 3 Section 3 (1) of the 2014 EIA Regulations (as amended in 2017), an EIA Report must include “(e) a description of the policy and legislative context within which the development is located and an explanation of how the proposed development complies with and responds to the legislation and policy context.”

The development is subject to various legislative requirements in relation to South African environmental law. This section provides a brief overview of relevant legislation and its applicability to the development. The development's construction and operation must adhere to all applicable legal requirements pertaining to environmental management.

The following acts and policies and their relevance to the development are briefly summarised:

- The Constitution of South Africa Act, 1996 (Act No. 108 of 1996);
- National Environmental Management Act, 1998 (Act No. 107 of 1998)
- National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004);
- National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008), as amended
- National Environmental Biodiversity Act, 2004 (Act No. 10 of 2004);
- National Water Act, 1998 (Act No. 36 of 1998);
- White Paper on Integrated Pollution and Waste Management for South Africa;
- Environmental Conservation Act, 1989 (Act No. 73 of 1989);
- Occupational Health and Safety Act, 1993 (Act No. 85 of 1993);
- The National Heritage Resources Act, 1999 (Act No. 25 of 1999);
- The National Forest Act, 1998 (Act No. 84 of 1998)
- Environmental Impact Assessment Regulations, promulgated in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998).
- Waste Management Regulations, promulgated in terms of the NEMWA.
- National Veld and Forest Fire Act, 1998 (Act No. 101 of 1998)
- Spatial Planning and Land Use Management Act, 2013 (Act No. 16 of 2013)
- Walter Sisulu Local Municipality, Integrated Development Plan
- Joe Gqabi District Municipality, Integrated Development Plan
- Fire Brigade Services Act, 1987 (Act No. 99 of 1987).
- Local Government: Municipal Systems Act, 2000 (Act No. 32 of 2000).
- Climate Change Act, 2024 (Act No. 22 of 2024)

3.1.1. The Constitution of South Africa Act, 1996 (Act No.108 of 1996)

The Constitution is the supreme law of the Republic, and all laws and conduct must be consistent with the Constitution. The Bill of Rights emphasises several provisions relevant to securing the protection of the environment. Section 24 states that “Everyone has the right –

- a) *To an environment that is not harmful to their health or well-being; and*
- b) *To have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that –*
 - i). *prevent pollution and ecological degradation;*
 - ii). *promote conservation; and*
 - iii). *secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.”*

The Constitution, therefore, compels the government to give effect to the people's environmental rights and places the government under a legal duty to act as a responsible custodian of the country's natural environment. The Constitution compels the government to pass legislation that protects the environment, prevents pollution and ecological degradation, promotes conservation, and secures sustainable development.

The proponent must ensure that the development does not contravene the Constitution by ensuring that no pollution or ecological degradation results from the activities undertaken and by undertaking the development in an ecologically sustainable manner.

Relevance to the development: *The proponent must ensure that the development's construction or operation does not contravene the Constitution. The proponent should comply with the Constitution by ensuring that no pollution or ecological degradation occurs due to the development and by conducting environmentally sustainable developmental practices. The proposed application must have all relevant permits before commencement, which include the Waste Management Licence, Environmental Authorisation, Construction Permits, etc.*

3.1.2. National Environmental Management Act, 1998 (Act No. 107 of 1998)

The National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) provides for duty of care and remediation of environmental damage, imposes an obligation on the responsible person (including an owner of land or premises, a person in control of land or premises or a person who has a right to use the land or premises) to take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring, or, in so far as such harm to the environment is authorised by law or cannot reasonably be avoided or stopped, to minimise and rectify such pollution or degradation of the environment.

NEMA serves as the basis for all environmental frameworks in South Africa. On 4 December 2014, new EIA Regulations (GNR 982) were promulgated in terms of Chapter 5 of the NEMA. These regulations were amended in April 2017 (GNR 326). The EIA Regulations contain three listing notices (GNR. 324, 325, and 327) which identify activities that are subject to either a BA or Scoping and EIA in order to obtain an EA. A BA must be completed if the proposed project triggers activities listed in GNR. 983 (Listing Notice 1) or GNR. 984 (Listing Notice 2). Activities triggered in GNR. 985 (Listing Notice 3) requires a Scoping and EIA process to be undertaken.

The listed activities, which are applicable to the proposed development for which the EA is being applied, are presented in the table below.

Table 13: Triggered Listed Activities in terms of EIA Regulations of 2014, as amended

Indicate the number and date of the relevant notice:	Activity No (s) (in terms of the relevant notice) :	Describe each listed activity as per the detailed project description (and not as per the wording of the relevant Government Notice):
Government Notice (GN) No. 983 of the 04 th of December 2014 (as amended by GN No. 327 of the 07 th of April 2017).	27	The proposed development entails the clearance of approximately 6 hectares of indigenous vegetation for the development of a landfill site with associated infrastructure. The proposed site has not been disturbed in more than 10 years; thus, the vegetation complies with the indigenous vegetation definitions.
	28	The proposed development involved the development of a landfill site covering approximately six (6) hectares outside the urban areas. The proposed site is used for agricultural purposes, mostly for grazing activities; however, it was previously used for other agricultural activities such as maize farming.

Based on the EIA-listed activities, the project was supposed to be subjected to the Basic Impact Assessment Process; however, due to the project also triggering waste management-listed activities requiring the Scoping and Full Environmental Impact Assessment Process, the whole application will have to be subjected to the Scoping and Full Environmental Impact Assessment Process. This report serves as an EIA Report for the proposed development.

Relevance to the development: *The proposed development must be subjected to the Environmental Impact Assessment process before the commencement of the works. The Scoping and Full Environmental Impact Assessment Process is being followed to obtain integrated Environmental Authorisation. In addition, landfill development must ensure that all activities are undertaken in line with NEMA's duty of care principle, including the prevention of pollution, ecological degradation, and the minimisation of environmental impacts through appropriate mitigation measures. This requires strict adherence to the mitigation hierarchy (avoid, minimise, rehabilitate), implementation of dust and odour control measures, stormwater management, and progressive rehabilitation of*

disturbed areas. Compliance with NEMA will ensure that the landfill development proceeds lawfully, sustainably, and in a manner that protects the environment and the health and well-being of surrounding communities.

3.1.3. National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004)

The National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004) provides for the setting of national norms and standards for regulating air quality monitoring, management and control and describes specific air quality measures to protect the environment and human health or well-being by:

- Preventing pollution and ecological degradation; and
- Promoting sustainable development through reasonable resource use.

The National Environmental Management: Air Quality Act also includes reference to the control of offensive odours, whereby reasonable steps to prevent the emission of any offensive odours caused by activities on premises are required. Also relevant is the establishment of national ambient dust fall-out levels that may be relevant to the development.

Relevance to the development: *The proposed development must be subjected to the Environmental Impact Assessment process before the commencement of the works. The Scoping and Full Environmental Impact Assessment Process will be followed to obtain the Waste Management Licence. Although the development does not trigger registration or licensing in terms of this Act, during the construction phase, the generation of dust and noise could become a factor for surrounding land users. Operationally, poor waste or manure management could contribute to odour emissions and reduced air quality. It remains the proponent's responsibility to remain within the acceptable limits as stipulated in the Air Quality Act.*

Dust suppression measures (such as water spraying, use of soil binders² and phased earthworks) must be implemented during construction. At the same time, operational activities must include daily waste cover, buffer zones, and stormwater diversion structures to control odour and dust fallout. A landfill gas management system must also be implemented to prevent uncontrolled methane emissions. Monitoring of ambient dust fallout and odour emissions will be required to demonstrate compliance with national standards. The proponent must align with the Walter Sisulu Local Municipality's Air Quality Management Plan (AQMP) to ensure that nuisance impacts are mitigated through operational controls, progressive rehabilitation, and compliance reporting.

By adhering to the Air Quality Act, the development will ensure that the landfill does not compromise the health and well-being of surrounding communities, while maintaining compliance with national air quality standards and municipal AQMP obligations.

2

https://www.engnet.co.za/c/c.aspx/ROA001?keyword=dust%20suppression%20chemicals&gad_source=1&gad_campaignid=111460454&gclid=Cj0KCQjw79nUBhCgARIsADSHka0Vjv1LNyxlhB2BnMSRkE1UxNC8fTX7bRV7CXNg8u96iKzuxdRqUaAmpEALw_wcB

3.1.4. National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008), as amended:

The National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) (NEM: WA) aims to reform the law regulating waste management to protect health and the environment.

This is achieved by:

- Providing reasonable measures for the prevention of pollution, ecological degradation and securing ecologically sustainable development;
- providing for national norms and standards for regulating the management of waste by all spheres of government;
- providing specific waste management measures;
- providing for the licensing and control of waste management activities;
- providing for the remediation of contaminated land;
- providing for the national waste information system; and
- providing compliance and enforcement thereof.

The NEM: WA indicates that certain waste management activities must be licensed, and according to Section 44 of the Act, the licensing procedure must be integrated with an environmental impact assessment process per the EIA Regulations promulgated in terms of the NEMA. Government Notice 921, published in Government Gazette No. 37083, on 29 November 2013, lists the waste management activities that require licensing. A distinction is made between Category A waste management activities, which require a Basic Assessment, and Category B waste management activities, which require the S&EIR process to be followed.

Table 14: triggered Listed Activity in terms of Waste Management Licence regulations of 2013, as amended

INDICATE THE NO. & DATE OF THE RELEVANT NOTICE:	ACTIVITY NUMBERS (AS LISTED IN THE WASTE MANAGEMENT ACTIVITY LIST) :	DESCRIBE EACH LISTED ACTIVITY (and not as per the wording of the relevant Government Notice):
Government Notice No. 921 in Government Gazette No. 37083 of 29 November 2013, as amended	Category C (Activity 1)	The proposed landfill site will have a Material Recovery Area with a capacity to store approximately 800 m ³ of the diverted waste materials.
	Category B (Activity 8)	The proposed development entails the development of a landfill site with four (4) cells covering approximately four (4) hectares with a combined designed airspace of approximately 460 881 m ³ .
	Category B (activity 10)	The proposed development entails the construction of a Class B landfill site.

Based on the EIA-triggered waste management-listed activities, a Scoping and Full Environmental Impact Assessment Process must be followed. This report serves as a Scoping Report for the proposed development.

Relevance to the development: *The proposed development must be subjected to the Environmental Impact Assessment process before the commencement of the works. The Scoping and Full Environmental Impact Assessment Process will be followed to obtain the Integrated Environmental Authorisation and Waste Management Licence.*

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

National Environmental Management - Biodiversity Act, 2004 (Act No. 10 of 2004): The Biodiversity Act provides for the conservation and management of South Africa's biodiversity. It has been developed in alignment with NEMA for the conservation of species and ecosystems that warrant national protection, sustainable use of Indigenous biological resources and fair and equitable sharing of benefits arising from bioprospecting involving Indigenous biological resources. By recognising that biodiversity conservation must also occur outside of protected areas, the Biodiversity Act introduces tools, including:

- Development of a National Biodiversity Framework (NBF)
- Development and publishing of bioregional plans to map and identify Critical Biodiversity Areas (CBAs), and provide guidelines for land-use planning and decision-making in these areas.
- Development and publishing of Biodiversity Management Plans (BMP) for an ecosystem, an indigenous species, or a migratory species.
- Publishing of threatened ecosystems and species in the Government Gazette, and the requirement for permits for carrying out a restricted activity involving a threatened species.
- Prevention of the spread and eradication of invasive alien species.

3.1.5.1. Threatened or protected ecosystems and species:

NEMBA states that biodiversity loss through habitat loss, degradation or fragmentation must be avoided, minimised, or remedied. The loss of biodiversity includes the loss of threatened or protected species and the loss of localised endemics. Chapter 4 of the NEM: BA deals with threatened or protected ecosystems and species, and its purpose is "to—

- a) *provide for the protection of ecosystems that are threatened or in need of protection to ensure the maintenance of their ecological integrity;*
- b) *provide for the protection of species that are threatened or in need of protection to ensure their survival in the wild;*
- c) *give effect to the Republic's obligations under international agreements regulating international trade in specimens of endangered species; and*
- d) *ensure that the utilisation of biodiversity is managed in an ecologically sustainable way."*

Aspects concerning the loss of biodiversity through the loss of localised endemics, the loss of localised species diversity, and the loss of ecological functions which support biodiversity are discussed in the Biodiversity Assessment Report (**attached to this EIA Report**). The study site is located within the Eastern Upper Karoo, which has a conservation status of 'Least concern'. Based on desktop studies, no red data listed (RDL) flora were observed. No faunal SCCs were observed, but a few species are likely to occur in the general area.

Relevance to the development: *The proponent must ensure that the proposed landfill development complies with the provisions of NEMBA by avoiding, minimising, or remedying biodiversity loss, including impacts on threatened or protected ecosystems and species. The Biodiversity Assessment Report, informed by the Terrestrial Ecology specialist study (Appendix E2), confirms that the site is located within the Eastern Upper Karoo, which has a conservation status of "Least Concern." No red data listed flora or faunal species of conservation concern were recorded during desktop studies, although some species are likely to occur in the broader area. The development must therefore incorporate mitigation measures to prevent habitat degradation, manage invasive alien species, and maintain ecological integrity in line with NEMBA requirements.*

3.1.5.2. Bioregional spatial planning:

CBA Maps are provided with formal legal status through the NEMBA, which introduced several new legislative tools to assist with conserving and managing South Africa's biodiversity. One of these is the declaration of "bioregions" and the publication of bioregional plans. Guidelines for the development of bioregional plans were developed by SANBI at DFFE's (then DEA) request and were published in the Government Gazette in 2009 as the "Guideline regarding the determination of bioregions and the preparation and publication of bioregional plans", referred to for short as the Guideline for Bioregional Plans (DEAT, 2009).

According to the Guideline for Bioregional Plans, the purpose of a bioregional plan is to provide a map of CBAs and ESAs with accompanying land-use guidelines, to inform land-use planning, environmental assessment and authorisations, and natural resource management by a range of sectors whose policies and decisions impact on biodiversity. A CBA Map is thus the core component of a bioregional plan. See below for a summary of the conceptual framework for CBA maps.

Table 15: Conceptual framework for CBA maps.

Map category	Landscape-level purpose	Broad management objective
Protected areas	Formal long-term protection for important biodiversity and landscape features. Together with CBAs, it ensures that a viable representative sample of all ecosystem types and species can persist.	Must stay in largely natural ecological conditions. Details are determined by the management plan that is required for each protected area.
CBA: Critical Biodiversity Areas	Together with protected areas, it ensures that a viable representative sample of all ecosystem	Must stay in largely natural ecological conditions.

	types and species can persist.	
ESA: Ecological Support Areas	Ensures the long-term ecological functioning of the landscape as a whole.	Must retain ecological processes, which often require at least semi-natural ecological conditions.
ONA: Other Natural Areas	Allows for a range of other land uses, including intensive land uses.	Determined by other spatial planning tools (e.g. SDFs).
NNR: Areas with No Natural Habitat Remaining	Areas already severely or irreversibly modified by intensive land uses.	Determined by other spatial planning tools (e.g. SDFs).

According to the Eastern Cape Biodiversity Sector Plan (2019), the study site is within a Terrestrial Ecological Support Area (ESA2). According to the plan, ESAs are areas NOT essential for meeting biodiversity targets, but are essential in terms of:

- *Terrestrial landscape: Ensuring connectivity between CBAs, strengthening climate change resilience, and the proper function of ecosystem infrastructure for the delivery of ecosystem services. From a terrestrial perspective, ESAs may include riparian areas, coastal corridors, ridges, etc.*
- *Aquatic landscape: ESAs extend into catchments that are essential for the maintenance of CBA rivers and wetlands.*

ESAs need to be maintained in a semi-natural, if not natural, state. The site is within ESA2, which is defined as an area where there is no natural habitat remaining in an area that would have been designated as a CBA 1, CBA 2 or ESA1. Several developments are excluded from ESA 2.

Relevance to the development: In terms of the Eastern Cape Biodiversity Sector Plan (2019), the portion of the study site is located within a Terrestrial Ecological Support Area (ESA2). ESAs are not essential for meeting biodiversity targets but are critical for maintaining ecological processes, landscape connectivity, and climate change resilience. The Terrestrial Ecology specialist study confirms that the site is already highly transformed, with limited remaining natural habitat, consistent with the ESA2 classification. No red data-listed flora or faunal species of conservation concern were recorded within the site, although some species are likely to occur in the broader landscape.

Based on the ECBSP (2019), municipal landfill sites are not specifically addressed in the Handbook; however, the landfill site was considered under the “Other Services” land use type. This land use type is intended for Government Use, including water and sewerage pipelines, Eskom power lines, and municipal zoning schemes appropriate for power generation by Independent Power Producers. The proposed development is considered a small landfill site, and as such, it is compatible with the proposed site (Yes (Y)) as per Table 12: Matrix of recommended land use management guidelines for terrestrial-based activities in the ECBSP Handbook.

The proposed development is therefore consistent with the bioregional spatial planning framework, as municipal service infrastructure such as landfill sites is recognised as permissible within ESA2, subject to compliance with the integrated environmental authorisations and the application of appropriate safeguards to ensure ecological integrity.

3.1.6. The National Water Act, 1998 (Act No. 36 of 1998)

The National Water Act, 1998 (Act No. 36 of 1998) (NWA), administered by DWS, aims to manage and protect the national water resources to achieve sustainable use of water for the benefit of all water users. The purpose is to achieve sustainable use of water for the benefit of all water users. The purpose of the Act is to ensure that the nation's water resources are protected, used, developed, conserved, and managed in ways that consider:

- Promoting equitable access to water;
- Redressing the results of past racial discrimination;
- Promoting the efficient, sustainable, and beneficial use of water in the public interest;
- Facilitating social and economic development;
- Providing for the growing demand for water use;
- Protecting aquatic and associated ecosystems and their biological diversity;
- Reducing and preventing pollution and degradation of water resources;
- Meeting international obligations;
- Promoting dam safety; and
- Managing floods and drought.

Section 21 of the NWA sets out water uses that may require registration or licensing. In terms of the NWA, water uses include any activity involving the following:

- a) ***Taking water from a water resource.***
- b) Storing water.
- c) Impeding or diverting the flow of water in a watercourse.
- d) Engaging in a stream flow reduction activity contemplated in section 36.
- e) Engaging in a controlled activity identified as such in section 37(1) or declared under section 38(1).
- f) Discharging waste or water-containing waste into a water resource through a pipe, canal, sewer, sea outfall or other conduit.
- g) ***Disposing of waste in a manner which may detrimentally impact a water resource.***
- h) Disposing of any manner of water which contains waste from or which has been heated in any industrial or power generation process.
- i) Altering the bed, banks, course or characteristics of a watercourse.
- j) Removing, discharging or disposing of water found underground if it is necessary for the efficient

continuation of an activity or for the safety of people.

- k) Using water for recreational purposes.

Relevance to the development: *The proposed Maletswai landfill site is located within Quaternary Catchment D14A of the Upper Orange Water Management Area. The Aquatic Impact Assessment confirmed that the preferred site does not contain wetlands, but ephemeral drainage lines occur nearby, and the Orange River lies approximately 450–500 m northwest of the preferred footprint. Buffer zones and stormwater management structures have been delineated to ensure protection of these water resources.*

The septic tanks proposed for the site also qualify for General Authorisation under Government Notice 665 of 2013. The required General Authorisation/Water Use Licence applications are being undertaken for the water provision and wastewater management and ROD in terms of the one environmental system principle. Compliance with the NWA will ensure that groundwater, surface water, and aquatic ecosystems are protected, and that the landfill development proceeds lawfully under the conditions set by the Department of Water and Sanitation.

The development may trigger water use licensing in terms of Section 21 of the NWA, specifically:

- *Section 21 (a) and (g): Taking water from a borehole for commercial use (at most 50 municipal employees, contractors, waste disposers, etc will be onsite on a given day). Thus, the following services analysis considers their water and sewer requirements.*
 - *The proposed development is located within Quaternary Catchment No. D14A of the Orange Vaal Catchment Management Area. According to the National Water Act, 1998 (36/1998): Revision of General Authorisation for the Taking and Storing of Water, National Water Act, 1998 (Act No. 36 of 1998), Government Notice 538 of 2016, any water user has a right to utilise 75m³/a from the borehole under this General Authorisation. The proposed landfill site is located on the remaining extent of Portion 1 of the Farm Melk Spruit No. 12, with an extent of 681 Ha. Thus, the farm qualifies for approximately 51 075 m³/a of underground water, with a calculated water demand of 1 622.4 m³/d. Therefore, the General Authorisation Application will be applied for in relation to this proposed development.*
 - *The proposed septic tanks will be small in extent, thus also qualify for GA in terms of Government Notice No. 665: Revision of General Authorisation in terms of Section 39 of the National Water Act, 1998 (Act No. 36 of 1998) (06 September 2013).*
 - *The required application has been made with the Department of Water and Sanitation; however, we are still awaiting a reference no.*
- *Section 21 g - related to the temporary storage of sewage in a septic tank. Domestic wastewater will be generated from the administration facilities, ablution facilities, kitchen/canteen facilities, handwashing facilities and associated domestic activities. The domestic wastewater system shall remain completely independent from the landfill leachate and contaminated stormwater systems. 90%*

of the adopted water demand is assumed to return to the wastewater system. Based on the design water demand of approximately 5.175 m³/day, the resulting wastewater generation is approximately 4.66 m³/day. This will also fall within a General Authorisation.

- Section 21 g - related to the actual landfill site development is managed through the Record of Decision (RoD), which forms part of the Integrated Environmental Authorisation.
 - The ROD is a legal document indicating DWS's decision regarding the licensing of the waste disposal site; include a decision to either recommend or not recommend the licence, accompanied by conditions under which DWS makes the above decision, conditions related to the protection of the water resource, and it is delegated to the Chief Director: Water Use Licence Management within the Department of Water and Sanitation.
 - The following figure shows the business process followed when applying for the RoD

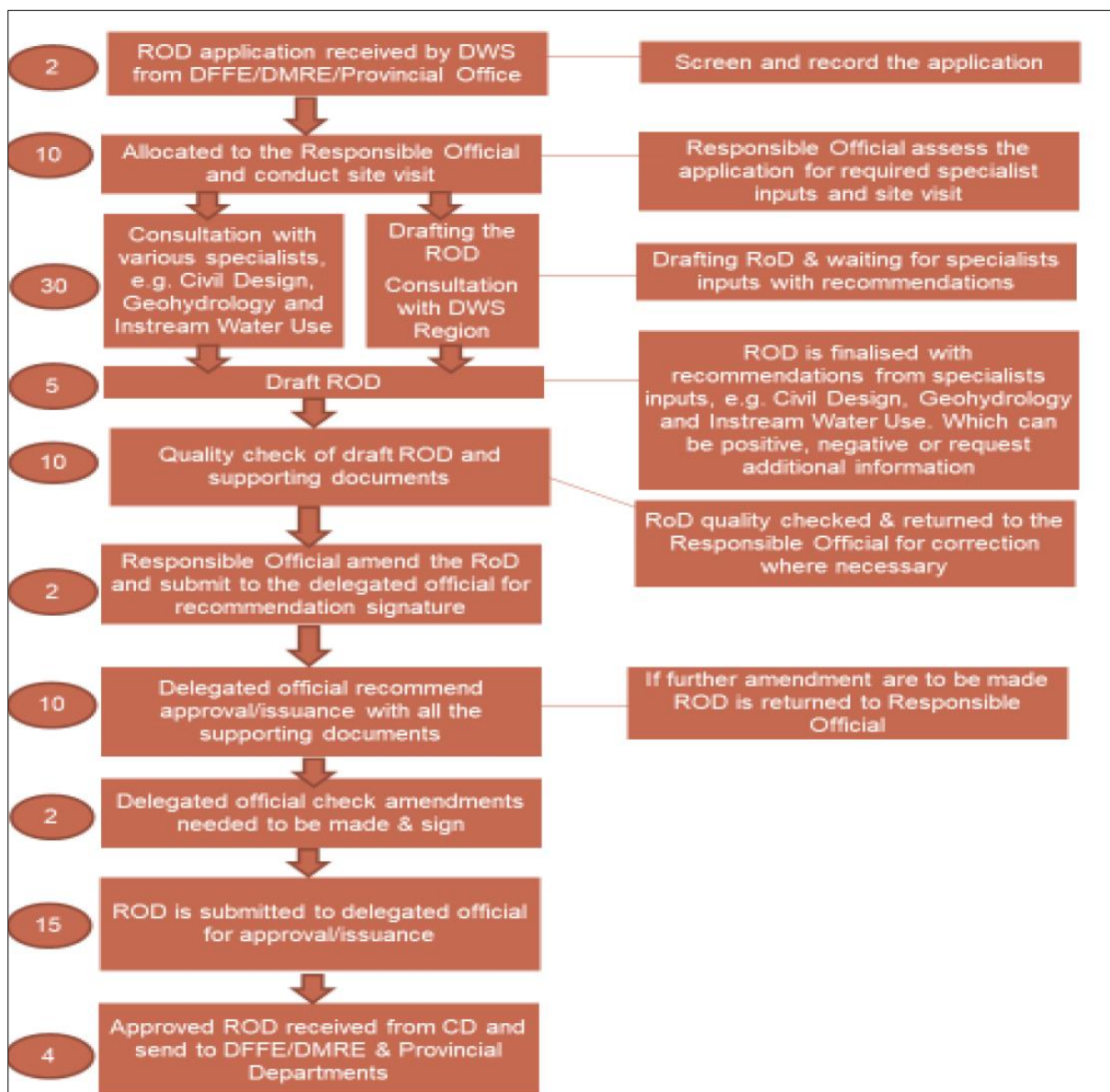


Figure 13: DWS RoD Business Process.

3.1.7. Environmental Conservation Act, 1989 (Act No.73 of 1989)

In terms of section 20 (1) of the Environmental Conservation Act, 1989 (Act No. 73 of 1989), waste can only be disposed of at a facility that has a permit issued by the Minister of Water Affairs and Forestry. The facility must be sited, designed, operated, and monitored strictly in accordance with the permit conditions. These conditions will include the requirements, standards and procedures set out in the DWS waste management series.

It should be noted that section 20 (1) of the Environmental Conservation Act, 1989, has been amended in terms of the issuing of waste disposal permits and exemptions, which is now the responsibility of the Minister of Environmental Affairs.

Section 24 of the Act allows the Minister to make regulations with respect to several waste management issues, and includes the following regulations:

- Disposal site application;
- Directions for control and management of general and small waste disposal sites;
- Noise control regulations; and plastic bag Regulations; and
- The waste will thus be subject to a permit issued under section 20 of the ECA.

3.1.8. Occupational Health and Safety Act, 1993 (Act No. 85 of 1993)

The Occupational Health and Safety Act 85 of 1993 is South Africa's principal legislation concerning the health and safety of employees. It also aims to protect persons who are not at work against hazards to health and safety arising out of or in connection with the activities of people at work. The Act places the responsibility on the employer to ensure a safe and healthy working environment and to ensure that every employee is made conversant with health and safety requirements relevant to their work. At the same time, the Act places the responsibility on the employee to follow their employer's health and safety procedures and instructions. Several Regulations have been promulgated under the Act that are relevant to development, including the following:

- General Administrative Regulations, 1994;
- Asbestos Regulations,
- Lead Regulations,
- Regulations for Hazardous Chemical Substances, 1995;
- Hazardous Biological Agents of 2001;
- General Safety Regulations, 1986;
- Environmental regulations for workplaces (Department of Labour, 1994); and
- Construction Regulations.

Relevance to the development: *All waste management activities need to be carried out in accordance with the requirements of the OHS Act and must include the following activities:*

- *Waste Management Practices must be safe and without risk;*

- *Risk Assessments conducted should include waste-related activities.*
- *Waste management training should be provided to employees and contractors; Written work instructions should be provided where necessary; and*
- *Relevant personal protective equipment and respiratory protective equipment must be provided as a last resort after all mitigatory measures have been reviewed.*

3.1.9. The National Heritage Resources Act, 1999 (Act No. 25 of 1999)

The National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA) introduces an integrated and interactive system for managing national heritage resources. The NHRA also includes landscapes and natural features of cultural significance as heritage resources. Under the National Heritage Act, 1999 (Act No. 25 of 1999), the following are protected:

Burial grounds and graves

36. (1) Where it is not the responsibility of any other authority, SAHRA must conserve and generally care for burial grounds and graves protected in terms of this section, and it may make such arrangements for their conservation as it sees fit.

(2) SAHRA must identify and record the graves of victims of conflict and any other graves which it deems to be of cultural significance and may erect memorials associated with the grave referred to in subsection (1), and must maintain such memorials.

(3) (a) No person may, without a permit issued by SAHRA or a provincial heritage resources authority—

- (a) destroy, damage, alter, exhume or remove from its original position or otherwise disturb the grave of a victim of the conflict, or any burial ground or part thereof which contains such graves;
- (b) destroy, damage, alter, exhume, remove from its original position or otherwise disturb any grave or burial ground older than 60 years which is situated outside a formal cemetery administered by a local authority; or
- (c) bring onto or use at a burial ground or grave referred to in paragraph (a) or (b) any excavation equipment, or any equipment which assists in the detection or recovery of metals.

Additionally, Section 38(1) under **Heritage Resources Management** of the National Heritage Act, 1999 (Act No. 25 of 1998), also protect heritage resources when the development falls within the following regulated activities:

- 38. (1) Subject to the provisions of subsections (7), (8) and (9), any person who intends to undertake a development categorised as—
 - (a) *the construction of a road, wall, powerline, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length;*
 - (b) *the construction of a bridge or similar structure exceeding 50 m in length;*
 - (c) *any development or other activity which will change the character of a site—*

- (i) exceeding 5,000 m² in extent; or
 - (ii) involving three or more existing erven or subdivisions thereof; or
 - (iii) involving three or more erven or divisions thereof which have been consolidated within the past five years; or
 - (iv) the costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority.
- (d) the re-zoning of a site exceeding 10,000 m² in extent; or
- (e) any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority.

Relevance to the development: *In terms of the National Heritage Resources Act, 1999, the proposed Maletswai landfill development triggers the requirement for a Phase 1 Heritage Impact Assessment and a Palaeontological Impact Assessment before commencement. The specialist proposals confirm that the scope of work includes archival research, field surveys, GIS mapping, report compilation, and submission to SAHRIS, together with a dedicated palaeontological field-based assessment and chance-find protocol. These investigations are necessary because the project footprint exceeds the thresholds in Section 38(1) of the Act, which regulates developments larger than 5,000 m² and linear infrastructure exceeding 300 m.*

The proponent must therefore ensure that all activities comply with Section 3(a) of the Act, which prohibits the disturbance of graves, burial grounds, or heritage resources older than 60 years without a permit from SAHRA or the relevant provincial heritage authority. The findings of the HIA and PIA have been incorporated into the Draft EIA Report, and any permit conditions or mitigation measures prescribed by ECPHRA must be implemented. Compliance with these requirements will ensure that heritage and palaeontological resources are appropriately managed, protected, and documented, and that the development proceeds lawfully in accordance with national heritage legislation.

*ECPHRA acknowledged and accepted the submitted Heritage Impact Assessment (HIA) compiled by Coetzee FP (June 2026) and the Paleontological Impact Assessment (PIA) by Fourie H. (May 2026). Furthermore, ECPHRA have confirmed that **there are no objections and the development may continue as planned**, in terms of Section 38(4) of the NHRA, provided that specialists' recommendations are adhered to.*

3.1.10. The National Forests Act, 1998 (Act No.84 of 1998)

The National Forests Act, 1998 (Act No. 84 of 1998) (NFA) was passed to protect and conserve trees growing in South Africa. The purpose of the NFA is to preserve trees and forests and to promote the sustainable management and development of forests for the benefit of all South Africans. Government Gazette 46094 (Notice No. 1935), published on 25 March 2022, lists nationally protected trees, which, under the Act, are protected against specific

activities. The effect of the declaration is that no person may (a) cut, disturb, damage or destroy; or (b) possess, collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, or any forest product derived from a protected tree, except under a license granted by the Minister; or in terms of an exemption published by the Minister in the Gazette.

Relevance to the development: *Aspects concerning the loss of biodiversity through the loss of localised endemics, the loss of localised species diversity, and the loss of ecological functions which support biodiversity are discussed in the Biodiversity Assessment Report (to be included in the Draft EIA Report). The study site is located within the Eastern Upper Karoo, which has a conservation status of 'Least concern'. Based on the specialised studies, no red data listed (RDL) flora were observed. No faunal SCC were observed, but a few species are likely to occur in the general area.*

4 PROJECT ALTERNATIVES

4.1. Project Alternatives

In accordance with the requirements of Appendix 3 of the 2014 Environmental Impact Assessment (EIA) Regulations (GNR 982 as amended), reasonable and feasible alternatives, including but not limited to site and technology alternatives, as well as the “do-nothing” alternative, should be considered.

The DFFE Guideline for determining alternatives states that the key criteria for consideration when identifying alternatives are that they should be “practicable”, “feasible”, “relevant”, “reasonable” and “viable”. Different alternatives relate specifically to the project under investigation. “Alternatives”, in relation to a proposed activity, means different ways of meeting the general purposes and requirements of the activity, which may include alternatives for:

- The property on which, or the location where, the activity is proposed to be undertaken.
- The type of activity to be undertaken.
- The design or layout of the activity.
- The technology to be used in the activity.
- The operational aspects of the activity.

In addition, the option of not implementing the activity (i.e. the “do-nothing” alternative) must also be considered.

The sections below describe the incrementally different alternatives being considered as part of the proposed Maletswai Landfill Site. Where no alternative is being considered, motivation has been provided as required by the EIA Regulations, 2014.

4.1.1. Site alternatives³

Three (3) sites were considered for the proposed development. All these sites are located on the same farm; thus, access to the land was not an issue. The preferred alternative site is located at the following central coordinates: 30°41'27.97" S 26°39'46.43" E (Preferred Site). Additionally, two (2) alternative sites were also considered: Alternative 01 (30°42'23.02" S 26°40'19.59" E) and Alternative 02 (30°42'27.27" S 26°39'27.81" E). Refer to the map below showing the alternative sites. Refer to the locality map below.

³ Please refer to the attached Air Quality Impact Assessment Report for detailed air quality assessment for all three (3) alternative sites.

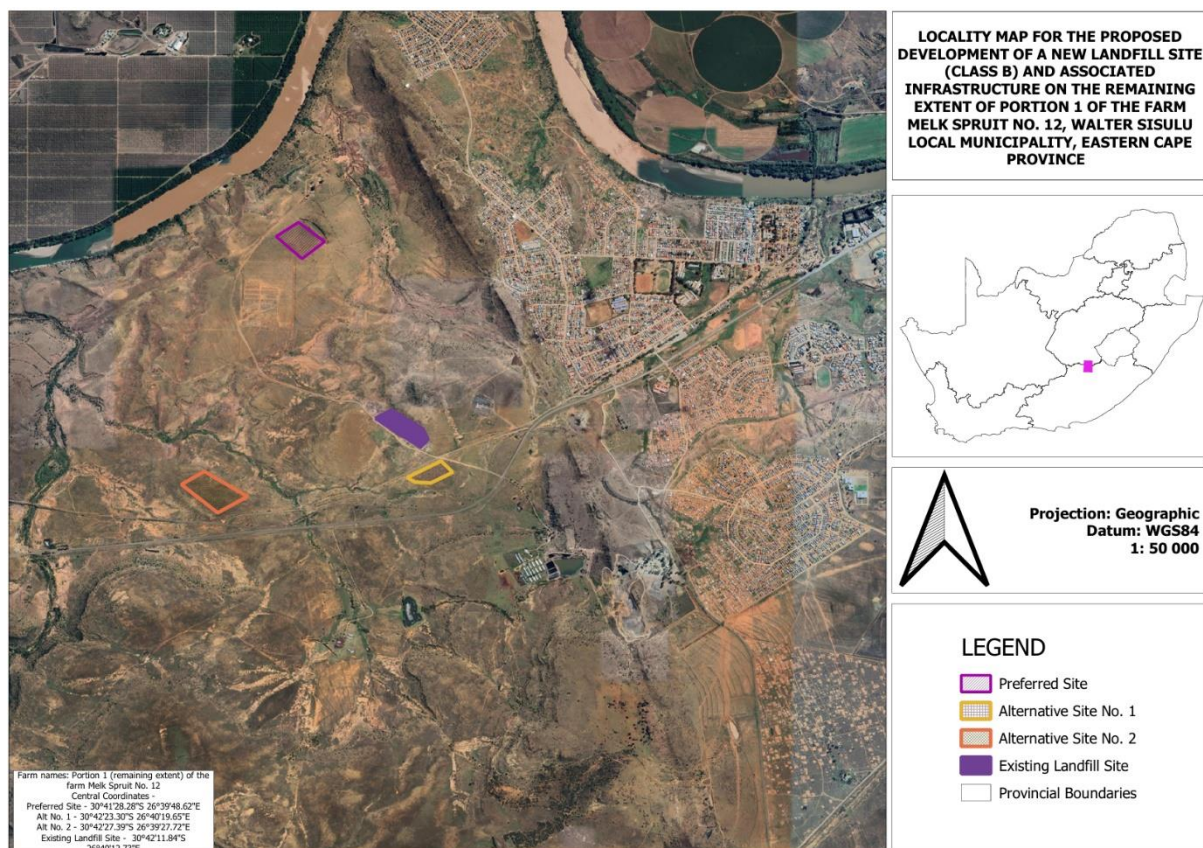


Figure 14: Location of the site considered.

A. Preferred Site

The preferred site is located on the remaining extent of **Portion 1 of the farm Melk Spruit No. 12**, with the following central coordinates: 30°41'27.97" S 26°39'46.43" E. The site was assessed based on various factors, including the following:

- **Visual Impacts:** When the site is run through the viewshed, the proposed site is not visible from the sensitive receptors within a 5 km radius of the proposed site. The proposed location shields the site from the community of Dukathole and the associated township, as well as road users of R58. The visual impact was confined to the nearby goat and cattle farmers and the Rotondwa Farms in the Free State Province. These stakeholders are being engaged throughout the public participation process. According to the Site Sensitivity Verification Report, the visual sensitivity of the preferred site is classified as low, due to its position within a previously cultivated and transformed agricultural landscape. No scenic routes, heritage sites, or tourism facilities fall within the viewshed, further reducing sensitivity. Mitigation measures, including progressive rehabilitation of disturbed areas and vegetative screening along the site boundary, will be implemented to ensure that residual visual impacts remain minimal and acceptable.
- **Proximity to the Main River or tributary** – the proposed site is located more than 420m away from either the Orange River or its associated watercourse; there are no natural watercourses within the 300m distance of the proposed site. Additionally, there are no watercourses within the proposed site except the stormwater runoff dam, which was previously constructed to catch the rain runoff. The small out-of-stream

impoundment in the area was investigated at the Preferred Site, but this feature is far less sensitive than the natural watercourses found adjacent to and within Options 1 & 2. The small impoundment is not very functional and was created to trap (impound) surface rainwater runoff, probably to retain some water for grazing livestock. However, the water volumes are low, and the impoundment is dry (that is, no visible surface water) for most of the year. However, impacts are expected to the farmers who were using the facility; with the availability of water in proximity to the area, the potential impacts on the farmers were considered minimal.

- **Ambient Air Quality (movement and concentrations)** – The Preferred Site benefits from comparatively greater surrounding vegetation and elevated terrain/hills. These features provide partial natural screening, increase surface roughness and may reduce near-ground wind movement and the immediate transport of coarse particulate matter and windblown litter. These natural features are considered supplementary advantages only and do not replace engineered dust, landfill-gas or odour controls. Key advantages as recorded by the Ambient Air Quality assessment:
 - Partial natural shielding provided by surrounding elevated terrain;
 - Greater vegetation cover and surface roughness capable of reducing near-ground wind movement;
 - Comparatively reduced exposure of the landfill footprint to unrestricted winds;
 - Reduced direct cumulative interaction with the existing dumping site compared with option site 1;
 - Lower potential for unrestricted windblown litter than the highly exposed option site 2; and
 - Greater opportunity to supplement existing natural screening with engineered buffer and vegetation-management measures.
- **Geotechnical** – Based on the geotechnical investigation, the proposed site was excavated to the required depth of more than three (3) meters, and no water table was encountered. Additionally, the clay horizon is of sufficient thickness and continuity in the investigation boreholes, which is ideal for containment and cover usage. These findings indicate favourable geotechnical conditions for the proposed development, with minimal risk of subsurface instability or seepage.
- **Availability of Services:** For the proper operation of the landfill site, several services are required, including water, roads, electricity, etc. There is an existing road and medium-voltage electrical lines (and transformers) which pass by the proposed site; as such, only upgrades could be required. This limits the need to develop new linear infrastructure, which could contribute to vegetation fragmentation. On-site water and sewer options are proposed for all the proposed sites.
- **Conservation Status (CBA/ESA)** – the proposed site was previously used for cultivation; however, the site has been reclaimed by the indigenous vegetation of the area. According to ECBSP, the majority of the site is considered transformed, with a portion, especially along the artificial dam, considered ESA 2. The landfill site development is not considered incompatible with the identified land uses associated with the ESA 2, and impacts are expected to be manageable within the broader conservation framework.

- **Future Expansions** – based on the space consideration, there is a potential for future expansion towards the North-East, East and South-East of the existing facility. Expansion options are preferred where the same auxiliary infrastructures can still be used. Therefore, reducing the development cost associated with the development of a new landfill site. This approach supports efficient resource utilisation and minimises additional environmental disturbance.

B. Alternative Site 01

The preferred site is located on **Portion 3 of the farm Melk Spruit No. 12**, with the following central coordinates: 30°42'23.02" S 26°40'19.59" E. The site was assessed based on various factors, including the following:

- **Visual Impacts:** When the site is run through the viewshed, the proposed site is visible from the sensitive receptors within a 5 km radius of the proposed site. The proposed location will expose the community of Dukathole and the associated township, as well as road users of R58, to the visual impact associated with the landfill site.
- **Proximity to the Main River or tributary** – this option is located on the edge of a natural small stream/drainage line; however, it is located approximately 2.5km from the Orange River. Option 1 is located on the edge of a small natural stream/drainage line; options 1 & 2 have the potential to have larger negative impacts on the natural water environment. This option has the potential to have larger negative impacts on the natural water environment. The identified watercourse was assessed for functionality, and it was confirmed that it does support aquatic life. The proposed site will also require an application for Section 21(c) and (i) of the National Water Act, 1998, in addition to the water use being considered for the application.
- **Ambient Air Quality (movement and concentrations)** – Option Site 1 occurs adjacent to the existing waste-disposal environment and is comparatively open. Development at this location could result in cumulative dust, landfill gas and odour effects. Existing electrical powerlines and associated servitudes also create an open infrastructure corridor and constrain opportunities for supplementary screening. While this option still remains technically feasible but is less favourable because of its proximity to the existing dumping area, cumulative waste-related emissions, open landscape and electrical servitude constraints.
- **Availability of Services:** for the proper operation of the landfill site, several services are required, including water, roads, electricity, etc. There is an existing road and medium-voltage electrical lines (and transformers) which pass by the proposed site; as such, only upgrades could be required. This limits the need to develop new linear infrastructure, which could contribute to vegetation fragmentation. On-site water and sewer options are proposed for all the proposed sites.
- **Conservation Status (CBA/ESA)** – The natural environments in the area of alternatives 1 & 2 are in a much better condition than that of the Preferred Site, which, for many years, was cultivated fields and is therefore transformed. According to ECBSP, a portion of the site will be affected by the freshwater ESA 1, indicating higher ecological sensitivity.

- **Future Expansions** – there are no available spaces for expansion.

C. Alternative Site 02

The preferred site is located on the remaining extent of **Portion 1 of the farm Melk Spruit No. 12**, with the following central coordinates: 30°42'27.27" S 26°39'27.81" E. The site was assessed based on various factors, including the following:

- **Visual Impacts:** When the site is run through the viewshed, the proposed site is visible from the sensitive receptors within a 5 km radius of the proposed site. The proposed location will expose the community of Dukathole and the associated township, as well as road users of R58, to the visual impact associated with the landfill site.
- **Proximity to the Main River or tributary** – the proposed site is located within 100m of a tributary of Melkspruit, and about 1.8 km from the main river (Orange River). The identified watercourses around the site were assessed for functionality, and it was confirmed that it does support aquatic life. The proposed site will also require an application for Section 21(c) and (i) of the National Water Act, 1998, in addition to the water use being considered for the application. Option 2 has a small natural drainage line within it. Options 1 & 2 have the potential to have larger negative impacts on the natural water environment.
- **Ambient Air Quality (movement and concentrations)** – Option Site 2 is characterised by a predominantly open and exposed landscape close to the road corridor. This setting increases its susceptibility to wind-driven particulate matter and windblown litter. Lightweight waste could potentially be transported toward road users, grazing land and the surrounding natural environment, with associated visual and land pollution effects. Option Site 2 presents the greatest exposure to unrestricted wind and therefore has a comparatively greater potential for fugitive dust and windblown litter to migrate toward the R58, surrounding grazing areas and the wider natural environment
- **Availability of Services:** For the proper operation of the landfill site, several services are required, including water, roads, electricity, etc. There is no existing infrastructure at site alternative 2, thus requiring the establishment of such services. On-site water and sewer options are proposed for all the proposed sites.
- **Geotechnical** – based on the geotechnical investigation, the proposed site was excavated to the required depth of more than three (3) meters, and no water table was encountered. Additionally, the clay horizon is of sufficient thickness and continuity in the investigation boreholes, which is ideal for the containment and cover usage.
- **Conservation Status (CBA/ESA)** – The natural environments in the area of alternatives 2 are in a much better condition than that of the Preferred Site, which, for many years, was cultivated fields and is therefore transformed. According to ECBSP, a portion of the site will be affected by the freshwater ESA 1, indicating higher ecological sensitivity.

- **Future Expansions** – Due to the surrounding watercourses, the potential for expansion of the landfill site on this proposed site is limited.

Below is the summary of the parameters used to assess the three (3) site alternatives, as shown in the Table below.

Table 16: Site Selection Summary

Parameters	Preferred Site	Alternative Site No. 1	Alternative Site No. 2
Visual Impacts	Low	High	High
Proximity to the Main River or tributary	More than 450m from the Orange River. There is no natural watercourse within 300m of this site.	Less than 100m of a tributary of Melkspruit. However, the site is located approximately 2.5 km from the Orange River.	There is a drainage line within the site. However, the site is located approximately 1.8 km from the Orange River.
Geotechnical	Ideal	-	Difficult to excavate
Availability of Services	Road and Electricity	Road	None
Future Expansions	Possible	Not possible	Limited
Conservation Status (CBA/ESA)	ESA 2	ESA 1	Not with the CBA or ESA
Air Quality	Moderate and manageable	Moderate–High	Moderate–High
Cumulative elevation of air pollutants	Low	High	Low

Based on the site selection assessment, the preferred site was selected.

4.1.2. Design Alternative

The overall aim of the facility layout (i.e., development footprint) is to maximise the available airspace for the proposed landfill site, while minimising infrastructure, operation, and maintenance costs, and social and environmental impacts. The findings of the specialist scoping assessments will assist the developer in selecting the optimum position for the landfill site and associated infrastructure, including, but not limited to, access roads and laydown areas within the larger development area considered. Currently, the following design alternatives were considered:

4.1.2.1. Landfill Size and Height Considerations

The total gross landfill airspace requirement for the Maletswai Landfill over the 20-year design horizon has been calculated at approximately 460 881 m³, which includes a 1:4 waste-to-cover ratio allowance for daily and intermediate cover, final capping, and operational inefficiencies. This figure represents the volumetric capacity that must be provided through a combination of landfill footprint and waste height. Selecting the appropriate height is therefore essential to balance land-use efficiency, engineering feasibility, environmental risk, and cost.

To assess the effect of varying landfill heights, the gross airspace requirement with a 0.85 shape factor was compared across four scenarios: 5 m, 10 m, 15 m, and 20 m above-ground fill heights, each combined with a 3 m excavation depth. The effective containment heights were therefore 8 m, 13 m, 18 m, and 23 m, respectively. As shown in the table below, increasing the landfill height significantly reduces the required footprint area. For instance, at 5 m above ground, the landfill would require more than 5.7 ha of net footprint, while at 10 m the net footprint reduces to approximately 3.55 ha.

Table 17: Containment heights considerations

Above-ground Fill (m)	Effective Height (m)	Net Footprint (m ²)	Net (ha)
5	8	57 610	5.7
10	13	35 452	3.55
15	18	25 604	2.5
20	23	20 038	2.0

The 10 m above-ground height (effective 13 m with excavation) is considered the optimal balance for the proposed site. It provides a compact footprint of 3.55 ha, which increases to approximately 6 ha gross once ancillary infrastructure is included. This size fits comfortably within a practical 5-8 ha development need, allowing space for leachate ponds, access roads, buffer zones, and support facilities. Compared with shallower fills, the 10 m configuration significantly reduces visual impact, stability problems and wind blow effect.

4.1.2.2. Layout options

Two site layout options were considered on the preferred site. The two options were guided by the existing infrastructures, such as the existing Eskom power line and the out-of-stream impoundment. Please refer to the layout options below.

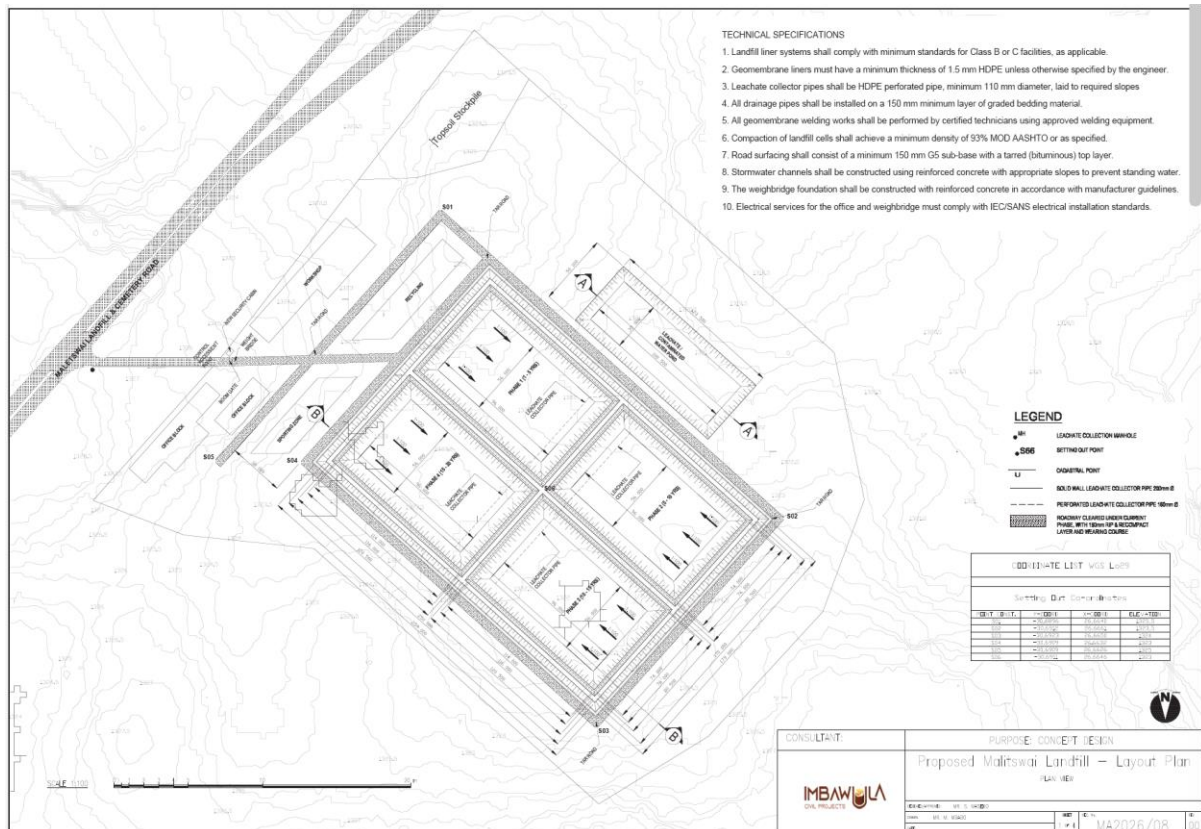


Figure 15: Layout Plan 1 (Preferred), with the relocation of the Eskom lines.

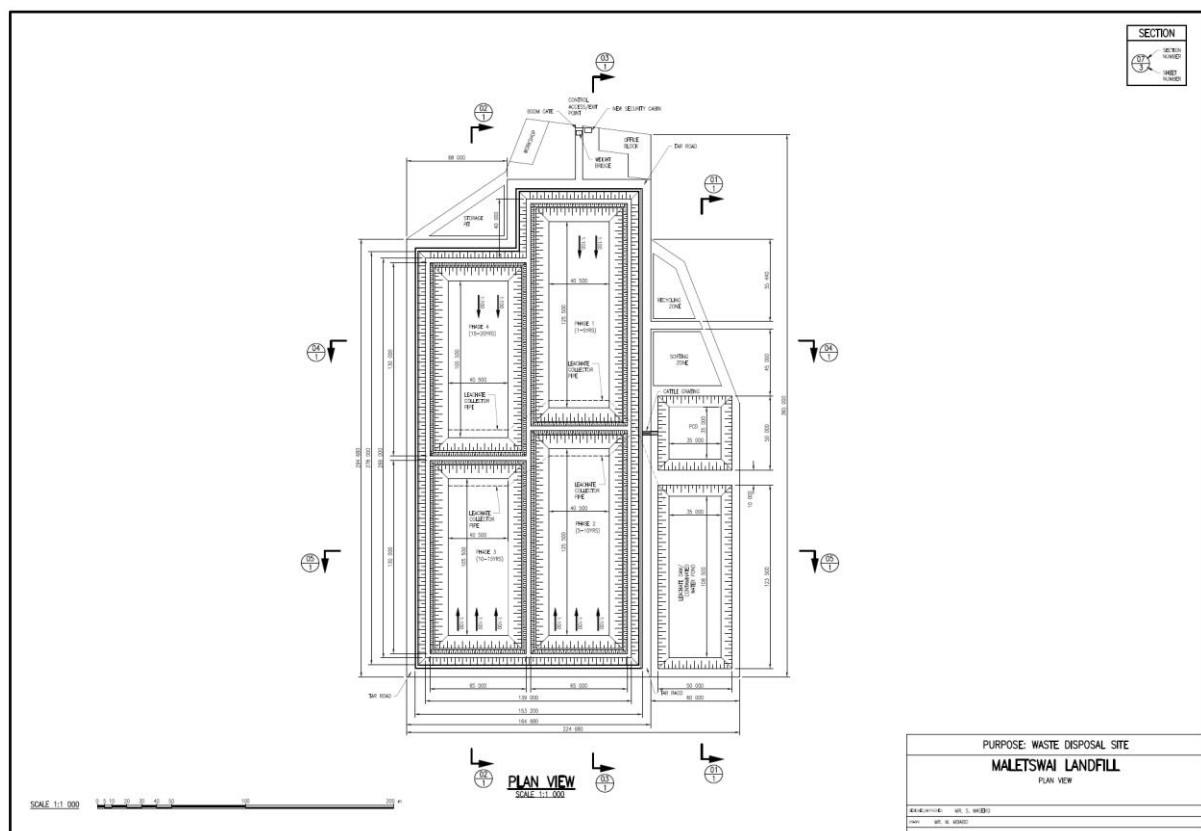


Figure 16: Option 2 – layout considering the non-relocation of the Eskom powerlines.

Both layouts do not provide buffer zones to the small out-of-stream impoundment. As the proposed site will redirect all surface run-off, which used to be impounded by the facility outside the catchment of the dam, and the internal stormwater will be channelled into a concrete layered dam. The embankment will be utilised as secondary containment in case of emergency, such as spillage or damage of the leachate and stormwater dams.

The implementation of layout option 1 requires the relocation of the existing Eskom powerline along the fence of the proposed landfill site, as illustrated below, while layout 2 accommodates the full 15m buffer zones as per the Eskom guidelines on the medium voltage powerlines. The outcome of the Eskom engagement regarding the proposed realignment should be concluded before the finalisation of the Detailed Engineering Designs for submission with the EIA Report.

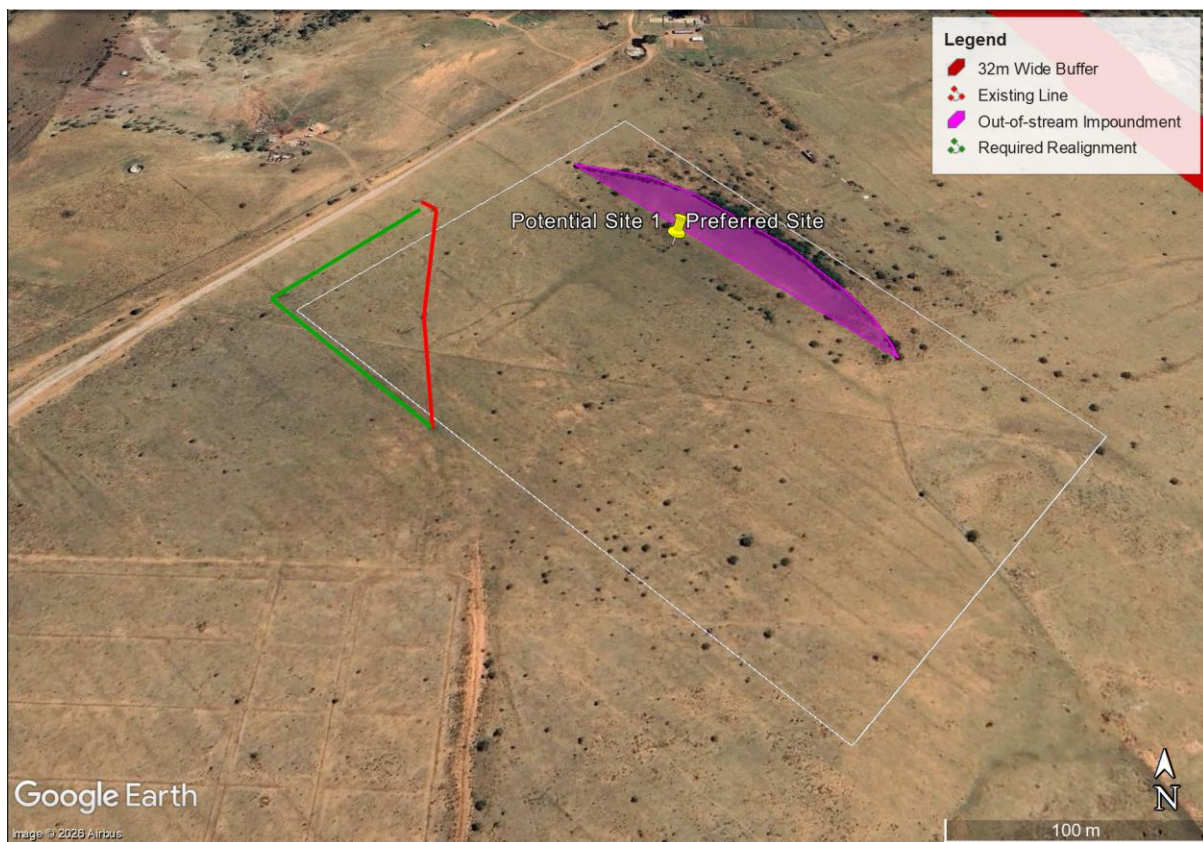


Figure 17: Existing Eskom powerline and proposed realignment.

4.1.3. Activity Alternatives

The consideration was made for the use of the proposed site for agriculture (cultivation, not grazing, as it is considered under a no-go option). However, based on the temporal analyses for the site, it was not cultivated for a long time; instead, it is used for grazing purposes. This is confirmed by the outcome of the agricultural study (by Dr Milambo Freddy Tshiala, dated August 2024 and KMG Environmental Solutions, 2026), which concluded that the proposed new landfill site project will not have any negative impact, especially in terms of loss of land for agriculture. As the land was not recently cultivated, it is used for animal grazing. The surrounding area is dominated by a disturbed area.

The three candidate sites have agricultural value, primarily through livestock grazing, but none was confirmed during the field assessment as supporting active intensive crop production. The overall agricultural capability is considered moderate and predominantly grazing-oriented.

The proposed development will result in unavoidable permanent transformation of agricultural soil and loss of grazing land within the landfill footprint. However, the magnitude of the affected agricultural resource is not considered sufficient, on the available evidence, to preclude the proposed development from an agricultural perspective.

The Preferred Site is considered acceptable for the proposed development from an agricultural perspective, notwithstanding that Option Site 1 is marginally preferred when agricultural considerations are viewed in isolation.

4.1.4. Landfill Containment Designs (Technology Alternatives)

The selection of the barrier system for the proposed Maletswai Landfill Cell 1 is one of the highest cost and risk drivers in the project. Two technically viable options have been assessed in line with the 2013 Norms and Standards for Disposal of Waste to Landfill (as amended in 2024):

- a compacted clay liner (CCL) combined with a high-density polyethylene (HDPE) geomembrane, and
- a geosynthetic clay liner (GCL) combined with an HDPE geomembrane.

In both cases, the geomembrane provides the primary hydraulic barrier, while the clay or geosynthetic component acts as a secondary attenuation layer and provides redundancy against geomembrane defects. Both alternatives require ancillary protective soil cover, leachate drainage aggregate, and pipework.

Based on the detailed bill of quantities and mid-market cost rates in Table 3, the CCL–HDPE system is estimated at approximately R14 million for the 4-hectare cell at an effective depth of 13 m. This cost reflects 24,000 m³ of clay material placed and compacted to a 600 mm thickness at an indicative rate of R450 per cubic meter, combined with the supply and welding of 40,000 m² of 2 mm HDPE geomembrane at R180 per square meter. Additional volumes are allocated for a 200 mm drainage aggregate layer and 200 mm protective soil cover, along with allowance for ancillary works including access roads, stormwater control, and fencing.

Table 18: Comparative Rates compares between (CCL and GCL in association with HDPE)

Component	Basis	CCL + HDPE	GCL + HDPE
Liner system	0.6 m CCL (24,000 m ³ @ R200/m ³) OR GCL (40,000 m ² @ R150/m ²)	R4.8 M	R6.0 M
HDPE geomembrane	40,000 m ² @ R180/m ²	R7.2 M	R7.2 M

Drainage + protective layers	Leachate gravel + cover soil	R0.6 M	R0.6 M
Ancillaries (roads, stormwater, fencing)	Lump sum	R0.0–1.0 M (incl.)	R0.0–1.0 M (incl.)
Subtotal – liner works		R13 M	R15 M
Studies & trials (common to both)	Borrow mapping, lab tests, permeability, trial strip, interface tests, and report	+R 1 M	+R1.02 M
Indicative Total		R14 M	R16 M

In contrast, the GCL–HDPE system is estimated at approximately R16 million for the same cell footprint. The higher cost reflects the premium associated with geosynthetic products and specialist installation, with GCL supply and placement cost at R150 per square meter. While this option requires less bulk clay handling on site, the geomembrane installation remains identical, and drainage and cover requirements are unchanged. The result is that the GCL–HDPE composite is approximately R1 million more expensive than the CCL–HDPE equivalent on a first-cost basis.

It is important to note that in both cases, an additional R1.02 million must be provisionally allocated to cover geotechnical investigations and trial works. This includes borrow-pit mapping, laboratory index and compaction testing, remoulded and in-situ permeability tests, chemical compatibility assessments, interface shear testing, and the construction of a trial clay liner strip. These studies are mandatory to demonstrate compliance with the minimum permeability requirements of $\leq 1 \times 10^{-9}$ m/s and to provide confidence in the long-term performance of the barrier system. Should the trial program confirm that locally sourced clay can reliably achieve the required hydraulic conductivity under field conditions, the CCL–HDPE system provides a robust and cost-effective solution. However, if trial results show variability or marginal compliance, the Employer will be obliged to revert to the pre-priced GCL–HDPE option to ensure regulatory approval and long-term environmental protection.

According to the Geotechnical Investigations, no suitable clay materials were found onsite for the construction of a conventional compacted clay liner. Thus, the design incorporates an engineered composite liner system consisting of a Geosynthetic Clay Liner and a 2.0 mm textured HDPE geomembrane, which was adopted and preferred for the development.

4.2. No-go alternative

The No-Go option would mean the poor waste management practices continue, and the applicant will not achieve the aims below of the proposed landfill site development:

- To replace the old Maizefield Landfill Site, which is in the process of closure.

- Provide facilities for improved waste management practices, such as proper water quality monitoring, landfill development with all required mitigation measures for pollution control and management.
- Provide a facility for sorting and storing waste, thus reducing the amount of waste being disposed of in the landfill site.
- Provide for the required alternative disposal site for general waste.

Additionally, the following benefits will be accrued by the surrounding communities.

- Support socio-economic development by improving waste management practices within the area.
- Enhance environmental management within the surrounding communities.
- Contribute to the municipality's strategic objectives for infrastructure improvement and service delivery.
- Align with national and provincial policies promoting the protection of the environment and pollution reduction and control.
- Ensure that the municipality complies with the statutory requirement of duty of care and promotion of community to access to an environment that is safe and healthy.

The Project is therefore both necessary to meet current and future infrastructure demands and desirable for promoting safe, sustainable, and efficient waste management practices within the region, while supporting local economic activity and community well-being. Therefore, the No-Go alternative is not considered feasible for this application

5 PUBLIC PARTICIPATION PROCESS

According to 21(1) - If S&EIR must be applied to an application, the applicant must, within 44 days of receipt of the application by the competent authority, submit to the competent authority a scoping report which has been subjected to a public participation process of at least 30 days and which reflects the incorporation of comments received, including any comments of the competent authority.

23(1) The applicant must, within 106 days of the acceptance of the scoping report submit to the competent authority—

- (a) an environmental impact assessment report inclusive of any specialist reports, and an EMPr, which must have been subjected to a public participation process of at least 30 days and which reflects the incorporation of comments received, including any comments of the competent authority; or
- (b) a notification in writing that the reports, and an EMPr, will be submitted within 156 days of receipt of the application by the competent authority, as significant changes have been made or significant new information has been added to the environmental impact assessment report or EMPr, which changes or information was not contained in the reports consulted on during the initial public participation process contemplated in subregulation (1)(a), and that the revised environmental impact assessment report or EMPr will be subjected to another public participation process of at least 30 days

Refer to **Appendix E** for the proof of PPP.

5.1. Objectives of the public participation process

Public Participation Process (PPP) forms an integral part of the application process. It provides people with the opportunity to raise their issues and concerns about the development. The public participation process to which this Scoping process is subjected must *“give all potential or registered interested and affected parties, including the competent authority, a period of at least **30 days** to submit comments.”* In addition, the public participation process *“must provide access to all information that reasonably has or may have the potential to influence any decision about an application.”* Public participation must include *“consultation with—*

- a) *the competent authority.*
- b) *every State department that administers a law relating to a matter affecting the environment relevant to an application for an environmental authorisation.*
- c) *all organs of state which have jurisdiction in respect of the activity to which the application relates; and*
- d) *all potential stakeholders, landowners, land users, where relevant, registered interested and affected parties.”*

In terms of the NEMA, the public participation process provides people who may be affected by the development with an opportunity to provide comments and to raise issues of concern about the project, or to make suggestions that may result in enhanced benefits for the project. Comments and issues raised during the PPP will be captured,

evaluated, and included in a comments and responses register. Note that this is an ongoing process. The issues will be addressed and included in the final version of the report, submitted to DEDEAT.

Table 19: Timeframes of the Landfill Site's Environmental Impact process

Table 10: Timelines of the Landfill Site's Environmental Impact process		
Pre-Application	The decision on the scope of work	Prior submission
	Stakeholder identification and analysis	
	Stakeholder engagement planning	
	Inclusion of the stakeholder engagement process in the application forms	
Submission of the Environmental Impact report to competent authorities		
Scoping and EIAR	Availability of Scoping, EIA reports and Environmental Management plan for public comment	30 Days for the public to comment per phase.
	• Notification to stakeholders • Adverts • Site notices available in public places • EIA/EMPr available in public places • Meetings and telephone consultations	
	• Update comments and response report	
	• Update EIA/EMPr	
Decision Phase	• The department considers and decides on the application • Inform the stakeholders of the decision process • Notification to stakeholders, and place on the website	107 Days + 14 Days
Appeals	• Notification of appeal(s) • Undertake the mediation process	20 Days
	• Notification of the result of the appeal	

5.2. Pre-application public participation

The involvement of interested and Affected Parties is vital in environmental assessment projects. The announcement of the EIA process and consequently the invitation of Interested and/or Affected Parties (I&APs) to participate was facilitated by the following methods:

- Site notice boards;
- Newspaper advertisements; and
- The distribution of the Background Information Document (BID).

5.3. Identification of stakeholders

During the inception phase of the project, I&APs and other key stakeholders were identified for the development. This included the identification of landowners, land occupants, farms, associations, ward councillors and relevant governmental officials. Engagements with I&APs and other stakeholders are an ongoing process and will continue into the EIA process.

5.4. Notification of the EIA process

The public participation process was initiated with the placement of site notices and the distribution of the BID to pre-identified I&APs and stakeholders.

5.4.1. Site notices

Seven (07) site notice boards were placed where they are accessible to the public, at the site and the surrounding boundary. The site notice illustrated key details about the development. Steps for potential I&APs to register and contact Rambuda Consultants (Pty) Ltd are clearly illustrated on the site notices. The notices were made in four (4) different languages, namely English, Sotho, IsiXhosa and Afrikaans.

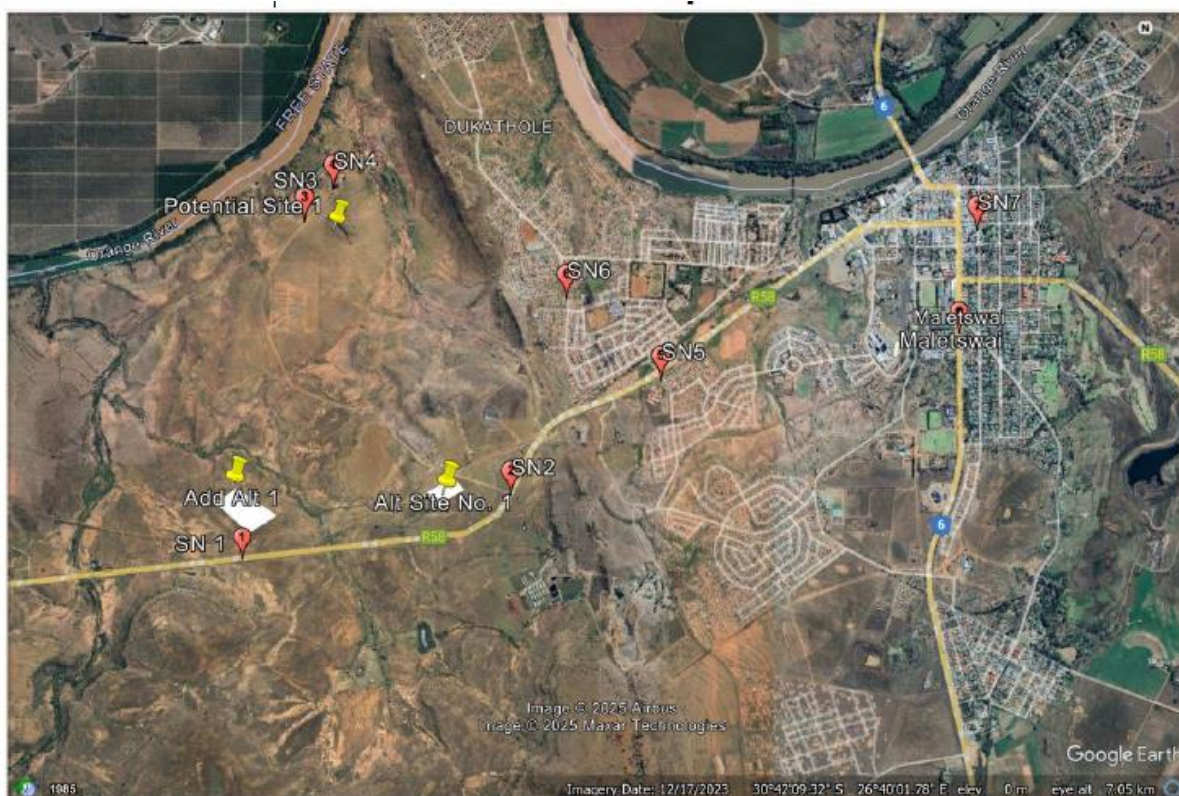


Figure 18: Location of the site notices around the project site

5.4.2. Distribution of background information documents:

The purpose of the BID is to ensure all relevant information and processes are made available to a wide range of stakeholders. Registered I&AP is also furnished with the BID.

5.4.3. Advert

The EIA guideline document stipulates that notices informing the public of the development be placed on site, and the project should be advertised in a local newspaper. All stakeholders and I&APs were notified of the availability of the draft reports via newspaper adverts. The published advert illustrated key information about the development and the steps for potential I&APs to lodge any comments they might have. Two (2) newspaper adverts were placed in Die Aliwal Weekblad Newspaper on 07 November 2025. The second advert will be placed in the same

newspaper (or another local newspaper) notifying the I&APs of the availability of the Draft EIA Report for commenting purposes. The initial adverts were in English and isiXhosa, and the second adverts will be in Sotho, Afrikaans and English.

5.5. Comments on the Scoping Reports

Kindly refer to Appendix C for comments and the response register.

5.6. Public participation information included in the Scoping and EIA report:

The Public Participation Process requires that the following information be included as part of the Public Participation Section of the report:

- (i). The steps undertaken in accordance with the Plan of Study for the assessment,
- (ii). A list of persons, organisations and government organs that were registered as interested and affected parties
- (iii). A summary of comments received from, and a summary of issues raised by, the interested and affected parties, the date of receipt of these comments and the response of the EAP to those comments.
- (iv). Copies of any representations, objections and comments received from the registered interested and affected parties.

Mitigation measures and guidelines listed in the Scoping and EIA report are summarised in a user-friendly document named the Environmental Management Programme (EMPr). The compilation of an EMPr is a requirement of the process as per Sections 32 and 34 of the NEMA.

5.7. Summary of the comments received

Comments were received from the Competent Authority and Rotondo Walnuts (Pty) Ltd; the comments can be summarised as follows:

- Rotondo Walnuts (Pty) Ltd objects to the location of the preferred site; however, they support consideration of an alternative site as the preferred site.
- Requirement for detailed assessment of the underground pollution potential of the landfill site, especially as the preferred site is located in proximity to the Orange River.
- The potential impact of the landfill site on their operations and further agricultural impacts on nut growth and international certifications.
- Ensuring full engagement with all potential Interested and Affected Parties.
- Aligning the waste characterisation with the relevant municipal documentation.
- Provision of wind directions for the past 20 years.
- Inclusion of climate-related impacts and resilience in the impact management.

5.8. Public participation summary:

The public participation process for the development commenced in October 2025 and is currently ongoing. The table below presents a summary of steps already taken regarding the PPP.

Table 20: Public participation process timeframe

Phase	Requirement	Date
Inception Phase	Site notice	08 November 2025
	Newspaper	07 November 2025 04 September 2026
	BID	November 2025
Scoping Phase	Submit draft Scoping Report to CA	17 November 2025
	30-day PPP for all stakeholders	19 November 2025
	Submitted Final Scoping	05 February 2026
EIA Phase	Specialist studies	To be completed in April – May 2026
	Draft EIA Report for stakeholder review	08 June 2026
	30-day PPP for Draft EIA Report	June - July 2026
	30-day PPP for Amended Draft EIA Report	September – October 2026
	Submission of Final EIA Report to CA	October 2026

6 THE RECEIVING ENVIRONMENT

6.1. Climate

Climatic indicators available for the proposed project site are characterised as a tropical and subtropical steppe climate. The warmest month is January with an average temperature of 21°C, whilst the coolest month is June with an average temperature of 7°C (Source: www.weatherbase.com). The average annual precipitation is 533 mm, with February being the month with the most precipitation (84 mm) and July at 10 mm being the month with the least precipitation.

The proposed project of the Landfill site is situated in Rainfall mainly in autumn and summer, peaking in March. MAP ranges from about 180 mm in the west to 430 mm in the east. Incidence of frost is relatively high but ranges widely from 80 days of frost per year (bordering the Upper Karoo Hardeveld on the Compassberg and mountains immediately to the west). Mean maximum and minimum monthly temperatures in Middelburg (Grootfontein) are 36.1 °C and -7.2°C °C for January and July, respectively. Corresponding values are 37 °C and -8 °C for Victoria West and 36.6 °C and -4.2°C for Hofmeyr. See also the climate diagram for Eastern Upper Karoo (NKu4) (Mucina and Rutherford, 2006).

In summary, rainfall is strongly seasonal, with peak precipitation in late summer and autumn. High evaporation rates and frequent frost events influence the water balance, requiring robust stormwater management and liner design to prevent ingress and maintain containment integrity.

6.2. Topography

Topographically, the area has a variable gradient comprising gentle slopes. The area is considered naturally stable as far as slope instability is concerned, with elevation varying between 1322 m (in the east) and then drops to 1311 m and finally 1304 m above mean sea level towards the west, with a slope gradient of approximately 3 %. No preferential drainage channels were noted on site, and it is expected that drainage, particularly during periods of heavy or prolonged rainfall, would be in the form of sheetwash down towards the south.

The Site Sensitivity Verification Report classified the topography as low sensitivity, with no ridges or escarpments of visual or ecological importance. The gentle slope gradient (~3%) is favourable for landfill cell construction and surface water diversion.

6.3. Regional and Site Geology

The proposed Maletswai landfill site is underlain by geological formations typical of the Karoo Supergroup, with the regional stratigraphy consisting of intercalated arenaceous and argillaceous strata belonging to the Beaufort Group. According to the Council for Geoscience's geological mapping, the site is predominantly classified as

Quaternary deposits consisting of unconsolidated alluvial sediments, sands, and calcrete horizons, overlying weathered sedimentary rocks. Lithological descriptors include a combination of sand, silt, and calcareous material, with Beaufort mudstones forming the deeper parent material.

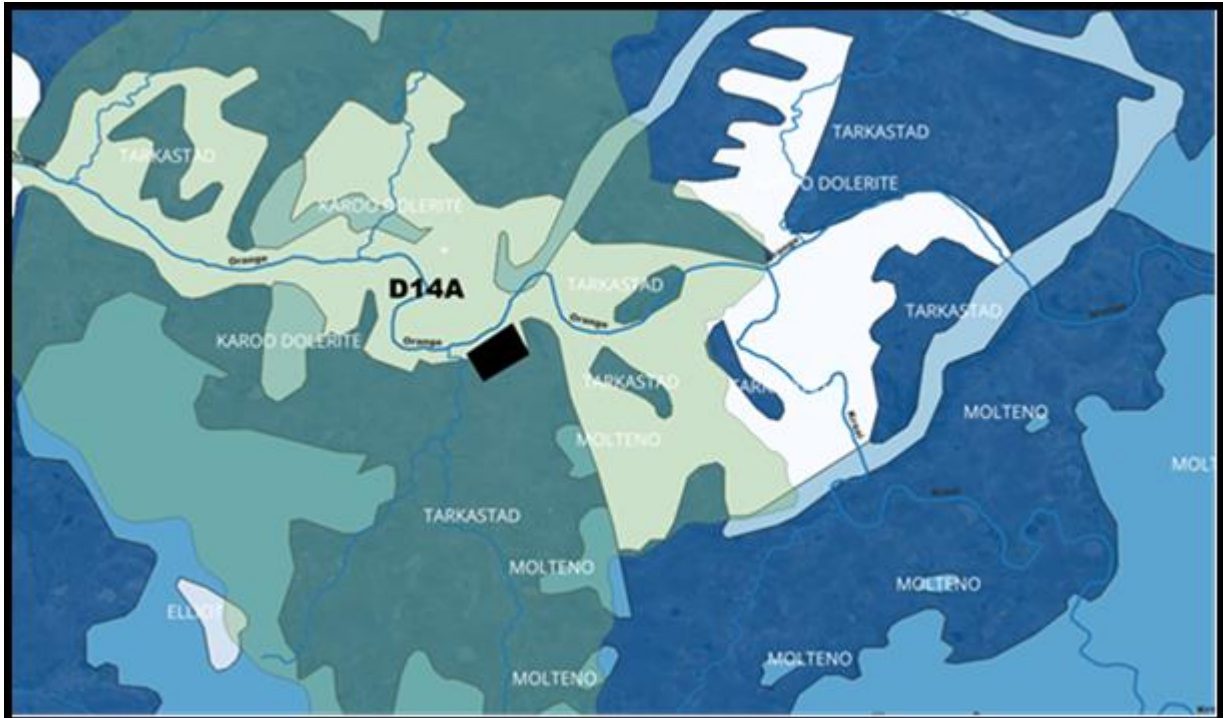


Figure 19: Map showing the geology of the area.

These conditions are consistent with the geotechnical investigation, which identified a surficial veneer of transported soil and hillwash material, underlain by residual silty clays derived from in-situ weathering of mudstones and shales. The bedrock comprises Beaufort mudstone, which is moderately weathered near the surface but becomes competent at greater depths. The overall geological profile is favourable for landfill development, as it provides both natural containment (in the form of low-permeability residual soils) and a competent founding stratum for engineered liner systems.

Geotechnical investigations confirmed that residual silty clays have low permeability, with hydraulic conductivity values suitable for landfill containment. No shallow groundwater was encountered within 3 m of excavation depth. The Beaufort mudstone bedrock provides a competent founding stratum for engineered liner systems, reducing the risk of subsurface migration.

6.4. Soils

The geotechnical investigation confirmed the presence of several distinct soil horizons:

- Topsoil/hillwash layer: Approximately 0.3–0.5 m thick, composed of loose sandy silts with occasional gravel. This material is unsuitable for liner construction but can be stripped and reused as daily cover or for site rehabilitation.

- Residual silty clay horizon: Typically 2–3 m thick, comprising reworked clayey soils derived from Beaufort mudstone. These soils exhibit moderate plasticity (Plasticity Index ~10–18) and low natural permeability. Laboratory tests indicate that, when compacted to 98% of Standard Proctor density at optimum moisture content, the silty clay can achieve hydraulic conductivities on the order of 10^{-9} m/s, making it suitable for use as a compacted clay liner (CCL) or as subgrade support beneath a geomembrane liner.
- Weathered mudstone/shale: Found below the residual clay, offering moderate rippability. This unit provides a competent foundation with an allowable bearing capacity of approximately 150 kPa, sufficient for supporting landfill infrastructure such as haul roads, berms, and leachate collection systems.

These soil conditions are advantageous because they provide both cover material sources (from topsoil and clay) and liner construction material (residual silty clays). However, further laboratory testing and a trial CCL strip are recommended to confirm that site-derived clay consistently achieves the required permeability and compaction specifications. If variability in clay properties is observed, a geosynthetic clay liner (GCL) option should be considered as an alternative or supplementary barrier.

Based on the geotechnical investigations, which confirmed that suitable clay materials are not available on site for the construction of a conventional compacted clay liner. The Geosynthetic Clay Liner and a 2.0 mm textured HDPE geomembrane were adopted.

6.5. Groundwater Conditions and Classification

Groundwater levels in the area are relatively deep, with the geotechnical investigation indicating no perched groundwater within the upper 3–4 m of test pits. Regional hydrogeological mapping suggests that the static groundwater table lies at depths greater than 5–6 m below the surface. This is significantly deeper than the proposed excavation depth of 3 m, reducing the risk of groundwater ingress into landfill cells during construction or operation.

Furthermore, the mudstones of the Beaufort Group are known to have low primary permeability, with groundwater movement typically confined to fractures and weathered zones. The combination of a deep-water table, low-permeability soils, and engineered liner systems greatly reduces the likelihood of significant groundwater contamination from landfill operations. Nevertheless, as a precaution, it is recommended that groundwater monitoring boreholes be installed around the site perimeter to provide early warning of any contamination, in line with the 2024 Norms and Standards for Disposal of Waste to Landfill.

This Geology, Soils and Groundwater section establishes that the site is geologically suitable for landfill development, with available clay materials for liner construction and low groundwater risk.

Regional hydrogeological mapping classifies the area as part of the Upper Karoo fractured aquifer system, with groundwater movement confined to fractures and weathered zones. Although no perched groundwater was intercepted, slightly moist conditions in test pits suggest seasonal seepage may occur, requiring precautionary design measures. In line with the 2024 Norms and Standards, perimeter monitoring boreholes will be installed to establish baseline quality and provide early warning of potential contamination.

The geotechnical investigation confirmed that no perched groundwater was intercepted within the upper 3–4 m of test pits. Regional hydrogeological mapping classifies the area as part of the Upper Karoo fractured aquifer system, with groundwater movement typically confined to fractures and weathered zones. Static groundwater levels are expected at depths greater than 5–6 m below the surface, significantly deeper than the proposed excavation depth of 3 m.

Slightly moist conditions were observed in some test pits, interpreted as seasonal soil moisture rather than shallow groundwater seepage. Nevertheless, precautionary measures will be incorporated into the landfill design to manage potential seasonal ingress, including perimeter drains and engineered liner systems.

In line with the 2024 Norms and Standards for Disposal of Waste to Landfill, perimeter groundwater monitoring boreholes will be installed to establish baseline quality and provide early warning of any contamination. This monitoring network will ensure ongoing compliance and allow for adaptive management should groundwater conditions change during operation.

6.6. Vegetation

The study site is within the Upper Karoo Bioregion of the Nama-Karoo Biome. The site is within the original extent of the veldtype commonly known as **Eastern Upper Karoo**.

Eastern Upper Karoo is characterised by flats and gently sloping plains (interspersed with hills and rocky areas of Upper Karoo Hardeveld in the west, Besemkaree Koppies Shrubland in the northeast and Tarkastad Montane Shrubland in the southeast), dominated by dwarf microphyllous shrubs, with 'white' grasses of the genera *Aristida* and *Eragrostis* (these become prominent especially in the early autumn months after good summer rains). The grass cover increases along a gradient from southwest to northeast (Mucina & Rutherford, 2010).

The study site is in an area where there are nearby hills covered with Besemkaree Koppies Shrubland. The area is also where the two biomes of Grassland and Nama-Karoo integrate. Vegetation along the small, seasonal drainage lines and streams is often classified or grouped under Inland Azonal Vegetation and more specifically as Upper Gariep Alluvial Vegetation (Mucina & Rutherford, 2010).

Eastern Upper Karoo is not a threatened veldtype (ecosystem) with a status of 'Least Concern' (Revised National List of Threatened Ecosystems. 2022. DFFE). The hierarchy and classifications of the vegetation of the study area.

Table 21: Vegetation classification of the study site

Category Description	Classification
Biome	Nama-Karoo
Bioregion	Upper Karoo
Vegetation Types	Eastern Upper Karoo
Status	Least concern (Not threatened)

The Terrestrial Ecology Impact Report confirmed that most of the site is transformed due to historical cultivation, with ESA 2 sensitivity identified along the artificial dam margin. Vegetation in seasonal drainage lines is classified as Upper Gariep Alluvial Vegetation, which is sensitive and requires buffer zones to prevent disturbance. The site lies within a biome transition zone between Grassland and Nama-Karoo, contributing to ecological heterogeneity but not elevating conservation status beyond 'Least Concern'

6.6.1. Aquatic vegetation

Aquatic vegetation within the study site is limited and primarily associated with ephemeral drainage lines and the artificial stormwater runoff dam. Indigenous aquatic plants such as *Isolepis fluitans* were observed, alongside alien species including *Arundo donax*, *Solanum mauritianum*, *Salix babylonica*, and *Eucalyptus* spp. No aquatic species of conservation concern (SCC) were identified. Alien vegetation is present at low to moderate levels but has not yet significantly compromised aquatic habitat functioning.

6.7. Fauna

The national screening tool assessment for the study area lists the potential presence of three faunal species of conservation concern (SCC). The regional statuses of the faunal SCC and their likelihood of being present on the study site are shown in the table below (Table 20). Most of the listed faunal SCC, if present in the region, will be found more west of the study site, which is a more open natural karroid shrubland and further away from the disturbances of the town, landfill site and other industrial activities. There is a low possibility of only two faunal SCC being routinely present in the study area, namely the marsh rat and the spotted-necked otter.

Table 22: Faunal SCC potentially present in the area of the study site

Species	Common Name	Regional Status	Screening Tool Potential Presence	Likelihood to be present on the study site
<i>Hydricitis maculicollis</i>	Spotted-necked otter	Vulnerable	Medium	No. Possibly found along the Orange River
<i>Hydroprogne caspia</i>	Caspian tern	Vulnerable	Medium	Yes, but more along the Orange River

<i>Sagittarius serpentarius</i>	Secretarybird	Vulnerable	High	Yes, but more likely in the open grassland and shrubland plains to the west of the study site
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6.7.1. Mammals

No mammal species were observed on the study site during field investigations, but a few are expected to occur, mostly rodents, which would include alien house mice and rats. The national screening tool lists the 'medium' potential presence of one mammal SCC, namely, the spotted-necked otter. The otter will not be found on the study site, but along the Orange River to the north.

No other mammal SCC was observed in the study area.

6.7.2. Avifauna

The study site is not within an Important Bird Area (IBA). No avifaunal SCC were observed during the site visit. However, the Caspian tern and Secretarybird, both of which are SCC, have been recorded in the general area. Numerous common birds were observed along the Orange River area.

The screening tool assessment lists the 'high' potential presence of Secretarybird and the 'medium' potential presence of Caspian tern in the area. This is confirmed (verified) with the background data reviewed.

6.7.3. Reptiles

The study area is not within a lizard hotspot but is within a snake hotspot. Lizards tend to prefer rocky habitats, and the study site is on a rocky mountain slope, where a number of common lizards are present. However, it is unlikely that any of the lizard and snake SCC for the province will be found on the study site. Reptiles will be found east of the study site along the rocky plateau and mountains near Aliwal North.

The national screening tool does not list or flag the potential presence of any reptile SCC for the study area.

6.7.4. Amphibians

Several common frog species will be found in the Orange River to the north of the study site. The Orange River and associated tributaries in the Aliwal North area provide suitable habitat for a number of common and widespread amphibian species associated with the eastern Karoo ecosystems. Amphibian diversity within the region is influenced by the presence of perennial water sources, temporary inundated depressions, and semi-arid terrestrial habitats adjacent to the river corridor. Species expected to occur are primarily widespread habitat generalists and river-associated taxa typical of the upper Orange River catchment.

Riverine habitats and permanent freshwater systems are likely to support species such as the Cape River Frog (*Amietia fuscigula*) and Common River Frog (*Amietia delalandii*), both of which are commonly associated with rivers, streams, dams, and well-vegetated freshwater habitats. Semi-arid terrestrial and seasonal wetland habitats in the broader landscape may support species including the Karoo Toad (*Vandijkophrynus gariepensis*), Senegal Running Frog (*Kassina senegalensis*), and Weale's Running Frog (*Semnodactylus wealii*). More generalist species such as the Guttural Toad (*Sclerophrys gutturalis*) and Common Platanna (*Xenopus laevis*) are also likely to occur in suitable aquatic and riparian habitats in the general area (du Preez, L. & Carruthers, 2017; SA Frog Atlas Project, Frog Map).

6.7.5. Invertebrates

Invertebrates such as spiders, scorpions and butterflies are important faunal groups, but are difficult to fully assess in a short period. During field investigations, specific attention was given to priority species such as Mygalomorphae arachnids (Trapdoor and Baboon spiders) and red data butterflies.

The national screening tool flags do not list or flag any invertebrate SCC occurring in the study area.

6.8. Regional Hydrology

The proposed Maletswai Landfill site is located within the Upper Orange Water Management Area (WMA 13), specifically in Quaternary Catchment D14A. This drainage system ultimately discharges north-westward into the Orange River, forming part of the larger Orange–Senqu basin. The regional hydrology is therefore defined by a semi-arid inland drainage network comprising predominantly non-perennial streams and ephemeral drainage lines that flow only during significant rainfall events.

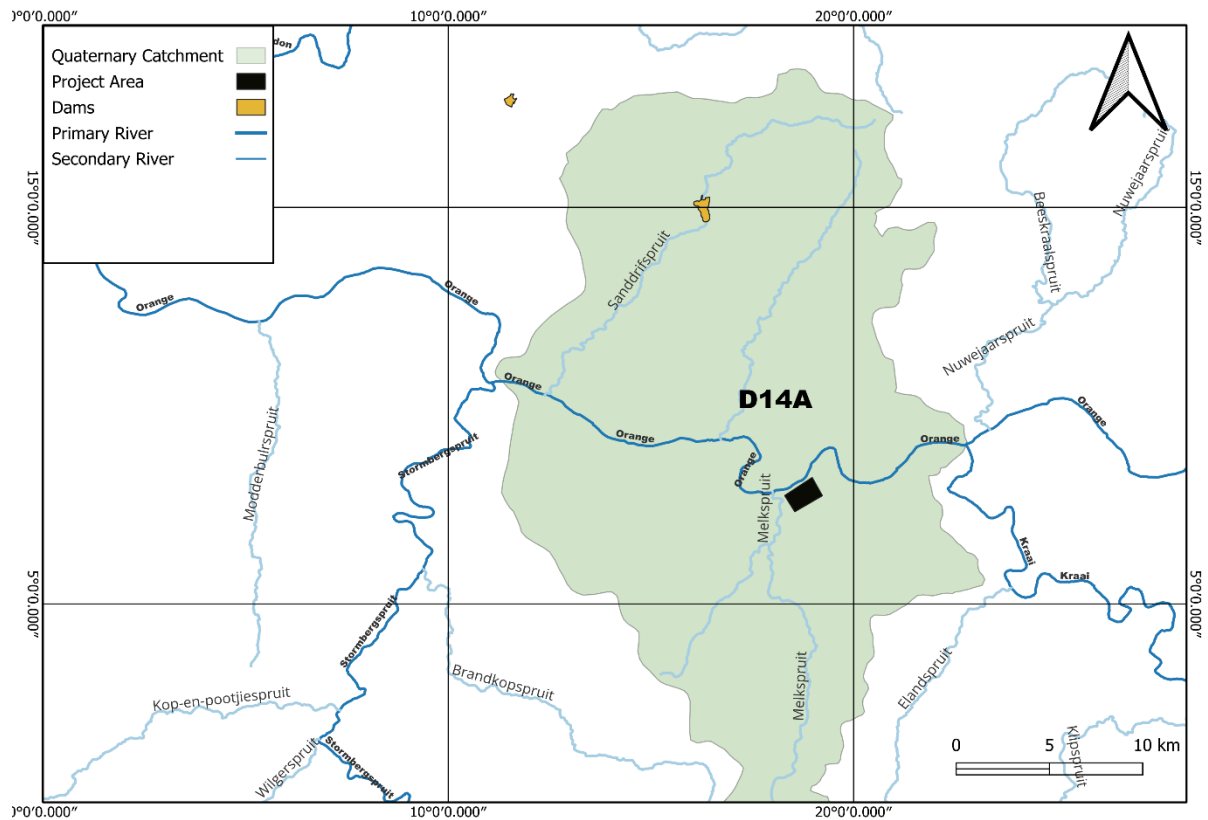


Figure 20: Reginal Hydrological Setting

The topography of the Maletswai area is gently undulating, with surface gradients ranging from 1 % to 5 %, directing overland flow toward minor tributary channels situated north-west of the proposed landfill footprint. The regional mean annual precipitation is approximately 493 mm/year, while mean annual potential evaporation is around 1,475 mm/year, resulting in a strongly negative climatic water balance ($B = -981$ mm). Under such conditions, runoff volumes are low, infiltration is limited, and streamflow occurs mainly as short-duration flash events during the summer rainfall period (October – March).

The Aquatic Specialist Report confirmed the presence of ephemeral drainage lines near the site, with buffer zones delineated to protect downstream resources. Stormwater management measures, including perimeter drains, diversion berms, and a runoff dam, will be incorporated into the design to prevent uncontrolled discharge and protect water quality.

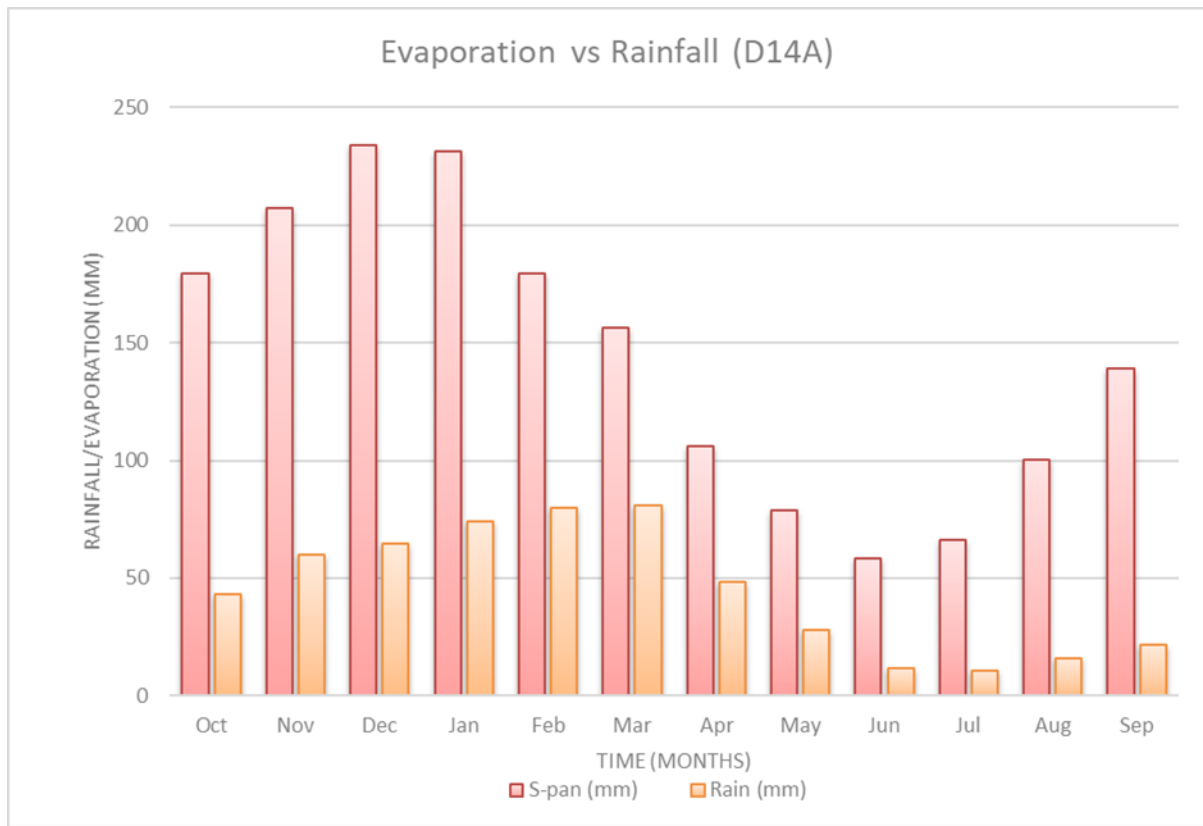


Figure 21: Figure comparing rainfall and evaporation within the project area.

6.9. Watercourses in the study area (Source – Aquatic Impact Assessment Study, Flori Scientific Services, 2026)

The main watercourses in the region are the perennial Orange River and semi-perennial Melkspruit. The Melkspruit flows north into the Orange River and varies from about 1,7km to 2,4km west of the study site. The Orange River varies in distance between 450m and 500m northwest of Site 1. The Orange River is the largest and longest river in South Africa.

The national wetland map (Map 5, 2018) (overlaid on Google Maps) does not highlight any wetlands in the vicinity of the three sites (Existing landfill site, Site 1 (Preferred new landfill site), Site 2 (Alternative site)), as shown in Figure below.



Figure 22: Main watercourses in the region

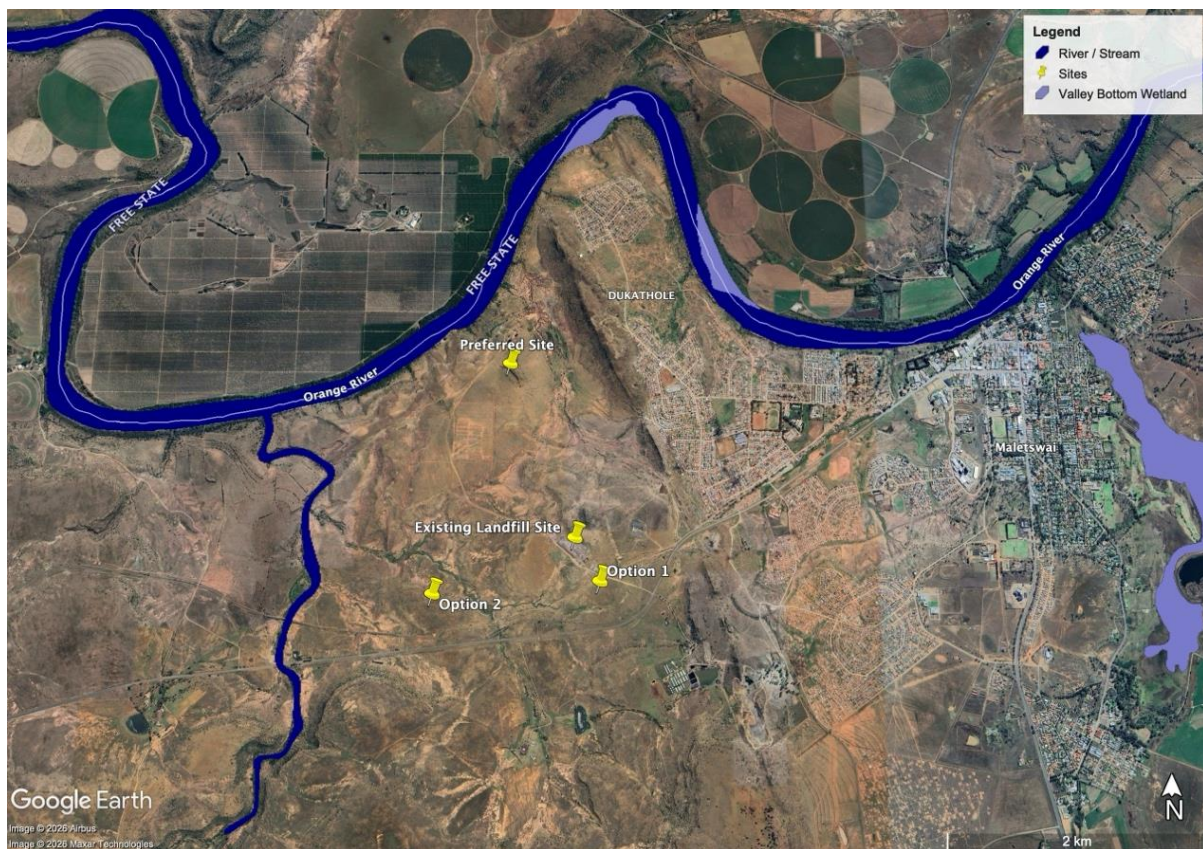


Figure 23: National Wetland Map (Map 5, 2018)

There are a few small and highly ephemeral streams and drainage lines in the vicinity of the alternative landfill sites. Those in the vicinity of Preferred Site flow directly into the Orange River, while those near Option 1 and Option 2 flow into the Melkspruit. There is a small out-of-stream impoundment at the Preferred Site (Figure 24, Figure 25, Figure 26). The small impoundment is not very functional and was created to trap (impound) surface rainwater run-off, probably to retain some water for grazing livestock. However, the water volumes are low, and the impoundment is dry (that is, no visible surface water) for most of the year. The impoundment is not a natural watercourse. There are occasions when a dam becomes part of the natural aquatic environment, but these are mostly in-stream dams that form an integral part of the linear river/stream and are important in terms of upstream and downstream connectivity.

Out-of-stream dams do not serve this same important aquatic function. However, there are out-of-stream dams that have become part of the aquatic environment and support wildlife such as waterbirds, but these are typically large dams that have permanent open bodies of water and not small, shallow and insignificant impoundments that dry out quickly, such as the one at Preferred Site. These large dams act very much like large natural pans or lakes. Erosion and gully formation are problematic in the study area, which is especially evident in areas of poor veld management and old cultivated fields (such as in the case of the Preferred Site) where the loss of ground cover has occurred. During erratic rainfall, soils are easily washed away along the slopes, quickly creating erosion gullies that at first may look like natural drainage lines, but are not. Erosion gullies are particularly a problem in the area of the Preferred Site, where the area has been transformed from years of ploughing and cultivated fields for crops. The eroded and denuded areas are visible as light, sandy areas in the satellite image shown below in Figure 24.

The veld in the areas of Options 1 & 2 is less impacted, with fewer erosion gullies present. Option 1 is situated on the north side of a small natural seasonal stream/drainage line, while there is a small natural drainage line that originates in Option 2.

The Aquatic Impact Assessment confirmed that no wetlands of conservation importance occur, but ephemeral drainage lines require buffer zones and stormwater management to prevent sedimentation and protect downstream water quality in the Orange River and Melkspruit.

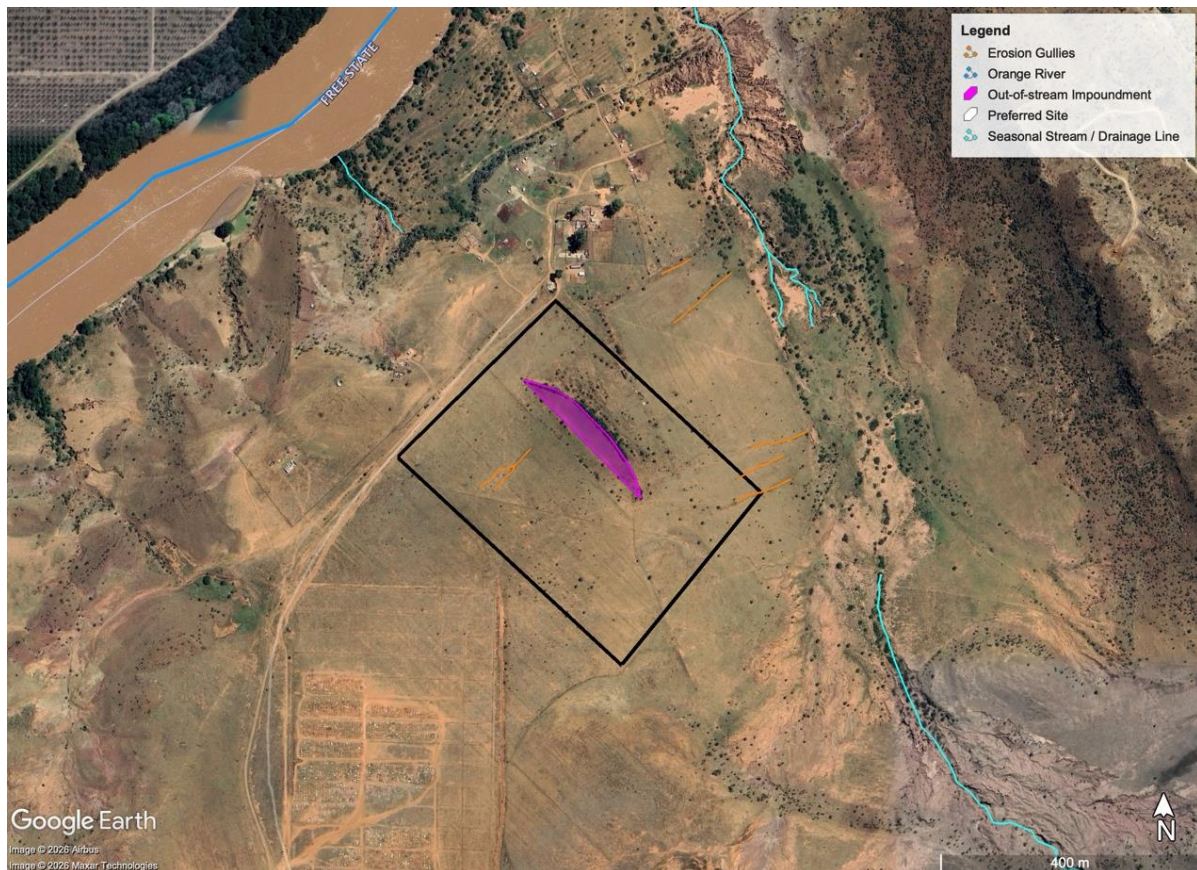


Figure 24: Watercourses in the vicinity of the Preferred Site

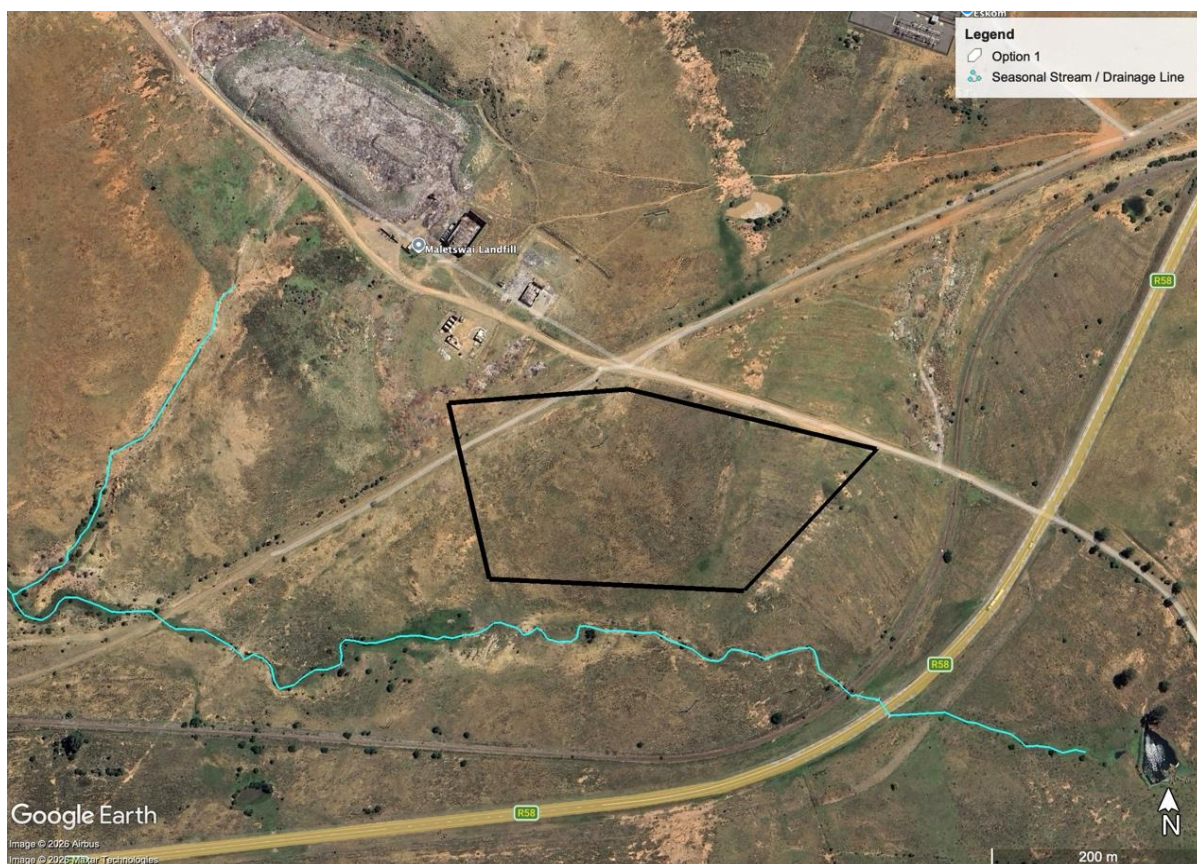


Figure 25: Watercourses in the vicinity of Alternative 1



Figure 26: Watercourses in the vicinity of Alternative 2

6.9.1. Present Ecological State of Watercourses in the Study Area

All watercourses identified within the study area and surrounding areas were assessed to determine their Present Ecological State (PES). The assessment criteria and structure are based on the modified Habitat Integrity approach of Kleynhans (1996, 1999). The PES is calculated by looking at the hydrology, geomorphology, water quality and biota of each watercourse. The ecological integrity of the main individual components making up the overall PES of the watercourse is shown below Table 23.

The PES of the Orange River in proximity to the study site is Category C – Moderately Modified, reflecting a large loss of natural habitats and ecosystem functions, although ecological importance remains high. The Melkspruit is Category B – Mostly Natural, with limited modification and moderate ecological importance. Ephemeral streams and drainage lines at Site 1 (Preferred) and Site 2 (Alternative) are Category C/D and C/B, respectively, indicating moderate to largely modified conditions due to erosion gullies and historical cultivation.

Wet Health Scores for sub-components (Table 22) confirm that hydrology, geomorphology, and water quality are moderately modified across most watercourses, while biota shows signs of terrestrial encroachment and invasive plant presence.

The DWS Desktop PES and EIS ratings (Table 21, Figure 23) align with field verification:

Table 23: PES of Watercourses in the Study Area

Criteria	Identified Watercourses			
	Orange River	Melkspruit	Streams / Drainage Lines – Site 1	Streams / Drainage Lines – Site 2
HYDROLOGY				
Flow modification	3	4	2	3
Permanent inundation	2	4	3	3
WATER QUALITY				
Water Quality Modification	3	4	2	3
Sediment Load Modification	3	3	2	3
GEOMORPHOLOGY				
Canalisation	3	4	2	3
Topographic Alteration	3	4	2	3
BIOTA				
Terrestrial Encroachment	2	4	2	3
Indigenous Vegetation Removal	2	4	3	3
Invasive Plant Encroachment	3	3	3	3
Alien Fauna	3	3	3	3
Over utilisation of Biota	3	4	3	3
Total:	30	41	27	33
Average:	2,7	3,7	2,5	3,0
Category:	C	B	C/D	C/B
Description	Moderately Modified	Mostly Natural	Moderately Modified	Moderately Modified
Description summary	A large loss of natural habitats and basic ecosystem functions has occurred.	Largely natural with few modifications, but with some loss of natural habitats	A large loss of natural habitats and basic ecosystem functions has occurred.	A large loss of natural habitats and basic ecosystem functions has occurred.
Recommended EMC	C	B	B	B

Table 24: Wet Health Scores for Sub-Components of the PES

Name	HGM	Hydrology	Water Quality	Geomorphology	Biota
Orange	River	Category C	Category C	Category C	Category C
Melkspruit	River	Category B	Category C	Category B	Category B
Streams/Drainage – Site 1	River	Category C	Category D	Category D	Category C/D
Streams/Drainage – Site 2	River	Category C	Category C	Category C	Category C/B

Category B = Mostly natural, Category C = Moderately modified. Category D = Largely modified

Table 25 and Figure 27, below, show the DWS Desktop PES and EIS (EI and ES) of the main rivers and streams in the area. Note that these values have been calculated from on-site records and assessments and, therefore, are typically accurate. Note that Site 1 (Preferred Site) and Site 2 (Option 1) are in different small catchment areas (Figure 27). The surface water at Site 1 (Preferred Option) drains into the Orange River, while at Site 2 (Option 1) and at Option 2 (not shown on map), the surface stormwater first drains into the Melkspruit, which then drains into the Orange River.

Table 25: DWS Desktop PES & EIS ratings for the study area

Watercourse	PES	EI	ES
Orange River	C	High	High
Melkspruit	C	Moderate	Moderate
Streams/Drainage – Site 1 (Preferred Site)	-	-	-
Streams/Drainage – Site 2 (Option 1)	-	-	-

PES = Present Ecological State. EI = Ecological Importance. ES = Ecological Sensitivity

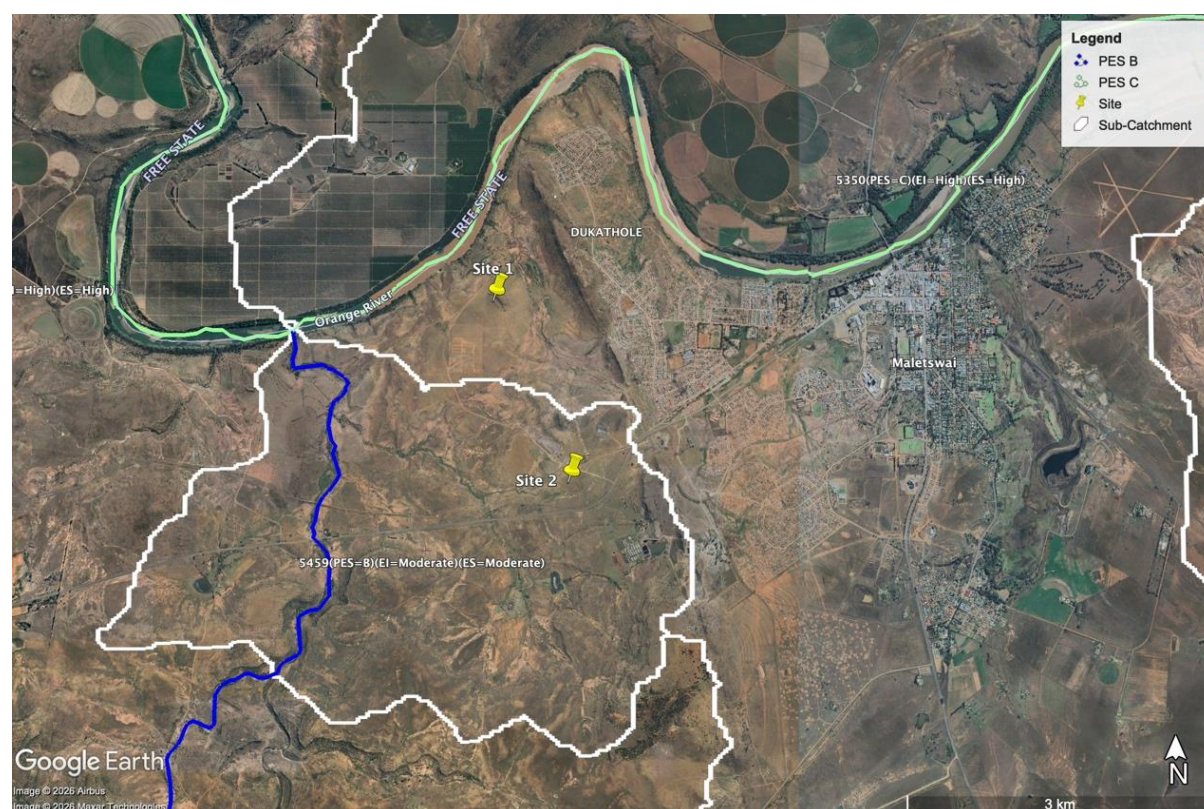


Figure 27: PES and EIS desktop ratings (DWS) of watercourses in the study site sub-catchments

These findings confirm that while the Orange River and Melkspruit retain ecological importance, smaller streams and drainage lines near the landfill sites are more degraded. Buffer zones and stormwater management measures are recommended to protect downstream ecological functioning and reduce sedimentation into the Orange River and Melkspruit.

6.9.2. Ecological Importance & Sensitivity of Watercourses in the Study Area

The Ecological Importance and Sensitivity (EIS) ratings of the water courses were calculated as shown in the table below (Table 24). See the appendices for methodology.

Table 26: EIS of watercourses in the study area

Determinants	Orange	Melkspruit	Seasonal Streams / Drainage Lines	Confidence
PRIMARY DETERMINANTS				
1. Rare & Endangered Species	2	1	0	4
2. Populations of Unique Species	2	1	1	4
3. Species/taxon Richness	2	2	1	4
4. Diversity of Habitat Types or Features	2	2	1	4
5. Migration route/breeding and feeding site for wetland species	2	1	0	4
6. Sensitivity to Changes in the Natural Hydrological Regime	3	1	1	3
7. Sensitivity to Water Quality Changes	3	2	1	3
8. Flood Storage, Energy Dissipation & Particulate / Element Removal	3	1	1	3
MODIFYING DETERMINANTS				
9. Protected Status	2	0	0	4
10. Ecological Integrity	2	2	2	4
TOTAL	23	13	8	-
AVERAGE	2,3	1,3	0,8	-
EIS Category	B	C	D	-
Description	High	Moderate	Low	-
	Considered to be ecologically important and sensitive. The biodiversity of these wetlands may be sensitive to flow and habitat modifications. They play a role in moderating the quantity and quality of water of major rivers.	Considered to be ecologically important and sensitive on a provincial or local scale. The biodiversity of these wetlands is not usually sensitive to flow and habitat modifications. They play a small role in moderating the quantity and quality of water of major rivers.	Not ecologically important and sensitive on any scale. The biodiversity of these watercourses is ubiquitous and not sensitive to flow and habitat modifications. They play an insignificant role in moderating the quantity and quality of water of major rivers.	

Table 27: EI & ES Ratings for the study area

Watercourse	EI	ES
Orange River	High	High
Melkspruit	Moderate	Moderate
Streams/Drainage – Site 1	Low	Low
Streams/Drainage – Site 2	Low	Low

EI = Ecological Importance. ES = Ecological Sensitivity

During site investigations, the PES and EIS of the identified watercourses were assessed. The comparison between the DWS desktop PES and EIS (EI & ES) ratings and on-site assessments is shown in the table below (Table 25).

Table 28: Comparison between Desktop and Site assessment ratings for PES and EIS

Watercourse	PES	EI	ES
Orange River	C	High	High
Melkspruit	C	Moderate	Moderate
Streams/Drainage – Site 1	-	-	-
Streams/Drainage – Site 2	-	-	-

PES = Present Ecological State. EI = Ecological Importance. ES = Ecological Sensitivity

6.9.3. Water Quality

Water quality is an important indicator and driver of the present ecological state (PES) of a watercourse and overall aquatic ecosystem. Water quality has a direct impact on aquatic macro-invertebrates, fish, frogs, etc., including flora. During site investigations, the pH and EC of the water were not measured. The water quality is fair, but with high levels of siltation, especially in the area of the Preferred Site. The townships to the east and the old, existing landfill site have a negative impact on the water quality. The water quality at Options 1 & 2 has less siltation and is of higher quality than at the Preferred Site.

6.9.4. Aquatic Sensitivity Map

The sensitivity maps for the two investigated sites for the new landfill site, in terms of only the aquatic ecology, are shown below (Figures 28 - 30). Although the small impoundment is not a 'high' sensitivity aquatic habitat or feature, it is recommended to consider avoiding a buffer if possible. However, the proposed landfill site will reduce the amount of run-off, which will be impounded by the structure.

The large 'high sensitivity' areas shown in Figures 23 and 25 include areas that have high levels of erosion and gully formation near and along the watercourses and low-lying areas, and therefore best avoided entirely.

The potential sites basically have a 'low' aquatic sensitivity. However, Option 1 is situated directly on the edge of natural watercourses and therefore potentially has a bigger negative impact on the aquatic environment. Option 2 is similar to Option 1, with a drainage line within the demarcated site area.

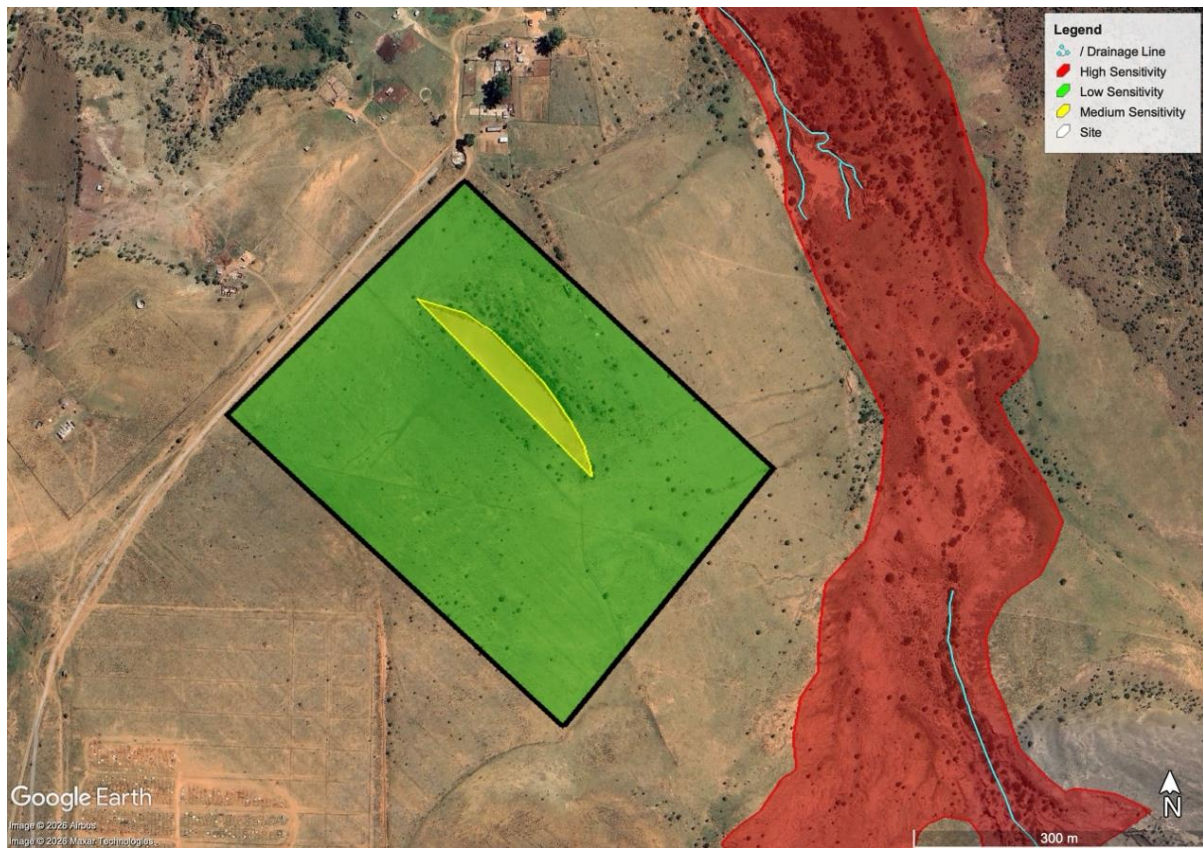


Figure 28: Aquatic Sensitivity Map: Preferred Site

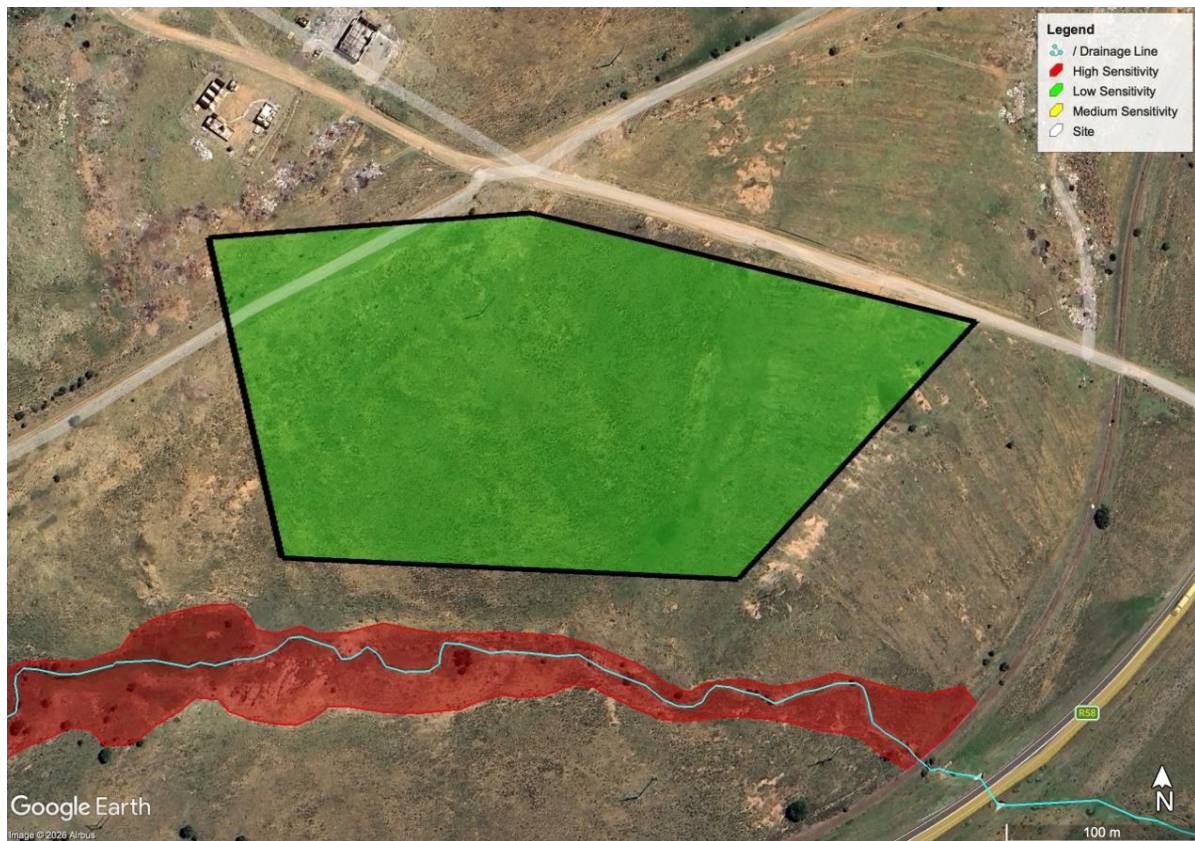


Figure 29: Aquatic Sensitivity Map: Option 1

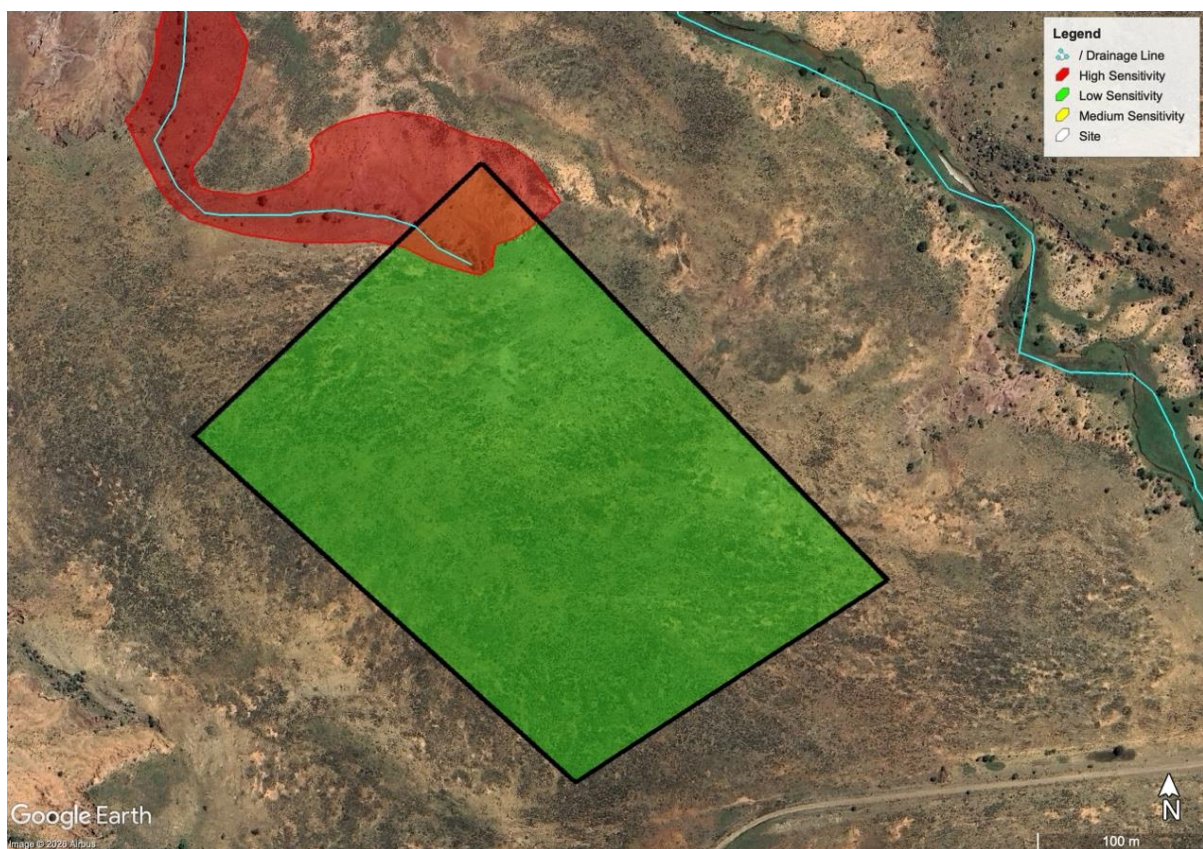


Figure 30: Aquatic Sensitivity Map: Option 2

6.9.5. Proposed Buffer Zones & Regulated Zones

Buffer zones around all natural watercourses of 32m wide from the bank edges are recommended. A small buffer (setback area) can be considered (i.e 20m) around the impoundment at Preferred Site, keeping in mind that this is not a natural watercourse or an important artificial aquatic system. The buffer zone around a natural drainage line is within the site area at Option 2, and the site is therefore also not recommended as a viable option. The buffer zone also includes an area of high erosion potential. (See the appendices for the differences between a buffer zone and a regulated zone.

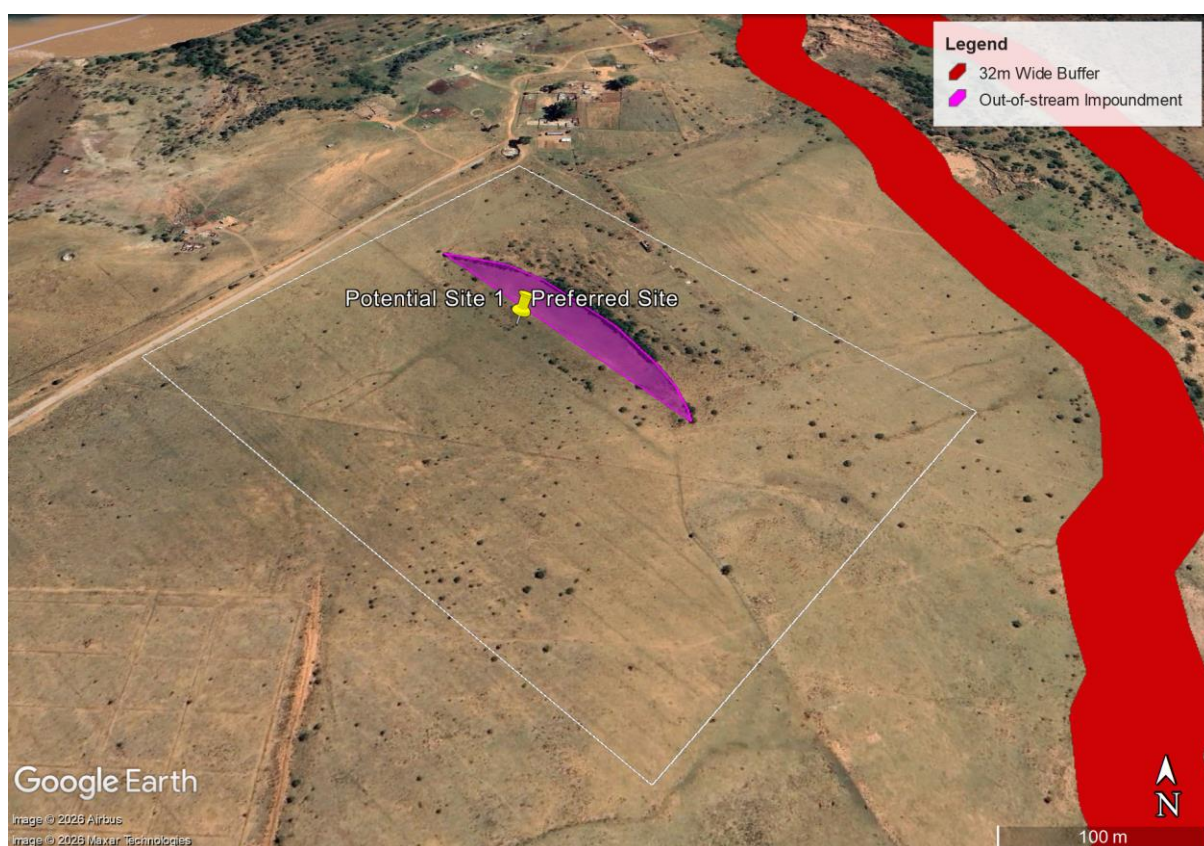


Figure 31: Buffer Zones in the vicinity of Site 1

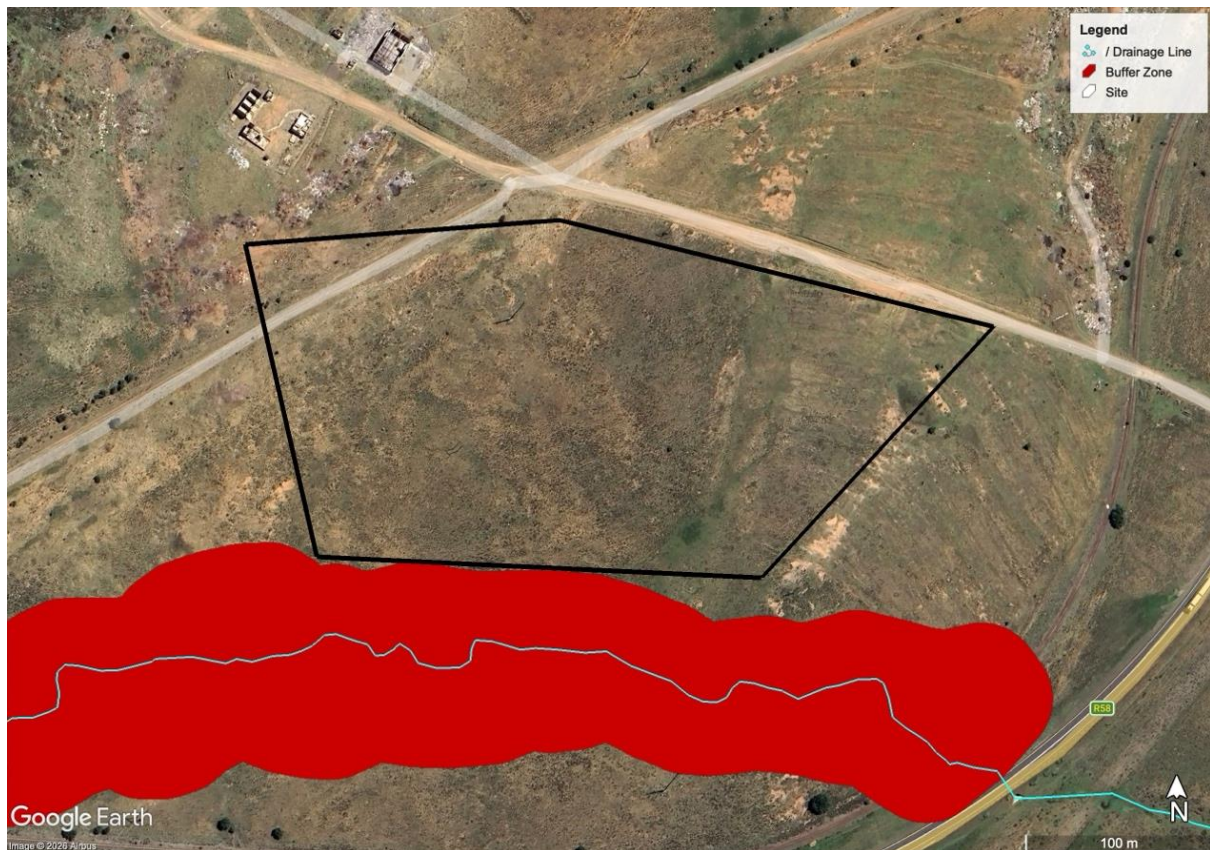


Figure 32: Buffer Zones in the vicinity of Option 1

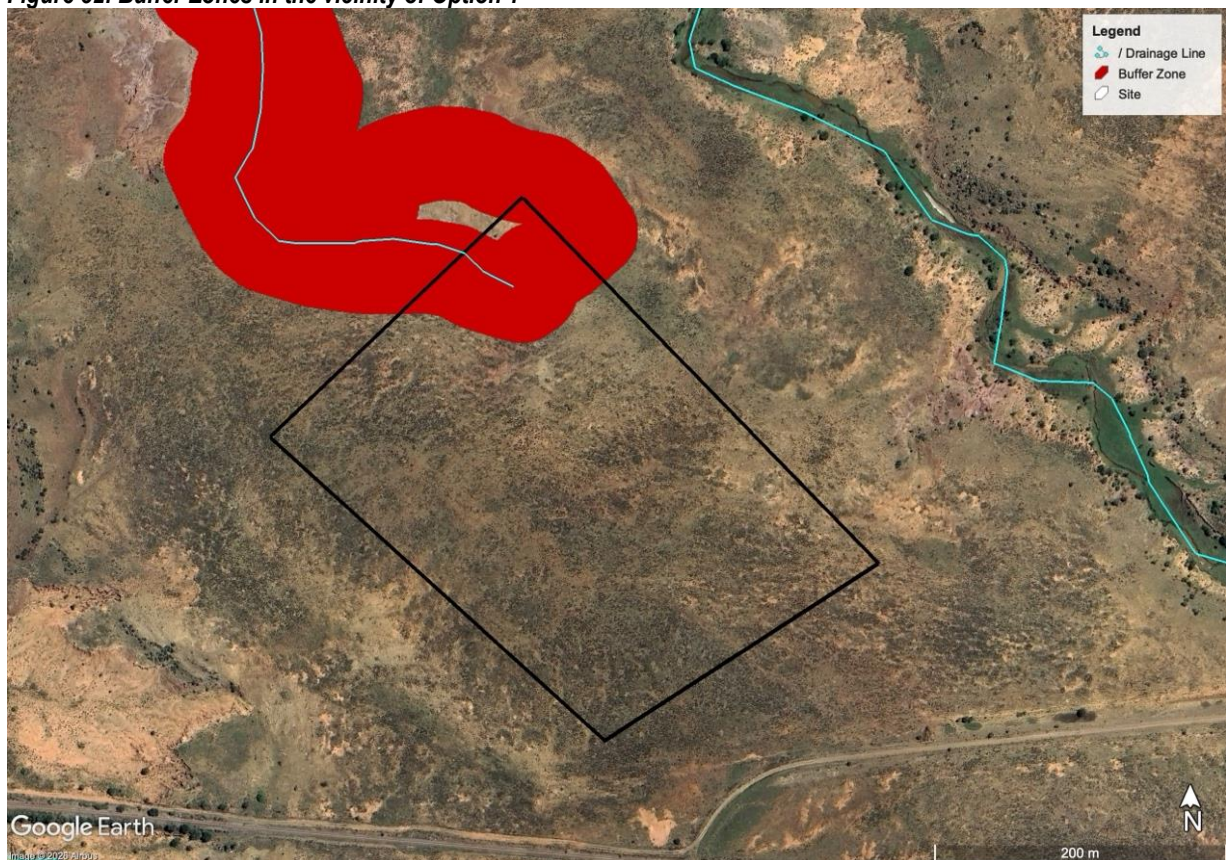


Figure 33: Buffer Zones in the vicinity of Option 2

6.10. Socio-economic Aspects⁴

According to HIS Markit (2020), the population of Walter Sisulu Local Municipality is approximately 91,600. It is projected to grow to approximately 103,503 during the year 2023. The population of Maletswai and its associated settlements is approximately 41,710. Based on the population figures from the Census 2001 (68,608), Census 2011 (77,457), ECSECC 2016 (87,263) and IHS Markit 2020 (91,600), the population for Walter Sisulu grew at approximately 1.63 % per annum, which is very similar to the growth rate of South Africa (1.55 %). The following are factors of interest:

- IHS Markit projected a population growth rate of 1.1 % from 2020 towards 2025. For the SDF, this growth rate will be extended to 2032 (planning horizon).
- The estimated growth rate for the Eastern Cape is approximately 1 % and for South Africa, approximately 1.3 % over the same period.
- It is estimated that the WSLM population will be approximately 103,503 in 2032, indicating a population increase of 9,803 persons and 2,800 households.
- It is expected that the majority of the population growth will occur in the Maletswai urban area, at approximately 1.5% per annum, with smaller population growth averages in the towns of James Calata, Venterstad, Steynsburg and Burgersdorp.
- This is the highest in the district and marginally higher than the provincial growth rate.
- Maletswai informal structure count increased from 1,127 structures in 2016 to 2,983 structures in 2022 (in-situ dot counts), which represents an increase of 1,856 structures in 5 years.
- It is estimated that population growth will be concentrated in Maletswai and remain above the district's estimated average of 1.1 %, at a predicted 1.5% per annum for the study period (2022-2032).
- It is estimated that the rural population will remain stable.

6.10.1. Sensitive receptors

Potential air quality sensitive receptors were identified within the 5 km assessment buffer surrounding the proposed Maletswai Landfill alternatives. Receptors were identified from the supplied spatial information, satellite imagery and field verification, with particular consideration given to residential areas, educational facilities, accommodation establishments, agricultural properties and road users. Six (6) Sensitive Receptors were confirmed as highlighted below:

- SR01 - Vumile Primary School / Residential Area - Located east to north-east of the proposed sites within the Dukathole/Maletswai residential environment. The school represents a high-sensitivity receptor because children occupy the facility for extended periods and may be sensitive to particulate matter, dust and offensive odour.
- SR02 – Limakatso Boutique Hotel/Residential Area Located east of the alternative sites within the developed Maletswai residential area. The hotel and surrounding residences represent sensitive

⁴ WSLM IDP

receptors because of continuous or extended human occupancy and potential sensitivity to dust and odour.

- SR03 - Plantation / Agricultural Farm - Located north-west of the candidate sites, across/near the Orange River agricultural landscape. The receptor is associated with agricultural activity and plantation/farm land. Sensitivity is primarily related to deposition of dust on vegetation and exposure of farm workers or occupants. The proposed development is located near active walnut plantations, which, according to the information received, support more than 600 workers during peak seasons.
- SR04 - R58 / Road Users Located south-west of the development alternatives along the regional road corridor. Road users represent transient receptors and therefore have lower exposure duration than residential receptors; however, excessive dust may affect visibility and short-duration exposure.
- SR05 - Residential Area Located north to north-east of the proposed development within the broader Dukathole/Orange River settlement environment. Residential occupation results in potentially continuous exposure, making this receptor sensitive to dust, PM₁₀, PM_{2.5}, landfill gas and offensive odour.
- SR06 - Residential Area Located south-east of the proposed development, toward the southern Maletswai/N6 development corridor. Although comparatively farther from the candidate sites, residential occupancy means that potential long-duration exposure to transported dust or odour remains relevant.



Figure 34: Sensitive receptors identified within the 5 km assessment buffer surrounding the proposed Maletswai Landfill alternatives (Source: AQIA, 2026)

6.10.2. Age & Education Profile

6.10.2.1. Age Analysis

The largest share of the population is within the young working-age (25-44 years) age category, with a total number of 32,800 or 35.8% of the total population. The age category with the second largest number of people is the babies and kids (0-14 years) age category, with a total share of 30.7%, followed by the teenagers and youth (15-24 years) age category with 13,400 people.

6.10.2.2. Education Analysis

The number of people without any schooling in Walter Sisulu Local Municipality accounts for 22.00% of the number of people without schooling in the district municipality, 1.40% of the province and 0.19% of the national. In 2020, the number of people in Walter Sisulu Local Municipality with a matric only was 13,300, which is a share of 32.58% of the district municipality's total number of people that has obtained a matric. The number of people with a matric and a Postgrad degree constitutes 34.30% of the district municipality, 1.08% of the province and 0.08% of the national.

6.10.2.3. Economically Active Population (EAP)

The economically active population (EAP) is a good indicator of how many of the total working age population are in reality participating in the labour market of a region. It includes both employed and unemployed people. Walter Sisulu Local Municipality's EAP was 35,700 in 2020, which is 38.98% of its total population.

The economically active population (EAP) is defined as the number of people (between the ages of 15 and 65) who are able and willing to work, and who are actively looking for work. From 2010 to 2020, the average annual increase in the EAP in the Walter Sisulu Local Municipality was 3.14%, which is 0.53 percentage points lower than the growth in the EAP of Joe Gqabi's for the same period.

6.10.2.4. Employment

Walter Sisulu Local Municipality employs a total of 25,300 people. Walter Sisulu Local Municipality also employs the highest number of people within Joe Gqabi District Municipality. The economic sectors that recorded the largest number of employment in 2020 were the community services sector with a total of 7,120 employed people or 28.1% of total employment. The trade sector, with a total of 4,760 (18.8%), employs the second-highest number of people relative to the rest of the sectors. The mining sector, with 41.4 (0.2%), is the sector that employs the least number of people in Walter Sisulu Local Municipality, followed by the electricity sector with 95.7 (0.4%) people employed.

In 2020, there was a total number of 10,900 unemployed people in Walter Sisulu, which is an increase of 6,120 from 4,750 in 2010. The total number of unemployed people constitutes 23.61% of the total number of unemployed people in Joe Gqabi District Municipality.

6.11. Ambient Air Quality

Baseline Ambient Air Quality monitoring was undertaken on the three (3) proposed sites, with the existing landfill site used as potential representative conditions of the operational phase of the proposed development. Five (5) representative monitoring points were identified MP01–MP05 and monitored on 30–31 August 2026. Monitoring included PM_{2.5}, PM₁₀ and TSP using a portable particulate monitor, together with CH₄, CO₂, H₂S, NO₂, SO₂ and O₂ using a portable multi-gas detector. Temperature, relative humidity, wind speed and wind direction were recorded as supporting meteorological parameters.

The results indicate generally good ambient air quality conditions across MP01, MP02, MP04 and MP05. MP03, which was influenced by the existing waste-disposal environment, consistently recorded comparatively higher particulate and gaseous concentrations. Field conditions were warm and dry, with temperatures ranging from approximately 21.4°C to 27.8°C, relative humidity of approximately 14%, no precipitation and predominantly south-easterly winds averaging approximately 2.2 m/s (8 km/h).

Table 29: Summary of Field Monitoring Results

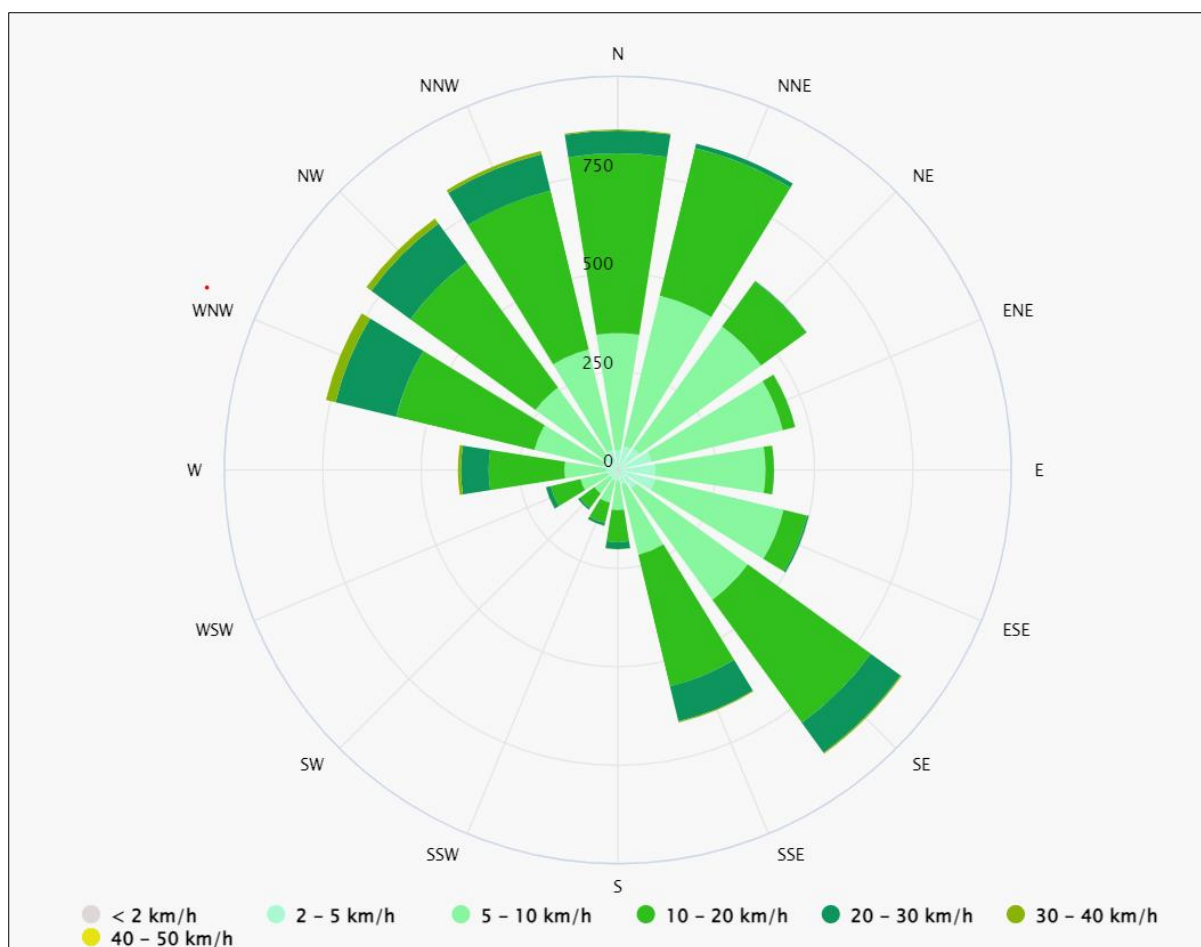
Parameter	Unit	Average	Maximum	Minimum
PM _{2.5}	µg/m ³	9.60	18.00	6.00
PM ₁₀	µg/m ³	25.60	48.00	17.00
TSP	µg/m ³	48.20	86.00	34.00
CH ₄	ppm	<1.40	3.00	<1.00
CO ₂	ppm	423.20	438.00	418.00
H ₂ S	ppm	<0.12	0.20	<0.10
NO ₂	ppm	<0.10	<0.10	<0.10
SO ₂	ppm	<0.10	<0.10	<0.10
O ₂	% vol	20.88	20.90	20.80

At MP03, PM_{2.5} reached 18 µg/m³, PM₁₀ 48 µg/m³ and TSP 86 µg/m³. CH₄ reached approximately 3 ppm, CO₂ approximately 438 ppm and H₂S approximately 0.2 ppm. The spatial pattern indicates a localised waste-related influence rather than widespread deterioration of ambient air quality across the study area.

6.12. Wind Conditions

Wind direction is a critical factor in landfill development because it dictates how odour, dust, landfill gases, and lightweight debris disperse into surrounding areas. The windier part of the year lasts for 6 months, from July to January, with average wind speeds of more than 9.1 miles⁵ per hour. The windiest month of the year at Aliwal North is September, with an average hourly wind speed of 10.3 miles per hour. The calmer time of year lasts for 5.9 months, from January 22 to July 18. The calmest month of the year at Aliwal North is April, with an average hourly wind speed of 7.9 miles per hour. The wind direction is predominantly to the NW direction as highlighted by the wind rose below.

⁵ 1 mile = 1,60934 km



The south-easterly winds recorded during field monitoring would transport emissions generally toward the north-west. However, wind direction varies seasonally and temporally, and receptors in all directions should therefore remain within the operational air quality management framework.

7 INTEGRATION OF SPECIALIST STUDIES

7.1. Aspects to be Assessed/Investigated by Specialists / Professional Team

In terms of GN R 960 (promulgated on 5 July 2019) and Regulation 16(1)(b)(v) of the 2014 EIA Regulations (as amended), the submission of a Screening Report generated from the DFFE's national web based environmental screening tool (<https://screening.environment.gov.za>) is compulsory for the submission of applications in terms of Regulation 19 and 21 of the 2014 EIA Regulations. The screening tool assessment was undertaken for the project study area. The results of the screening tool assessments for the various themes are presented in Table 27.

Table 30: Themes identified by the DFFE Screening Tool for the proposed development

Theme	Very sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
Agriculture Theme		X		
Animal Species Theme				X
Aquatic Biodiversity Theme	X			
Archaeological and Cultural Heritage Theme				X
Civil Aviation Theme		X		
Defence Theme				X
Palaeontology Theme	X			
Plant Species Theme				X
Terrestrial Biodiversity Theme	X			

Specialist Assessment Identification

According to the Screening Tool Report, the following Specialist Assessments were identified and recommended to be undertaken as part of the environmental process for the proposed development:

- Agricultural Impact Assessment
- Landscape/Visual Impact Assessment
- Archaeological and Cultural Heritage Impact Assessment
- Palaeontology Impact Assessment
- Terrestrial Biodiversity Impact Assessment
- Aquatic Biodiversity Impact Assessment
- Noise Impact Assessment
- Traffic Impact Assessment
- Geotechnical Assessment
- Climate Impact Assessment
- Health Impact Assessment
- Socio-Economic Assessment
- Ambient Air Quality Impact Assessment

- Plant Species Assessment
- Animal Species Assessment

In accordance with the Procedures for the Assessment and Minimum Criteria for Reporting on identified Environmental Themes in terms of Sections 24(5)(a) and (h) and 44 of National Environmental Management Act, NEMA, 1998 (Act No. 107 of 1998) this Site Sensitivity Verification Report (SSVR) has essentially been compiled to provide a rationale for the Specialist Studies undertaken as part of the Scoping and Environmental Impact Assessment Process

Table 31: Applicable Specialist Study

Specialist Assessment / Theme	Sensitivity Rating as per Screening Report	Sensitivity Rating as per the EAP / Specialist Verification	Response
Agricultural Impact Assessment	High sensitivity	Medium	The studies are being prepared and will be included in the EIA Report.
Terrestrial Biodiversity Impact Assessment	Very High sensitivity	Medium	
Geotechnical Assessment	None Provided	Medium	
Aquatic Biodiversity Impact Assessment	Very High sensitivity	Medium	
Archaeological and Cultural Heritage Impact Assessment	Low sensitivity	Medium	
Palaeontology Impact Assessment	Very High sensitivity	Medium	
Plant Species Assessment	Low sensitivity	Low	
Animal Species Assessment	Low sensitivity	Medium	
Geohydrological Impact Assessment	None Provided	High	
Ambient Air Quality Impact Assessment	None Provided	Medium	
Landscape/Visual Impact Assessment	None Provided	Low	While there are sensitive receptors within a 5km radius of the proposed site, its location provides an advantage in mitigating adverse impacts associated with these environmental aspects of the project. The topographical influence of the site will have a significant impact on air pollution dispersion modelling, viewshed, and other factors. In simplified terms, the mountains will act as a barrier to airflow, thereby protecting receptors within the zone of influence. Additionally, information from the existing unmanaged landfill site was used as a reference point for air movements/dispersions, which indicated localised changes to the ambient air quality,
Health Impact Assessment	None Provided	Low	
Noise Impact Assessment	None Provided	Low	

Specialist Assessment / Theme	Sensitivity Rating as per Screening Report	Sensitivity Rating as per the EAP / Specialist Verification	Response
			thus resulting in the conclusion that impacts are minimal outside the project area. Additionally, the size of the landfill is considered small; as such, the potential impact will be localised in nature
Traffic Impact Assessment	None Provided	Low	The proposed site is within the same area as the existing landfill site, and no additional traffic shocks are expected. The site has existing access to the R58; as such, no major road improvement is expected.
Climate Impact Assessment	None Provided	Low	The proposed size of the landfill is considered small, and as such, the potential impacts will be localised in nature. Therefore, the potential impacts from the landfill site can be assessed with limited specialist input.
Socio-Economic Assessment	None Provided	Low	
Civil Aviation	High	Low	While the Environmental Screening Tool Report does not require any Civil Aviation Report under the identified Specialist assessments (Refer to pages 5 and 6 of the report in Appendix I3). The proposed sites were assessed against the below to determine the site sensitivity: • The closest aerodrome is FAAN on the eastern side of Maletswai; the proposed site has no impact or influence on it. • The waste cells' height is kept within 10 m and, considering that the proposed sites are located at an average of 1323 above sea level, which is lower than the surrounding mountain's average of 1390 m above sea level. Thus, minimising the risk of any interference with low-flying aircraft or aviation operations in the vicinity. • In terms of the Local Airspace Classification, the proposed site is situated outside of controlled airspace typically used for commercial or military aviation. Therefore, the project does not interfere with regulated air traffic patterns. • Runway Proximity: The proposed development is not located near major airports or airstrips, reducing

Specialist Assessment / Theme	Sensitivity Rating as per Screening Report	Sensitivity Rating as per the EAP / Specialist Verification	Response
			the likelihood of any conflict with take-off, landing, or flight paths. • Lighting: The development will adhere to minimal lighting specifications to prevent interference with nocturnal navigation for aircraft. No high-intensity lights will be installed that could be mistaken for navigational aids. • Building materials and windows are selected to avoid excessive reflection or glare that could impact visibility for passing aircraft. The proposed sites are located on the remaining extent of Portion 1 of the farm Melk Spruit No. 12, Maletswai is not expected to have any impacts on Civil Aviation; therefore, no further Civil Aviation Impact Assessments are recommended. However, the CIVIL AVIATION COMPLIANCE STATEMENT has been prepared and appended to the EIA Report under appendix D8.

The identified specialists have prepared the reports as part of the EIA Report, in line with the DFFE protocol, which was followed in preparation for the verification and compliance report/statements.

7.2. Specialist Report Summaries

7.2.1. Ecological (terrestrial biodiversity) Impact Assessment

The Ecological Impact Assessment looks primarily at the fauna & flora occurring on the site and the potential impacts arising from the project on these components. The study is to determine the sensitivity of habitats, determine if there are any fatal flaws and recommend mitigating measures to reduce any potential negative impacts.

Purpose of the study: to determine the current ecological state of a site, including vegetation and habitats, and then determine the likely impacts of the proposed development on that ecology. In addition, mitigation measures are recommended to reduce negative and enhance positive impacts. The Terms of Reference will include:

- Review existing information on the site,
- Determine the main plant communities within the site,
- Where possible, identify any flora Species of Conservation Concern (SCC) according to the latest legislation and lists, including the Red Lists.

- Identify any faunal species that may occur on the site.
- Where possible, identify any faunal SCC according to the latest legislation and lists, including the Red List.
- Assess the extent of alien plant species over the site, and associated risks of alien invasion as a result of the proposed development in accordance with the latest legislation and lists.
- Provide a general overview of the project area in terms of connectivity, corridors, rivers and streams and ecological viability in relation to the surrounding region with relevant recent information.
- Place the project area within the biodiversity context of the wider area (i.e., provide the “bigger picture”);
- Identify (as far as is possible from the data collected) the principal ecological processes evident within the project site and their relative importance in determining the biodiversity characteristics present.
- Assess the potential direct and indirect impacts resulting from the proposed development and associated infrastructure, both on the footprint and the immediate surrounding area during construction and operation.
- Describe appropriate mitigation measures that can be adopted to reduce negative impacts for each phase of the project, where required.

According to the Terrestrial Study (2026), the screening tool assessment showed that the Plant Theme sensitivity was ‘low’. This was verified (confirmed) during field investigations. No floral or faunal SCCs were observed. However, in terms of fauna, Secretarybirds have been recorded in the general area of the study site.

There are a few small and highly ephemeral streams and drainage lines in the vicinity of the new landfill site alternatives. Those in the vicinity of the Preferred Site flow directly into the Orange River, while those near Option 1 and Option 2 flow into the Melkspruit. There is a small out-of-stream impoundment at the Preferred Site. The small impoundment is not very functional and was created to trap (impound) surface rainwater run-off, probably to retain some water for grazing livestock. However, the water volumes are low, and the impoundment is dry (that is, no visible surface water) for most of the year. The impoundment is not a natural watercourse.

The natural environments in the area of Options 1 & 2 are in a much better condition than that of the Preferred Site, which, for many years, was cultivated fields and is therefore transformed. Therefore, the Preferred Site is the preferred alternative for the new landfill site, which is required because the existing old site is at capacity and is in the process of closure.

As mentioned, there is a small out-of-stream impoundment in the area investigated at the Preferred Site, but this feature is far less sensitive than the natural watercourses found adjacent to and within Options 1 & 2. Nevertheless, buffer zones have been delineated that should be strictly implemented. This, along with stormwater management plans, should ensure that the landfill site will have little to very low negative impacts on the water environment in

the area, especially that of natural watercourses. Site 1 (Preferred Site) is therefore the recommended preferred site alternative for the new Maletswai Landfill Site.

The areas investigated within the three landfill site alternatives are larger than required. This was done in order to give some flexibility in the final placement of the landfill site. Therefore, recommended buffer areas must be implemented, and the site should be established as far away from the impoundment as possible. The site should be properly fenced from the onset. A detailed stormwater plan is also required, which must include details of construction and management. With proper construction and management, impacts on the surrounding aquatic systems/water environment will be limited.

The specialist concluded as follows:

- All three sites (Preferred site, Option 1 and Option 2) are within the veldtype (ecosystem) known as Eastern Upper Karoo. The veldtype is not threatened and has a status of 'least concern'.
- There are a few small and highly ephemeral streams and drainage lines in the vicinity of the site alternatives. Those in the vicinity of the Preferred Site flow directly into the Orange River, while those near Options 1 & 2 flow into the Melkspruit. There are no wetlands in or near the three site alternatives.
- There is a small out-of-stream impoundment at the Preferred Site. The impoundment is not a natural watercourse.
- The screening tool assessment sensitivities were assessed during the site investigations, with the results as follows:

Theme	Screening Tool Sensitivity	Site Investigations Sensitivity	Findings
Terrestrial biodiversity	Very High & Low	Very High & Low	Verified (Confirmed)
Aquatic biodiversity	Very High & Low	Very High & Low	Verified (Confirmed)
Animal species	High & Low	High & Low	Verified (Confirmed)
Plant species	Low	Low	Verified (Confirmed)

- As part of the study and assessment, the site ecological importance (SEI) for the identified habitats was calculated with the following results:

Aspect	Habitat / Ecosystem	Result
Conservation Importance	Altered Environment	Low
	Karoo Shrubland	Low
	Watercourses	High
Functional Integrity	Altered Environment	Low
	Karoo Shrubland	Medium
	Watercourses	Medium
Receptor Resilience	Altered Environment	Medium
	Karoo Shrubland	Medium

	Watercourses	Low
Biodiversity Importance	Altered Environment	Low
	Karoo Shrubland	Low
	Watercourses	Medium
Site Ecological Importance	Altered Environment	Low
	Karoo Shrubland	Low
	Watercourses	High

- The recommended site alternative for the new landfill site is: The Preferred Site.
- Buffer zones around all natural watercourses of 32m wide from the streambank edges are recommended. Buffer zones include 'high sensitivity' aquatic areas.
- No terrestrial buffer zones are necessary.
- It is the opinion of the specialist that the project should be authorised and allowed to proceed with the implementation of buffers and other listed mitigating measures.

Impact Significance Ratings: The ecological impacts associated with the proposed landfill development were evaluated using the standard EIA methodology (extent, duration, intensity, probability, and significance before and after mitigation). The ratings presented below are based on the findings of the Ecological Specialist Report (Annexure F). Impacts are expected to be localised to the landfill footprint and immediate surroundings, with a long-term duration due to permanent habitat transformation. The intensity is considered moderate, and the probability of occurrence is high as disturbance within the footprint is unavoidable. Consequently, the significance of impacts before mitigation is assessed as moderate to high. With the implementation of mitigation measures recommended in Annexure E1, the residual significance is expected to be reduced to low to moderate.

Cumulative Impacts: Cumulative effects were also considered in relation to existing pressures in the surrounding landscape, as identified in the Ecological Specialist Report (Annexure E). The landfill development will interact with ongoing erosion and gully formation resulting from historical cultivation and poor veld management, which may exacerbate soil loss and habitat degradation. Disturbance during construction may increase the risk of alien plant invasion, compounding existing ecological pressures. Furthermore, the transformation of land within the footprint contributes to habitat fragmentation and reduces ecological connectivity between remnant natural areas, thereby limiting faunal movement corridors. When combined, these cumulative impacts may further reduce ecological resilience in the region. However, with effective mitigation and ongoing ecological monitoring, as recommended in Annexure F, the cumulative significance is anticipated to remain low to moderate.

Residual Impacts: Despite the implementation of mitigation measures recommended in the Ecological Specialist Report (Annexure E) — including alien plant control, rehabilitation with indigenous species, and the establishment of buffer zones — some residual impacts on terrestrial biodiversity are expected. These include the permanent transformation of habitat within the landfill footprint, reduced ecological connectivity across the site, and the

potential for opportunistic invasion by alien species during construction. While these impacts are anticipated to be of low to moderate significance after mitigation, they underscore the need for ongoing ecological monitoring, adaptive management, and rehabilitation of disturbed areas to ensure long-term ecological integrity.

Monitoring Programme: In line with the recommendations of the Ecological Specialist Report (Annexure F), a monitoring programme will be implemented to ensure that mitigation measures are effective and that ecological integrity is maintained throughout the construction and operational phases. The programme will include:

- Alien Plant Monitoring: Annual surveys to detect and control alien invasive species across the site and buffer zones.
- Flora SCC Monitoring: Seasonal checks for the presence of flora Species of Conservation Concern (SCC), with records maintained and reported.
- Faunal Monitoring: Opportunistic sightings and targeted surveys for faunal SCC, particularly during breeding seasons, to assess disturbance levels.
- Habitat Condition Assessments: Annual inspections of rehabilitated areas and buffer zones to evaluate vegetation recovery, erosion control effectiveness, and ecological connectivity.
- Compliance Audits: Regular ECO audits to verify implementation of mitigation measures, including stormwater management and rehabilitation commitments.
- Reporting: Monitoring results will be compiled into annual compliance reports submitted to the competent authority, with adaptive management measures introduced where monitoring indicates shortcomings.

Substantiated Statement (as per the specialist study)

Below is a substantiated statement, based on the findings of the specialist assessment, study and report, regarding the acceptability, or not, of the proposed development, if it should receive approval or not and any conditions to which this statement is subjected.

The screening tool assessment showed that the Plant Theme sensitivity was 'low'. This was verified (confirmed) during field investigations. No floral or faunal SCC were observed. However, in terms of fauna, Secretarybirds have been recorded in the general area of the study site.

There are no watercourses directly within either of the three alternative landfill sites investigated. There is a small impoundment within the area of the Preferred Site. Option 1 is located on the edge of a natural small stream / drainage line, while Option 2 has a small natural drainage line within it. Option 1 & 2 have the potential to have larger negative impacts on the natural water environment.

The main watercourses in the region are the perennial Orange River and semi-perennial Melkspruit. The Melkspruit flows north into the Orange River and varies from about 1,7km to 2,4km west of the study site. The Orange River varies in distance between 450m and 500m northwest of the Preferred Site. The landfill site will have no direct impact on any of these two watercourses.

There are a few small and highly ephemeral streams and drainage lines in the vicinity of the new landfill site alternatives. Those in the vicinity of the Preferred Site flow directly into the Orange River, while those near Option 1 and Option 2 flow into the Melkspruit. There is a small out-of-stream impoundment at the Preferred Site. The small impoundment is not very functional and was created to trap (impound) surface rainwater run-off, probably to retain some water for grazing livestock. However, the water volumes are low and the impoundment is dry (that is, no visible surface water) for most of the year. The impoundment is not a natural watercourse. There are occasions when a dam becomes part of the natural aquatic environment, but these are mostly in-stream dams that form an integral part of the linear river / stream and are important in terms of upstream and downstream connectivity. Out-of-stream dams do not serve this same important aquatic function. However, there are out-of-stream dams that have become part of the aquatic environment and support wildlife such as waterbirds, but these are typically large dams that have permanent open bodies of water and not small, shallow and insignificant impoundments that dry out quickly, such as the one at the Preferred Site. These large dams act very much like large natural pans or lakes. The natural environments in the area of Options 1 & 2 are in a much better condition than that of the Preferred Site, which for many years was cultivated fields and is therefore transformed.

Therefore, the Preferred Site is the preferred alternative for the new landfill site, which is required, because the existing old site is at capacity and is in the process of closure. As mentioned, there is a small out-of-stream impoundment in the area investigated at the Preferred Site, but this feature is far less sensitive than the natural watercourses found adjacent to and within Options 1 & 2. Nevertheless, buffer zones have been delineated that should be strictly implemented. This along with stormwater management plans should ensure that the landfill site will have little to very low negative impacts on the water environment in the area, especially that of natural watercourses.

Site 1 (Preferred Site) is therefore the recommended preferred site alternative for the new Maletswai Landfill Site. The areas investigated within the three landfill site alternatives are larger than required. This was done in order to give some flexibility in the final placement of the landfill site. Therefore, recommended buffer areas must be implemented and the site should be established as far back away from the impoundment as possible. The site should be properly fenced from the onset. A detailed stormwater plan is also required that must include detail of construction and management. With proper construction and management impacts on the surrounding aquatic systems / water environment will be limited. In reality, the impact on the aquatic environment is low with the implementation of necessary mitigating measures, which not only includes those listed in the report, but also those required by other relevant legislation controlling the establishment and operation of landfill sites. This will include

protecting groundwater and controlling of polluted and contaminated onsite surface water. If properly established and well managed, the landfill site will have little negative impact on the water environment.

7.2.2. Wetland Delineation and Riparian Impact Assessment

The purpose of the study is to determine if any watercourses (including wetlands such as freshwater pans) are present on the site. If so, to delineate them, assess potential negative impacts and recommend buffers and mitigating measures, if necessary, to avoid or limit negative impacts on these watercourses.

According to the Aquatic Impact Assessment Study (2026), there are no watercourses directly within either of the three alternative landfill sites investigated. There is a small impoundment within the area of the Preferred Site. Option 1 is located on the edge of a natural, small stream/drainage line, while Option 2 has a small natural drainage line within it. Options 1 & 2 have the potential to have larger negative impacts on the natural water environment.

The main water courses in the region are the perennial Orange River and semi-perennial Melkspruit. The Melkspruit flows north into the Orange River and varies from about 1,7km to 2,4km west of the study site. The Orange River varies in distance between 450m and 500m northwest of the Preferred Site. The landfill site will have no direct impact on any of these two watercourses. There are a few small and highly ephemeral streams and drainage lines in the vicinity of the new landfill site alternatives. Those in the vicinity of the Preferred Site flow directly into the Orange River, while those near Option 1 and Option 2 flow into the Melkspruit. There is a small out-of-stream impoundment at the Preferred Site. The small impoundment is not very functional and was created to trap (impound) surface rainwater run-off, probably to retain some water for grazing livestock. However, the water volumes are low, and the impoundment is dry (that is, no visible surface water) for most of the year. The impoundment is not a natural watercourse. There are occasions when a dam becomes part of the natural aquatic environment, but these are mostly in-stream dams that form an integral part of the linear river/stream and are important in terms of upstream and downstream connectivity. Out-of-stream dams do not serve this same important aquatic function. However, there are out-of-stream dams that have become part of the aquatic environment and support wildlife such as waterbirds, but these are typically large dams that have permanent open bodies of water and not small, shallow and insignificant impoundments that dry out quickly, such as the one at the Preferred Site.

The natural environments in the area of Options 1 & 2 are in a much better condition than that of the Preferred Site, which, for many years, was cultivated fields and is therefore transformed. Therefore, the Preferred Site is the preferred alternative for the new landfill site, which is required because the existing old site is at capacity and is in the process of closure.

As mentioned, there is a small out-of-stream impoundment in the area investigated at the Preferred Site, but this feature is far less sensitive than the natural watercourses found adjacent to and within Options 1 & 2. Nevertheless,

buffer zones have been delineated that should be strictly implemented. This, along with stormwater management plans, should ensure that the landfill site will have little to very low negative impacts on the water environment in the area, especially that of natural watercourses. Site 1 is therefore the recommended site alternative for the new Maletswai Landfill Site.

The areas investigated within the three landfill site alternatives are larger than required. This was done in order to give some flexibility in the final placement of the landfill site. Therefore, recommended buffer areas must be implemented, and the site should be established as far away from the impoundment as possible. The site should be properly fenced from the onset. A detailed stormwater plan is also required, which must include details of construction and management. With proper construction and management, impacts on the surrounding aquatic systems/water environment will be limited. In reality, the impact on the aquatic environment is low with the implementation of necessary mitigating measures, which not only include those listed in the report, but also those required by other relevant legislation controlling the establishment and operation of landfill sites. This will include protecting groundwater and controlling polluted and contaminated onsite surface water.

If properly established and well managed, the landfill site will have little negative impact on the water environment.

The specialist further concludes that:

- The main watercourses in the region are the perennial Orange River and semi-perennial Melkspruit. The Melkspruit flows north into the Orange River and varies from about 1,7km to 2,4km west of the general study site. The Orange River varies in distance between 450m and 500m northwest of the Preferred Site.
- There are a few small and highly ephemeral streams and drainage lines in the vicinity of the site alternatives. Those in the vicinity of the Preferred Site flow directly into the Orange River, while
- those near Options 1 & 2 flow into the Melkspruit. There are no wetlands in or near the three site alternatives.
- There is a small out-of-stream impoundment at the Preferred Site. The impoundment is not a natural watercourse.
- The recommended site alternative for the new landfill site is: The Preferred Site.

Findings Summary: The delineation confirmed that no mapped wetlands or watercourses occur within the site, but ephemeral drainage lines and an artificial impoundment are present. These features are sensitive to disturbance and require appropriate buffers and management measures to prevent erosion, sedimentation, and ecological degradation.

Impact Significance Ratings: Direct, indirect, and cumulative impacts on riparian zones and ephemeral drainage lines were evaluated using the standard EIA methodology. Based on the findings of the Wetland Specialist Report (Annexure F):

- Impacts are localised to the footprint and immediate surroundings.
- Duration is long-term, as drainage line disturbance persists beyond construction.
- Intensity is moderate, given erosion and connectivity risks.
- Probability is high, as disturbance is unavoidable near drainage lines.
- Significance prior to mitigation is moderate to high.
- With mitigation (buffers, erosion control, stormwater management, alien vegetation control), residual significance is reduced to low.

Mitigation Measures:

Mitigation measures recommended in **Annexure F** include:

- Maintain 32 m buffer zones around natural drainage lines.
- Apply erosion control measures in areas of gully formation.
- Implement alien vegetation management along riparian margins.
- Ensure stormwater management systems prevent sedimentation into downstream rivers.

Residual Impacts: Even with the implementation of recommended mitigation measures, some residual impacts are expected. At Option 1 and Option 2, the close proximity of the proposed footprints to natural drainage lines means that minor ecological impacts may persist. These include potential disturbance of riparian margins, increased erosion risk, and reduced ecological connectivity. While such impacts are anticipated to be of low significance after mitigation, they highlight the importance of maintaining buffer zones, enforcing strict stormwater management, and monitoring riparian habitat condition throughout the construction and operational phases.

Monitoring Programme: In line with the recommendations of the Wetland Specialist Report (Annexure E), a monitoring programme will be implemented to ensure that mitigation measures are effective. The programme will include:

- Riparian Habitat Monitoring: Annual ecological surveys to assess vegetation recovery, erosion control effectiveness, and habitat connectivity.
- Water Quality Monitoring: Regular sampling via perimeter boreholes to detect changes in water quality and sedimentation.
- Alien Vegetation Monitoring: Annual surveys along riparian margins to detect and control invasive species.

- Compliance Audits: ECO audits to verify implementation of buffer zones, erosion control, and stormwater management.
- Reporting: Monitoring results will be compiled into annual compliance reports submitted to the competent authority, with adaptive management measures introduced where monitoring indicates shortcomings.

Substantiated Statement (As per the specialist)

Below is a substantiated statement, based on the findings of the specialist assessment, study and report, regarding the acceptability, or not, of the proposed development, if it should receive approval or not and any conditions to which this statement is subject.

There are no watercourses directly within either of the three alternative landfill sites investigated. There is a small impoundment within the area of the Preferred Site. Option 1 is located on the edge of a natural small stream/drainage line, while Option 2 has a small natural drainage line within it. Options 1 & 2 have the potential to have larger negative impacts on the natural water environment.

The main watercourses in the region are the perennial Orange River and semi-perennial Melkspruit. The Melkspruit flows north into the Orange River and varies from about 1,7km to 2,4km west of the study site. The Orange River varies in distance between 450m and 500m northwest of the Preferred Site. The landfill site will have no direct impact on either of these two watercourses.

There are a few small and highly ephemeral streams and drainage lines in the vicinity of the new landfill site alternatives. Those in the vicinity of the Preferred Site flow directly into the Orange River, while those near Option 1 and Option 2 flow into the Melkspruit. There is a small out-of-stream impoundment at the Preferred Site. The small impoundment is not very functional and was created to trap (impound) surface rainwater run-off, probably to retain some water for grazing livestock. However, the water volumes are low and the impoundment is dry (that is, no visible surface water) for most of the year. The impoundment is not a natural watercourse. There are occasions when a dam becomes part of the natural aquatic environment, but these are mostly in-stream dams that form an integral part of the linear river / stream and are important in terms of upstream and downstream connectivity. Out-of-stream dams do not serve this same important aquatic function. However, there are out-of-stream dams that have become part of the aquatic environment and support wildlife such as waterbirds, but these are typically large dams that have permanent open bodies of water and not small, shallow and insignificant impoundments that dry out quickly, such as the one at the Preferred Site. These large dams act very much like large natural pans or lakes. The natural environments in the area of Options 1 & 2 are in a much better condition than that of the Preferred Site, which for many years was cultivated fields and is therefore transformed.

Therefore, the Preferred Site is the preferred alternative for the new landfill site, which is required, because the existing old site is at capacity and is in the process of closure.

As mentioned, there is a small out-of-stream impoundment in the area investigated at the Preferred Site, but this feature is far less sensitive than the natural watercourses found adjacent to and within Options 1 & 2. Nevertheless, buffer zones have been delineated that should be strictly implemented. This, along with stormwater management plans, should ensure that the landfill site will have little to very low negative impacts on the water environment in the area, especially that of natural watercourses.

Site 1 (Preferred Site) is therefore the recommended preferred site alternative for the new Maletswai Landfill Site. The areas investigated within the three landfill site alternatives are larger than required. This was done in order to give some flexibility in the final placement of the landfill site. Therefore, recommended buffer areas must be implemented, and the site should be established as far back from the impoundment as possible. The site should be properly fenced from the onset. A detailed stormwater plan is also required that must include details of construction and management. With proper construction and management, impacts on the surrounding aquatic systems/water environment will be limited. In reality, the impact on the aquatic environment is low with the implementation of necessary mitigating measures, which not only include those listed in the report, but also those required by other relevant legislation controlling the establishment and operation of landfill sites. This will include protecting groundwater and controlling polluted and contaminated onsite surface water.

If properly established and well managed, the landfill site will have little negative impact on the water environment.

7.2.3. Heritage Impact Assessment

Terms of Reference: In accordance with the **Heritage Specialist Report (Annexure F)**, the survey included:

- Identification and detailed description of artefacts, assemblages, settlements, and structures of archaeological or historical nature within the study area.
- Estimation of the significance of these remains in terms of archaeological, historical, scientific, social, religious, aesthetic, and tourism value.
- Assessment of potential impacts on archaeological and historical remains resulting from development activities.
- Recommendations for mitigation where complete or partial conservation may not be possible.

Methodology

A Phase 1 Heritage Impact Assessment Study was undertaken, which included:

- Field survey of the proposed development area.
- Documentation of property details and type of assessment in terms of Section 38(1) of the National Heritage Resources Act, 1999 (Act No. 25 of 1999).
- Location and description of identified sites.
- Assessment of the importance of each site, indicating which should be conserved and which mitigated.

- Evaluation of potential impacts of the development on identified sites.
- Recommendations for conservation or mitigation, including permit requirements where applicable.

Findings Summary

The Heritage Specialist Report has identified one historical structure (Site 1) and one cemetery (Site 2) that were recorded during the survey. The dam retaining wall probably dates to the early 20th century and was connected with a system of furrows (canals). The dam is currently still in use and retains water for livestock in the region south of the Orange River. Site 2 is an active cemetery. Due to the proximity of Site 1 (historical dam wall) to the proposed Alternative Site 1 for the landfill site, the preferred options from a heritage perspective are Alternative Site 2 and Alternative Site 3.

No archaeological (both Stone Age and Iron Age) artefacts, assemblages, features, structures or settlements were recorded during the survey of the project footprint. It is well known that Late Iron Age stone-walled settlements do not usually occur in open, exposed low-lying grasslands and floodplains.

It is therefore recommended, from a cultural heritage perspective, that the proposed development may proceed, taking into account the proposed mitigation measures.

Also, please note: Archaeological deposits usually occur below ground level. Should archaeological artefacts or skeletal material be revealed in the area during development activities, such activities should be halted, and a university or museum notified in order for an investigation and evaluation of the find(s) to take place (cf. NHRA (Act No. 25 of 1999),

Residual Impacts

Despite the implementation of mitigation measures, some residual impacts may persist. These include the potential for accidental disturbance of subsurface palaeontological resources during excavation and the permanent alteration of heritage context if structures are removed under permit. While these impacts are anticipated to be of low significance after mitigation, they underscore the importance of strict adherence to chance-find procedures, permit conditions, and ongoing communication with heritage authorities.

Monitoring Programme

In line with the recommendations of the Heritage Specialist Report (Annexure E), a monitoring programme will be implemented to ensure compliance with heritage legislation. The programme will include:

- **Chance-Find Monitoring:** ECO oversight during excavation to ensure chance-find procedures are followed.

- **Permit Compliance:** Verification that all required permits from SAHRA/EC-PHRA are obtained before disturbance.
- **Reporting:** Documentation of any heritage or palaeontological finds, with reports submitted to SAHRA/EC-PHRA.
- **Adaptive Management:** Implementation of additional mitigation measures if monitoring identifies risks not previously anticipated.

*However, it must be noted that the ECPHRA acknowledged and accepted the submitted Heritage Impact Assessment (HIA) compiled by Coetzee FP (June 2026) and the Paleontological Impact Assessment (PIA) by Fourie H. (May 2026). Furthermore, ECPHRA have confirmed that **there are no objections and the development may continue as planned**, in terms of Section 38(4) of the NHRA, provided that specialists' recommendations are adhered to.*

7.2.4. Palaeontological Impact Assessment

The Phase 1: Field Study was undertaken in early May 2026 in winter, under mild and dry conditions. As this is a field study, the season (vegetation) and time (shadows) have an influence and the following is reported:

- The Project includes one locality Option with two Potential sites (see Figures) with **VERY HIGH** and **HIGH** sensitivities present near Aliwal North:
- Other locality options will not be feasible as all of the options may be situated on the Beaufort Group sediments with the same impact. Any no-go areas are possible as the entire project is underlain by the same formation and sensitivity throughout. Potential Site 1 is preferred due to the lack of surface fossils.

Field Observation – Fieldwork was done in early May 2026. The area is open and can be reached by road and surveyed on foot. Vegetation is lush, but low, with some trees, scattered rocks with fossils are present, mostly sandstone, and huge sandstone banks are present at the river's edge. Low hills and power lines also dot the topography. A dump site is present between the two proposed sites. Visibility was good throughout the project. Fossils were found mostly as imprints, probably not worth collecting.

Recommendation:

Concerns/threats to be added to EMP:

- Threats to the National Heritage are earth-moving equipment/machinery (for example, haul trucks, front-end loaders, excavators, graders, dozers) during construction, the sealing-in, disturbance, damage or destruction of the fossils by development, vehicle traffic, clearing, and human disturbance.

- Special care must be taken during the clearing, digging, drilling, blasting (may not be required) and excavating of foundations, trenches, channels and footings and removal of overburden, not to intrude fossiliferous layers.

The recommendations are:

- The potential impact of the development on fossil heritage is **VERY HIGH**, and therefore, a Phase 1: Field Survey was necessary for this development (according to SAHRA protocol). If a chance fossil is found during the development, a Phase 2 Palaeontological Impact Assessment and Mitigation or conservation will be necessary.
- Mitigation may be needed if fossils are to be collected before the development. Overburden and interburden must be surveyed for fossils. Fossils were found mostly as imprints, probably not worth collecting.
- No consultation with parties was necessary. The Environmental Control Officer must familiarise themselves with the formation present and its fossils and follow protocol.
- The development may go ahead with caution. The ECO must survey fossils before and or after clearing, ground-breaking, or excavating and keep a photographic record.
- The EMPr will cover the conservation of heritage and palaeontological material that may be exposed during activities. For a chance find, the protocol is to immediately cease all activities, construct a 30m no-go barrier, and contact SAHRA/ECPHRA for further investigation. It is recommended that the EMPr be updated to include the involvement of a palaeontologist for pre-construction training of the ECO.

*However, it must be noted that the ECPHRA acknowledged and accepted the submitted Heritage Impact Assessment (HIA) compiled by Coetzee FP (June 2026) and the Paleontological Impact Assessment (PIA) by Fourie H. (May 2026). Furthermore, ECPHRA have confirmed that **there are no objections and the development may continue as planned**, in terms of Section 38(4) of the NHRA, provided that specialists' recommendations are adhered to.*

7.2.5. Agricultural Potential Impact Assessment Study

The Agricultural Impact Assessment considered the Preferred Site, Option Site 1 and Option Site 2 for the proposed Maletswai Landfill development. The assessment incorporated desktop information, field verification undertaken on 30 July 2026, regional soil and land capability information, soil sampling and laboratory analysis.

The principal findings of the assessment are as follows:

- All three candidate sites are currently utilised predominantly for livestock grazing;
- Cattle, sheep, goats and other domestic livestock utilise the grassland resources within the study area;

- No active crop cultivation was observed within the three candidate footprints during the field assessment;
- The preferred site is nevertheless mapped within an area associated with temporary commercial dryland cultivation, indicating possible historical or potential cultivation;
- Regional land capability mapping identifies the three sites predominantly as grazing capability land;
- None of the alternatives directly overlaps the mapped irrigation protected agricultural areas or rain-fed protected agricultural areas shown in the supplied dataset;
- The immediate soil landscape is principally associated with chromic luvisols and eutric leptosols, with eutric cambisols and haplic luvisols occurring within the broader
- area;
- The soils and terrain provide functional agricultural capability, principally for grazing;
- The overall agricultural potential of the three sites is considered moderate;
- Development of any of the alternatives will result in unavoidable loss and transformation of soil and grazing resources within the permanent landfill footprint; and
- Impacts outside the permanent footprint can be substantially reduced through appropriate topsoil management, erosion control, pollution prevention and
- rehabilitation.

Site-Specific Findings

The Preferred Site currently functions primarily as grazing land and has moderate agricultural sensitivity. Its mapped association with dryland cultivation indicates that portions of the area may have previously supported, or may retain potential for, cultivation. The site is also situated adjacent to an existing graveyard/cemetery, which represents an important broader land-use consideration.

Option Site 1 currently functions as grazing land but occurs within a comparatively more disturbed landscape adjacent to the existing dumping site. Existing electrical powerlines and associated servitudes and nearby railway infrastructure contribute to fragmentation of the site.

Option Site 2 similarly supports livestock grazing and retains moderate agricultural sensitivity. It is comparatively open and exposed and occurs close to the main road, railway and electrical infrastructure.

Conclusion

The proposed establishment of the Maletswai Landfill will result in direct and long-term transformation of soil and grazing resources within the development footprint. These impacts cannot be completely avoided irrespective of which alternative is selected. However, the affected landscape is predominantly characterised by moderate agricultural capability associated with livestock grazing rather than confirmed high-potential intensive cropland. The field assessment further confirmed that all three alternatives were being utilised predominantly for grazing at the time of assessment.

Option Site 1 represents the first agricultural preference due to its comparatively disturbed setting adjacent to the existing dumping site. Existing electrical infrastructure and servitude constraints, however, reduce its overall development suitability.

The Preferred Site is consequently supported as the overall preferred alternative, subject to the implementation of the mitigation, soil conservation, topsoil management, pollution prevention, erosion control, rehabilitation and monitoring measures prescribed in this report.

On this basis, no agricultural fatal flaw has been identified that would prevent the proposed landfill development from proceeding at the Preferred Site, provided that the final development remains within the approved footprint and the recommendations of this Agricultural Impact Assessment are incorporated into the project's Environmental Management Programme and implemented throughout the project lifecycle.

Key Recommendations

Should the proposed landfill proceed, the following agricultural management requirements are recommended:

- restrict all development to the authorised footprint;
- avoid unnecessary disturbance of surrounding grazing land;
- strip suitable topsoil separately before major earthworks;
- protect topsoil stockpiles against erosion, contamination and compaction;
- reuse conserved topsoil during progressive and final rehabilitation;
- prevent uncontrolled vehicle movement outside designated areas;
- implement erosion and stormwater controls before extensive soil disturbance;
- prevent contamination of soil by fuels, oils, chemicals, waste and leachate;
- maintain the engineered landfill containment and leachate management systems;
- rehabilitate temporary disturbance areas as soon as they are no longer required;
- establish stable vegetation cover on rehabilitated surfaces;
- maintain fencing and appropriate livestock access controls; and
- undertake post-rehabilitation monitoring until soil and vegetation conditions are stable.

Specialist Opinion

Based on the information available and the findings of the Agricultural Impact Assessment, the proposed landfill development is not considered to present a fatal agricultural constraint. The three candidate sites have agricultural value, primarily through livestock grazing, but none was confirmed during the field assessment as supporting active intensive crop production. The overall agricultural capability is considered moderate and predominantly grazing-oriented.

The proposed development will result in unavoidable permanent transformation of agricultural soil and loss of grazing land within the landfill footprint. However, the magnitude of the affected agricultural resource is not considered sufficient, on the available evidence, to preclude the proposed development from an agricultural perspective.

The Preferred Site is considered acceptable for the proposed development from an agricultural perspective, notwithstanding that Option Site 1 is marginally preferred when agricultural considerations are viewed in isolation.

7.2.6. Geohydrological Impact Assessment Study

The terms of reference applicable to the geohydrological specialist report include the following:

- A regional baseline description of the hydrogeological characteristics of the site and surroundings;
- Conduct a hydrocensus of all existing groundwater users and usage on site and in the adjacent areas, including data from the National Groundwater Database (NGDB);
- Evaluate the existing groundwater quality;
- Determine the groundwater level;
- Perform a risk assessment of the aquifer contamination potential;
- Compile a specialist report (using the EIA-aligned template);
- Evaluation and assessment of alternatives;
- Evaluation and assessment of potential impacts;
- Specialist recommendations.

Terms of Reference

In accordance with the Geohydrological Specialist Report (Annexure E), the study included:

- A regional baseline description of hydrogeological characteristics.
- A hydrocensus of existing groundwater users and usage, including data from the National Groundwater Database (NGDB).
- Evaluation of groundwater quality and determination of groundwater levels.
- Risk assessment of aquifer contamination potential.
- Evaluation of alternatives and potential impacts.
- Specialist recommendations for mitigation and monitoring.

Methodology

The methodology combined desktop analysis of NGDB records with field hydrocensus surveys. Groundwater levels were measured, and water quality samples were analysed. Risk assessment tools were applied to evaluate aquifer vulnerability to contamination.

Findings Summary

The Geohydrological Specialist Report (Annexure D) confirmed that groundwater levels are relatively deep (>5–6 m), with low-permeability mudstones limiting aquifer recharge. No perched groundwater was identified within the upper 3–4 m. Existing boreholes in the surrounding area are used for domestic supply. The landfill footprint poses a potential contamination risk if leachate is not properly managed.

Impact Significance Ratings

- Extent: Localised to the site and immediate surroundings.
- Duration: Long-term, as aquifer contamination persists beyond construction.
- Intensity: Moderate to high, depending on leachate management.
- Probability: Medium to high.
- Significance pre-mitigation: High.
- Significance post-mitigation: Low to moderate, provided engineered liners, leachate collection, and monitoring boreholes are implemented.

Mitigation Measures

- Installation of engineered liners and leachate collection systems.
- Establishment of perimeter groundwater monitoring boreholes.
- Regular water quality monitoring and reporting.
- Emergency response plan for contamination events.

Residual Impacts

Residual impacts may include minor long-term risks of groundwater contamination due to unforeseen liner failure or leachate migration. These are anticipated to be of **low significance** after mitigation but require ongoing monitoring and adaptive management.

Monitoring Programme

- Quarterly groundwater quality sampling from perimeter boreholes.
- Annual reporting to the competent authority.
- ECO audits to verify liner integrity and leachate management.
- Adaptive management measures if contamination is detected.

7.2.7. Geotechnical Assessment Study

The terms of reference applicable to the geotechnical specialist report include the following:

- Conduct geotechnical studies and establish the baseline condition on the proposed site, which includes:
 - Assessment of the underlying bedrock geology (at a desktop level)

- Assessment of the topographical conditions
- Identification of problem soils
- Identification of potential flaws based on geotechnical considerations
- Assessment of potential geological instability associated with natural slopes, erosion and infrastructure development
- Assessment of foundation conditions and consequently recommendations for foundations
- Evaluation of potential construction constraints.
- Compilation of a specialist report (using the EIA-aligned template).
- Evaluation and assessment of potential impacts.
- Specialist recommendations.

Terms of Reference

In accordance with the Geotechnical Specialist Report (Annexure E), the study included:

- Assessment of underlying bedrock geology (desktop level).
- Evaluation of topographical conditions.
- Identification of problem soils and potential flaws.
- Assessment of geological instability associated with slopes, erosion, and infrastructure development.
- Assessment of foundation conditions and recommendations for foundations.
- Evaluation of potential construction constraints.
- Specialist recommendations for mitigation.

Methodology

The methodology combined desktop geological mapping with field investigations, including borehole drilling and soil sampling. Laboratory tests were conducted to determine soil strength, clay content, and dispersive properties.

Findings Summary

According to the Geotechnical Specialist Report (Annexure E), a total of six (06) test pits were excavated on site. In addition, six (06) dynamic cone penetrometer (DCP) tests were performed at the project site. Other activities included soil profiling, sample collection and the conducting of laboratory testing of the soil materials at an engineering materials testing laboratory at Roadlab.

Based on the 1:250 000 Geological map of the Aliwal North region (sheet 3026), the oldest rocks at the site are assigned to the Tarkastad Subgroup (Trt), a stratigraphic unit within the Beaufort Group of the Karoo Supergroup. The Trt lithologies are comprised of a brownish-red to greenish-grey mudstone with intercalated fine to medium-

grained sandstone. Dolerite intrusions (Jd) in the form of sills, sheets and dykes cover the upper parts of the project site.

The current geotechnical site investigation programme has revealed a minimum of three (03) soil material sublayers divided into Hillwash (0 – 1 023 mm), Colluvium (1 023 – 1 203 mm), and the Residual soils (1 023 – 3 000 mm). The profiles generally indicate a similar material layering across the site.

Based on the available geotechnical data, the recommended geotechnical site class at the proposed construction site is C - C1 / S – S1. Bashan Consulting highly recommends the removal of the upper cohesionless, un-engineered, Hillwash before the commencement of the construction stage. The foundation types recommended for a double volume steel frame structure, which will be utilised as a recycling shelter at the proposed site, are Spread Footings (or pad footings) and/or Strip Footings with light reinforcement. The concrete floor slab (surface bed) with a light reinforcement (193 Ref Mesh) should be founded on a completed terrace compacted using G6 or G7 quality material of a minimum of 200 mm thickness with a subgrade reaction of 67MPa / m.

Impact Significance Ratings

- Extent: Localised to the footprint.
- Duration: Long-term, as geotechnical risks persist beyond construction.
- Intensity: Moderate, due to dolomitic conditions and erosion potential.
- Probability: Medium.
- Significance pre-mitigation: Moderate to high.
- Significance post-mitigation: Low to moderate, provided gravity surveys, erosion control, and appropriate foundation designs are implemented.

Mitigation Measures

- Conduct gravity surveys to confirm dolomite depth and manage sinkhole risks.
- Implement erosion control measures along drainage lines.
- Design foundations in accordance with geotechnical recommendations.
- Monitor slopes and drainage areas during construction.

Residual Impacts

Residual impacts may include minor risks of subsidence or erosion in dolomitic areas. These are anticipated to be of low significance after mitigation, but require ongoing monitoring and adaptive engineering responses.

Monitoring Programme

- Regular geotechnical inspections during construction.
- Monitoring erosion control effectiveness.
- Periodic slope stability assessments.
- Reporting of geotechnical performance in annual compliance audits.

7.2.8. Air Impact Assessment Study

KMG Environmental Solutions Services (Pty) Ltd was appointed by Rambuda Consultants (Pty) Ltd to undertake an Air Quality Impact Assessment (AQIA) for the proposed establishment of a new municipal landfill facility in Maletswai (Aliwal North), Eastern Cape Province, on behalf of Walter Sisulu Local Municipality. The assessment considered three candidate development areas, namely the Preferred Site, Option Site 1 and Option Site 2.

The AQIA comprised desktop assessment, review of available regional ambient air quality information, identification of existing emission sources and sensitive receptors, assessment of meteorological and dispersion characteristics, and site-specific field verification and ambient air quality monitoring undertaken on 30–31 August 2026.

Baseline Air Quality Environment

The study area is characterised by a predominantly rural and peri-urban environment influenced by agricultural activities, grazing land, road and railway infrastructure, residential development, exposed surfaces and existing waste-management activities. Existing potential sources of atmospheric emissions include vehicle traffic, unpaved-road dust, windblown soil, domestic activities, agricultural activities, biomass/veld burning, railway activities and the existing waste-disposal area.

Regional ambient air quality information from the SAAQIS Zwelitsha monitoring station was reviewed as supplementary baseline information. The station is approximately 250 km from the Maletswai project area and was therefore used for regional context only rather than as a direct representation of site-specific conditions. The July 2026 Zwelitsha dataset indicated generally low concentrations of SO₂, NO₂, NO, NO_x and O₃, while PM₁₀ showed greater short-term variability. The mean PM₁₀ concentration was approximately 20.714 µg/m³, with an hourly maximum of approximately 159.210 µg/m³. The maximum represents an hourly measurement and should not be interpreted directly against a 24-hour ambient standard.

Quality-control review identified invalid or physically implausible values in several meteorological channels, including ambient temperature, relative humidity and atmospheric pressure. These parameters were therefore excluded from quantitative baseline interpretation. No valid wind-speed or wind-direction observations were available from the supplied station dataset.

Field Monitoring

Site-specific ambient air quality monitoring was undertaken at five representative monitoring points, MP01–MP05, on 30–31 August 2026. Monitoring included PM_{2.5}, PM₁₀ and TSP using a portable particulate monitor, together with CH₄, CO₂, H₂S, NO₂, SO₂ and O₂ using a portable multi-gas detector. Temperature, relative humidity, wind speed and wind direction were recorded as supporting meteorological parameters.

Field conditions were warm and dry, with temperatures ranging from approximately 21.4°C to 27.8°C, relative humidity of approximately 14%, no precipitation and predominantly south-easterly winds averaging approximately 2.2 m/s (8 km/h).

Summary of Field Monitoring Results Parameter Unit Average Maximum Minimum

Parameter	Unit	Average	Maximum	Minimum
PM _{2.5}	µg/m ³	9.60	18.00	6.00
PM ₁₀	µg/m ³	25.60	48.00	17.00
TSP	µg/m ³	48.20	86.00	34.00
CH ₄	ppm	<1.40	3.00	<1.00
CO ₂	ppm	423.20	438.00	418.00
H ₂ S	ppm	<0.12	0.20	<0.10
NO ₂	ppm	<0.10	<0.10	<0.10
SO ₂	ppm	<0.10	<0.10	<0.10
O ₂	% vol	20.88	20.90	20.80

The results indicate generally good ambient air quality conditions across MP01, MP02, MP04 and MP05. MP03, which was influenced by the existing waste-disposal environment, consistently recorded comparatively higher particulate and gaseous concentrations.

At MP03, PM_{2.5} reached 18 µg/m³, PM₁₀ 48 µg/m³ and TSP 86 µg/m³. CH₄ reached approximately 3 ppm, CO₂ approximately 438 ppm and H₂S approximately 0.2 ppm. The spatial pattern indicates a localised waste-related influence rather than widespread deterioration of ambient air quality across the study area.

Sensitive Receptors

Six sensitive receptors were identified within the adopted 5 km assessment buffer. These comprise Vumile Primary School and surrounding residential development (SR01), Limakatso Boutique Hotel and surrounding residential development (SR02), an agricultural plantation/farm (SR03), road users (SR04) and residential areas represented by SR05 and SR06. Their spatial distribution relative to the alternatives is shown on the project Sensitive Receptors Map. The school and residential receptors were assigned the greatest sensitivity because of their potential for regular or prolonged human exposure.

The principal receptor concerns are particulate matter, nuisance dust and offensive odour. Road users are additionally potentially sensitive to visible dust where uncontrolled emissions affect visibility.

Principal Air Quality Impacts

The principal construction-phase impact is expected to be fugitive particulate matter generated by vegetation clearing, excavation, earthworks, topsoil handling, vehicle movement and exposed surfaces.

Operational impacts are expected to include PM_{10} , $PM_{2.5}$ and nuisance dust from internal roads, waste handling and exposed surfaces; CH_4 and CO_2 from waste decomposition; H_2S and other potentially odorous compounds; offensive odour from fresh and decomposing waste and leachate; vehicle and machinery exhaust emissions; and windblown waste. The MP03 monitoring results demonstrate that an active waste environment can produce a measurable localised increase in particulate matter and waste-related gases. Consequently, the principal management objective for the proposed landfill should be to prevent such localised effects from extending beyond the operational footprint toward surrounding sensitive receptors.

Without mitigation, dust, landfill gas and odour impacts may reach moderate to high local significance during adverse operational and meteorological conditions. With appropriate mitigation, residual impacts are expected to be predominantly low to low moderate.

Dispersion Considerations

The project landscape is generally open and gently undulating. Dispersion potential differs between the alternatives because of variations in terrain, vegetation and exposure. The south-easterly winds recorded during field monitoring would transport emissions generally toward the north-west. However, wind direction varies seasonally and temporally, and receptors in all directions should therefore remain within the operational air quality management framework.

The Preferred Site benefits from comparatively greater surrounding vegetation and elevated terrain/hills. These features provide partial natural screening, increase surface roughness and may reduce near-ground wind movement and the immediate transport of coarse particulate matter and windblown litter. These natural features are considered supplementary advantages only and do not replace engineered dust, landfill-gas or odour controls.

Alternatives Assessment

The Preferred Site is considered the most favourable alternative from an air quality perspective. Option Site 1 occurs adjacent to the existing waste-disposal environment and is comparatively open. Development at this location could result in cumulative dust, landfill gas and odour effects. Existing electrical powerlines and associated

servitudes also create an open infrastructure corridor and constrain opportunities for supplementary screening. Option Site 2 is characterised by a predominantly open and exposed landscape close to the road corridor. This setting increases its susceptibility to wind-driven particulate matter and windblown litter. Lightweight waste could potentially be transported toward road users, grazing land and the surrounding natural environment, with associated visual and land pollution effects.

The air quality ranking is therefore:

- Preferred Site – most preferred;
- Option Site 1 – second preferred; and
- Option Site 2 – least preferred.

Mitigation and Monitoring

The principal air quality management requirements include:

- regular dust suppression on unpaved roads, appropriate vehicle speed limits, minimisation of exposed surfaces, rapid waste compaction and covering, maintaining the smallest practicable active working face, landfill-gas management, effective leachate management, prohibition of uncontrolled waste burning and containment and retrieval of windblown litter. Existing vegetation around the Preferred Site should be retained wherever compatible with landfill engineering, safety and environmental requirements because it provides useful supplementary wind and dust screening.
- Routine monitoring should include PM_{10} , $PM_{2.5}$, dust, CH_4 , CO_2 , O_2 and H_2S , together with meteorological parameters. Dust-fall monitoring should be considered at representative upwind and downwind boundaries, particularly once construction and landfill operation commence.
- An air quality complaints register should also be maintained, and repeated complaints relating to dust or odour should trigger targeted investigation and corrective action.

Specialist Conclusion

No fatal air quality constraint has been identified for the proposed Maletswai Landfill.

Baseline field monitoring indicates generally good ambient air quality across the broader study area, with the principal existing waste-related influence occurring locally around MP03. The proposed landfill will introduce additional particulate, landfill-gas and odour emissions, but these impacts are considered manageable through appropriate engineering design, operational controls and monitoring.

The Preferred Site is supported as the preferred alternative from an air quality perspective because its surrounding vegetation and elevated terrain provide comparatively greater natural screening and reduced exposure to

unrestricted wind movement. It also avoids the more direct cumulative waste-related influence associated with Option Site 1 and the highly exposed roadside setting associated with Option Site 2.

Accordingly, the proposed landfill at the Preferred Site is considered acceptable from an air quality perspective, provided that the mitigation, monitoring, landfill-gas management, dust suppression, odour control and litter-management measures prescribed in this AQIA are incorporated into the EMPr and implemented throughout construction, operation, closure and post-closure.

8 POTENTIAL IMPACTS ASSOCIATED WITH THE PROJECT

It should be noted that the recommendations of the specialists have been incorporated in this chapter.

8.1. Assessment Methodology

The significance of Environmental Impacts will be assessed in accordance with the following method:

Table 32: Risk Matrix Rating Methodology

The significance of Environmental Impacts was assessed in accordance with the following method:

A) The extent of the impact.

Extent table

Extent	Description	Rating
Site	Impact limited to the proposed site	1
Regional	Impact extent beyond the proposed site, however, within the regional scale	2
Provincial	Impact extent beyond the proposed site, however, within the provincial boundaries	3
National	Impact extent beyond the provincial boundaries	4

B) Probability describes the likelihood of the impact occurring, and is rated as follows:

Probability table

Probability	Description	Rating
Improbable	Low possibility of impact to occur either because of design or historical experience	1
Probable	The distinct possibility that impact will occur	2
Highly probable	Most likely, that impact will occur	3
Definite	The impact will occur, in the case of adverse impacts, regardless of any prevention measures.	4

C) The severity factor is calculated from the factors given to "intensity" and "duration". Intensity and duration factors are awarded to each impact, as described below. The Intensity factor is awarded to each impact according to the following method:

Intensity and duration table

Impact	Description	Severity Factor
Low intensity	natural and manmade functions are not affected	1
Medium intensity	The environment is affected, but natural and manmade functions and processes continue	2
High intensity	environment affected to the extent that natural or manmade functions are altered to the extent that they will temporarily or permanently cease or become dysfunctional	4

Duration is assessed, and a factor is awarded in accordance with the following:

- Short term - <1 to 3 years - Factor 1

- Medium-term - 3 to 10 years - Factor 2
- Long-term - impact will only cease after the operational life of the activity, either because of a natural process or by human intervention - Factor 3.
- Permanent - mitigation, either by natural process or by human intervention, will not occur in such a way or in such a time span that the impact can be considered transient - Factor 4.

The severity rating is obtained from calculating a severity factor and comparing the severity factor to the rating in the table below. For example: The Severity factor = Extent X Intensity Factor X Duration factor = 1 X 2 x 3 = 6

A Severity factor of six (6) equals a Severity Rating of Medium severity (Rating 3) as per the table below:

Severity Ratings

Rating	Factor
Low Severity (Rating 2)	Calculated values 2 to 6
Medium Severity (Rating 3)	Calculated values >6 to 12
High Severity (Rating 4)	Calculated values 13 to 19
Very High severity (Rating 5)	Calculated values above 20

A Significance Rating is calculated by multiplying the Severity Rating by the Probability Rating. The significance rating should influence the development project as described below:

- Low significance (calculated Significance Rating 2 to 6): **Positive impact and negative impacts** of low significance should not influence the proposed development project.
- Medium significance (calculated Significance Rating >6 to 12): **Positive impact:** Should weigh towards a decision to continue. **Negative impact:** Should be mitigated to a level where the impact would be of medium significance before the project can be approved.
- High significance (calculated Significance Rating 13 and more): **Positive impact:** Should weigh towards a decision to continue, should be enhanced in the final design. **Negative impact:** Should weigh towards a decision to terminate the proposal, or mitigation should be performed to reduce the significance to at least a medium significance rating.

The significance methodology used by Rambuda Consultants (Pty) Ltd was prescribed to environmental consultants during various courses on Impact Assessments. No methodology can be accurate to a numerical value where the environment is concerned because it cannot be measured. Numerical values are only an indication of the significance or severity of impacts. If we do not agree with the outcome of the assessment, we will adjust the numerical value to reflect a more realistic significance. The methodology only acts as an aid to the environmental consultant, and the consultant needs to use his/her experience in the field together with the methods to reach a realistic significance of impacts.

8.2. Legal Requirements as per the EIA Regulations, 2014 (as amended) for the undertaking of an Impact Assessment Report

This chapter identifies the potential environmental impacts associated with the development of the proposed project. This chapter includes the following information required in terms of the EIA Regulations, 2014 - Appendix 3: Content of the EIA Report:

8.3. Identification of Potential Impacts Associated with the Project

The project site considered for the proposed landfill site is located on the remaining extent of Portion 1 of the Farm Melk Spruit No. 12, an area of approximately 681 Ha in extent. The proposed project site, a development area of approximately 06 ha, has been considered within this Scoping Study, within which the proposed development will be located from a technical and environmental sensitivity perspective. The study will indicate the areas of sensitivity that the developer would need to take into consideration in the planning of the final layout of the proposed landfill site within the development area.

Potential environmental impacts and risks associated with the proposed development include:

- Construction phase impacts, such as temporary air emissions (dust and vehicle emissions), noise, solid waste and wastewater generation, and Occupational Health and Safety (OHS) issues such as the risk of preventable accidents leading to injuries and/or fatalities.
- Landscape and visual impacts, such as the visibility of the project within the wider landscape and associated impacts on landscape designations, character types and surrounding communities.
- Ecology and natural resources, such as habitat loss/fragmentation, impacts on designated areas and disturbance or displacement of protected or vulnerable species.
- Heritage, such as impacts on the setting of designated sites or direct impacts on below-ground archaeological or palaeontological deposits as a result of ground disturbance during construction.
- Transport and access, such as impacts associated with the transportation of materials and personnel on project-affected communities.
- Water usage, such as the cumulative water use required for the facility, will be from groundwater resources.

The majority of the environmental impacts identified as associated with the proposed facility are expected to occur during the construction phase. Environmental issues associated with operation and decommissioning activities of the facility and associated infrastructure are similar and include, among others:

- Impact on ecology, including flora and fauna.
- Impact on air quality
- Impact on soils, geology, agricultural potential, and land use.

- Impact on heritage resources (including archaeology and palaeontology).
- Visual impacts.
- Social impacts (positive and negative); and
- Impacts on Traffic

Environmental issues specific to the operation of the facility and associated infrastructure could include, among others:

- Long-term loss of protected species (flora, fauna, avifauna) or conservation-worthy habitats.
- Change in land use for the footprint of the facility.
- Visual impacts (negative viewer perceptions and visibility of the facility).
- Air quality impacts.
- Social impacts (positive and negative).
- Odour, litter and vectors.
- Water pollution from poor containment and leachate management systems.

8.4. Assumptions made during the Evaluation of Potential Impacts

While evaluating potential impacts associated with the proposed project, the EIA process evaluation assumed the following:

- The EIA Phase evaluation of impacts has been largely based on detailed assessment of the proposed site and supporting specialist studies.
- All information provided by the developer and I&APs to the environmental team was correct and valid at the time it was provided.
- The development footprint (the area that will be affected during the operation phase) will include the footprint for the facility and associated infrastructure (i.e. internal access roads and grid connection infrastructure).
- Specialist-specific assumptions can be accessed through various specialist studies under Appendix D of the report.

8.5. Evaluation of Potential Impacts associated with the Construction Phase, Operation and Decommissioning phases

8.5.1. *Impacts on terrestrial ecology (including flora and fauna)*

Construction Phase	Potential Impact																	
	The project impacts will occur as vegetation is removed from within the proposed footprint of the facility. In addition, disturbance to vegetation leads to alien invasive species spreading in an area. These impacts will result in habitat loss and fragmentation. Impacts may be felt as a loss of habitat structure, function, and species composition. Once the facilities are constructed, the vegetation will not be re-established until after the facility is rehabilitated and a sustainable vegetation cover is established on the facility.																	
	During the construction phase, the vegetation and animal life over the entire development footprint will be impacted. Any fauna present in this proposed footprint will be driven off onto the surrounding habitat. While the proposed site is located within the least-concerned vegetation, a portion of the site is affected by ESA 2. This results in a <u>medium significance</u> rating due to the conservation value of the biodiversity on site and adjacent to the site.																	
	The combined project impact to terrestrial ecology (prior to mitigation) will definitely be of a HIGH negative significance, affecting the local habitat. The impact will act in the medium term and is definite. The impact risk class is thus Very High .																	
	Cumulative Impact																	
	The cumulative impact to the site is related mostly to the proposed landfill site development, but also to other anthropogenic activities such as overgrazing, establishment of housing and use of land for subsistence farming. The cumulative (unmitigated) impact of the project on terrestrial ecology within the context of its surroundings is thus considered to definitely be of a HIGH negative significance, affecting the local habitat. The impact will act in the medium term and will is definite.																	
	Residual Impact																	
	Mitigation measures will reduce the impact footprint and improve the success of any rehabilitation activities undertaken. The residual impact will definitely be of MODERATE negative significance, affecting the local habitat to an extent. The impact will act in the medium term and has a high probability of occurrence. The impact risk class is thus Moderate.																	
	<table><tr><td>Extent</td><td>Probability</td><td>Duration</td><td>Severity</td><td>Significance before mitigation</td><td></td></tr><tr><td>1</td><td>4</td><td>3</td><td>2</td><td>24</td><td>Very High</td></tr></table>						Extent	Probability	Duration	Severity	Significance before mitigation		1	4	3	2	24	Very High
	Extent	Probability	Duration	Severity	Significance before mitigation													
1	4	3	2	24	Very High													
Mitigations																		
- All construction areas should be demarcated prior to construction to ensure that the footprint of the impacts are limited only to the development footprint (including areas where vehicles may traverse); - A suitable seed mix of indigenous plants should be used in all rehabilitation programmes on the site;																		

	• All alien invasive species on-site should be removed, and follow-up monitoring and removal programmes should be undertaken once construction is complete; and • Topsoil and subsoil should be stockpiled to conserve the seedbank; • Stockpiles of soil must be separate and appropriately managed for final capping of the site; • No hunting or trapping of animals must be permitted on or adjacent to the construction site; • Any animal that falls into excavations or is found elsewhere on site should be caught by a specialist and released back into the environment. • Workers must be limited to areas under construction, and access to neighbouring agricultural lands must be strictly regulated ("no-go areas" through all stages of the project), preventing uncontrolled hunting and poaching. • Construction should be limited, where practical, to the daylight hours, preventing disturbances to the nocturnal activities of certain species and nearby human populations. • Clearance must be limited to the required infrastructure at the time.					
	Extent	Probability	Duration	Severity	Significance after mitigation	
	1	3	2	2	12	Medium
Operational Phase	Potential Impact					
	• Poor alien management control. • Poor waste management leads to the spreading of waste into the surrounding environment. • hurting/ killing of fauna found onsite					
	Extent	Probability	Duration	Severity	Significance before mitigation	
	1	2	3	2	12	Medium
	Mitigations					
	• Implementation of the Alien Plant Management Plan. • Waste must be covered at the end of each day. • Litter fencing must be maintained throughout the operation phase of the project. • No disposal of waste must be allowed outside any cell. • No hunting or trapping of animals must be permitted on or adjacent to the construction site; • Any animal that falls into excavations or is found elsewhere on site should be caught by a specialist and released back into the environment.					
	Extent	Probability	Duration	Severity	Significance after mitigation	
	1	1	3	1	3	Low

8.5.2. Impacts on Surface Water Resources (rivers, drainage lines and wetlands)

Construction Phase	Potential Impact
	There are no watercourses directly within either of the three alternative landfill sites investigated. There is a small impoundment within the area of the Preferred Site. Option 1 is located on the edge of a natural, small stream/drainage line, while Option 2 has a small natural drainage line within it. Options 1 & 2 have the potential to have larger negative impacts on the natural water environment. The main watercourses in the region are the perennial Orange River and semi-perennial Melkspruit. The Melkspruit flows north into the Orange River and varies from about 1,7km to 2,4km west of the study site. The Orange River varies in distance between 450m and 500m northwest of the Preferred Site. The landfill site will have no direct impact on any of these two watercourses. There are a few small and highly ephemeral streams and drainage lines in the vicinity of the new landfill site alternatives. Those in the vicinity of the Preferred Site flow directly into the Orange River, while those near Option 1 and Option 2 flow into the Melkspruit. There is a small out-of-stream impoundment at the Preferred Site. The small impoundment is not very functional and was created to trap (impound) surface rainwater run-off, probably to retain some water for grazing livestock. However, the water volumes are low, and the impoundment is dry (that is, no visible surface water) for most of the year. The impoundment is not a natural watercourse. There are occasions when a dam becomes part of the natural aquatic environment, but these are mostly in-stream dams that form an integral part of the linear river/stream and are important in terms of upstream and downstream connectivity. Out-of-stream dams do not serve this same important aquatic function. However, there are out-of-stream dams that have become part of the aquatic environment and support wildlife such as waterbirds, but these are typically large dams that have permanent open bodies of water and not small, shallow and insignificant impoundments that dry out quickly, such as the one at the Preferred Site. These large dams act very much like large natural pans or lakes. During the construction phase, the removal of vegetation and preparation of the construction area will result in a large area of exposed soil. In addition, construction vehicles traversing the sites may result in hydrocarbon spillage that may enter the watercourses. Without mitigation measures, exposed soils will be mobilised during rainfall events, which will result in increased sedimentation and turbidity in surface water. Hydrocarbons, even

	in small amounts, entering the surface water resources can have significant detrimental effects on the aquatic environment. Any decrease in water quality will result in a direct impact on surface water and wetland features and the ecological state of these features. The combined weighted project impact to surface water (prior to mitigation) will definitely be of a MODERATE negative significance, affecting the local area. The impact will act in the medium term and is going to occur. The impact risk class is thus Moderate. Cumulative Impact The baseline impacts are considered to be insignificant; therefore, the cumulative unmitigated impact will definitely be of a MEDIUM negative significance, affecting the local area to an extent. The impact is going to happen and will be medium-term. The impact risk class is thus Moderate. Residual Impact Mitigation measures will substantially reduce the cumulative impact. The residual impact has a high probability of being of LOW negative significance, affecting the local area to an extent. The impact will most probably occur and will be medium-term. The impact risk class is thus Moderate.					
	Extent	Probability	Duration	Severity	Significance before mitigation	
	1	2	2	2	6	Medium
	Mitigations					
	• In the event of a spill of potential pollutants that would be at risk of entering any nearby surface water feature, the spill must be fully remediated and pollutants removed. Should pollutants enter a surface water feature, full remediation of the polluted area within the surface water feature must be undertaken. • Contaminated water should be directed into the correct disposal system, and none should go into the stormwater system. • Construction should be avoided within 100 m of the edge of a natural surface water body; • A surface water monitoring plan should be implemented to ensure that no significant impacts are affecting the watercourses in proximity to the construction site.					

	• Demarcated areas where waste generated by construction activities can be safely contained and stored temporarily for the construction phase should be lined and bunded. • All hazardous materials, inter alia, paints, turpentine and thinners must be stored appropriately to prevent these contaminants from entering the environment; • Install a dirty-water collection system to prevent contaminated water from entering the natural system. This water should be recycled or reused; otherwise, responsibly disposed of off-site. • Demarcate the “no-go” areas with tape and ensure that the demarcation remains in place for the duration of the construction works. • Install an authority-approved barrier system at the new landfill facility to prevent contamination of the soils and water bodies. • Ensure that a WULA is obtained from DWS before commencement of any work within the site; • An alien invasive control programme needs to be established and maintained through all phases of the development; and • The propagation of low-growing dense vegetation suitable for the habitat such as grasses, sedges or reeds is the best natural method to reduce erosion potential in sensitive areas. • Maintain a substantial protective separation between the waste disposal footprint and the Orange River and associated drainage features. • Ensure that clean stormwater is diverted around the landfill and that contaminated runoff cannot discharge towards the Orange River. Settling ponds/maturation ponds are required into which all polluted stormwater and leachate should be diverted and prevented from leaving the site. • Implement appropriate landfill containment/leachate management and progressively cover exposed waste. The National Norms and Standards for Disposal of Waste to Landfill provide requirements relating to containment barriers, drainage layers and landfill design. • Establish a surface-water and groundwater monitoring programme, with sampling locations selected to detect any potential migration of landfill-related pollutants towards the Orange River.					
	Extent	Probability	Duration	Severity	Significance after mitigation	
	1	2	1	2	4	Low
Operational Phase	Potential Impact					

	During the operational phase, the consecutive rehabilitation (capping and replacement of soils on the landfill body and side slopes), maintenance vehicles traversing the sites, and potential leaks/spills along pipelines could all result in impacts to the surface water environment. Activities such as Improper management of the leachate and stormwater run-off from the Landfill site due to an absence of clean and dirty water segregation exacerbate the magnitude of contaminated run-off potential, rather than effective diversion of clean run-off from the landfill surface and Improper surface water management arising from rainfall falling on the landfill to prevent all such surface water from becoming contaminated, and/or contributing to leachate potential by infiltrating through the landfill due to ponding on the surface of the landfill rather than freely draining. These activities could result in the following impacts to surface water resources: • Decrease in water quality: - Remotely possible hydrocarbon spillage that may enter the watercourses; - Increased sedimentation / suspended solids in water resulting in increased turbidity; - Increased, albeit limited, possibility of creating an environment for micro-organisms such as E.coli to proliferate; and - Decreased habitat conditions; • Heavy Metals, Soluble Organic Matter, Inorganic Compounds etc, are the main leachable pollutants which could emanate from the landfill site, this have major impacts on the surrounding environment (especially soil and water contaminations). • Decrease in water quantity: - Surface water flow that is intercepted by the dirty water containment infrastructure will decrease the volume of runoff entering surface water resources. The combined project impact on surface water (before mitigation) will likely be of MODERATE negative significance, affecting the local area. The impact will occur in the medium term and has a high probability of occurring. The impact risk class is thus Moderate. Cumulative Impact The cumulative impact during the operational phase to surface water and groundwater (before mitigation) will probably be of a MODERATE negative significance, affecting the local area in extent. The impact has a high probability of occurrence and will be medium-term. The impact risk class is thus Moderate.
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	Residual Impact						
	Mitigation measures will substantially reduce the cumulative impact and if all measures are implemented, will slightly improve the initial operation phase impacts to surface water resources. The residual impact to surface water and wetlands will probably be of a MODERATE negative significance, affecting the local area in extent. The impact has a medium probability of occurring and will be medium-term. The impact risk class is thus Moderate						
	Extent	Probability	Duration	Severity	Significance before mitigation		
	2	1	4	2	16	High	
	Mitigations						
	• The landfill should be shaped in a manner that runoff will be channelled away from the site. • Sizing of ponds is designed to meet standards and norms. Full compliance with the engineering designs. • Maintenance of the landfill liners • Due to the standard cell operation method used for the landfill, which stipulates that only one cell will be operational at any given time, stormwater will be minimal. • A surface and groundwater monitoring programme must be implemented as per the Geohydrological Study and the monitoring plan. If the monitoring data indicates the need for corrective action, the magnitude of the impact must be assessed by an appropriately qualified and experienced specialist and the necessary measures are put forward based on the magnitude of the impact. • Regular maintenance of the stormwater and leachate management system should be undertaken in accordance with the maintenance requirements (Operational Plan and Engineering Designs) to ensure that leachate and stormwater run-off are effectively diverted and contained on site.						
	Extent	Probability	Duration	Severity	Significance after mitigation		
	1	1	4	2	8	Medium	
	Decommissioning Phase	Potential Impact					
		During the closure/decommissioning phase, the profiling, capping and re-vegetation of the landfill facility will be the source of the primary impacts to the surface water. These activities will be undertaken through conventional construction methods (trucks, dozers, and other construction vehicles)					

	and will involve the handling and deposition of soils and the amelioration of soils using fertilisers or other chemical additives. These activities present similar risks to surface water resources as assessed in the construction and operational phase, i.e. the decrease in surface water quality as a result of: • Dirty water entering the environment during the decommissioning; • Remotely possible hydrocarbon spillage that may enter the watercourses; • Increased sedimentation / suspended solids in water resulting in increased turbidity; • Increased albeit limited possibility of creating an environment for micro-organisms such as E.coli, Heavy Metals, Soluble Organic Matter, and inorganic compounds to proliferate; and • Decreased habitat conditions. The combined project impact of closure activities on surface water (before mitigation) will probably be of a LOW negative significance, affecting only the study area. The impact will act in the medium term and is highly probable. The impact risk class is thus Moderate negative. Cumulative Impact Closure activities are not expected to increase the cumulative impacts (before mitigation) on the surface water and wetland elements of the receiving environment that may have occurred during the construction and operational phases. The cumulative impacts will probably have a MODERATE negative significance, affecting the local area to some extent. The impact will have a high probability of occurring and will be medium-term. The impact risk class is thus Medium-negative. The primary purpose of closure activities is to create a sustainable, clean and safe final profile that is suitably tied into the natural drainage pattern, and that will not produce pollution on an ongoing basis post closure of the project. If this is achieved, the surface water resources will ultimately experience a net positive impact on surface water and wetland resources because the surface water intercepted by containment infrastructure will be reintroduced back into the environment as the final profile will be deemed clean. However, without mitigation measures, this will not be realised
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as the project-related impacts will result in ongoing negative impacts post-closure. Mitigation measures will assist in reducing the cumulative impacts that will have accrued as a result of this project.					
Residual Impacts The residual impact on surface water and wetlands will probably be of a LOW negative significance, affecting the local area to some extent. The impact has a medium probability of occurrence and will be medium-term. The impact risk class is thus Low negative.					
Extent	Probability	Duration	Severity	Significance before mitigation	
1	2	2	2	8	Medium
Mitigations					
• Ensure that the mitigation measures documented in the Operational Phase are implemented; • The surface water monitoring plan needs to be continued beyond the closure phase until a stable and acceptable state of surface water quality has been established. • Demarcated areas where waste generated by closure activities can be safely contained and stored • An alien invasive control programme needs to be established and maintained through all phases of development; • The propagation of low-growing dense vegetation suitable for the habitat such as grasses, sedges or reeds, is the best natural method to reduce erosion potential in sensitive areas; and • Ensure that soils placed during consecutive rehabilitation of the side slopes of the facility are ameliorated with a suitable mix of additives (fertilisers, lime, etc.) and that an indigenous seed mix is used for seeding of the slopes. • Concurrent rehabilitation of the Landfill should be carried out in accordance with the designs. • Ongoing surface water monitoring. • Refer to mitigation measures proposed in the construction phase.					
Extent	Probability	Duration	Severity	Significance after mitigation	
1	1	2	1	2	Low

8.5.3. Impacts on Groundwater Resources

Construction Phase	Potential Impact					
	- Contamination of groundwater due to spillage, leakage, and incorrect handling of fuel and other hazardous materials. - Lack of provision of ablutions may lead to the creation of informal ablutions.					
	Extent	Probability	Duration	Severity	Significance before mitigation	
	1	2	3	3	18	High
	Mitigations					
	- Secondary containment for all fuel stored on site. - Accurate oil records must be kept. - Ensure clean-up protocols are in place and followed. - Temporary ablutions must be provided for construction employees					
	Extent	Probability	Duration	Severity	Significance after mitigation	
	1	2	3	1	6	Low
Operational Phase	Potential Impact					
	During the operational phase of the facility, in an unmitigated scenario, leachate will develop over time and will percolate into the groundwater below the facility from where it will disperse into the surrounding environment. However, the groundwater specialist's report indicated that there is a low probability that leachate would pollute the groundwater beneath. While these potential impacts (Improper management of the leachate and stormwater run-off from the Landfill site) allow rainwater to pond in areas on the surface and side areas of the landfill, These ponds allow for artificial hydraulic heads to form which force water into the body of the landfill, to percolate through, and contribute to the potential for leachate generation that could potentially contaminate groundwater resources, Improper design of the lining system for the ponds could provide a pathway for the contamination of the groundwater resources and Potential contamination of groundwater during operations and maintenance due to: - accidental					

release of the leachate and stormwater from the ponds; - damage of the ponds lining system; - lack of maintenance of stormwater and leachate drains; and - silt traps that are not de-silted regularly) might have impacts on the underground resource. However, the combined project impact during the operational phase on groundwater (before mitigation) will thus probably be of a LOW negative significance, affecting the local extent, and acting in the medium term. The impact will have a low likelihood of occurring. The impact risk class is thus Low. Cumulative Impact Due to the fact that the only other industrial activities in the area, with potential for groundwater pollution, are the existing landfill site and the sewage plant, the cumulative impact will probably have a MODERATE negative significance, affecting the local area to some extent. The impact has a low probability of occurrence and will act in the medium term. The impact risk class is thus Low. Residual Impact Mitigation measures will ensure that the impact to groundwater resources incurred during the operational phase of the proposed project will be reduced almost to the baseline conditions prevalent on site. The residual impact is expected to be of a LOW negative significance, affecting the local area to some extent. The impact is improbable if all mitigation measures are undertaken effectively, and will act in the medium term. The impact risk class is thus Low.					
Extent	Probability	Duration	Severity	Significance before mitigation	
1	1	5	1	5	Low
Mitigations					
• Install clean and dirty water cut-off trenches to ensure that clean water is kept clean, and dirty water is contained. • Ensure a suitable barrier system (i.e. composite barrier system of suitable protection layers/liners, and leak detection system) is installed below all contaminated areas to ensure that leachate from the facility does not enter the environment; and					

	• Install a groundwater monitoring system that ensures that early detection of groundwater pollution can be detected. • Ensure that the mitigation measures documented in the construction phase are implemented, especially the installation of a suitably designed barrier system below the facility. • The stormwater management plan must minimise the influx of clean water into dirty water containment areas. • Implementation of the underground monitoring programme. • Effective monitoring and maintenance of the leachate interception and stormwater management system according to the stipulations in the EMPr (Operational Plan and Engineering Designs) to ensure that leachate and stormwater run-off do not pond on the surface and side areas of the landfill. • Lining of the landfill cells, stormwater and leachate management systems as per the recommendations of the Design Reports (Appendix F) where it is proposed that a double liner system or equivalent Class B barrier system be installed. • In the maintenance of the ponds, care must be taken not to damage any HDPE liners. Personnel should avoid walking on the liners. Scratches can compromise the service life of a liner. Tears or deep scratches to the exposed liner should be noted and repaired where necessary by a specialist Contractor. It is possible to have patches welded over damaged areas of the liner. Regular inspections of the exposed liners should be carried out as part of routine maintenance. For both ponds, should desilting or removal of precipitated solids be required, absolute care must be taken not to damage the liners. Only plastic spades should be used. Care must also be taken not to damage the HDPE liners with herbicides or “weed eaters” another type of grass-cutting machine. Where damage is noted, the operator should call in a professional liner installer to repair the damage. The liners are UV-resistant and resistant to most chemicals. However, as the quality of the leachate can vary with time, the ponds should be monitored for unexpected degradation. • Maintenance of both the stormwater and leachate drains should be carried out on a regular basis. The v-drains associated with stormwater management require simple desilting. This may be achieved manually without any additional equipment. The silt trap will also require regular desilting which may be done by hand or with a skid steer via the access ramp. Leachate drains should be monitored by regular inspections of the manholes located every 40 m. If blockages occur, specialist rodding equipment may be required for unblocking. A standby borehole pump may be kept on site in case of significant blockages requiring the extraction of leachate.
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	Pumps must be maintained as per their specifications. This may require periodic service and possible replacement. The enhanced evaporation system is designed and includes accessories to minimise operational maintenance.					
	Extent	Probability	Duration	Severity	Significance after mitigation	
	1	1	5	2	10	Medium
Decommissioning Phase	Potential Impact					
	- Groundwater contamination due to decommissioning activities. - Refer to impacts on groundwater resources during the construction phase					
	Extent	Probability	Duration	Severity	Significance before mitigation	
	1	1	5	1	5	Low
	Mitigations					
	- Ongoing groundwater monitoring of the Landfill and pollution control pond area should be conducted. - Refer to the mitigation measures proposed in the construction phase					
	Extent	Probability	Duration	Severity	Significance after mitigation	
	1	1	5	1	5	Low

8.5.4. Impacts on Soils, Geology, Agricultural Potential and Land Use

Construction	Potential Impact				
	All three potential sites are situated in the network of dolerite sills, sheets and dykes, mainly intrusive into the Karoo Supergroup. The preferred site is not situated in any unstable areas, such as dolomitic areas and fault zones, based on maps indicating the regional geology. The rock formation underlying the study area is relatively impermeable, limiting the spread of possible pollution to groundwater resources within the proximity of the waste site or landfill facility. The Preferred Site currently functions primarily as grazing land and has moderate agricultural sensitivity and is located approximately 600m from a Walnuts Plantation. Its mapped association with dryland cultivation indicates that portions of the area may have previously supported, or may retain potential for, cultivation. The site is also situated adjacent to an existing graveyard/cemetery, which represents an important broader land-use consideration.				
	The combined weighted project impact to geology (before mitigation) will definitely be of a MODERATE negative significance, affecting the development site. The impact will be permanent and have a moderate probability of occurrence. The impact risk class is thus Moderate.				
	Cumulative Impact There are no significant existing impacts to geology, and therefore, cumulative impacts are very much the same as the project impacts. The combined weighted project impact to geology (before mitigation) will definitely be of a MODERATE negative significance, affecting the development site. The impact will be permanent and have a moderate probability of occurrence. The impact risk class is thus Moderate. Residual Impact As no mitigation measures are possible, the residual impact will be the same as the cumulative impact above, i.e. the combined weighted project impact to geology (before mitigation) will definitely be of a MODERATE negative significance, affecting the development site. The impact will be permanent and has a moderate probability of occurrence. The impact risk class remains Moderate.				
	Extent	Probability	Duration	Severity	Significance before mitigation

	1	2	4	2	16	High
	Mitigations					
	- Disturbed areas of natural vegetation, as well as excavation areas, must be rehabilitated immediately to prevent soil erosion. - Remove and store topsoil separately in areas where excavation/degradation takes place. Topsoil should be used for rehabilitation purposes in order to facilitate the regrowth of species that occur naturally in the area. - Secondary containment for all fuel stored on site. - Accurate oil records must be kept. - Limit the area disturbance to the landfill footprint. - Maintain fencing and appropriate livestock access. - No burning of waste must be allowed onsite. - Ensure clean-up protocols are in place and followed. - Use of drip trays underneath any stationary vehicle. - Collection of contaminated soil using the spill kit. All leakages onto soils should be cleaned immediately.					
	Extent	Probability	Duration	Severity	Significance after mitigation	
	1	2	3	1	6	Low
Operational	Potential Impact					
	- Improper management of the leachate and stormwater run-off from the Landfill site could potentially contaminate soils. - Potential contamination of soils (lateral movement of the leachate in the upper soil zone) during operations and maintenance due to: - accidental release of the leachate and stormwater from the ponds; - damage to the ponds' lining system; - lack of maintenance of stormwater and leachate drains; and - silt traps that are not de-silted regularly. - Leaking machinery onsite. - air quality impacts on the nearby Walnuts Plantations.					
	Extent	Probability	Duration	Severity	Significance before mitigation	

	1	2	5	1	10	Medium
	Mitigations					
	• Effective monitoring and maintenance of the stormwater management system in accordance with the stipulations in the Operational Plan and engineering designs to ensure there are no leakages of contaminated leachate and stormwater into the soil. • All leakages onto soil should be cleaned immediately. • Drains and silt traps must be de-silted regularly. • Use of drip trays underneath any stationary vehicle. • Collection of contaminated soil using the spill kit. • Maintain fencing and appropriate livestock access. • No burning of waste must be allowed onsite. • Land outside the authorised landfill footprint should remain available for its existing agricultural function wherever practicable. • Construction workers and contractors should not unnecessarily disturb surrounding grazing areas, damage fences, create unauthorised access tracks or interfere with livestock. • Where existing livestock access routes or fencing are affected by construction, appropriate arrangements should be made to maintain livestock management and prevent animals from entering active construction or landfill areas. • Compact and cover deposited waste promptly; • Apply effective dust suppression to unpaved roads and active earthworks; • Implement and enforce vehicle speed limits; • Minimise unnecessary exposed surfaces; • Retain surrounding natural vegetation where compatible with engineering and safety requirements; • Planting of high treetops along the four sides of the landfill site. • Install and maintain appropriate litter-control fencing; • Retrieve windblown waste outside the operational footprint;					

	- Prohibit uncontrolled burning of waste; - Implement landfill-gas monitoring and management; - Manage leachate and contaminated water to prevent persistent odour; - Progressively rehabilitate completed and disturbed surfaces; - Undertake particulate and landfill-gas monitoring; - Open or uncontrolled burning of waste should be prohibited. - Any landfill fire should be treated as an environmental incident because it may generate substantial particulate matter, smoke and gaseous pollutants. - The facility should maintain appropriate fire-prevention and emergency-response procedures, including access to suitable firefighting resources and clear reporting responsibilities.					
	Extent	Probability	Duration	Severity	Significance after mitigation	
	1	2	2	2	8	Medium
Closure/ Decommissioning	Potential Impact					
	- Increased erosion due to decommissioning activities. - Refer to construction and operational phase impacts					
	Extent	Probability	Duration	Severity	Significance before mitigation	
	1	2	2	2	8	Medium
	Mitigations					
	- Concurrent rehabilitation of the Landfill should be carried out in accordance with the Engineering Design (Appendix F). - Rehabilitation of areas affected by construction and operation activities should ideally commence at the start of the rainy season. - All areas where topsoil was removed should be landscaped to reflect the surrounding conditions. - Refer to the construction and operational phase mitigation					
	Extent	Probability	Duration	Severity	Significance after mitigation	

	1	1	3	1	3	Low
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8.5.5. Impacts on Heritage (Archaeology and Palaeontology)

Construction	Potential Impact																
	Impacts that could occur to historically significant structures are limited to the physical removal of graves and historical buildings, vandalism or renovations to these structures resulting in permanent damage. No paleontological, archaeological, cultural, or heritage sites of any significant value were identified on the preferred site. The unmitigated impact is probably of HIGH significance to the local area, acting permanently on the site. The probability of occurrence is low, and therefore, the impact rating is LOW negative.																
	Cumulative Impact																
	The cumulative impact on cultural heritage is expected to be of HIGH significance to the local area, acting permanently. There is a low probability of the impact occurring, and the rating is LOW negative.																
	Residual Impact																
	If the above mitigation measures are implemented, the residual impact will be of MODERATE significance over the local area. The impact will act on the long term and will have a low probability of occurrence. The impact rating will remain negative.																
	<table><tr><th>Extent</th><th>Probability</th><th>Duration</th><th>Severity</th><th colspan="2">Significance before mitigation</th></tr><tr><td>1</td><td>2</td><td>4</td><td>2</td><td>16</td><td>High</td></tr></table>						Extent	Probability	Duration	Severity	Significance before mitigation		1	2	4	2	16
Extent	Probability	Duration	Severity	Significance before mitigation													
1	2	4	2	16	High												
Mitigations																	
- maintain a 30m (reduced from 50m buffer) buffer zone around the dam wall. - Any disturbance to a site of cultural, historical, archaeological or paleontological significance must immediately be investigated by a qualified expert in the field. - All recommendations by the relevant expert must be adhered to.																	

	A rescue operation to any uncovered site of significance must be carried out under the supervision of a relevant expert.					
	Extent	Probability	Duration	Severity	Significance after mitigation	
	1	1	4	2	8	Medium
Operational	Potential Impact					
	Any impacts to the cultural or heritage aspects of the environment will occur during the construction phase (assessed separately in previous sections of this report) and there is probably expected to be NO ADDITIONAL IMPACT to the Archaeology, Palaeontology, and Cultural Heritage of the area as a result of operational activities.					
	Extent	Probability	Duration	Severity	Significance before mitigation	
	Mitigations					
	Extent	Probability	Duration	Severity	Significance after mitigation	
Closure/ Decommissioning	Potential Impact					
	Any impacts to the cultural or heritage aspects of the environment will occur during the construction phase (assessed separately in previous sections of this report) and there is probably expected to be NO ADDITIONAL IMPACT to the Archaeology, Palaeontology, and Cultural Heritage of the area as a result of operational activities.					
	Extent	Probability	Duration	Severity	Significance before mitigation	
	Mitigations					
	Extent	Probability	Duration	Severity	Significance after mitigation	

8.5.6. Air Quality Impacts

Construction	Potential Impact
	Where construction activities are undertaken in conjunction with exposed soils, there is a risk of generating dust. Construction vehicles also utilise hydrocarbon fuels and are known to have greenhouse gas exhaust fumes. These impacts are limited to the construction phase. With regard to dust, the larger particles typically fall within 500 m of the activity; this dust is known for its nuisance factor. Dust fallout on plants will cause a reduction in the plant's ability to photosynthesise and may reduce production potential. Beyond 500 m, the impact from fallout dust is considered negligible. The construction activities will mostly be located more than 500 m from the closest human settlement. The finer particulates that also result in health impacts are known to travel much further. Sensitive receptors, such as children under 5 years of age and elderly people older than 65 years of age, may be more severely impacted. No baseline assessment or monitoring was undertaken for the purpose of this study. Baseline Ambient Air Quality monitoring was undertaken on the three (3) proposed sites, with the existing landfill site used as potential representative conditions of the operational phase of the proposed development. Five (5) representative monitoring points were identified MP01–MP05 and monitored on 30–31 August 2026. Monitoring included PM_{2.5}, PM₁₀ and TSP using a portable particulate monitor, together with CH₄, CO₂, H₂S, NO₂, SO₂ and O₂ using a portable multi-gas detector. Temperature, relative humidity, wind speed and wind direction were recorded as supporting meteorological parameters. The results indicate generally good ambient air quality conditions across MP01, MP02, MP04 and MP05. MP03, which was influenced by the existing waste-disposal environment, consistently recorded comparatively higher particulate and gaseous concentrations. Field conditions were warm and dry, with temperatures ranging from approximately 21.4°C to 27.8°C, relative humidity of approximately 14%, no precipitation and predominantly south-easterly winds averaging approximately 2.2 m/s (8 km/h). At MP03, PM_{2.5} reached 18 µg/m³, PM₁₀ 48 µg/m³ and TSP 86 µg/m³. CH₄ reached approximately 3 ppm, CO₂ approximately 438 ppm and H₂S approximately 0.2 ppm. The spatial pattern indicates a localised waste-related influence rather than widespread deterioration of ambient air quality across the study area.

	The combined weighted project impact during the construction phase on air quality (before mitigation) will possibly be of a MINIMUM negative significance, affecting the region. The impact will act in the medium term and will have a high probability of occurrence. The impact risk class is thus Moderate. Cumulative Impact The air quality in the area is impacted by wood/coal burning for heat and cooking from the local informal and formal residential areas. Traffic on gravel roads and agricultural activities also contribute to dust. The predominant source of air emissions will be the landfill construction site. The cumulative impact during the construction phase on air quality (prior to mitigation) will possibly be of a MINIMUM negative significance, affecting the regional area. The current impacts will act over the medium term and have a high probability of occurrence. The impact risk class is thus Moderate. Residual Impact The residual impact on air quality during the construction phase will be determined by the baseline impacts and will possibly be of a MINIMUM negative significance, affecting the regional area. The impact will act in the medium term and has a moderate probability of occurrence. The impact risk class is thus Low.					
	Extent		Probability	Duration	Severity	Significance before mitigation
	2		2	2	2	16
	High					
	Mitigations					
	• Ensure that vegetation clearing is limited to only the areas where construction will take place. • Ensure that “no-go” areas are staked and marked clearly prior to construction commencing. • Prevent construction vehicles from riding all over the site, and ensure that they stick to pre-determined routes and low speeds; • Sequence the construction methodology in such a way as to reduce the area of exposed soil to its minimum extent practically possible; • Use chemical dust suppression (such as dust-a-side) on areas to be frequently used; and • Regularly undertake dust suppression using uncontaminated water to ensure that dust mobilisation is prevented.					

	Dust nets must be utilised when working in heavy winds.					
	Extent	Probability	Duration	Severity	Significance after mitigation	
	2	2	1	2	8	Medium
Operational	Potential Impact					
	During the operational phase, impacts to air quality will occur as a result of maintenance activities and deposition of general waste at the landfill facility. Where maintenance activities are undertaken in conjunction with exposed soils, there is a risk of generating dust. Vehicles also utilise hydrocarbon fuels and are known to emit greenhouse gas exhaust fumes. During the operational phase, the surface of the landfill facility will be increased substantially. This area will be exposed to the elements. Additional impacts may occur from windblown particles from the exposed areas of the landfill. The combined weighted project impact during the operational phase to air quality (prior to mitigation) will possibly be of a High negative significance, affecting the local area. The impact will act in the medium term and has a medium probability of occurrence. The impact risk class is thus Medium negative.					
	Cumulative Impact The cumulative air quality impacts during the operational phase will be dictated by the current baseline conditions and will thus be the same as the assessment provided in the construction phase, i.e. the cumulative unmitigated impact will possibly be of a LOW negative significance, affecting the local area. The current impacts will act in the medium term and have a medium probability of occurrence. The impact risk class is thus Low negative.					
	Residual Impact Mitigation measures will reduce the likelihood of the project resulting in additional impacts to the receiving air environment. The residual impact thus remains as assessed as the cumulative impact, i.e. will possibly be of a LOW negative significance, affecting the local area. The current impacts will act in the medium term and will have a low likelihood of occurrence. The impact risk class is thus Medium negative.					
	Extent	Probability	Duration	Severity	Significance before mitigation	
	2	2	4	2	36	Very High

	Mitigations
	• Ensure that vegetation clearing is limited to only the areas where construction will take place; • Ensure that “no-go” areas are fenced to ensure that ongoing maintenance activities do not unnecessarily impact the wider area. • Use chemical dust suppression (such as dust-a-side) on areas to be frequently driven; • Regularly undertake dust suppression on all gravel roads using uncontaminated water to ensure that dust mobilisation is prevented. • Odour monitoring through water and gas monitoring. • Internal haul roads should therefore be maintained in a condition that minimises loose surface material. • Water suppression should be undertaken according to actual conditions rather than a fixed schedule only. Increased watering may be required during dry periods, particularly when relative humidity is low and winds are sufficient to entrain loose material. • Vehicle speeds should be controlled, and unnecessary vehicle movements should be avoided. • Where traffic volumes justify it, consideration should be given to stabilising or surfacing frequently used sections of the internal road network. • The active landfill working face should be maintained at the smallest practicable size consistent with safe landfill operation. • Incoming waste should be promptly: Receive waste → Spread → Compact → Cover → Inspect. • Effective compaction and covering will reduce exposed waste surfaces and thereby assist in controlling odour, windblown litter and direct gaseous emissions. • Waste should not remain unnecessarily exposed overnight where operationally avoidable. • Landfill gas management should form an integral component of the operational and postclosure management system. • The landfill operator should monitor for evidence of: ○ Methane accumulation; ○ Uncontrolled gas venting; ○ Cracks in landfill cover; ○ Gas migration; ○ Persistent odour;

	○ Vegetation stress potentially associated with gas migration; and ○ Abnormal conditions around landfill-gas infrastructure. ● Where landfill gas generation becomes significant, appropriate passive or active gas-control infrastructure should be implemented in accordance with the final engineering design. ● The MP03 field results demonstrated a localised waste-related methane concentration of approximately 3 ppm compared with <1 ppm at the other monitoring points. This reinforces the importance of preventing uncontrolled landfill-gas emissions from becoming established at the future facility. ● Odour management should focus on prevention at source. The principal controls should include: ○ Rapid compaction of deposited waste; ○ Regular application of appropriate cover; ○ Minimisation of the active working face; ○ Effective landfill-gas management; ○ Appropriate leachate management; ○ Prevention of stagnant contaminated water; ○ Rapid management of unusually odorous waste; ○ Maintaining good housekeeping; ○ Preventing accumulation of decomposing waste outside designated disposal areas; and ○ Investigating odour complaints promptly. ● H₂S should receive particular attention because the field assessment recorded a comparatively elevated result at the existing waste-influenced MP03 location. ● Persistent odour beyond the landfill boundary should trigger investigation of the active working face, landfill gas, leachate infrastructure and other potential sources.
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	• Windblown litter is particularly important because of the open landscape surrounding the development and the potential for lightweight material to affect grazing land, roads and the natural environment. • The landfill should therefore implement: ○ Perimeter fencing; ○ Appropriately positioned litter-control fencing around active working areas; ○ Rapid waste compaction; ○ Regular covering; ○ Routine collection of windblown material; ○ Increased inspections during windy conditions; and ○ Immediate retrieval of waste transported beyond the authorised landfill footprint. • Construction and landfill equipment should be maintained in good operating condition. • Management measures should include: ○ Routine servicing; ○ Prevention of excessive engine idling; ○ Removal or repair of visibly smoking equipment; ○ Efficient vehicle routing; ○ Avoiding unnecessary trips; ○ Maintaining internal roads; and ○ Ensuring waste-delivery vehicles comply with applicable roadworthiness requirements. • These measures will assist in limiting NO_x, particulate matter and other combustion-related emissions. • Open or uncontrolled burning of waste should be prohibited. • Any landfill fire should be treated as an environmental incident because it may generate substantial particulate matter, smoke and gaseous pollutants.
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	- The facility should maintain appropriate fire-prevention and emergency-response procedures, including access to suitable firefighting resources and clear reporting responsibilities. - Leachate and contaminated-water infrastructure should be operated to minimise odour generation. - The operator should avoid prolonged accumulation of stagnant contaminated water where practicable and regularly inspect the leachate collection system and Pollution Control Dam. - Where persistent odour is identified around these facilities, the source should be investigated and corrective action implemented. - Particular attention should be given to SR01, SR02, SR05 and SR06 because these represent educational, accommodation or residential receptors with potentially prolonged human exposure. The receptor map confirms their distribution within the adopted 5 km assessment area. - SR01, representing Vumile Primary School and the surrounding residential area, should be considered a high-priority receptor for dust and particulate management. - Air quality complaints originating from these receptors should be formally recorded, investigated and linked to meteorological and operational conditions at the time of the complaint. - An air quality complaints register should be maintained throughout landfill operation.					
	Extent	Probability	Duration	Severity	Significance after mitigation	
	1	2	2	2	8	Medium
Closure/ Decommissioning	Potential Impact					
	<i>Same as the construction and operational phase</i>					
	Extent	Probability	Duration	Severity	Significance before mitigation	
	Mitigations					
	Extent	Probability	Duration	Severity	Significance after mitigation	

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8.5.7. Socio-Economic Impacts

Construction	Potential Impact
	<u>Potential positive impacts</u> • » Creation of employment and business opportunities, and opportunities for skills development and on-site training. <u>Potential negative impacts</u> • Impacts associated with the presence of construction workers on local communities. • Impacts related to the potential influx of job seekers. • Increased risks to livestock and farming infrastructure associated with the construction-related activities and presence of construction workers on the site. • Increased risk of grass fires associated with construction-related activities. • Nuisance impacts, such as noise, dust, and safety, are associated with construction-related activities and vehicles. • Impact on productive farmland (Rotondo Walnuts) Impacts: Creation of local employment, training, and business opportunities Due to the lack of diversification in the local economy, the potential for local companies is likely to be limited. The majority of benefits are therefore likely to accrue to contractors and engineering companies based outside the municipality. The local service sector will also benefit from the construction phase. The potential opportunities would be linked to accommodation, catering, cleaning, transport, and security, etc., associated with the construction workers on the site. The hospitality industry in the area will also benefit from the provision of accommodation and meals for professionals (engineers, quantity surveyors, project managers, product representatives, etc.) and other (non-construction) personnel involved on the project. Experience from other construction projects

	indicates that the potential opportunities are not limited to on-site construction workers but also to consultants and product representatives associated with the project. It should be noted that some substantial positive impacts can be generated by this project, and the total significance of these positive impacts is whittled away by numerous smaller negative impacts. The potential for mitigation is thus large, and the potential benefits that could be generated by mitigation will show tremendous improvements in the overall rating of this impact. However, without mitigation, the combined project impact on the social environment (prior to mitigation) will possibly be of a LOW negative significance, affecting the local area. The impact will act in the medium term and has a medium probability of occurring. The impact risk class is thus Low negative. Cumulative Impact Potential negative cumulative impacts: • As far as the uncertainty is concerned, the perceived impact will be cumulative to the general impact of economic instability due to the poor economic growth in the country, and is therefore not specifically related to the proposed project. Expectations about job creation are also a current reality in South Africa and will be an issue in any project that may generate jobs; • Environmental nuisances that occur during construction will be temporary, and • Loss of agricultural potential and current land use. Potential positive cumulative impacts: • The potential for new employment opportunities during the construction phase; and • Provision of a local landfill site to reduce the incidence of burning or burying waste, which has negative impacts on air quality and groundwater quality, respectively.
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The cumulative impact on the social environment (before mitigation) will possibly be of a LOW negative significance, affecting the local area. The impact will occur in the medium term and has a medium probability of occurrence. The impact risk class is thus Low. Residual Impact Many of the impacts cannot be mitigated to such an extent that they are no longer significant. Many of the impacts will be short-term or medium-term and will disappear after the construction phase. Residual impacts that are mentioned are those impacts that will be long-term or permanent. Many of these impacts cannot be managed or controlled, as some occur on an individual level. Should successful mitigation be implemented, the residual impact on the social environment will possibly be of a LOW positive significance, affecting the local area. The impact will act in the medium term and is of a moderate probability of occurring. The impact risk class is thus Low positive.					
Extent	Probability	Duration	Severity	Significance before mitigation	
2	3	2	2	24	Very High
Mitigations					
- Any infrastructure such as roads which may be impacted by the project should be maintained in their present condition or improved upon. - Contractors must adhere to the rules as set down by the property owner. This aspect should be included in their scope of work to ensure that they provide the financial means to execute the necessary maintenance and repair work required. Should they disobey the local rules regarding speeding, a fine system must be implemented. - During construction, any incidents must be reported in a complaints register that should be inspected by the social/environmental monitor every week. - The contractor should have a person trained in first aid on site to deal with smaller incidents that require medical input. - For the duration of the construction phase, there must be a well-published, culturally appropriate grievance mechanism. This must be agreed with local communities at the start of the construction period in the area. The communities must give input in the process to ensure ownership. Grievances must be dealt with within a certain period.					

	• All grievances must be recorded in a register stating the grievance, the date that it occurred and the action taken. • For the duration of the construction phase, the ECO will be responsible for assisting the aggrieved person in completing a form or submission that explains the grievance, the process followed and what the outcomes were. • Where possible, unskilled and semi-skilled labour should be employed from the surrounding local communities. • The contractor must put up signs that no recruitment will take place on site, and all jobseekers must be shown away from site. • The contractor should not allow his staff to utilise services from squatters. There must be a formal trading area for informal traders, but they must not be allowed to sleep where they trade or set up camps in close proximity to the construction camp. • HIV/AIDS and Sexually Transmitted Disease (STD) awareness training must form part of the induction of staff. • Condoms must be freely available on site. • STD and HIV / AIDS awareness training should be provided in conjunction with local NGOs or the Department of Health. • The workforce must be discouraged from engaging in casual sexual relationships with local people and informed of the consequences. • The code of conduct, as agreed with the affected communities and landowners, should be adhered to. • No alcohol should be sold in the camps, and the amount of alcohol allowed in the camp should be limited. • Prostitutes should not be allowed to enter the camp. • Unspoilt natural areas should be avoided as far as possible, and infrastructure should rather be erected in areas where similar infrastructure already occurs, whilst considering cumulative impacts. • Dust suppression must be undertaken. • No construction work should take place on Sundays, public holidays or at night. • Access to the site should be controlled as far as possible. • Local unemployed people must be given preference in the recruitment process. • No open fires must be allowed. Food should be prepared off-site and transported in. Vendors must travel in and out of the area and should not be allowed in the construction area. • Refer to Agricultural and Air Quality Impact Management.
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	Extent	Probability	Duration	Severity	Significance after mitigation	
	2	1	4	1	8	Medium
Operational	Potential Impact					
	During the Operational Phase of the project, the activities that will have an impact on the social environment include the maintenance of the landfill for use by the local public. The combined project impact on the existing social environment (prior to mitigation) will probably be of a LOW positive significance, affecting the local area. The impact will act in the medium term and has a low probability of occurring. The impact risk class is thus Low positive.					
	Cumulative Impact					
	Potential cumulative impacts include:					
	• The retention of jobs at the landfill site; • Potential for recycling by informal scrap collectors; • Provision of the landfill site for use by local residents, thereby reducing the likelihood that waste will be buried or burnt.					
	The cumulative impact to the social environment (prior to mitigation) during the operational phase will probably be of a LOW positive significance, affecting the local area. The impact will act in the medium term and will have a moderate likelihood of occurring. The impact risk class is thus Low positive.					
	Residual Impact					
	The residual impact on the social environment will probably be of a LOW positive significance, affecting the local area. The impact will occur in the medium term and has a moderate probability of occurrence. The impact risk class is thus Low positive					
	Extent	Probability	Duration	Severity	Significance before mitigation	
	2	2	4	1	16	High
Mitigations						

	Same with the construction phase.					
	Extent	Probability	Duration	Severity	Significance after mitigation	
Closure/ Decommissioning	Potential Impact					
	SIMILAR TO BOTH CONSTRUCTION AND OPERATIONAL PHASES					
	Extent	Probability	Duration	Severity	Significance before mitigation	
	Mitigations					
	SIMILAR TO BOTH CONSTRUCTION AND OPERATIONAL PHASES					
	Extent	Probability	Duration	Severity	Significance after mitigation	

8.5.8. Visual Impacts

Construction	Potential Impact
	Visual impact of the facility on observers in proximity to the proposed facility infrastructure and activities. Potential sensitive visual receptors include: » Residents of the chicken farm and farming community (in closer proximity to the facility) » Observers travelling along the R58 Road and Dukathole (however, the viewshed analysis outcome shows low visibility). The project impact of the proposed development during construction will be from the earthworks that have to be undertaken. The area will be visible from the roads traversing the area, as well as from local residential nodes. Dust, heavy vehicles and construction camps will be visible to those in the area. The combined weighted project impact on the existing visual environment (before mitigation) will definitely be of a HIGH negative significance, affecting the local area. The impact will act in the medium term and will definitely occur. The impact risk class is thus High.

	Cumulative Impact					
	The present visual landscape is one dominated by agriculture and wilderness, with intermittent rural residences and some industrial activities, such as a cemetery and the old landfill site. The additional impact will significantly alter the extent of the predominant current impacts on the visual environment. The cumulative impact on the visual environment (before mitigation) during the construction phase will probably be of a HIGH negative significance, affecting the local area. The impact will act in the medium term and will definitely occur. The impact risk class is thus High					
	Residual Impact					
	The residual impacts will possibly be of MODERATE significance, acting on the local area in the medium term. The impact will definitely occur, and so the overall impact is rated as Moderate.					
	Extent	Probability	Duration	Severity	Significance before mitigation	
	1	3	2	2	12	Medium
	Mitigations					
	- Only the footprint of the proposed site should be exposed. In all other areas, the natural vegetation should be retained; - Dust suppression techniques should be in place at all times during the construction phase. - Access roads should be minimised to prevent unnecessary dust. - Utilise non-shiny structures for the hard park and toilets, i.e. avoid unpainted roofs; and - Ensure that all impacted areas during construction are topsoiled and re-vegetated before commencement of the operational phase to resemble the natural landscape.					
	Extent	Probability	Duration	Severity	Significance after mitigation	
	1	2	2	1	4	Low
	Potential Impact					
Operational	During the operational phase, the primary impact on the receiving visual environment will occur as a result of the deposition of waste, which will result in the height of the facility. The increased height of the facility makes it more visible. The combined project impact on the existing visual environment					

	(before mitigation) will definitely be of a MODERATE negative significance, affecting the local area. The impact will act in the long term and has a high probability of occurrence. The impact risk class is thus Moderate negative.				
	Cumulative Impact The cumulative visual impact (before mitigation) will definitely have a MODERATE negative impact on the local environment in the long term. The impact has a high probability of occurrence. The impact risk class is Moderate negative.				
	Residual Impact The visual impact of the proposed landfill site cannot be mitigated entirely, and a long-term visual impact will probably persist post-operational phase. With mitigation, the impact will have a medium probability of occurrence and is expected to be of a MODERATE negative significance affecting the local extent. The impact risk class is Moderate negative.				
	Extent	Probability	Duration	Severity	Significance before mitigation
	2	3	4	1	24
	Mitigations - Undertake consecutive rehabilitation of the side slopes of the facility to reduce the visual impact; and - Ensure that topsoil stockpiles that will be in place for more than 2 years are seeded and vegetated. - Revegetate all the capped cells. - Plant trees along the fences of the landfill site.				
	Extent	Probability	Duration	Severity	Significance after mitigation
	2	2	3	1	12
Closure/ Decommissioning	Potential Impact				
	SIMILAR TO THE OPERATIONAL PHASE IMPACTS				
	Extent	Probability	Duration	Severity	Significance before mitigation

	Mitigations					
	Extent	Probability	Duration	Severity	Significance after mitigation	

8.5.9. Noise Impacts

Construction	Potential Impact					
	Noise generation during the construction phase at the proposed site					
	Extent	Probability	Duration	Severity	Significance before mitigation	
	1	2	2	2	8	Medium
	Mitigations					
	- All construction vehicles and equipment are to be kept in good repair. - Construction activities, and particularly the noisy ones, are to be contained to reasonable hours during the day and early evening. - Machines in intermittent use should be shut down in the intervening periods between work or throttled down to a minimum. - In general, operations should meet the noise standard requirements of the Occupational Health and Safety Act (No. 85 of 1993). - Construction staff working in areas where the 8-hour ambient noise levels exceed 75 dBA should wear ear protection equipment.					
	Extent	Probability	Duration	Severity	Significance after mitigation	
	1	2	2	1	4	Low
Operational	Potential Impact					
	There are no operational phase noise impacts associated with this project					
	Extent	Probability	Duration	Severity	Significance before mitigation	

	Mitigations					
	Refer to construction phase impacts.					
	Extent	Probability	Duration	Severity	Significance after mitigation	
Closure/ Decommissioning	Potential Impact					
	Refer to construction phase impacts.					
	Extent	Probability	Duration	Severity	Significance before mitigation	
	Mitigations					
	Refer to construction phase impacts.					
	Extent	Probability	Duration	Severity	Significance after mitigation	

8.5.10. Traffic Impacts

Construction	Potential Impact					
	Increase in traffic due to construction activities					
	Extent	Probability	Duration	Severity	Significance before mitigation	
	1	2	3	2	12	Medium
	Mitigations					
	No person is allowed to drive more than 20 km/h on the gravel access road. This is applicable only to the access roads on site. All areas within the site itself have a reduced speed limit of 50 km/h. This is communicated to all persons by means of National Speed Signs.					

	- When using heavy or large vehicles/equipment, “spotters” are to be present to assist the driver with his blind spots. - Any incident or damage to a vehicle must be reported immediately as per municipal Policies and Procedures					
	Extent	Probability	Duration	Severity	Significance after mitigation	
	1	2	3	1	6	Low
Operational	Potential Impact					
	Operational phase traffic.					
	Extent	Probability	Duration	Severity	Significance before mitigation	
	1	2	3	2	12	Medium
	Mitigations					
	Refer to construction phase impacts					
	Extent	Probability	Duration	Severity	Significance after mitigation	
	1	2	3	1	6	Low
Closure/ Decommissioning	Potential Impact					
	Refer to construction phase impacts					
	Extent	Probability	Duration	Severity	Significance before mitigation	
	1	2	3	2	12	Medium
	Mitigations					
	Refer to the construction phase impacts					
	Extent	Probability	Duration	Severity	Significance after mitigation	
	1	2	3	1	6	Low

8.5.11. Waste Management (Waste acceptance and disposal)

Construction	Potential Impact
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	- General waste generated includes domestic waste and small amounts of building rubble. - Hazardous waste is generated through the spillage of oil/diesel/chemicals used during construction					
	Extent	Probability	Duration	Severity	Significance before mitigation	
	1	2	3	2	12	Medium
	Mitigations					
	- Disposal of waste must be in accordance with relevant legislative requirements. - General waste can be disposed of at the disposal site with prior permission from the Operations Manager. All waste must be weighed and recorded prior to disposal. - The Contractor must familiarise themselves with the definitions of waste and the handling, storage and transport of waste as prescribed in the applicable environmental legislation. - Burning of waste will not be permitted.					
	Extent	Probability	Duration	Severity	Significance after mitigation	
	1	1	3	1	3	Low
Operational	Potential Impact					
	- Monitoring of the waste received within the site. - The disposal activities to focus on at the cell at the time. - The litter fence must be maintained. - Open and maintain a compliance register, and all complaints must be investigated and resolved. - Daily covering of the waste. - Collection of litter along the fence lines.					
	Extent	Probability	Duration	Severity	Significance before mitigation	
	1	2	3	2	12	Medium
	Mitigations					

	Refer to the construction phase impacts					
	Extent	Probability	Duration	Severity	Significance after mitigation	
	1	1	3	1	3	Low
Closure/ Decommissioning	Potential Impact					
	Refer to the construction phase impacts					
	Extent	Probability	Duration	Severity	Significance before mitigation	
	1	2	3	2	12	Medium
	Mitigations					
	Refer to the construction phase impacts					
	Extent	Probability	Duration	Severity	Significance after mitigation	
	1	1	3	1	3	Low

8.5.12. Odour, litter and vectors

Construction	Potential Impact					
	none; only applicable to the operational and closure phase					
	Extent	Probability	Duration	Severity	Significance before mitigation	
	Mitigations					
	N/A					
	Extent	Probability	Duration	Severity	Significance after mitigation	
	1	1	3	1	3	Low
Operational	Potential Impact					
	Landfill sites cause environmental and community concerns through odour emissions, wind-blown litter, and the attraction of vectors (pests).					

	- Odour Impacts are caused by decomposing organic waste releasing trace gases like hydrogen sulfide (rotten egg smell), ammonia (pungent), etc. Strong foul smells can impact the quality of life for nearby residents, cause stress, and can trigger physical symptoms like headaches, nausea, and throat irritation. Persistent, bad odours heavily lower property values and land prices in surrounding neighbourhoods. - Litter Impacts may result from plastic bags, paper, and packaging materials that are easily caught and carried away by the wind during dumping and compaction. Wind-blown debris litters surrounding fields, blocks drainage systems, and gets caught in trees. Animals and birds mistake loose plastic and trash for food, which can cause fatal blockages in their digestive systems or entanglement. - Vector (Pest), <i>Flies</i>: Houseflies (<i>Musca domestica</i>) and blowflies (<i>Chrysomya megacephala</i>), Mosquitoes, Rodents: Rats and mice. Cockroaches, birds, and Scavengers can be attracted by badly operated landfill sites. These are attracted by food waste, organic matter, and standing water, which attract pests like rats, mice, flies, mosquitoes, and birds. These vectors act as carriers for dangerous pathogens, increasing the risk of spreading infectious diseases to nearby communities and agricultural fields. Rodents and pests multiply rapidly at the site and spread into local farms or businesses, damaging stored food, produce, and property.					
	Extent	Probability	Duration	Severity	Significance before mitigation	
	1	2	3	2	12	Medium
	Mitigations					
	- Odour monitoring through water and gas monitoring. - The active landfill working face should be maintained at the smallest practicable size consistent with safe landfill operation. - Incoming waste should be promptly: Receive waste → Spread → Compact → Cover → Inspect. - Effective compaction and covering will reduce exposed waste surfaces and thereby assist in controlling odour, windblown litter and direct gaseous emissions. - Waste should not remain unnecessarily exposed overnight where operationally avoidable. - Landfill gas management should form an integral component of the operational and post closure management system. - The landfill operator should monitor for evidence of:					

	○ Methane accumulation; ○ Uncontrolled gas venting; ○ Cracks in landfill cover; ○ Gas migration; ○ Persistent odour; ○ Vegetation stress potentially associated with gas migration; and ○ Abnormal conditions around landfill-gas infrastructure. ● Where landfill gas generation becomes significant, appropriate passive or active gas-control infrastructure should be implemented in accordance with the final engineering design. ● Odour management should focus on prevention at source. The principal controls should include: ○ Rapid compaction of deposited waste; ○ Regular application of appropriate cover; ○ Minimisation of the active working face; ○ Effective landfill-gas management; ○ Appropriate leachate management; ○ Prevention of stagnant contaminated water; ○ Rapid management of unusually odorous waste; ○ Maintaining good housekeeping; ○ Preventing accumulation of decomposing waste outside designated disposal areas; and ○ Investigating odour complaints promptly. ● H₂S should receive particular attention because the field assessment recorded a comparatively elevated result at the existing waste-influenced MP03 location.
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	• Persistent odour beyond the landfill boundary should trigger investigation of the active working face, landfill gas, leachate infrastructure and other potential sources. • Windblown litter is particularly important because of the open landscape surrounding the development and the potential for lightweight material to affect grazing land, roads and the natural environment. The landfill should therefore implement: ○ Perimeter fencing; ○ Appropriately positioned litter-control fencing around active working areas; ○ Rapid waste compaction; ○ Regular covering; ○ Routine collection of windblown material; ○ Increased inspections during windy conditions; and ○ Immediate retrieval of waste transported beyond the authorised landfill footprint. • Construction and landfill equipment should be maintained in good operating condition. Management measures should include: ○ Routine servicing; ○ Prevention of excessive engine idling; ○ Removal or repair of visibly smoking equipment; ○ Efficient vehicle routing; ○ Avoiding unnecessary trips; ○ Maintaining internal roads; and ○ Ensuring waste-delivery vehicles comply with applicable roadworthiness requirements. • These measures will assist in limiting NO_x, particulate matter and other combustion-related emissions. • Open or uncontrolled burning of waste should be prohibited. • Any landfill fire should be treated as an environmental incident because it may generate substantial particulate matter, smoke and gaseous pollutants.
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	• The facility should maintain appropriate fire-prevention and emergency-response procedures, including access to suitable firefighting resources and clear reporting responsibilities. • Leachate and contaminated-water infrastructure should be operated to minimise odour generation. • The operator should avoid prolonged accumulation of stagnant contaminated water where practicable and regularly inspect the leachate collection system and Pollution Control Dam. • Where persistent odour is identified around these facilities, the source should be investigated and corrective action implemented. • Particular attention should be given to SR01, SR02, SR05 and SR06 because these represent educational, accommodation or residential receptors with potentially prolonged human exposure. The receptor map confirms their distribution within the adopted 5 km assessment area. • SR01, representing Vumile Primary School and the surrounding residential area, should be considered a high-priority receptor for dust and particulate management. • Air quality complaints originating from these receptors should be formally recorded, investigated and linked to meteorological and operational conditions at the time of the complaint. • An air quality complaints register should be maintained throughout landfill operation. • Spray neutralizing agents along the site edges when needed. • waste trucks entering the landfill site must cover their loads with nets or tarps. • Crush and cover waste tightly so pests cannot burrow or feed easily. • Hire professional pest control services to spray or trap rodents and flies. • Fill puddles and manage drainage so mosquitoes do not breed in standing water.					
	Extent	Probability	Duration	Severity	Significance after mitigation	
	1	1	3	1	3	Low
Closure/ Decommissioning	Potential Impact					
	Refer to the construction phase impacts					

	Extent	Probability	Duration	Severity	Significance before mitigation	
	1	2	3	2	12	Medium
	Mitigations					
	Refer to the construction phase impacts					
	Extent	Probability	Duration	Severity	Significance after mitigation	
	1	1	3	1	3	Low

8.6. Evaluation of Potential Cumulative Impacts Associated with the Project

Impacts of a cumulative nature place the direct and indirect impacts of the proposed project into a regional and national context, particularly in view of similar or resultant developments and activities in the region. Potential cumulative impacts associated with the proposed development are described below and have been assessed in detail as part of the subsequent EIA phase.

Cumulative impacts, in relation to an activity, refer to 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. For cumulative effects analysis to help the decision-maker and inform interested parties, it must be limited to effects that can be evaluated meaningfully (DEAT, 2004). It is important to explore the potential for cumulative impacts, as this will lead to a better understanding of these impacts and the potential for mitigation that may be required. The scale at which the cumulative impacts are assessed is important. For example, the significance of the cumulative impact on the regional or national economy will be influenced by landfill site developments throughout South Africa, while the significance of the cumulative impact on the visual amenity may only be influenced by similar developments that are in closer proximity to each other. For practical purposes, a sub-regional scale of 20km is considered for the evaluation of the cumulative impact of landfill sites.

Cumulative effects are commonly understood as the impacts which combine from different projects, and which result in a significant change, which is larger than the sum of all the impacts (DEAT, 2004). The complicating factor is that the projects that need to be considered are from the past, present and reasonably foreseeable future development. Cumulative effects can be characterised according to the pathway they follow. One pathway could be the persistent additions from one process. Another pathway could be the compounding effect from one or more processes. Cumulative effects can therefore occur when impacts are:

- Additive (incremental);
- Interactive.
- Sequential; or
- Synergistic.

Canter and Sadler (1997) describe the following process for addressing cumulative effects in an EIA:

- Delineating potential sources of cumulative change (i.e., GIS to map the landfill site facilities in proximity to one another);
- Identifying the pathways of possible change (direct impacts);
- Indirect, non-linear, or synergistic processes; and
- Classification of resultant cumulative changes.

Name of the existing/Authorised Landfill site	Location	Size	Status
Existing Maletswai Landfill Site (Ref No. JG/A/14/001/2022)	30°42'12.63"S 26°40'12.45"E Approximately 1,3 km south of the proposed site.	GCB-	In a process of closure

No other landfill site was found within a 20km radius.

The cumulative impacts that have the potential to be compounded through the development of the landfill site facilities and their associated infrastructure in proximity to other similar developments include impacts such as those listed below. The role of the cumulative assessment is to test if such impacts are relevant to the facility within the development area being considered for approval, including consideration of the following:

- » Unacceptable loss of threatened or protected vegetation types, habitat or species through clearing, resulting in an impact on the conservation status of such flora, fauna or ecological functioning.
- » Unacceptable risk to freshwater features through disturbance associated with construction activities and increased runoff and erosion during the operation phase.
- » Unacceptable risk to avifauna through habitat loss, displacement.
- » Unacceptable loss of high agricultural potential areas presents a risk to food security and increased soil erosion.
- » Unacceptable loss of heritage resources (including palaeontological and archaeological resources);
- » Complete or whole-scale change in the sense of place and character of an area and unacceptable visual intrusion; and
- » Unacceptable impact to socio-economic factors and components, including impacts on sense of place, impacts on local services and accommodation and impacts on the local economy.

Summary of the nature, significance, consequence, extent, duration and probability of the impacts

- » The above-mentioned impacts are considered to be probable, although it is anticipated that the extent, duration, and magnitude of these impacts can be minimised to levels where this impact can be regarded as having low significance through the implementation of appropriate mitigation measures.
- » The operational lifespan of the project is expected to be long-term (i.e. a minimum of 20 years), and subsequently the impact is also expected to be long-term.
- » The impact associated with the proposed development is expected to be local, affecting mainly the immediate environment and surrounding areas.

Gaps in knowledge & recommendations for further study:

- » Each specialist study has consider and assesses the cumulative impacts of proposed, approved and authorised similar projects in the area.

9 ENVIRONMENTAL IMPACT STATEMENT

9.1. Key Findings of the EIA

The findings of the Environmental Impact Assessment indicate that the most significant potential impacts associated with the proposed project relate to geohydrology, hydrology, and the visual environment. These impacts are considered manageable, provided that the mitigation measures and recommendations set out in this report, together with those contained in the Environmental Management Programme (EMPr) attached as Appendix G, are fully implemented. The site sensitivity map is provided in Appendix A.

The assessment further indicates that the existing water management system at the current landfill site does not comply with the applicable permit conditions. Should the current situation remain unchanged, the Municipality is unlikely to achieve compliance with the relevant legislation, guidelines, regulations, and standards. Continued operation under the existing conditions would therefore perpetuate the following constraints:

- inadequate stormwater management around the landfill site;
- inadequate leachate management around the landfill site; and
- insufficient remaining landfill airspace to meet the disposal requirements for the remaining operational life of the facility.

Accordingly, based on the findings of this EIA study, the Environmental Assessment Practitioner (EAP) recommends that the proposed landfill and associated infrastructure be authorised, and that a Waste Management Licence be granted.

In order to achieve appropriate environmental management standards and ensure that the findings of the environmental studies are implemented through practical and enforceable measures, the recommendations arising from this EIA study have been incorporated into the EMPr. The EMPr must be used as the primary tool for ensuring compliance with the environmental specifications, mitigation measures, and management requirements applicable to the project.

The implementation of the EMPr throughout the full life cycle of the project, including the construction, operational, and decommissioning phases, is considered essential to achieving the environmental management standards established for the development. It is further recommended that the following key conditions be included as part of any environmental authorisation and Waste Management Licence issued for the project:

- The proponent must comply with all applicable statutory requirements relevant to the undertaking of the proposed activity. These include, but are not limited to:
 - the provisions of the National Water Act, 1998 (Act No. 36 of 1998); and
 - the provisions of the National Heritage Resources Act, 1999 (Act No. 25 of 1999).

- The proponent must appoint a suitably qualified and experienced independent Environmental Control Officer (ECO) for the construction phase of the development. The ECO must be responsible for monitoring compliance with the EMPr and ensuring that all mitigation, rehabilitation, and management measures and recommendations are implemented.
- The following mitigation measures must be implemented during the operational phase of the facility in line with the EMPr and Operational Management Plan etc:
 - maintenance of the landfill cell lining system, stormwater management infrastructure, and leachate management systems in accordance with the recommendations of the appointed engineer;
 - regular maintenance of the stormwater management system to prevent the ponding of leachate and stormwater runoff on the landfill surface and along the side areas of the landfill; and
 - implementation of a groundwater monitoring programme.

10 CONCLUSION AND RECOMMENDATION

The Environmental Impact Assessment undertaken for the proposed development of a new Class B landfill site and associated infrastructure on the Remaining Extent of Portion 1 of the Farm Melk Spruit No. 12, Walter Sisulu Local Municipality, has considered the need and desirability of the project, the preferred development footprint, site alternatives, environmental sensitivities, specialist findings, public participation inputs and proposed mitigation measures.

The assessment confirms that there is a clear municipal need for a compliant and engineered waste disposal facility to serve the Maletswai area and surrounding settlements. The proposed landfill has been designed to provide approximately **460 881 m³** of airspace over a 20-year operational period, supported by phased-in cell usage, a leachate collection system, stormwater management infrastructure, access control, internal roads, a weighbridge, administrative facilities and waste sorting/recovery infrastructure.

The preferred site and layout are considered environmentally acceptable, provided that the mitigation measures identified in this EIA Report, the specialist studies, the Engineering Design Report and the Environmental Management Programme are fully implemented. The proposed Class B containment system, comprising a composite liner, leachate management infrastructure and monitoring systems, will significantly reduce the risk of contamination to soil, groundwater and surface water resources. The assessment further indicates that potential impacts relating to ecology, aquatic resources, heritage, palaeontology, air quality, traffic, waste handling, stormwater, visual intrusion and nuisance impacts can be avoided, reduced or managed to acceptable levels through the implementation of the recommended mitigation and monitoring measures.

Based on the findings of the EIA process, no fatal flaws have been identified that would prevent the proposed development from proceeding. The residual impacts are considered manageable, subject to strict compliance with applicable legislation, licence conditions, approved design specifications and the EMPr. It is therefore the reasoned opinion of the Environmental Assessment Practitioner that the proposed development may be authorised, subject to the implementation of the recommendations and conditions set out below.

Recommendations

It is recommended that the competent authority consider granting Environmental Authorisation and the Waste Management Licence for the proposed Class B landfill site and associated infrastructure, subject to the following conditions:

- The landfill must be designed, constructed, operated, monitored, rehabilitated and closed in accordance with the approved Engineering Design Report, the Environmental Management Programme, the Waste Management Licence conditions and all applicable waste management legislation.

- The Class B composite liner system, leachate collection system, leachate management infrastructure, stormwater control measures and monitoring systems must be installed and verified by suitably qualified professionals before disposal activities commence.
- Clean and dirty stormwater must be separated at all times. Stormwater diversion channels, cut-off drains, dirty water containment systems and erosion control measures must be constructed and maintained to prevent contaminated runoff from entering surrounding watercourses or sensitive areas.
- A groundwater, surface water, leachate and air quality monitoring programme must be implemented during the construction, operational, closure and post-closure phases. Monitoring results must be submitted to the relevant authorities as required by the licence conditions.
- Waste acceptance procedures must be strictly enforced to ensure that only authorised general waste streams are accepted at the facility. Hazardous waste, health-care risk waste and any unauthorised waste types must not be accepted and must be redirected to appropriately licensed facilities.
- The mitigation measures recommended in the ecological, aquatic, heritage, palaeontological, geotechnical, agricultural, air quality and engineering assessments must be incorporated into the final EMPr and implemented by the applicant, contractors and site operator.
- The recommended buffer zones and no-go areas must be clearly demarcated before construction commences and must be maintained for the duration of the project.
- A suitably qualified Environmental Control Officer should be appointed to monitor compliance with the EMPr during construction and to provide independent environmental compliance reporting.
- Progressive rehabilitation must be undertaken as each landfill cell reaches capacity. This must include profiling, capping, erosion control, vegetation establishment and long-term stability monitoring.
- The applicant must ensure that sufficient financial, technical and institutional capacity is available for construction, operation, maintenance, monitoring, rehabilitation, closure and post-closure management of the landfill.
- Implementation of the approved operational management plan, air and water quality monitoring plan, etc.

11 AFFIRMATION BY EAP

I, KABEDI MASHILO OF RAMBUDA CONSULTANTS (name of company) declare that;

- I act as the independent environmental practitioner in this application
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting environmental impact assessments, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I will take into account, to the extent possible, the matters listed in Regulation 18 of the regulations when preparing the application and any report relating to the application;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by me for submission to the competent authority;
- I will ensure that information containing all relevant facts in respect of the application is distributed or made available to interested and affected parties and the public and that participation by interested and affected parties is facilitated in such a manner that all interested and affected parties will be provided with a reasonable opportunity to participate and to provide comments on documents that are produced to support the application;
- I will ensure that the comments of all interested and affected parties are considered and recorded in reports that are submitted to the competent authority in respect of the application, provided that comments that are made by interested and affected parties in respect of a final report that will be submitted to the competent authority may be attached to the report without further amendment to the report;
- **I will keep a register of all interested and affected parties that participated in a public participation process; and**
- **I will provide the competent authority with access to all information at my disposal regarding the application, whether such information is favourable to the applicant or not**
- **all the particulars furnished by me in this form are true and correct;**
- ***will perform all other obligations as expected from an environmental assessment practitioner in terms of the Regulations; and***
- **I realise that a false declaration is an offence in terms of Regulation 48 and is punishable in terms of section 49B (2) of the Act.**

SIGNATURE OF EAP

DATE

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