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AGRICULTURAL IMPACT ASSESSMENT

Establishment of a New Landfill Site in Maletswai (Aliwal North), Eastern Cape Province

Prepared For

Rambuda Consultants (Pty) Ltd

On Behalf of

Walter Sisulu Local Municipality

AUGUST 1, 2026

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DOCUMENT INFORMATION TABLE

Document Information	Details
Report Title	Agricultural Impact Assessment
Project Title	Establishment of a New Landfill Site in Maletswai (Aliwal North), Eastern Cape Province
Project Number	77/2024/2025
Client / Employer	Walter Sisulu Local Municipality
Main Consultant	Rambuda Consultants (Pty) Ltd
Specialist Consultant	KMG Environmental Solutions Services (Pty) Ltd
Project Location	Maletswai (Aliwal North), Eastern Cape Province
Approximate Coordinates	30°41'28.34"S, 26°39'52.36"E
Assessment Type	Soil, Agricultural Potential, Land Use and Land Capability Impact Assessment
Assessment Date	30 July 2026
Report Date	21 August 2026
Project Phase	Environmental Authorisation and Waste Management Licence Application
Assessment Areas	Preferred Site, Alternative Site No. 1 and Alternative Site No. 2
Proposed Operational Life	Approximately 20 Years
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Reviewed and Approved By	Tshiamo Mcdonald Setsipane – M.Sc. (Agric) Soil Science, Pr.Sci.Nat.
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Specialist Appointment Date	28 July 2026
Laboratory	NviroTek Laboratories
Laboratory Report Reference	WO 207429:264476
Laboratory Report Date	12 August 2026
Purpose of Assessment	To assess the soil characteristics, agricultural potential, land use and land capability of the proposed development areas; compare the Preferred Site and alternatives; determine potential agricultural impacts; and recommend appropriate mitigation and management measures.

REPORT DISCLAIMER

This Agricultural Impact Assessment Report has been prepared by KMG Environmental Solutions Services (Pty) Ltd for the proposed establishment of a new landfill site in Maletswai (Aliwal North), Eastern Cape Province. The report has been prepared specifically for use by Walter Sisulu Local Municipality, Rambuda Consultants (Pty) Ltd and the relevant regulatory authorities in support of the applicable environmental authorisation and waste management licensing processes.

The findings, interpretations and recommendations presented in this report are based on information made available to KMG at the time of the assessment, including project design information, site observations undertaken during the assessment on 30 July 2026, available desktop information and laboratory analyses of soil samples collected from the assessed sites. The assessment considers the Preferred Site, Alternative Site No. 1 and Alternative Site No. 2 in accordance with the specialist appointment requirements.

The conclusions contained herein represent the professional interpretation of the information available at the time of reporting and are applicable to the proposed development and assessment areas described in this report. Changes to the project footprint, design, land use, site conditions or proposed activities may require reconsideration or updating of the findings and recommendations.

This report should be read in its entirety. Individual sections, tables, figures, conclusions or recommendations should not be interpreted independently of the overall assessment. KMG Environmental Solutions Services (Pty) Ltd accepts no responsibility for the use of this report for purposes other than those for which it was prepared or for modifications made to the report without written authorisation.

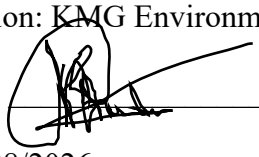
SPECIALIST DECLARATIONS

Declaration by the Author

I, Khumbelo Given Marabe, declare that:

- I am the author responsible for the preparation of this Agricultural Impact Assessment for the proposed establishment of a new landfill site in Maletswai (Aliwal North), Eastern Cape Province.
- I am registered with the South African Council for Natural Scientific Professions (SACNASP) as a Professional Natural Scientist, Registration No. 132731.
- I have applied appropriate professional judgement in compiling this assessment based on the project information, site assessment undertaken on 30 July 2026, available desktop information and laboratory results.
- I have no vested or financial interest in the proposed development other than remuneration for professional services rendered.
- The findings and recommendations presented in this report are based on the information available at the time of the assessment.
- I undertake to disclose any material information that may influence the findings or recommendations contained in this report.
- To the best of my knowledge, the information presented in this report is accurate and has not been intentionally altered or misrepresented.

Name: Khumbelo Given Marabe
Professional Registration: Pr.Sci.Nat. – Environmental Science, SACNASP Reg. No. 132731
Role: Author
Organisation: KMG Environmental Solutions Services (Pty) Ltd

Signature: 

Date: 21/08/2026

Declaration by the Reviewer and Approver

I, Tshiamo Mcdonald Setsipane, declare that:

- I have reviewed this Agricultural Impact Assessment and the technical findings, interpretations, conclusions and recommendations contained herein.
- I am suitably qualified and experienced in Soil Science and the assessment of soils, agricultural potential, land use and land capability.
- I hold an M.Sc. (Agric) in Soil Science and have professional experience in Soil, Land Use and Land Capability Assessments, Agricultural Impact Assessments and related specialist investigations.
- I have undertaken the review independently and have applied appropriate professional judgement to the information presented.
- I have no vested or financial interest in the proposed development other than remuneration for professional services rendered.
- To the best of my professional knowledge, the assessment appropriately presents the findings arising from the information and specialist data considered in the report.
- I approve the report for submission, subject to the limitations and conditions stated within the assessment.

Name: Tshiamo Mcdonald Setsipane
Qualification: M.Sc. (Agric) Soil Science
Professional Capacity: Soil Scientist / Professional Natural Scientist
Role: Reviewer and Approver

Signature: 

Date: 21/08/2026

ACRONYMS AND ABBREVIATIONS

Acronym / Abbreviation	Description
AIA	Agricultural Impact Assessment
AQIA	Air Quality Impact Assessment
BA	Basic Assessment
CBR	California Bearing Ratio
CCL	Compacted Clay Liner
CQA	Construction Quality Assurance
DFFE	Department of Forestry, Fisheries and the Environment
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
EC	Electrical Conductivity
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
GCL	Geosynthetic Clay Liner
GIS	Geographic Information System
GPS	Global Positioning System
HDPE	High-Density Polyethylene
IWMP	Integrated Waste Management Plan
KMG	KMG Environmental Solutions Services (Pty) Ltd
LFG	Landfill Gas
MRF	Material Recovery Facility
MRD	Maximum Rate of Deposition
NEMA	National Environmental Management Act, 1998 (Act No. 107 of 1998)
NEM:AQA	National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004)
NEMWA	National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008)
NWA	National Water Act, 1998 (Act No. 36 of 1998)
OHS	Occupational Health and Safety
OMC	Optimum Moisture Content
PCD	Pollution Control Dam
Pr.Sci.Nat.	Professional Natural Scientist
SACNASP	South African Council for Natural Scientific Professions
SAWS	South African Weather Service
SAWIS	South African Waste Information System
SANS	South African National Standards
SSSA	Soil Science Society of South Africa
WMA	Water Management Area
WML	Waste Management Licence
WSLM	Walter Sisulu Local Municipality

TERMS AND DEFINITIONS

Term	Definition

Agricultural Impact Assessment	A specialist assessment undertaken to determine the potential effects of a proposed development on soils, agricultural land use, land capability and agricultural potential.
Agricultural Potential	The inherent potential of land to support agricultural production based on factors such as soil properties, terrain, climate, water availability and prevailing land use.
Agricultural Sensitivity	The relative sensitivity of land to disturbance or permanent transformation based on its agricultural potential, land capability, soil characteristics and existing agricultural use.
Alternative Site	An alternative location considered for the proposed landfill development. For this assessment, Alternative Site No. 1 and Alternative Site No. 2 are assessed comparatively with the Preferred Site.
Baseline Conditions	The existing environmental and agricultural conditions of the study area prior to implementation of the proposed development.
Land Capability	The ability of land to support a particular type and intensity of land use without resulting in unacceptable or long-term degradation of the soil resource.
Land Use	The current manner in which land is utilised, including agricultural activities, grazing, cultivation, infrastructure, conservation or other uses.
Mitigation	Measures designed to avoid, prevent, minimise, rehabilitate or otherwise manage adverse impacts associated with the proposed development.
Preferred Site	The site identified through the project site-selection process as the preferred location for development of the proposed Maletswai Landfill Facility.
Rehabilitation	Measures undertaken to restore disturbed land to a stable, functional and sustainable condition following construction, operation or closure activities.
Soil	The naturally occurring unconsolidated material at the Earth's surface consisting of mineral particles, organic matter, water and air that provides the physical medium for plant growth.
Soil Fertility	The capacity of soil to supply essential plant nutrients in appropriate quantities and proportions for plant growth.
Soil Profile	A vertical section through the soil showing the sequence and characteristics of soil horizons from the surface to the underlying parent material.
Soil Sampling	The collection of representative soil material from selected locations for field description and/or laboratory analysis.
Soil Chemical Properties	Chemical characteristics of soil that influence fertility and plant growth, including pH and concentrations or proportions of nutrients and exchangeable elements such as phosphorus, potassium, calcium, magnesium and sodium.
Soil pH	A measure of soil acidity or alkalinity. The laboratory results considered in this assessment report soil pH determined in potassium chloride (KCl).

Study Area	The geographical area considered during the specialist assessment, including the Preferred Site and the identified alternative sites where applicable.
Topsoil	The upper soil horizon containing relatively higher concentrations of organic matter, nutrients and biological activity and which is generally the most valuable soil material for rehabilitation purposes.
Development Footprint	The area that will be directly transformed or disturbed by the proposed landfill cells and associated infrastructure.
Landfill	An engineered waste disposal facility where waste is deposited onto or into land and managed in accordance with applicable environmental and waste management requirements.
Landfill Cell	A defined engineered portion of a landfill within which waste is progressively deposited, compacted and covered.
Material Recovery Facility	A facility associated with the proposed landfill where recyclable materials may be separated and recovered from the waste stream before final disposal.
Impact	A change to the existing environmental or agricultural condition resulting directly or indirectly from an activity associated with the proposed development.
Residual Impact	The impact that remains after appropriate mitigation and management measures have been implemented.
Cumulative Impact	The combined effect of the proposed development together with existing or reasonably foreseeable activities affecting the same environmental resource.
Significance	The relative importance of an identified impact determined through consideration of factors such as magnitude, extent, duration, probability and the sensitivity of the affected resource.
Site Suitability	The degree to which a site is considered appropriate for the proposed development after consideration of identified environmental constraints, sensitivities and potential impacts.

EXECUTIVE SUMMARY

KMG Environmental Solutions Services (Pty) Ltd was appointed by Rambuda Consultants (Pty) Ltd to undertake an Agricultural Impact Assessment (AIA) 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 the Preferred Site, Option Site 1 and Option Site 2 and provides specialist agricultural input to the environmental authorisation, waste management licensing and site-selection processes.

The proposed landfill is intended to provide replacement municipal waste-disposal capacity following the existing Maletswai landfill reaching the end of its operational lifespan. The proposed facility will have an anticipated operational life of approximately 20 years and will include engineered landfill cells, access and internal roads, a weighbridge, Material Recovery Facility, administration facilities, stormwater and leachate-management infrastructure, a Pollution Control Dam and associated services.

The AIA comprised desktop assessment, field verification undertaken on 30 July 2026, soil sampling, laboratory analysis, assessment of existing agricultural land use, soil and land capability interpretation and comparative assessment of the three development alternatives.

Baseline Agricultural Environment

The project occurs within a predominantly rural agricultural landscape. Field verification confirmed that all three candidate sites are characterised principally by grassland utilised for livestock grazing. Evidence of cattle, sheep, goats and other domestic livestock was observed, while no active crop cultivation was identified within the candidate footprints during the field assessment.

Regional agricultural and land-capability mapping similarly identifies grazing as the dominant agricultural function of the candidate sites. The Preferred Site has a desktop association with temporary commercial dryland cultivation, which may indicate historical cultivation or broader cultivation potential, although current field conditions were predominantly grazing.

The three candidate sites are considered to have moderate agricultural capability, predominantly suited to grazing. None of the candidate footprints directly overlaps the mapped Irrigation Protected Agricultural Areas or Rain-fed Protected Agricultural Areas considered in the assessment.

Soil and Agricultural Capability

Regional SOTER mapping indicates that the broader landscape contains Chromic Luvisols, Eutric Leptosols, Eutric Cambisols and Haplic Luvisols. The Preferred Site and Option Site 2 are principally associated with Chromic Luvisols, while Option Site 1 occurs close to the transition between Eutric Leptosols and Chromic Luvisols.

Five representative soil samples were collected, comprising three samples from the Preferred Site and one from each alternative. Laboratory analysis demonstrated variability in soil chemistry, with pH(KCl) ranging from 5.26 to 6.43 and differences in phosphorus,

potassium, calcium, magnesium and other exchangeable properties. No individual analytical parameter identified any of the alternatives as exceptionally high-potential agricultural soil.

The integrated soil, terrain, rainfall, land-use and field information therefore supports an overall classification of moderate agricultural capability, with grazing representing the principal sustainable agricultural function.

Nearby Perennial Nut Plantations

The broader agricultural receiving environment includes perennial nut plantations, which are regarded as high-sensitivity agricultural receptors. Unlike the predominantly grazing-oriented candidate footprints, perennial orchards represent long-term commercial agricultural investment and require consideration of potential off-site impacts from landfill activities.

The principal potential risks include dust deposition on foliage, smoke from accidental landfill fires or uncontrolled burning, windblown litter, persistent odour and waste-associated pests or vectors.

Persistent dust deposition on tree foliage may, where sufficiently severe or prolonged, interfere with light interception and leaf gas exchange and consequently has the potential to affect photosynthetic functioning and crop productivity. The principal concern is therefore repeated or chronic deposition rather than isolated short-duration dust events.

Potential smoke and odour exposure also requires precautionary management because the plantation produces a commercial nut crop. However, the assessment does not establish that landfill emissions will result in nut taint, reduced yield or loss of export or phytosanitary certification. These are potential risk pathways that require prevention, monitoring and investigation where credible evidence of exposure occurs.

The plantation should therefore be formally treated as a high-sensitivity agricultural receptor within the EMPr.

Principal Agricultural Impacts

Development of the landfill will result in unavoidable permanent transformation of soil and loss of grazing land within the approved footprint. The principal direct impacts include topsoil loss, alteration of soil profiles, compaction, erosion, potential contamination and reduction in agricultural land capability.

Potential indirect impacts include dust deposition on surrounding agricultural vegetation and perennial crops, smoke exposure, windblown waste, odour, pest/vector attraction and potential crop-quality concerns.

The engineered landfill containment system, leachate collection infrastructure, clean and contaminated stormwater separation and Pollution Control Dam provide important controls against contamination of surrounding agricultural soils.

With effective footprint control, topsoil conservation, dust suppression, pollution prevention, fire management, litter control, vector management and rehabilitation, most impacts outside the permanent landfill footprint are expected to remain manageable.

Alternatives and Site Preference

The Preferred Site is considered the most favourable alternative from an agricultural perspective when both direct land transformation and potential indirect impacts on surrounding agricultural activities are considered.

The Preferred Site benefits from comparatively greater surrounding vegetation and terrain features that provide partial natural screening against near-ground wind movement, dust and windblown litter. It also has lower cumulative interaction with the existing dumping area than Option Site 1.

Option Site 1 is ranked second. Although its already disturbed setting reduces additional fragmentation of grazing land, it occurs adjacent to the existing dumping site and is influenced by electrical powerlines, servitudes and nearby railway infrastructure. This introduces greater cumulative potential for waste-related dust, odour, litter and vector effects.

Option Site 2 is ranked third. It comprises functional grazing land but is comparatively open and exposed, with fewer substantial natural wind barriers and proximity to road, railway and electrical infrastructure. This setting increases the potential for unrestricted wind-driven dust and litter transport across surrounding agricultural and natural land.

The agricultural ranking is therefore:

- Preferred Site – most preferred
- Option Site 1 – second preferred
- Option Site 2 – least preferred

Mitigation and Monitoring

The principal agricultural management requirements include minimising the development footprint, stripping and conserving suitable topsoil, preventing unnecessary compaction, controlling erosion and stormwater, preventing contamination and progressively rehabilitating disturbed areas.

Protection of the perennial nut plantation should additionally include plantation-facing dust monitoring, wind-speed and wind-direction monitoring, effective road-dust suppression, retention of vegetation screening where practicable, prohibition of uncontrolled waste burning, landfill fire prevention, litter containment, landfill-gas and odour management and integrated pest/vector control.

Any credible complaint relating to crop contamination, persistent dust deposition or nut taint should be investigated using the source conditions, meteorological information and, where justified, appropriate crop or product laboratory analysis.

Specialist Conclusion

No agricultural fatal flaw has been identified for the proposed Maletswai Landfill.

The development will result in unavoidable permanent loss of moderate-capability grazing land within the landfill footprint. However, the affected candidate sites do not comprise confirmed high-potential intensive cropland, and impacts on agricultural resources outside the permanent footprint can be substantially reduced through appropriate mitigation and monitoring.

The nearby perennial nut plantations increase the sensitivity of the broader agricultural receiving environment and require specific protection against dust, smoke, litter, odour, contamination and waste-associated vectors. These potential impacts are considered manageable and do not, on the available evidence, indicate that crop yield, product quality or phytosanitary/export status will necessarily be adversely affected.

The Preferred Site is therefore supported as the most suitable agricultural alternative because it provides the most favourable balance between direct agricultural land loss, natural terrain and vegetation screening, cumulative waste-related risk and protection of surrounding agricultural activities.

Development of the Preferred Site is considered acceptable from an agricultural perspective, provided that the soil conservation, pollution prevention, plantation protection, dust and fire control, litter management, monitoring and rehabilitation measures prescribed in this AIA are incorporated into the EMPr and implemented throughout the project lifecycle.

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1. INTRODUCTION

1.1 Background

Walter Sisulu Local Municipality (WSLM) is proposing the establishment of a new municipal landfill facility in the Maletswai (Aliwal North) area of the Eastern Cape Province. The project forms part of the Municipality's strategy to improve waste management services and provide adequate long-term waste disposal capacity within its area of jurisdiction.

The existing Maletswai landfill has reached the end of its operational lifespan and has been approved for closure. Consequently, WSLM initiated the development of a new engineered landfill facility and associated Material Recovery Facility (MRF) to provide continued municipal waste disposal services while improving compliance with applicable environmental and waste management requirements.

Imbawula Civil Projects (Pty) Ltd was appointed by WSLM on 03 April 2025 as the Professional Service Provider and Employer's Agent for the planning, design, environmental authorisation and implementation support associated with the new landfill facility and the rehabilitation and closure of the existing Maletswai landfill under Contract No. 77/2024/2025. The overall project includes feasibility assessment, environmental authorisation, engineering investigations, detailed design, preparation of tender documentation, construction monitoring, commissioning support and project close-out.

As part of the environmental assessment process, three potential development sites were identified and assessed. These comprise the Preferred Site, Alternative Site No. 1 and Alternative Site No. 2. The preliminary site selection process considered environmental, geotechnical, hydrological and engineering factors. The Preferred Site was identified as favourable in the design assessment due to its relatively low visual impact, location more than 200 m from identified watercourses, favourable geotechnical conditions, existing road and electricity services and potential for future expansion.

KMG Environmental Solutions Services (Pty) Ltd was subsequently appointed by Rambuda Consultants (Pty) Ltd to undertake specialist Agricultural and Air Quality assessments for the proposed development. The appointment specifically requires the specialist investigations to consider all identified alternatives and provide a professional opinion in accordance with the relevant environmental standards applicable to the respective specialist fields.

This report presents the Agricultural Impact Assessment undertaken for the proposed development. The assessment considers the potential implications of the proposed landfill on soil resources, existing agricultural land use, land capability and agricultural potential and provides mitigation and management measures to minimise adverse impacts.

1.2 Project Location

The proposed landfill development is located near Maletswai (Aliwal North) within Walter Sisulu Local Municipality in the Eastern Cape Province, close to the provincial boundary with the Free State. The project site is situated at approximately:

Latitude: 30°41'28.34"S
Longitude: 26°39'52.36"E

Primary regional access is provided by the N6 national road connecting East London and Bloemfontein through Aliwal North. Access from Aliwal North towards the project area is provided through provincial and local gravel roads, followed by existing farm access roads approaching the proposed development area. The existing access network is currently associated with agricultural activities and may require minor upgrading or maintenance to accommodate construction traffic, particularly during wet conditions.

The broader project area occurs within a predominantly rural landscape. The terrain is described in the project design information as gently undulating, with surface gradients generally ranging between approximately 1% and 5%.

1.3 Purpose of the Agricultural Impact Assessment

The purpose of this Agricultural Impact Assessment is to establish the baseline agricultural characteristics of the proposed development area and determine the potential impacts that may arise from the construction, operation and eventual closure of the proposed landfill facility.

The assessment specifically considers the Preferred Site, Alternative Site No. 1 and Alternative Site No. 2. The assessment is intended to provide specialist agricultural information that can inform the environmental authorisation, waste management licensing and site-selection processes.

The assessment considers soil characteristics, agricultural potential, land capability, existing land use and the sensitivity of agricultural resources to disturbance. Particular attention is given to the potential permanent transformation of soil resources within the landfill footprint and the implications of associated infrastructure, earthworks and landfill operations.

1.4 Objectives of the Assessment

The principal objectives of the Agricultural Impact Assessment are to:

- Characterise the existing soil and agricultural environment within the assessed sites;
- Evaluate relevant soil physical and chemical characteristics;
- Determine the agricultural potential and land capability of the affected areas;
- Identify existing agricultural land uses within and surrounding the development areas;
- Determine the agricultural sensitivity of the preferred site and alternative sites;
- Evaluate potential impacts associated with construction, operation, rehabilitation and closure of the landfill;
- Compare the preferred site, alternative site no. 1 and alternative site no. 2 from an agricultural perspective;
- Identify appropriate measures for topsoil conservation, erosion prevention, pollution prevention and rehabilitation;
- Determine residual impacts following implementation of mitigation measures; and
- Provide a specialist opinion regarding the agricultural suitability of the proposed development and assessed alternatives.

1.5 Scope of Work

The Agricultural Impact Assessment incorporates a review of available project and environmental information, consideration of the proposed landfill design and associated infrastructure, site assessment undertaken on 30 July 2026, soil sampling, laboratory analysis and interpretation of the findings.

Five soil samples were submitted to NviroTek Laboratories for chemical analysis. Three samples represent the Preferred Site, while one sample was analysed from Alternative Site No. 1 and one from Alternative Site No. 2. Laboratory parameters included pH (KCl), Bray I phosphorus, exchangeable potassium, sodium, calcium and magnesium, exchangeable acidity, base proportions, S-value, T-value, density and sulphur.

The assessment therefore integrates available desktop information, project design information, field observations and laboratory soil data to characterise the agricultural environment and assess the potential effects of the proposed development.

1.6 Proposed Development

The proposed development comprises an engineered municipal landfill facility designed to provide approximately 20 years of waste disposal capacity. Based on the project design information, the facility is anticipated to commence disposal operations in approximately 2027.

The development will include landfill disposal cells and associated infrastructure, including a composite containment system, leachate collection infrastructure, stormwater management infrastructure, Pollution Control Dam, access and internal roads, weighbridge and control facilities, administration and staff facilities, security infrastructure, utilities and a Material Recovery Facility.

The proposed landfill cell footprint has been developed around an approximately 10 m above-ground waste fill configuration with approximately 3 m excavation below existing ground level. The design report identifies an active landfill cell footprint of approximately 35,500 m² (3.55 ha), with the overall development requiring additional land for ancillary infrastructure, roads, buffer areas and environmental management facilities.

From an agricultural perspective, development of the landfill will require stripping and disturbance of existing soils, excavation, earthworks, construction of infrastructure and long-term transformation of land within the operational footprint. These activities form the principal basis for the agricultural impact assessment presented in the subsequent sections of this report.

1.7 Assessment Date

The field component of the Agricultural Impact Assessment was undertaken on 30 July 2026. The information collected during the assessment, together with the available project documentation and subsequent laboratory soil analysis, forms the basis of this specialist report.

2. PROJECT DESCRIPTION

2.1 Project Overview

Walter Sisulu Local Municipality proposes to establish a new engineered municipal landfill facility in Maletswai (Aliwal North), Eastern Cape Province. The development is intended to provide replacement waste disposal capacity following the existing Maletswai landfill reaching the end of its operational lifespan.

The proposed facility forms part of a broader municipal waste management intervention that includes development of the new landfill and the rehabilitation and closure of the existing disposal facility. The project is being undertaken under Contract No. 77/2024/2025.

The proposed landfill has been designed to accommodate municipal solid waste generated within Walter Sisulu Local Municipality over an anticipated operational period of approximately 20 years. The engineering design incorporates phased landfill development, environmental containment systems and supporting infrastructure required for the operation and management of the facility.

2.2 Need for the Proposed Development

The existing Maletswai landfill has reached its available airspace capacity and is in the process of closure. The project design report further identifies existing waste management practices, including waste burning and inadequate covering of deposited waste, as environmentally undesirable conditions requiring improvement.

The proposed development is therefore intended to provide a purpose-designed waste disposal facility incorporating engineered environmental protection measures and appropriate operational controls.

The proposed facility will provide for controlled waste acceptance, weighing and record keeping, engineered waste placement and compaction, daily and intermediate cover, stormwater management, leachate collection, landfill gas management, environmental monitoring, recycling and progressive rehabilitation.

2.3 Site Alternatives

Three potential development sites were considered during the project site-selection process:

- Preferred Site;
- Alternative Site No. 1; and
- Alternative Site No. 2.

The project design report compares the alternatives using visual impacts, proximity to watercourses, geotechnical conditions, availability of services and potential for future expansion.

The comparison presented in the design report is summarised below.

Parameter	Preferred Site	Alternative Site No. 1	Alternative Site No. 2
Visual Impacts	Low	High	High
Proximity to Watercourses	More than 200 m	Less than 100 m	More than 100 m
Geotechnical Conditions	Ideal	Ideal	Difficult to excavate
Availability of Services	Road and electricity	Road	None
Future Expansion	Possible	Not possible	Not possible

The specialist appointment requires the Agricultural Impact Assessment to cover all alternatives and express a specialist opinion in accordance with the relevant environmental standards.

Accordingly, the agricultural assessment does not rely solely on the engineering preference. Each alternative is considered from a soil, land use, land capability and agricultural potential perspective before a specialist site preference is determined.

2.4 Landfill Classification and Waste Disposal Requirements

The design report classifies the proposed Maletswai landfill as a small landfill based on projected waste deposition rates. Approximately 12,256 tonnes of waste per annum were estimated for the 2024 base year, corresponding to approximately 47.1 tonnes per operational day based on 260 operating days per year.

With an assumed annual waste growth rate of 1.5%, the projected waste quantity for the anticipated first operational year of 2027 is approximately 12,780.6 tonnes per annum, equivalent to an Initial Rate of Deposition of approximately 49.1 tonnes per day.

Over the 20-year design period, the Maximum Rate of Deposition is projected to increase to approximately 66.1 tonnes per day. The design report consequently identifies the facility as a small landfill and describes the proposed facility as a Class B liner landfill with a G:S:B- classification.

2.5 Landfill Footprint and Capacity

The proposed disposal cell footprint considered during the engineering design is approximately 46,985 m². The conceptual configuration includes excavation to approximately 3 m below ground level and a final landfill height of approximately 10 m above existing ground level, with side slopes of approximately 1 vertical to 3 horizontal.

The design report calculates a gross available airspace of approximately 519,184 m³ for this configuration. The projected total airspace requirement over the 20-year operational period is approximately 460,881 m³, including allowance for cover material.

For detailed containment and leachate design purposes, an active landfill cell footprint of approximately 35,500 m² (3.55 ha) is used. The broader development area will additionally

accommodate roads, leachate and stormwater infrastructure, buffer areas and supporting facilities.

2.6 Proposed Landfill Infrastructure

The proposed development includes the principal waste disposal area together with infrastructure necessary for controlled landfill operation. Based on the detailed design, the facility will incorporate:

- Engineered landfill cells;
- Access and internal roads;
- Weighbridge and control office;
- Material recovery facility;
- Administration and staff facilities;
- Security fencing and controlled access;
- Water and electricity services;
- Plant and equipment maintenance areas;
- Landfill gas management infrastructure;
- Stormwater diversion and drainage infrastructure;
- Leachate collection and conveyance infrastructure;
- Pollution control dam;
- Environmental monitoring infrastructure; and
- Areas required for progressive rehabilitation and final closure.

The supporting infrastructure will occupy additional land beyond the active disposal cells and therefore forms part of the overall area considered when evaluating potential disturbance of soil and agricultural resources.

2.7 Landfill Containment System

The proposed landfill incorporates an engineered composite containment system intended to minimise the potential migration of leachate and contaminants into the underlying soil and groundwater environment.

The selected liner configuration comprises:

- Prepared and compacted subgrade;
- Reinforced geosynthetic clay liner (gcl);
- 2.0 mm textured high-density polyethylene (hdpe) geomembrane;
- Geotextile protection layer;
- Leachate drainage blanket; and
- Perforated hdpe leachate collection pipes.

From an agricultural soil perspective, the containment system is relevant because it reduces the potential for contamination of soils surrounding and underlying the operational landfill footprint. However, soils located directly within the landfill footprint will undergo substantial physical disturbance during excavation and construction.

2.8 Stormwater and Leachate Management

The stormwater management strategy is based on separating clean stormwater from potentially contaminated runoff. Clean runoff originating outside operational landfill areas will be diverted around the facility using cut-off drains, diversion berms and drainage channels.

Runoff originating within operational areas will be treated as contaminated water and directed toward the leachate management system and Pollution Control Dam.

The leachate management system will comprise a drainage blanket, perforated HDPE collection pipes, collection sumps, transfer infrastructure and a lined Pollution Control Dam.

These measures are particularly relevant to the agricultural assessment because uncontrolled contaminated runoff or leachate could adversely affect soil quality and potentially reduce the agricultural functionality of surrounding land.

2.9 Waste Placement and Operational Activities

During operation, waste will be placed in layers not exceeding approximately 0.5 m and compacted using landfill compaction equipment. The design assumes an in-place waste density of approximately 0.8 t/m³.

A minimum soil cover thickness of approximately 150 mm is proposed for daily cover, while approximately 300 mm of intermediate cover will be applied to inactive areas. The use of soil for operational cover represents an important consideration for the agricultural assessment because suitable soil material will need to be sourced and managed throughout the operational life of the landfill.

The working face will be kept as small as practicable, while stormwater diversion berms and cut-off drains will be maintained around active cells to minimise water ingress.

2.10 Material Recovery and Waste Diversion

The proposed facility will incorporate a Material Recovery Facility near the landfill entrance. The MRF is intended to facilitate separation and recovery of recyclable materials including plastics, cardboard, glass and metals before final disposal.

The design report indicates that recycling and waste diversion are intended to reduce the quantity of material requiring disposal and thereby contribute to extending the operational life of the landfill.

2.11 Progressive Rehabilitation and Closure

Landfill development is proposed to occur progressively. Completed areas will receive interim or final cover to minimise infiltration, erosion and nuisance impacts.

At final closure, the landfill will be capped using a cover system incorporating a low-permeability barrier, drainage components and vegetated soil cover. Vegetation will be

established to stabilise the final landform and assist with integration of the closed facility into the surrounding landscape.

From an agricultural perspective, rehabilitation will require appropriate management of available topsoil and other suitable growth media. Soil stripped from development areas should therefore be conserved wherever practicable for subsequent rehabilitation rather than being unnecessarily mixed with subsoil, waste or unsuitable construction material.

2.12 Activities Relevant to the Agricultural Assessment

The principal project activities with the potential to affect soil and agricultural resources include vegetation clearing, stripping of topsoil, excavation to form landfill cells, construction of roads and supporting infrastructure, movement of heavy machinery, soil stockpiling, use of soil as landfill cover material, construction of stormwater and leachate infrastructure, waste disposal operations and final rehabilitation.

These activities may result in direct loss or transformation of agricultural land, disturbance of soil horizons, compaction, erosion, changes in surface drainage and potential contamination where waste, leachate, fuels or other pollutants are inadequately managed.

The subsequent sections of this assessment therefore evaluate the existing soil and agricultural environment to establish the significance of these potential impacts and determine the appropriate management measures for the Preferred Site and alternative sites.

3. TERMS OF REFERENCE AND SCOPE OF ASSESSMENT

3.1 Terms of Reference

KMG Environmental Solutions Services (Pty) Ltd was appointed by Rambuda Consultants (Pty) Ltd to undertake an Agricultural Impact Assessment for the proposed landfill development in Maletswai (Aliwal North), Eastern Cape Province. The appointment forms part of the specialist environmental investigations required for the proposed development.

The appointment letter, dated 28 July 2026, requires KMG to undertake Agricultural and Air Quality Assessment investigations for the proposed landfill site. The specialist assessment is required to cover all alternatives provided for the project and to express a professional opinion in accordance with the relevant environmental standards applicable to the specialist field.

For the purposes of this Agricultural Impact Assessment, the terms of reference therefore include consideration of the Preferred Site, Alternative Site No. 1 and Alternative Site No. 2.

3.2 Scope of the Agricultural Assessment

The Agricultural Impact Assessment evaluates the potential effects of the proposed landfill development on soil and agricultural resources within the assessed development areas.

The scope of the assessment comprises:

- Review of available project documentation and design information;
- Consideration of the preferred site and two alternative sites;
- Assessment of the sites undertaken on 30 july 2026;
- Consideration of existing land use and the agricultural setting of the project area;
- Assessment of soil characteristics relevant to agricultural potential;
- Collection and laboratory analysis of representative soil samples;
- Interpretation of soil chemical characteristics;
- Consideration of land capability and agricultural potential;
- Identification of agricultural sensitivities and constraints;
- Identification of potential impacts during construction, operation and closure;
- Comparative assessment of the identified site alternatives;
- Formulation of mitigation, soil conservation and rehabilitation measures; and
- Provision of a specialist opinion regarding the suitability of the proposed development from an agricultural perspective.

3.3 Desktop Assessment

The desktop component involved review of the project information provided for the proposed Maletswai Landfill development, with particular emphasis on information relevant to soils, terrain, geology, climate, existing land use and the proposed physical development footprint.

The Detailed Design Report prepared for the project was used as the principal source of project-specific engineering and environmental information. The document contains information regarding the proposed landfill location, site-selection process, development alternatives, landfill footprint, geology, soils, topography, climatic conditions, geotechnical investigations and proposed infrastructure.

The desktop information was considered together with observations from the specialist assessment and laboratory soil results.

3.4 Field Assessment

The field assessment was undertaken on 30 July 2026. The purpose of the field component was to obtain site-specific information necessary to characterise the agricultural environment and support interpretation of the available desktop information.

The assessment focused on conditions relevant to agricultural sensitivity, including soil characteristics, existing land use, general terrain conditions, evidence of disturbance and the characteristics of the areas associated with the Preferred Site and alternatives.

Representative soil samples were collected for laboratory analysis to provide additional information regarding the chemical condition and agricultural characteristics of the soils.

3.5 Soil Sampling Programme

A total of five soil samples were submitted for laboratory analysis. Sampling represented all three development alternatives as follows:

Site Alternative	Sample Reference	Laboratory Number

Preferred Site	Preferred Site S1	G41-76226
Preferred Site	Preferred Site S2	G41-76227
Preferred Site	Preferred Site S3	G41-76228
Alternative Site No. 1	Option Site 1 S1	G41-76229
Alternative Site No. 2	Option Site 2 S2	G41-76230

The greater number of samples collected from the Preferred Site provides additional information on spatial variability within the site currently identified for development. The alternative sites are represented by one laboratory sample each.

3.6 Laboratory Analysis

The soil samples were analysed by NviroTek Laboratories under Certificate of Analysis Report No. WO 207429:264476. The samples were received by the laboratory on 04 August 2026 and the analytical report was issued on 12 August 2026.

The laboratory analytical suite comprised:

Parameter	Analytical Basis
Soil pH	pH (KCl)
Phosphorus	Bray I
Potassium	Ammonium Acetate (AmAc)
Sodium	Ammonium Acetate (AmAc)
Calcium	Ammonium Acetate (AmAc)
Magnesium	Ammonium Acetate (AmAc)
Exchangeable Acidity	KCl
Calcium Percentage	AmAc
Magnesium Percentage	AmAc
Potassium Percentage	AmAc
Sodium Percentage	AmAc
Acid Saturation	AmAc
Ca:Mg Ratio	AmAc
(Ca+Mg):K Ratio	AmAc
Mg:K Ratio	AmAc
S-Value	AmAc
Na:K Ratio	AmAc
T-Value	Calculated
Density	Laboratory determination
Sulphur	AmAc

These parameters provide information on soil reaction, nutrient status and the relative proportions of exchangeable bases and were considered as part of the agricultural potential interpretation.

3.7 Supporting Geotechnical Information

The project Detailed Design Report contains additional physical soil information derived from the project's geotechnical investigation. The investigation describes the development

area as being generally underlain by a thin topsoil horizon followed by residual soils derived from Beaufort Group sediments.

The reported materials comprise predominantly silty sands, sandy silts and fine-grained residual soils, with localised clay-rich horizons. These materials are underlain by weathered mudstone and shale transitioning to more competent sedimentary bedrock with depth.

The project geotechnical laboratory results classify investigated materials predominantly as A-1-b and A-4 under the AASHTO classification system and as G7, G9 and G10 materials under the TRH14 classification system. The design report describes these soils as generally having low to moderate plasticity.

These geotechnical results were considered as supporting information. They were originally generated for engineering purposes and are therefore not treated as a substitute for the agricultural soil assessment.

3.8 Assessment of Alternatives

The assessment considers all three project alternatives in accordance with the specialist appointment.

The comparison is undertaken from an agricultural perspective and considers available information relating to:

- Soil characteristics;
- Soil chemical condition;
- Existing agricultural land use;
- Agricultural potential;
- Land capability;
- Extent and permanence of expected soil disturbance;
- Rehabilitation potential; and
- Potential loss or transformation of agricultural land.

The agricultural comparison is undertaken independently of the engineering site-selection outcome. The fact that a site may be preferred from an engineering perspective does not automatically mean that it represents the preferred alternative from an agricultural perspective.

3.9 Impact Assessment Scope

Potential agricultural impacts are considered for the principal phases of the proposed development.

During construction, the assessment considers impacts associated with vegetation clearing, topsoil stripping, excavation, earthworks, construction traffic, soil compaction, erosion, soil stockpiling and potential contamination.

During operation, consideration is given to the long-term occupation and transformation of land, continued soil disturbance, use of soil for cover material, potential contamination associated with waste and leachate, erosion and management of rehabilitated surfaces.

The closure and rehabilitation phase considers soil replacement, final cover establishment, erosion control, revegetation and the potential restoration of stable land capability following closure.

3.10 Assumptions and Limitations

The assessment is based on the project information and site conditions available at the time of reporting. The following considerations apply when interpreting the findings:

- The assessment reflects conditions observed during the specialist assessment undertaken on 30 July 2026;
- The final extent of agricultural disturbance will depend on the approved development footprint and detailed implementation layout;
- Three laboratory samples were analysed for the Preferred Site, while Alternative Sites No. 1 and No. 2 are each represented by one laboratory sample;
- Soil properties may vary spatially between individual sampling locations;
- The laboratory results provide information on selected soil chemical properties and should be interpreted together with field, terrain, land use and other soil information rather than in isolation;
- Supporting geotechnical soil data were generated primarily for engineering design purposes;
- Future changes to the project footprint or infrastructure layout may alter the extent and significance of agricultural impacts; and
- Conclusions regarding agricultural suitability apply to the development and alternatives assessed in this report.

These limitations do not prevent an agricultural assessment of the proposed development but are considered when assigning agricultural sensitivity, comparing alternatives and formulating the specialist conclusions.

4. APPLICABLE LEGISLATION, POLICIES AND PLANNING FRAMEWORK

4.1 Introduction

The proposed establishment of the Maletswai Landfill is subject to a range of national, provincial and municipal legislative and planning requirements. From an agricultural perspective, the regulatory framework is particularly concerned with the sustainable use of land, protection of soil resources, avoidance of unnecessary loss of agricultural land, prevention of land degradation and pollution, and rehabilitation of disturbed areas.

The Agricultural Impact Assessment has therefore been undertaken within the context of the environmental, agricultural, spatial planning, land-use and waste management framework applicable to the proposed development.

The principal legislation, policies and planning instruments considered are summarised below.

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

The National Environmental Management Act, 1998 (NEMA) provides the overarching framework for environmental management in South Africa.

The environmental management principles contained in NEMA require development to be socially, environmentally and economically sustainable and require environmental impacts to be considered, prevented where practicable and otherwise minimised and remedied.

These principles are directly relevant to agricultural resources because the establishment of the proposed landfill will result in disturbance and transformation of soils within the development footprint.

The assessment therefore considers whether impacts on soils and agricultural land can be avoided or minimised through appropriate site selection, footprint control, topsoil management, pollution prevention and rehabilitation.

4.3 Environmental Impact Assessment Regulations, 2014, as Amended

The Environmental Impact Assessment Regulations promulgated under NEMA establish the procedural framework for environmental authorisation of listed activities.

Specialist investigations undertaken as part of an environmental assessment must provide sufficient information to allow the competent authority to understand the environmental sensitivity of the affected area, the nature and significance of potential impacts and the effectiveness of proposed mitigation measures.

This Agricultural Impact Assessment therefore provides specialist information relating to soil, land capability, agricultural potential, land use and the agricultural implications of the Preferred Site and alternative sites.

4.4 Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes

The procedures prescribed for environmental themes identified through the national environmental screening process provide the framework for specialist assessment of agricultural resources.

The agricultural assessment process considers the sensitivity of land based on factors including agricultural potential, existing agricultural activities, soil characteristics and land capability.

The specialist assessment therefore evaluates whether the proposed development could result in unacceptable loss or degradation of agricultural resources and identifies mitigation measures required to manage such impacts.

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

The Conservation of Agricultural Resources Act (CARA) provides for the conservation of South Africa's natural agricultural resources, including soil, vegetation and water resources associated with agricultural land.

CARA is particularly relevant to the proposed development because construction and landfill operations may expose soils to erosion, compaction, disturbance and degradation.

Measures required to support the objectives of CARA include:

- Prevention and control of soil erosion;
- Appropriate management of disturbed soil;
- Control of vegetation disturbance;
- Prevention of land degradation;
- Appropriate management of runoff;
- Stabilisation of disturbed surfaces; and
- Rehabilitation of areas no longer required for active development.

These principles are incorporated into the mitigation measures contained in this Agricultural Impact Assessment.

4.6 Preservation and Development of Agricultural Land Act, 2024

The Preservation and Development of Agricultural Land Act provides a contemporary legislative framework directed at the preservation and sustainable development of agricultural land.

The legislation strengthens the principle that agricultural land is a finite national resource that should be appropriately considered when land is proposed for non-agricultural development.

The relevance of the Act to the proposed landfill is therefore associated with determining the agricultural value of the affected land and ensuring that development decisions are informed by the potential loss or transformation of agricultural resources.

The comparative assessment of the Preferred Site and alternatives is consequently important in determining whether the project can avoid unnecessary disturbance of land with comparatively higher agricultural value.

4.7 National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008)

The National Environmental Management: Waste Act (NEMWA) provides the principal legislative framework for waste management in South Africa.

The proposed Maletswai development comprises an engineered municipal landfill facility and is therefore directly subject to waste management requirements.

From an agricultural perspective, NEMWA is important because inappropriate waste disposal may result in contamination and degradation of soil resources.

The landfill design incorporates measures intended to reduce these risks, including an engineered composite GCL-HDPE liner system, leachate collection infrastructure, a Pollution Control Dam, stormwater management and environmental monitoring.

4.8 National Norms and Standards for Disposal of Waste to Landfill

The National Norms and Standards for Disposal of Waste to Landfill establish technical requirements applicable to landfill classification, containment, operation and environmental protection.

The Detailed Design Report identifies the proposed facility as a Class B liner landfill and incorporates an engineered containment system comprising a prepared subgrade, GCL, 2.0 mm textured HDPE geomembrane, protection geotextile, drainage layer and leachate collection system.

These measures are important to the agricultural environment because they reduce the potential for waste-derived contaminants and leachate to migrate into surrounding soils.

4.9 National Water Act, 1998 (Act No. 36 of 1998)

The National Water Act (NWA) provides for the protection, sustainable use and management of South Africa's water resources.

Although principally concerned with water resources, the Act is relevant to agricultural soils because uncontrolled contaminated runoff, leachate and erosion may result in combined soil and water resource degradation.

The proposed landfill incorporates separation of clean and contaminated stormwater, diversion drains, leachate collection and a Pollution Control Dam. These measures will also assist in protecting soils surrounding the landfill from contamination and erosion.

4.10 Spatial Planning and Land Use Management Act, 2013 (Act No. 16 of 2013)

The Spatial Planning and Land Use Management Act (SPLUMA) establishes the national framework for spatial planning and land-use management.

SPLUMA promotes spatial sustainability, efficiency, resilience and good administration and requires development decisions to consider the long-term implications of land transformation.

The proposed conversion of land to a landfill represents a substantial and long-term land-use change. Agricultural capability and the potential loss of productive land are therefore relevant considerations in determining the appropriateness of the proposed location.

4.11 National Development Plan 2030

The National Development Plan recognises agriculture as an important contributor to rural economic development, employment and food security.

The NDP supports sustainable utilisation of natural resources and productive agricultural land while also recognising the need for infrastructure and improved municipal services.

The proposed development must therefore balance the need for sustainable municipal waste management infrastructure against the need to conserve agricultural soil resources and avoid unnecessary loss of productive land.

4.12 EASTERN CAPE PROVINCIAL FRAMEWORK

4.12.1 Eastern Cape Provincial Spatial Development Framework

The Eastern Cape Provincial Spatial Development Framework provides strategic spatial guidance for development within the Province.

The provincial planning approach recognises the importance of agricultural resources, rural landscapes, environmental assets and sustainable settlement and infrastructure development.

For the proposed Maletswai Landfill, the agricultural assessment contributes to this planning framework by identifying whether the development would result in significant transformation of agricultural land and whether alternative sites present materially different agricultural constraints.

Land development should therefore seek to minimise unnecessary fragmentation or permanent loss of productive agricultural land and should incorporate appropriate rehabilitation where disturbance cannot be avoided.

4.12.2 Eastern Cape Provincial Growth and Development Planning Framework

Provincial development planning recognises agriculture as an important component of the Eastern Cape economy, particularly within rural municipalities.

The sustainable management of agricultural resources is therefore important for maintaining rural livelihoods, agricultural productivity and long-term economic resilience.

Development of municipal infrastructure remains necessary, but such development should be appropriately located and designed to minimise avoidable impacts on productive agricultural resources.

4.12.3 Eastern Cape Environmental Management Context

Environmental management within the Eastern Cape is administered within the applicable national environmental legislative framework together with provincial planning and environmental governance structures.

The proposed landfill therefore requires consideration of the cumulative implications of soil disturbance, land transformation, waste management, water protection and rehabilitation.

The findings of this Agricultural Impact Assessment provide agricultural specialist input to that broader environmental decision-making process.

4.13 WALTER SISULU LOCAL MUNICIPALITY PLANNING FRAMEWORK

4.13.1 Walter Sisulu Local Municipality Integrated Development Plan

The Walter Sisulu Local Municipality Integrated Development Plan (IDP) provides the strategic development framework for municipal service delivery, infrastructure development, spatial planning and local economic development.

Waste management infrastructure forms part of the Municipality's service-delivery responsibilities, while agriculture remains an important component of the local economy.

The establishment of the new Maletswai landfill must therefore be considered within the broader municipal objective of improving waste management services while supporting sustainable land-use and environmental management.

The Municipality's planning framework also recognises the importance of managing landfill licensing and compliance as part of its waste-management responsibilities.

4.13.2 Walter Sisulu Local Municipality Spatial Development Framework

The Municipal Spatial Development Framework provides guidance regarding the desired spatial form and future development of the municipality.

From an agricultural perspective, development should be appropriately located so that valuable agricultural resources are not unnecessarily fragmented or permanently transformed where reasonable alternatives exist.

The agricultural sensitivity and land capability information contained in this assessment therefore provide specialist information that can support spatial and land-use decision-making for the proposed landfill.

4.13.3 Walter Sisulu Local Municipality Land Use Scheme

The Walter Sisulu Local Municipality Land Use Scheme provides the mechanism for regulating and managing land-use rights within the municipal area.

The Scheme is intended to give effect to the Municipal Spatial Development Framework and SPLUMA and to guide the appropriate development and utilisation of land.

The proposed landfill development must therefore be compatible with the applicable zoning and land-use management requirements or obtain the necessary land-use approvals where required.

The Scheme's planning approach includes minimising adverse impacts of development on public health, the environment and natural resources.

4.13.4 Walter Sisulu Local Municipality Spatial Planning and Land Use Management By-Law

The municipal Spatial Planning and Land Use Management By-Law provides the local procedural and decision-making framework for land-development applications.

The proposed change in land use associated with establishment of a landfill must therefore be considered against applicable municipal planning requirements, development principles, spatial policies and land-use controls.

Agricultural capability and the long-term transformation of the affected land constitute relevant environmental and land-use considerations in this process.

4.13.5 Municipal Agricultural and Environmental Considerations

The Walter Sisulu municipal planning framework recognises agriculture as an important land-use and economic activity. Development outside established urban areas should consequently consider impacts on agricultural land, natural resources and the surrounding rural landscape.

The municipal planning framework specifically promotes avoidance of development on land regarded as prime or unique agricultural land and seeks to prevent significant reduction of high-value agricultural areas.

Accordingly, this assessment considers whether any of the proposed landfill alternatives represent comparatively important agricultural land and whether the Preferred Site can be developed without unacceptable loss of agricultural resources.

4.14 Relevance to the Proposed Development

The legislation and planning instruments described above collectively establish several principles directly applicable to the proposed Maletswai Landfill.

These require the project to:

- Consider agricultural resources during site selection;
- Avoid unnecessary disturbance of high-value agricultural land;
- Minimise the development footprint where practicable;
- Conserve suitable topsoil before construction;
- Prevent soil erosion and compaction outside the approved footprint;
- Prevent contamination of surrounding soils;
- Manage clean and contaminated stormwater separately;
- Control leachate and waste-derived pollution;
- Rehabilitate disturbed areas progressively;
- Stabilise and revegetate the final landfill surface;
- Consider the long-term consequences of permanent land transformation; and

- Ensure that the proposed land use is consistent with applicable provincial and municipal spatial planning requirements.

Compliance with these principles has been incorporated into the assessment methodology, impact assessment and mitigation measures presented in subsequent sections of this report.

4.15 Summary of Applicable Legislative and Planning Framework

Table below provides a consolidated summary of the principal national, provincial and municipal legislation, policies and planning instruments applicable to the Agricultural Impact Assessment and the proposed Maletswai Landfill development.

Table 1 : Applicable Legislative and Planning Framework

Legislation / Policy / Planning Instrument	Level	Key Relevance to the Agricultural Impact Assessment
National Environmental Management Act, 1998 (Act No. 107 of 1998)	National	Establishes environmental management principles requiring sustainable development, avoidance and minimisation of environmental impacts and rehabilitation of disturbed environments.
Environmental Impact Assessment Regulations, 2014, as amended	National	Provides the environmental authorisation framework and requires appropriate assessment of environmental impacts and specialist input where applicable.
Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes	National	Provides requirements relevant to assessment and reporting of agricultural sensitivity, land capability and potential impacts on agricultural resources.
Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983)	National	Provides for conservation of agricultural resources and is particularly relevant to soil erosion, land degradation, vegetation management and rehabilitation.
Preservation and Development of Agricultural Land Act, 2024	National	Promotes preservation, sustainable use and development of agricultural land and consideration of agricultural resources where land is proposed for non-agricultural development.
National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008)	National	Regulates waste management activities and is relevant to prevention of soil contamination and environmentally responsible development and operation of the proposed landfill.
National Norms and Standards for Disposal of Waste to Landfill	National	Establishes landfill design, containment and operational requirements intended to prevent pollution of soil, groundwater and surrounding environmental resources.

National Water Act, 1998 (Act No. 36 of 1998)	National	Provides for protection of water resources and is relevant to stormwater, leachate, erosion and prevention of contaminated runoff affecting surrounding soils and water resources.
Spatial Planning and Land Use Management Act, 2013 (Act No. 16 of 2013)	National	Requires sustainable and efficient land-use planning and consideration of the long-term implications associated with transformation of land.
National Development Plan 2030	National	Recognises the importance of agriculture, food security, rural development, infrastructure and sustainable utilisation of natural resources.
Eastern Cape Provincial Spatial Development Framework	Provincial	Provides strategic spatial guidance for development in the Eastern Cape and supports sustainable land use and protection of important agricultural and environmental resources.
Eastern Cape Provincial Growth and Development Planning Framework	Provincial	Recognises agriculture as an important component of provincial economic and rural development and promotes sustainable management of productive resources.
Eastern Cape Environmental Management Framework	Provincial	Provides the broader provincial environmental planning context within which development and environmental sensitivities are considered.
Walter Sisulu Local Municipality Integrated Development Plan	Municipal	Provides the Municipality's strategic framework for infrastructure, waste management, service delivery, environmental management and local economic development.
Walter Sisulu Local Municipality Spatial Development Framework	Municipal	Guides the spatial location of development and provides a basis for considering agricultural land, environmental constraints and appropriate future land uses.
Walter Sisulu Local Municipality Land Use Scheme	Municipal	Regulates land-use rights and development within the municipal area and requires development to be compatible with applicable zoning and land-use management provisions.
Walter Sisulu Local Municipality Spatial Planning and Land Use Management By-Law	Municipal	Provides the local procedural framework for land-development applications and implementation of SPLUMA principles within the municipality.

Collectively, the applicable legislative and planning framework requires the proposed development to consider the agricultural value and sensitivity of the affected land before permanent transformation occurs. Particular emphasis is placed on avoiding unnecessary

disturbance of productive agricultural land, conserving soil resources, preventing erosion and contamination, managing stormwater and leachate, and ensuring effective rehabilitation.

For the proposed Maletswai Landfill, compliance should therefore include appropriate comparison of the Preferred Site and alternatives, restriction of disturbance to the approved development footprint, stripping and conservation of suitable topsoil, prevention of soil contamination, erosion control, management of runoff and progressive rehabilitation of disturbed areas.

The engineering design already incorporates several measures that support these objectives, including separation of clean and contaminated stormwater, an engineered GCL-HDPE liner system, leachate collection infrastructure, a Pollution Control Dam and progressive rehabilitation provisions.

5. ASSESSMENT METHODOLOGY

5.1 Methodological Approach

The Agricultural Impact Assessment was undertaken through an integrated desktop review, field assessment, soil sampling programme, laboratory analysis and interpretation of available project-specific soil and environmental information.

The methodology was designed to characterise the soil and agricultural environment of the Preferred Site, Alternative Site No. 1 and Alternative Site No. 2 and to provide a comparative basis for evaluating the potential impacts of the proposed landfill development.

The assessment process comprised the following principal components:

- Review of available project and engineering information;
- Review of available soil, geological, climatic and land-use information;
- Field assessment undertaken on 30 july 2026;
- Identification of representative soil sampling locations;
- Collection of soil samples from the three development alternatives;
- Laboratory analysis of selected soil chemical properties;
- Interpretation of soil fertility and agricultural characteristics;
- Consideration of land capability and agricultural potential;
- Identification of agricultural sensitivities;
- Comparative evaluation of the three site alternatives;
- Identification and assessment of potential development impacts; and
- Formulation of soil conservation, mitigation, monitoring and rehabilitation measures.

5.2 Desktop Review

The desktop assessment involved review of the information supplied for the proposed Maletswai Landfill project.

The Detailed Design Report was reviewed to obtain project-specific information relating to the site location, development footprint, site alternatives, topography, climate, geology, soils, groundwater conditions, proposed landfill configuration and associated infrastructure.

Particular consideration was given to information relevant to agricultural resources, including the reported soil conditions, terrain characteristics, proposed excavation depths, extent of land transformation, stormwater management, rehabilitation requirements and the anticipated operational life of the landfill.

The design information indicates that the site is generally characterised by gently undulating terrain with gradients of approximately 1% to 5%. The underlying materials are described as predominantly silty sands, sandy silts and fine-grained residual soils derived from weathered Beaufort Group sedimentary formations.

5.3 Field Assessment

The field component of the Agricultural Impact Assessment was undertaken on 30 July 2026.

The purpose of the field assessment was to obtain site-specific information necessary to support the agricultural evaluation and to identify representative areas for soil sampling.

The field assessment considered:

- General terrain and landscape characteristics;
- Existing land use;
- Visible evidence of agricultural activities;
- Soil surface characteristics;
- General soil condition;
- Existing disturbance;
- Erosion or potential erosion features;
- Vegetation and ground-cover conditions;
- Accessibility of the proposed development areas; and
- Areas potentially affected by the proposed landfill and associated infrastructure.

Observations obtained during the field assessment were considered together with the desktop and laboratory information when evaluating agricultural sensitivity.

5.4 Soil Sampling Strategy

Representative soil samples were collected from the Preferred Site and both alternative sites.

A total of five samples were submitted for laboratory analysis. Three samples were obtained from the Preferred Site to provide an indication of variability across the proposed preferred development area. One sample was analysed from Alternative Site No. 1 and one from Alternative Site No. 2.

The sampling distribution is presented in Table below.

Table 2: Soil Sampling Distribution

Assessment Area	Sample Reference	Laboratory Number
Preferred Site	Preferred Site S1	G41-76226
Preferred Site	Preferred Site S2	G41-76227
Preferred Site	Preferred Site S3	G41-76228
Alternative Site No. 1	Option Site 1 S1	G41-76229
Alternative Site No. 2	Option Site 2 S2	G41-76230

The laboratory Certificate of Analysis confirms these five sample references and their respective laboratory numbers.

5.5 Laboratory Analysis

The collected soil samples were submitted to NviroTek Laboratories for chemical analysis under Report No. WO 207429:264476. The samples were received by the laboratory on 04 August 2026, analytical work commenced on the same date, and the Certificate of Analysis was issued on 12 August 2026.

The analytical programme included parameters relevant to interpretation of soil chemical condition and nutrient status.

Table 3 : Laboratory Analytical Parameters

Parameter	Method / Extraction
pH	KCl
Phosphorus (P)	Bray I
Potassium (K)	Ammonium Acetate
Sodium (Na)	Ammonium Acetate
Calcium (Ca)	Ammonium Acetate
Magnesium (Mg)	Ammonium Acetate
Exchangeable Acidity	KCl
Calcium Percentage	Ammonium Acetate
Magnesium Percentage	Ammonium Acetate
Potassium Percentage	Ammonium Acetate
Sodium Percentage	Ammonium Acetate
Acid Saturation	Ammonium Acetate
Ca:Mg Ratio	Ammonium Acetate
(Ca+Mg):K Ratio	Ammonium Acetate
Mg:K Ratio	Ammonium Acetate
S-Value	Ammonium Acetate
Na:K Ratio	Ammonium Acetate
T-Value	Calculation
Density	Laboratory determination
Sulphur (S)	Ammonium Acetate

The Certificate of Analysis identifies the applicable laboratory methods and notes that parameters marked with an asterisk are not included in the laboratory's Schedule of Accreditation.

5.6 Interpretation of Soil Chemical Properties

Laboratory results were interpreted comparatively across the three assessed alternatives.

Particular attention was given to:

- Soil reaction and acidity based on ph;
- Phosphorus availability;
- Potassium status;
- Calcium and magnesium concentrations;
- Sodium concentrations;
- Relative proportions of exchangeable bases;
- Calcium-to-magnesium relationships;
- Magnesium-to-potassium relationships;
- Exchangeable acidity;
- Sulphur; and
- Spatial variation between sampling locations.

No individual laboratory parameter was used in isolation to determine agricultural suitability. The results were considered collectively and together with field observations and available project information.

The laboratory results demonstrate measurable variation between sampling locations. Soil pH (KCl), for example, ranges from 5.26 to 6.43 across the five samples, while calcium, magnesium and potassium concentrations also vary between the Preferred Site and alternative sites.

5.7 Consideration of Physical Soil Information

The agricultural assessment was supplemented by physical soil information contained within the project's Detailed Design Report.

The geotechnical investigation described in the design report identified a thin topsoil layer overlying predominantly residual silty sands, sandy silts and fine-grained materials, followed by weathered mudstone and shale.

The engineering laboratory results classify investigated materials mainly as A-1-b and A-4 under the AASHTO system and G7, G9 and G10 under the TRH14 classification system.

This information was used only as supporting information because the geotechnical investigation was undertaken for engineering purposes rather than specifically for agricultural soil classification.

5.8 Land Use Assessment

Existing land use was considered during the field assessment and desktop interpretation.

The purpose of the land-use assessment was to establish the current functional use of the affected land and determine whether the proposed development would directly displace

active agricultural activities or alter land that contributes to the surrounding agricultural landscape.

Land-use observations were considered in conjunction with soil characteristics and terrain when determining agricultural sensitivity.

5.9 Land Capability and Agricultural Potential Assessment

Land capability was evaluated by considering the combined influence of available soil information, terrain, soil chemical condition, existing land use and development constraints.

Agricultural potential was interpreted as the ability of the assessed land to support agricultural production under prevailing site conditions.

The assessment considered that agricultural capability cannot be determined solely from nutrient concentrations. The interpretation therefore considered the combined influence of:

- Soil characteristics;
- Terrain;
- Soil chemical condition;
- Existing land use;
- Physical disturbance;
- Potential limitations to cultivation;
- Potential suitability for grazing; and
- Potential for long-term agricultural utilisation.

5.10 Agricultural Sensitivity Assessment

Agricultural sensitivity was determined by considering the importance and vulnerability of the affected soil and agricultural resources.

Higher sensitivity is generally associated with land possessing comparatively favourable soil conditions, productive agricultural use and greater potential to support sustained agricultural production.

Lower sensitivity is associated with land where agricultural use or potential is constrained by soil, terrain, disturbance or other site-specific limitations.

The sensitivity assessment provides the basis for evaluating whether permanent transformation of the affected land by the proposed landfill would constitute a significant loss of agricultural resources.

5.11 Assessment of Site Alternatives

The Preferred Site, Alternative Site No. 1 and Alternative Site No. 2 were compared from an agricultural perspective.

The comparison considered:

- Laboratory soil characteristics;
- Agricultural potential;
- Land capability;
- Existing land use;
- Agricultural sensitivity;
- Expected extent of disturbance;
- Permanence of land transformation;
- Potential soil-management requirements; and
- Rehabilitation considerations.

The alternative assessment was undertaken independently from the engineering site-selection process to ensure that agricultural considerations are appropriately represented in the overall environmental decision-making process.

5.12 Impact Identification and Assessment

Potential impacts were identified for the construction, operational and closure/rehabilitation phases.

Construction-related impacts considered include:

- Loss and disturbance of topsoil;
- Alteration of natural soil profiles;
- Soil compaction;
- Erosion;
- Contamination by fuels, oils and construction materials;
- Disturbance of agricultural land; and
- Loss of agricultural production potential within the development footprint.

Operational impacts include:

- Long-term occupation and transformation of land;
- Potential soil contamination associated with waste and leachate;
- Continued use and disturbance of soil for cover material;
- Erosion of disturbed or rehabilitated surfaces; and
- Potential effects on surrounding agricultural land where operational controls are inadequate.

Closure and rehabilitation considerations include:

- Replacement and utilisation of conserved topsoil;
- Establishment of stable final landforms;
- Erosion control;
- Revegetation;
- Restoration of functional soil cover; and
- Long-term stability of rehabilitated areas.

5.13 Mitigation Hierarchy

Mitigation measures were developed using the environmental mitigation hierarchy, with preference given to avoidance before minimisation and rehabilitation.

For agricultural resources, the hierarchy applied in this assessment comprises:

Avoid unnecessary disturbance → Minimise the development footprint → Strip and conserve suitable topsoil → Prevent compaction, erosion and contamination → Reuse conserved soil during rehabilitation → Establish stable vegetation → Monitor rehabilitation performance.

Particular emphasis is placed on conserving topsoil because the proposed landfill will involve substantial excavation and permanent transformation of soils within the active landfill footprint.

5.14 Methodological Limitations

The following limitations are recognised:

- The field assessment represents site conditions encountered on 30 July 2026;
- Laboratory analysis comprised five samples, with three representing the Preferred Site and one representing each alternative;
- The alternative sites therefore have a lower sampling density than the Preferred Site;
- Soil properties may vary between sampling locations;
- The nvirotek analysis primarily provides soil chemical information and does not by itself constitute a detailed soil-form classification survey;
- Available geotechnical soil information was generated for engineering purposes and was used only as supporting information;
- Final agricultural impacts will depend on the final approved development footprint; and
- Future changes to the proposed landfill layout may require reconsideration of affected agricultural resources.

These limitations were taken into account during interpretation of the results and do not prevent comparative assessment of the three alternatives using the information available for this study.

6. DESKTOP ASSESSMENT FINDINGS

6.1 Locality and Regional Setting

The proposed Maletswai Landfill development is located on the western to south-western outskirts of Maletswai (Aliwal North), within the Walter Sisulu Local Municipality and Joe Gqabi District Municipality, Eastern Cape Province. Three candidate development areas were considered, namely the Preferred Site, Option Site 1 and Option Site 2.

The locality mapping indicates that the study area occurs within a predominantly rural and peri-urban landscape west of Maletswai. The Orange River is the dominant regional drainage feature to the north, while the R58 provides an important regional connection through the southern portion of the study area. The N6 occurs east of the candidate sites and provides the principal regional transport connection through Maletswai.

The Preferred Site is the northernmost alternative and is situated comparatively closer to the Orange River and the existing Maletswai/Dukathole settlement area. Option Sites 1 and 2 occur farther south-west within a more open rural landscape and closer to the R58 corridor.

The satellite imagery indicates extensive agricultural activity within the broader landscape, particularly cultivated and irrigated agricultural fields north of the Orange River. In contrast, the immediate surroundings of the three candidate sites are dominated by open grassland, scattered shrubland and localised disturbed areas.

Locality Map

Locality Map of project area located in Maletswai Local Municipality's position within the Joe Gqabi District Municipality, Eastern Cape Province, South Africa.

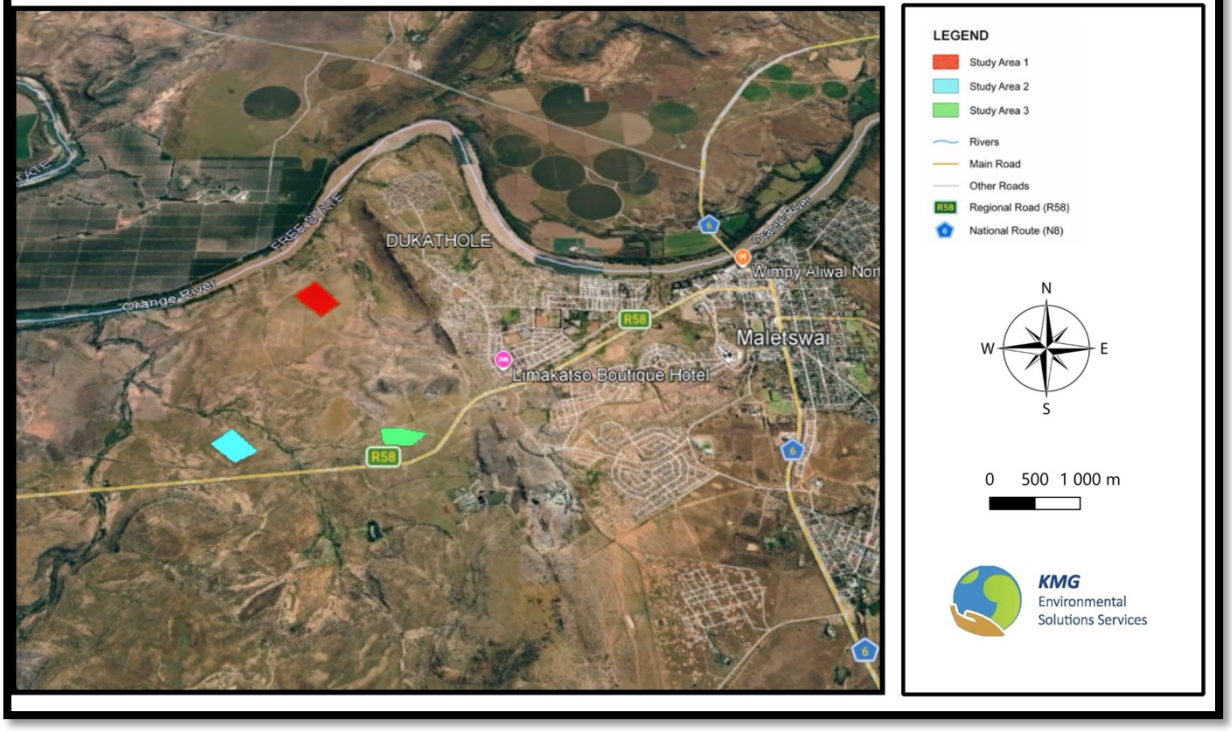


Figure 1 : Locality of the Preferred Site, Option Site 1 and Option Site 2 within the Maletswai area.

6.2 Topography and Terrain

The desktop topographic assessment indicates that the three candidate sites occur within a generally gentle to gently undulating landscape. The surrounding terrain becomes more elevated and locally rocky toward the western and south-western portions of the broader study area.

The SOTER Procedures Manual recognises slope gradient and relief intensity as fundamental criteria for differentiating landforms. Under the SOTER regional slope classification, gradients of 2–5% are classified as gently undulating, while slopes of 5–8% are classified as undulating.

From an agricultural perspective, gently undulating terrain is generally favourable for grazing because it permits livestock movement and does not impose the severe accessibility and erosion limitations normally associated with steep terrain. However, the agricultural suitability of land cannot be determined from slope alone and must be considered together with soil depth, soil characteristics, drainage and climatic conditions.

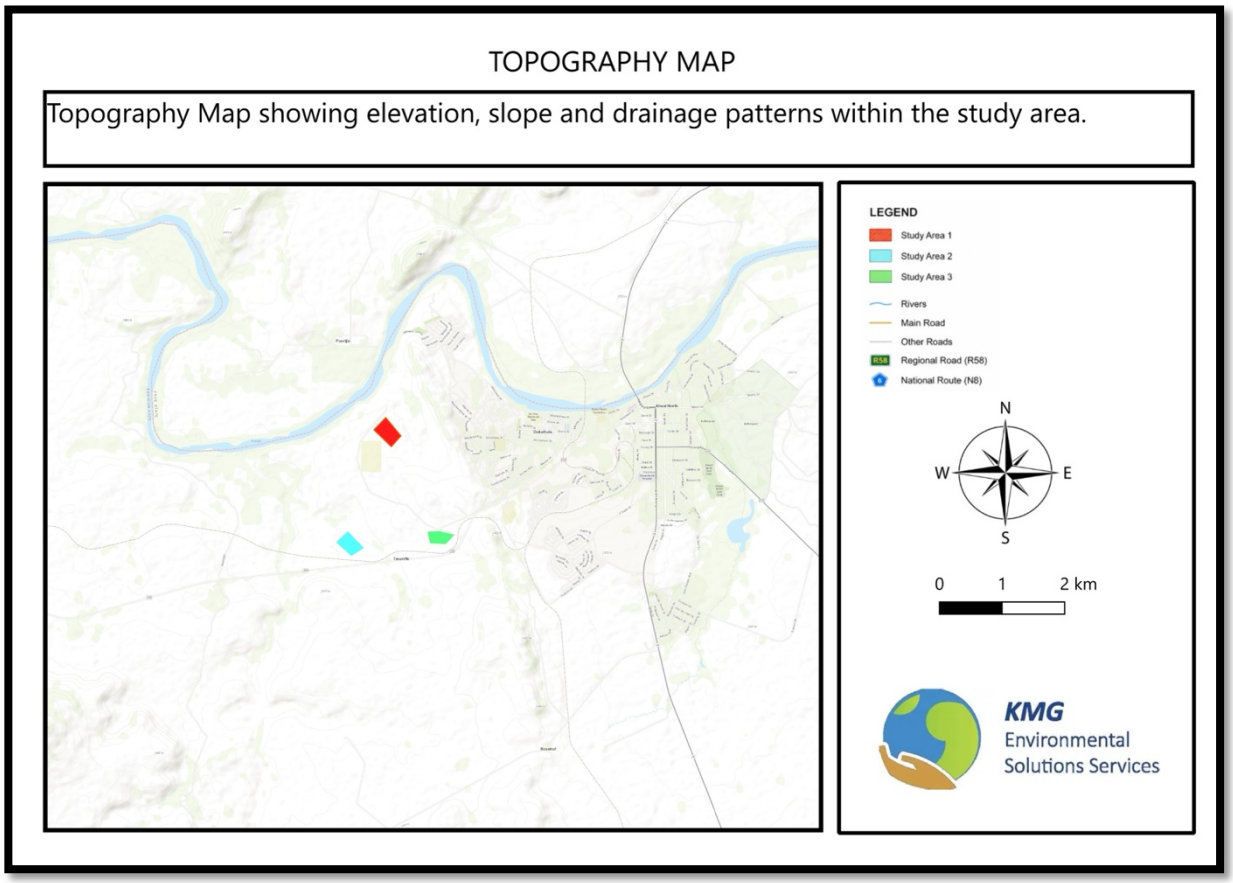


Figure 2 : Topography, elevation and drainage patterns associated with the study area.

6.3 Land Cover and Vegetation

The SANBI BGIS Land Use Decision Support mapping indicates that the broader study area comprises a mixture of natural land cover, cultivated land, urban/built-up areas and localised waterbodies. The immediate surroundings of Option Sites 1 and 2 are predominantly represented as natural land cover, while the Preferred Site has a stronger spatial association with a mapped cultivated area.

The vegetation mapping similarly indicates that the candidate sites occur within the broader regional vegetation mosaic west of Maletswai. The vegetation setting is consistent with a landscape in which grassland and shrub-dominated communities provide an important potential grazing resource.

SOTER treats land cover separately from the more stable soil and terrain properties because vegetation and land use are comparatively dynamic and can change over time. The SOTER Procedures Manual therefore recommends that land-cover information be updated using more recent observations where available.

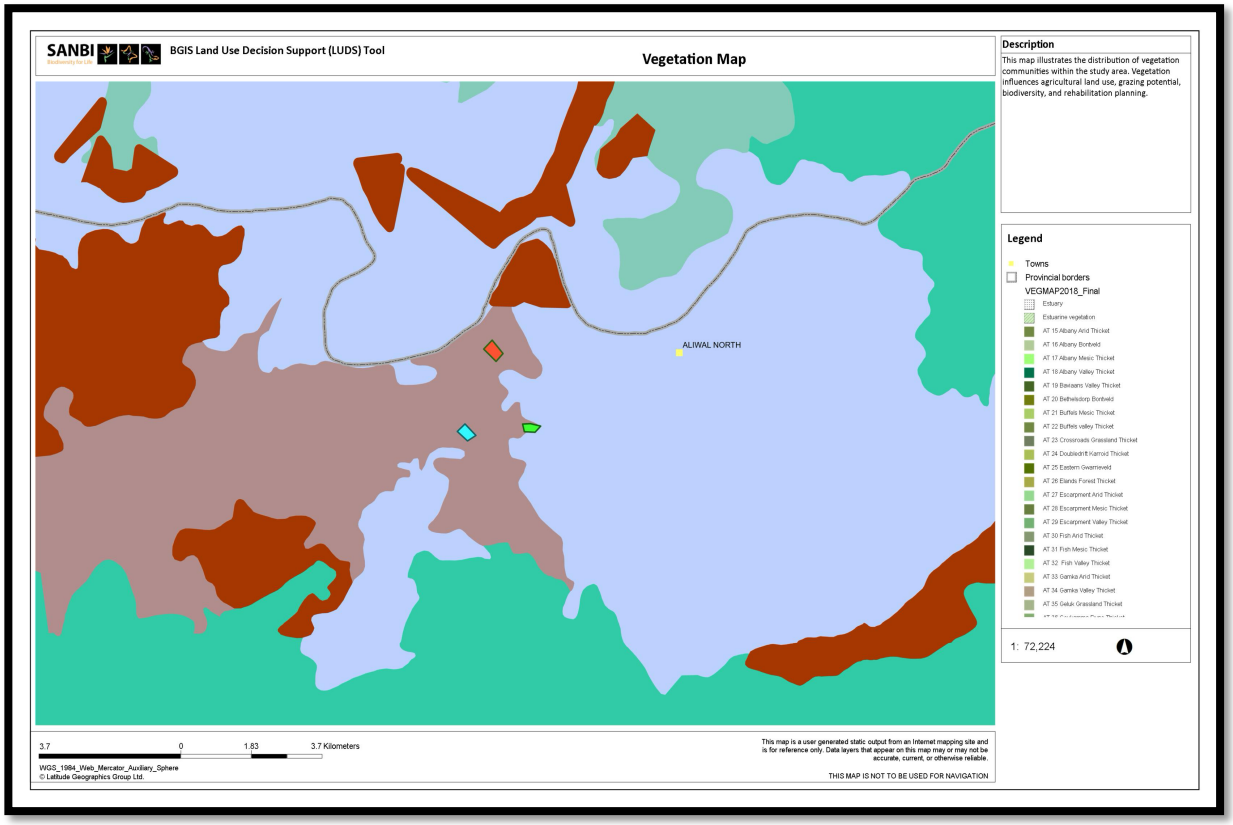


Figure 3 : Regional vegetation characteristics associated with the candidate sites.

6.4 Current Land Use

The desktop Current Land Use Map identifies a notable distinction between the alternatives. The Preferred Site overlaps an area mapped as temporary commercial dryland cultivation, whereas Option Site 1 and Option Site 2 occur predominantly within unimproved grassland.

Under the SOTER land-use hierarchy, rain-fed arable cultivation is classified as an agricultural cropping system, while extensive grazing refers to grazing of natural or semi-natural grassland or savanna vegetation.

The desktop mapping therefore suggests that the Preferred Site has a stronger association with previous or existing cultivated agricultural land, while the two alternative sites are more strongly associated with grassland and grazing-type agricultural use.

As land use is dynamic, these desktop classifications are subsequently verified against the conditions observed during the field assessment.

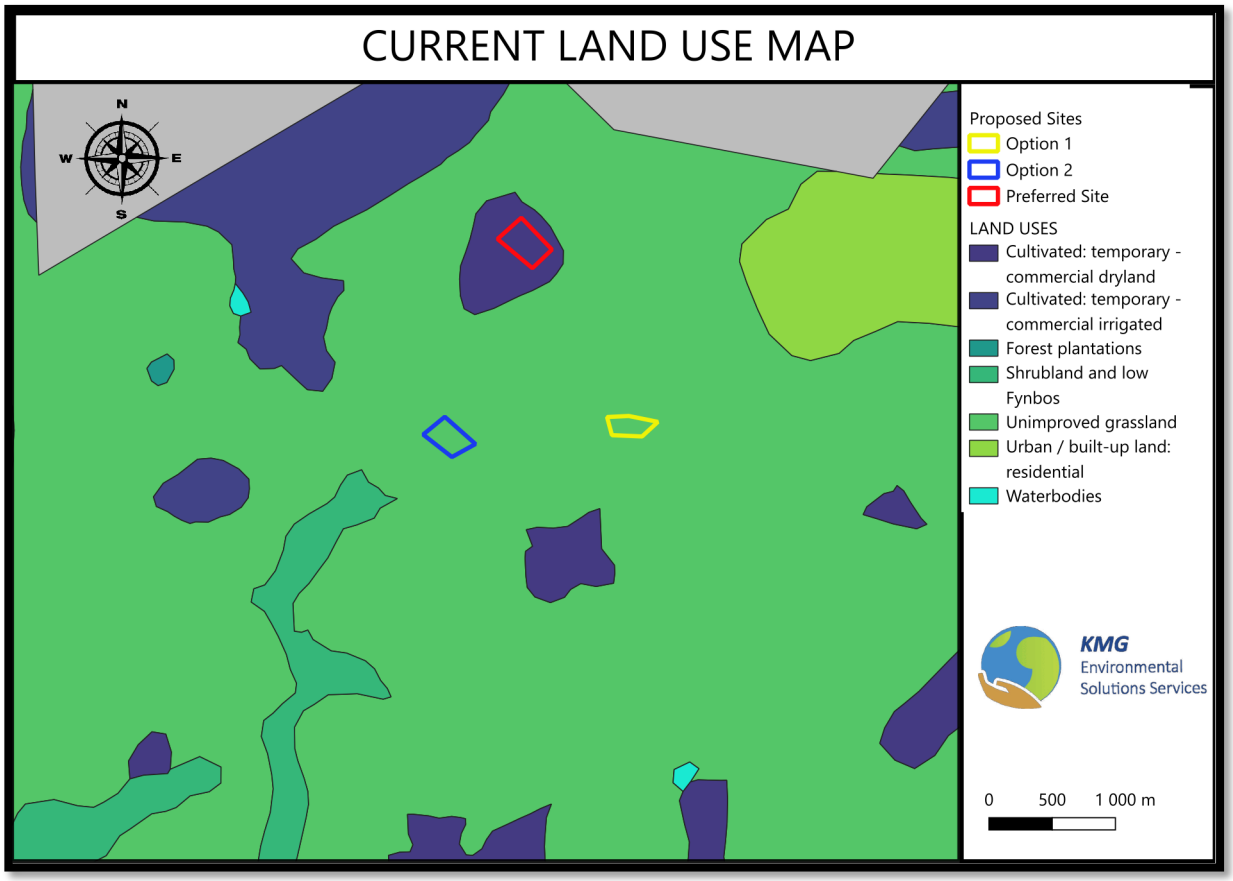


Figure 4 : Desktop current land-use classification of the candidate sites

6.5 Agricultural Land Capability and Grazing Capability

The Agricultural and Land Capability Map indicates that all three candidate sites occur predominantly within the Grazing land-capability grouping. The broader landscape also contains mapped arable areas and agricultural field boundaries, including an old-field/cultivated feature associated with the Preferred Site.

The Grazing Capability Map similarly indicates broadly comparable grazing conditions across the three candidate sites.

These datasets collectively indicate that livestock grazing represents the dominant mapped agricultural function of the immediate study area. The desktop assessment does not identify a substantial difference in inherent grazing capability between the three alternatives.

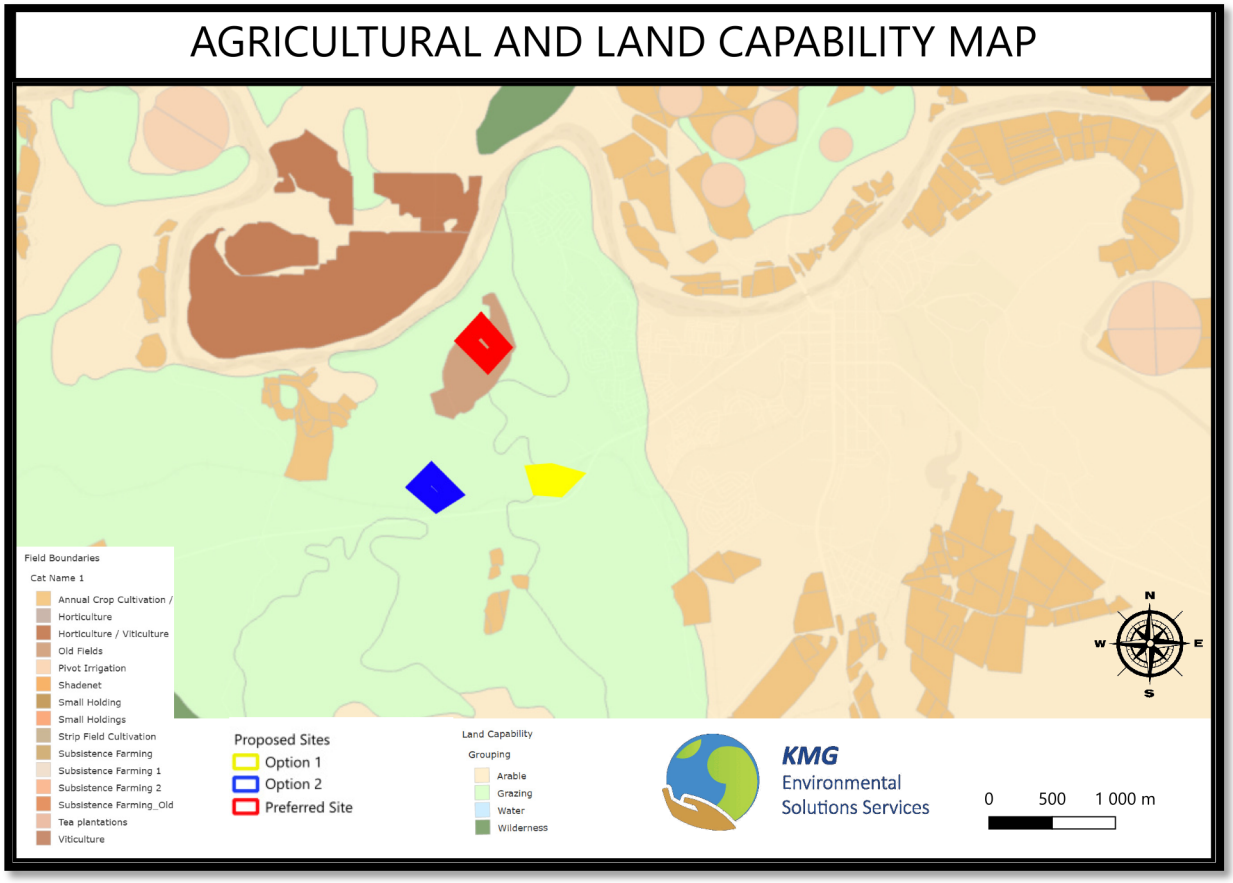


Figure 5 : Agricultural and land capability associated with the candidate sites.

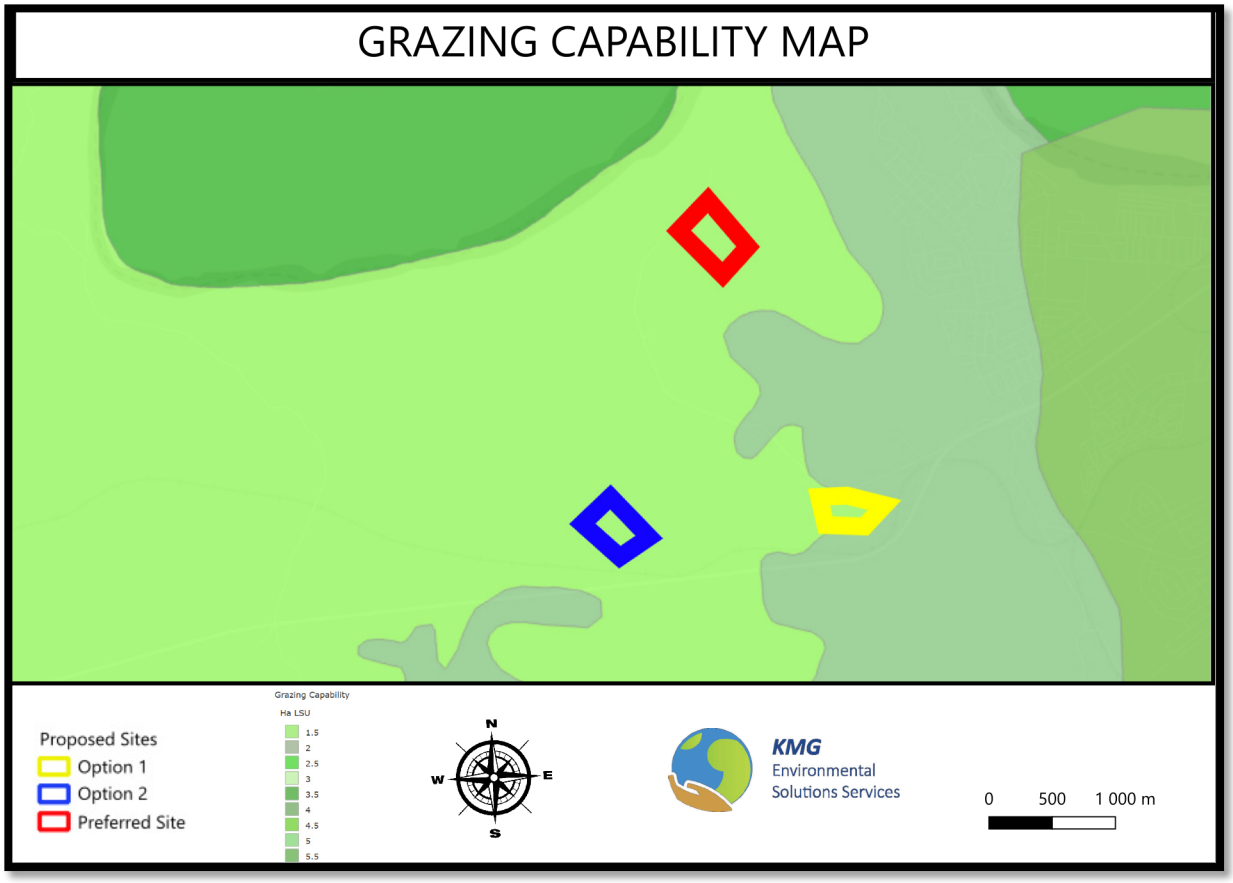


Figure 6 : Grazing capability associated with the candidate sites

6.6 Regional Soil Classification and Soil Properties

6.6.1 Basis of Soil Interpretation

The regional soil assessment was undertaken using the available DSMW and SOTER soil mapping. The SOTER dataset is particularly useful because it integrates soil with terrain characteristics.

The SOTER methodology considers land as a combination of terrain and soil characteristics, including landform, lithology, surface form, slope, parent material and soil. A SOTER unit therefore represents a characteristic combination of these properties rather than necessarily a single homogeneous soil type.

This distinction is important for the present assessment. The SOTER Procedures Manual notes that, at its reference mapping scale, individual soil components may not always be spatially separable and a mapped terrain component may contain several soil components forming a soil association or complex.

The SOTER mapping should consequently be interpreted as regional soil-resource information and not as a replacement for site-specific soil investigation. The manual expressly states that the SOTER approach is not intended to replace traditional soil surveys.

6.6.2 Mapped Soil Types

The SOTER Soil Type Map identifies four principal FAO soil units within the broader study landscape:

- LPe – Eutric Leptosols;
- CMe – Eutric Cambisols;
- LVh – Haplic Luvisols; and
- LVx – Chromic Luvisols.

These codes and classifications are confirmed using the SOTER Procedures Manual.The Preferred Site and Option Site 2 occur principally within the mapped LVx (Chromic Luvisol) landscape. Option Site 1 occurs close to the transition between LPe (Eutric Leptosols) and LVx (Chromic Luvisols). CMe (Eutric Cambisols) occurs extensively within the surrounding landscape, while LVh (Haplic Luvisols) occurs farther south.

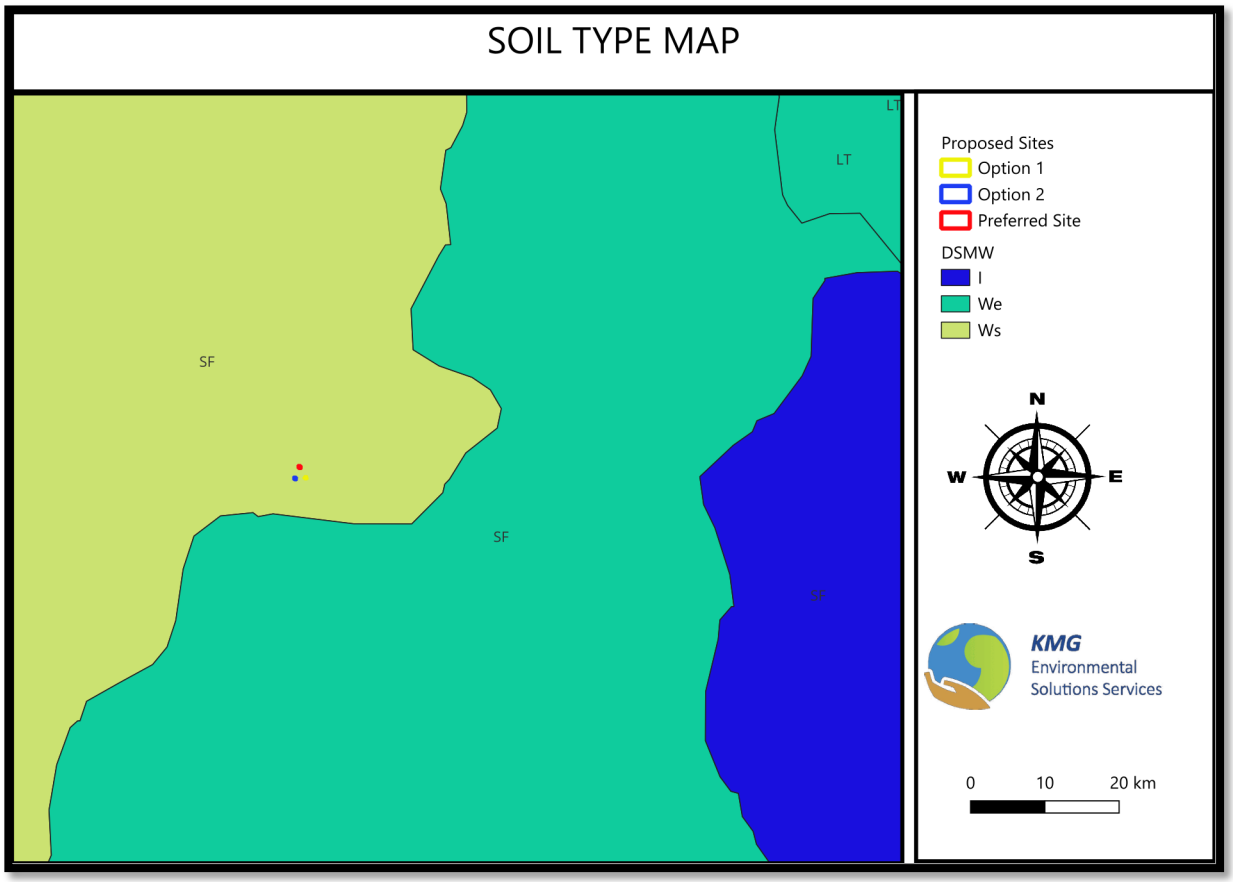


Figure 7 : Regional DSMW soil setting of the proposed development area.

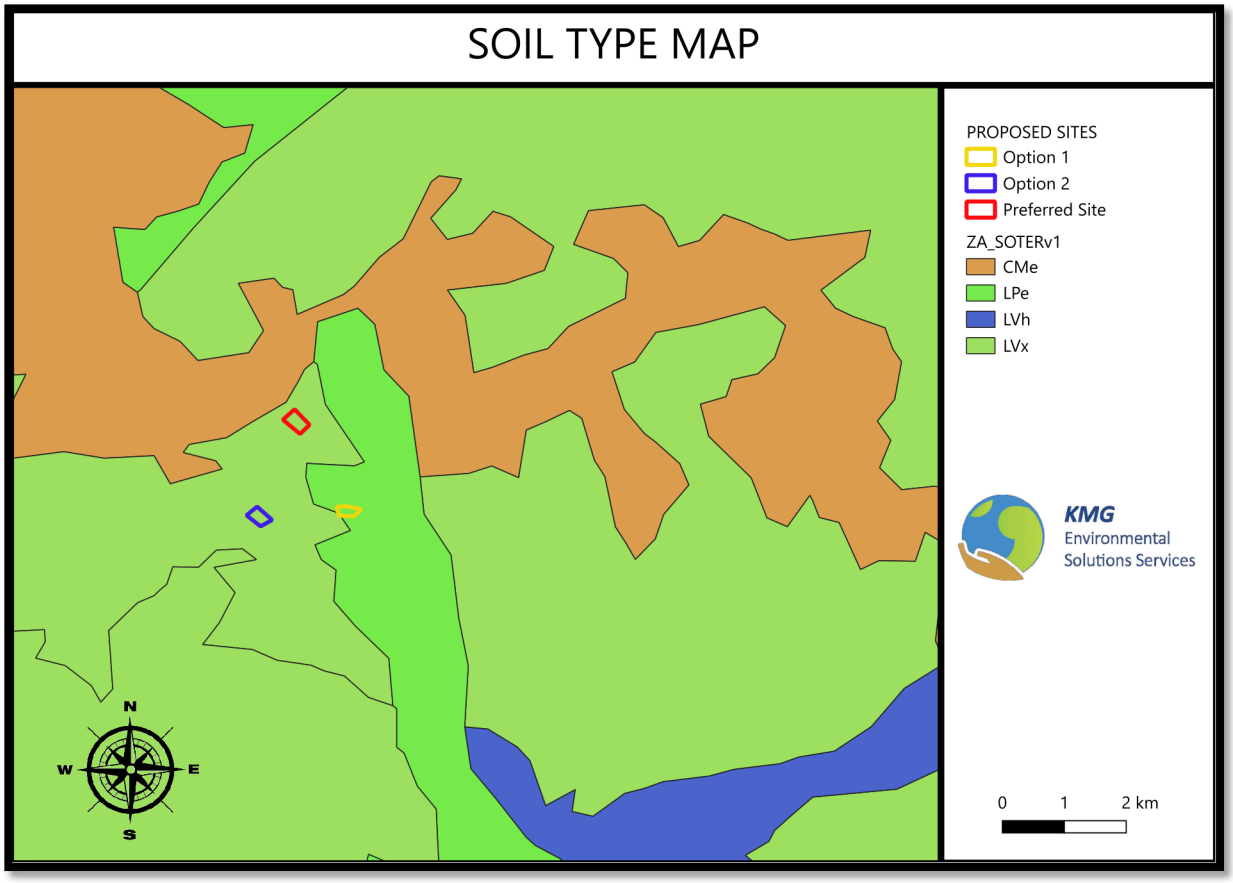


Figure 8 : SOTER soil classification associated with the candidate sites.

6.6.3 Soil Properties Relevant to Agricultural Capability

The agricultural interpretation of the mapped soils must consider physical properties such as soil depth, texture, drainage, infiltration, surface rockiness, stoniness and erosion susceptibility.

The SOTER framework specifically recognises surface rockiness, surface stoniness, erosion, sensitivity to surface capping and rootable depth as attributes relevant to the interpretation of soil components. Rootable depth is particularly important because it represents the depth to which plant roots can grow without physical or chemical restriction. SOTER classifies soils as very shallow (<30 cm), shallow (30–50 cm), moderately deep (50–100 cm), deep (100–150 cm) and very deep (≥150 cm).

The principal mapped soil units and their agricultural implications are summarised below.

Table 4 : Mapped SOTER Soil Units and Agricultural Characteristics

SOTER Code	Soil Unit	Occurrence in Study Area	Relevant Soil Characteristics	Agricultural Capability Implications
LVx	Chromic Luvisols	Principal mapped unit associated with the Preferred Site and Option Site 2	Luvisol classification is associated with development of an argic subsurface horizon. Under SOTER/FAO terminology, an argic horizon has a distinctly higher clay content than the overlying horizon and has a sandy-loam or finer texture with at least 8% clay.	The textural differentiation may provide greater moisture and nutrient retention in the subsoil than very shallow or coarse-textured soils. Agricultural performance remains dependent on effective depth, drainage, structure and climatic moisture availability.
LPe	Eutric Leptosols	Occurs near Option Site 1 and within the surrounding landscape	The mapped unit belongs to the Leptosol group. The SOTER map itself does not provide site-specific measurements of depth, stoniness or rooting restriction; these require field verification.	Potential agricultural limitation should therefore be evaluated primarily through site-specific effective depth, surface rockiness/stoniness and rooting conditions rather than inferred from the regional map alone.
CMe	Eutric Cambisols	Extensive within the surrounding landscape north and east of the sites	Cambisols are associated with a cambic diagnostic horizon. The SOTER manual describes a cambic horizon as an altered subsurface horizon, sandy loam or finer with at least 8% clay, showing development of soil structure and evidence of alteration.	Generally represents a developed mineral soil resource, but agricultural capability depends on depth, texture, drainage, terrain and climatic conditions.
LVh	Haplic Luvisols	Occurs farther south of the candidate sites	As a Luvisol, the unit is associated with an argic horizon and vertical textural differentiation within the profile.	May provide functional rooting and moisture-storage conditions where profiles are sufficiently deep, but capability cannot be assigned without site-specific depth and physical-property information.

The SOTER manual also identifies soil texture as a fundamental physical property. Soil texture ranges from sand and loamy sand through sandy loam, loam, clay loam and ultimately clay depending on the proportions of sand, silt and clay.

Texture influences agricultural capability because it affects infiltration, drainage, water-storage capacity, aeration and susceptibility to compaction. The regional SOTER classification alone does not provide sufficient site-specific particle-size information to assign an exact texture to each candidate footprint. These characteristics are therefore refined through the field investigation and available project-specific information.

6.6.4 Drainage, Infiltration and Erosion Considerations

SOTER identifies soil drainage and infiltration as important profile attributes. Drainage classes range from excessively drained to very poorly drained, while basic infiltration rate is classified from very slow (<0.1 cm/h) to extremely rapid (≥25 cm/h).

The SOTER framework also recognises sheet, rill, gully, tunnel, water/wind and wind erosion as forms of observable soil degradation.

These properties are relevant to the proposed landfill because clearing of vegetation, excavation and movement of heavy machinery may alter infiltration, compact soils and increase runoff. Consequently, even where soils currently provide functional grazing capability, disturbance could significantly reduce their agricultural functionality if topsoil, drainage and erosion are not appropriately managed.

6.7 Rainfall and Agricultural Climate

The CHIRPS Average Precipitation Map indicates that all three candidate sites occur predominantly within the approximately 500–550 mm annual rainfall class.

SOTER identifies rainfall as a mandatory climatic characteristic because precipitation represents an important component of land-resource interpretation.

The mapped rainfall conditions are sufficient to support natural grassland and livestock grazing. However, rainfall of this magnitude may impose limitations on dependable rain-fed cropping, particularly where soils have restricted rooting depth or limited plant-available water-storage capacity.

Because the three candidate sites occur within the same mapped rainfall class, climatic moisture availability does not provide a substantial basis for differentiating between them.

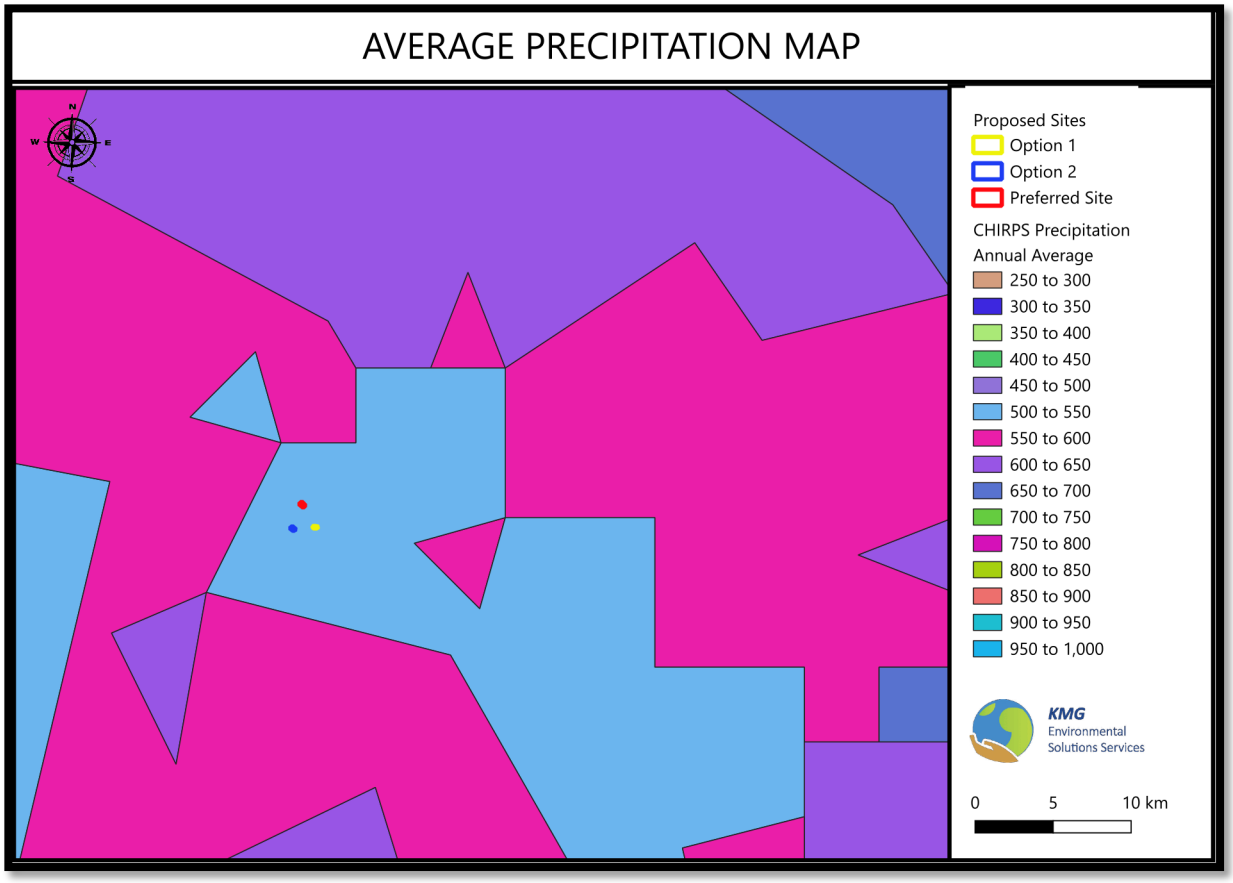


Figure 9 : Average annual precipitation associated with the study area.

6.8 Hydrological Setting

The Hydrological Profile Map places the three alternatives within the same broad hydrological profile. The Orange River occurs to the north of the candidate sites and represents the dominant regional drainage feature. The Melkspruit occurs to the west and south-west of the alternative sites.

The NFEPA Hydrological Map identifies a range of river and wetland features within the broader landscape. The supplied mapping does not indicate direct overlap between the three candidate footprints and the principal mapped wetland polygons.

Hydrological conditions are relevant to agricultural capability because drainage influences soil aeration, rooting conditions, erosion and soil-water availability. The SOTER methodology similarly recognises surface drainage, groundwater depth and flooding as terrain-component attributes relevant to land-resource interpretation.

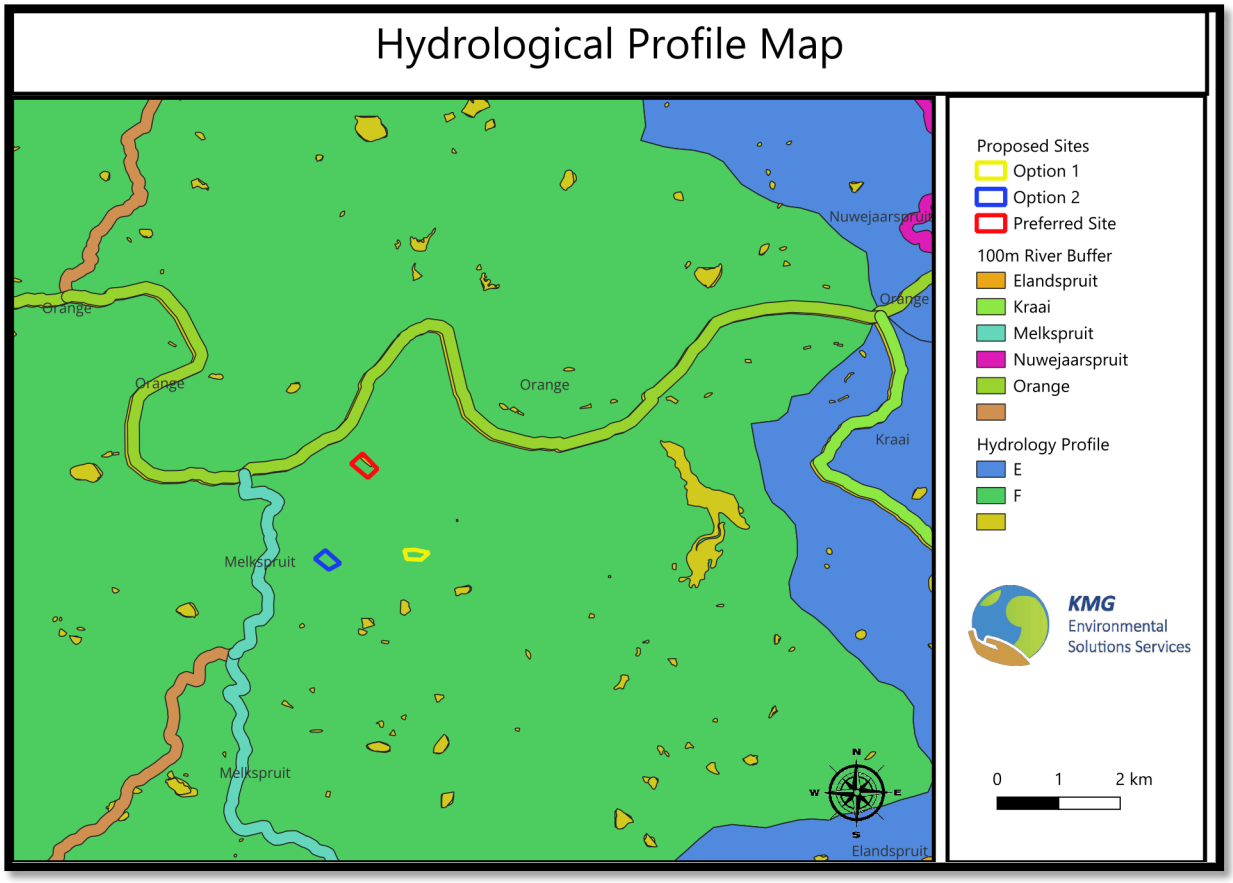


Figure 10 : Hydrological profile and principal watercourses associated with the study area.

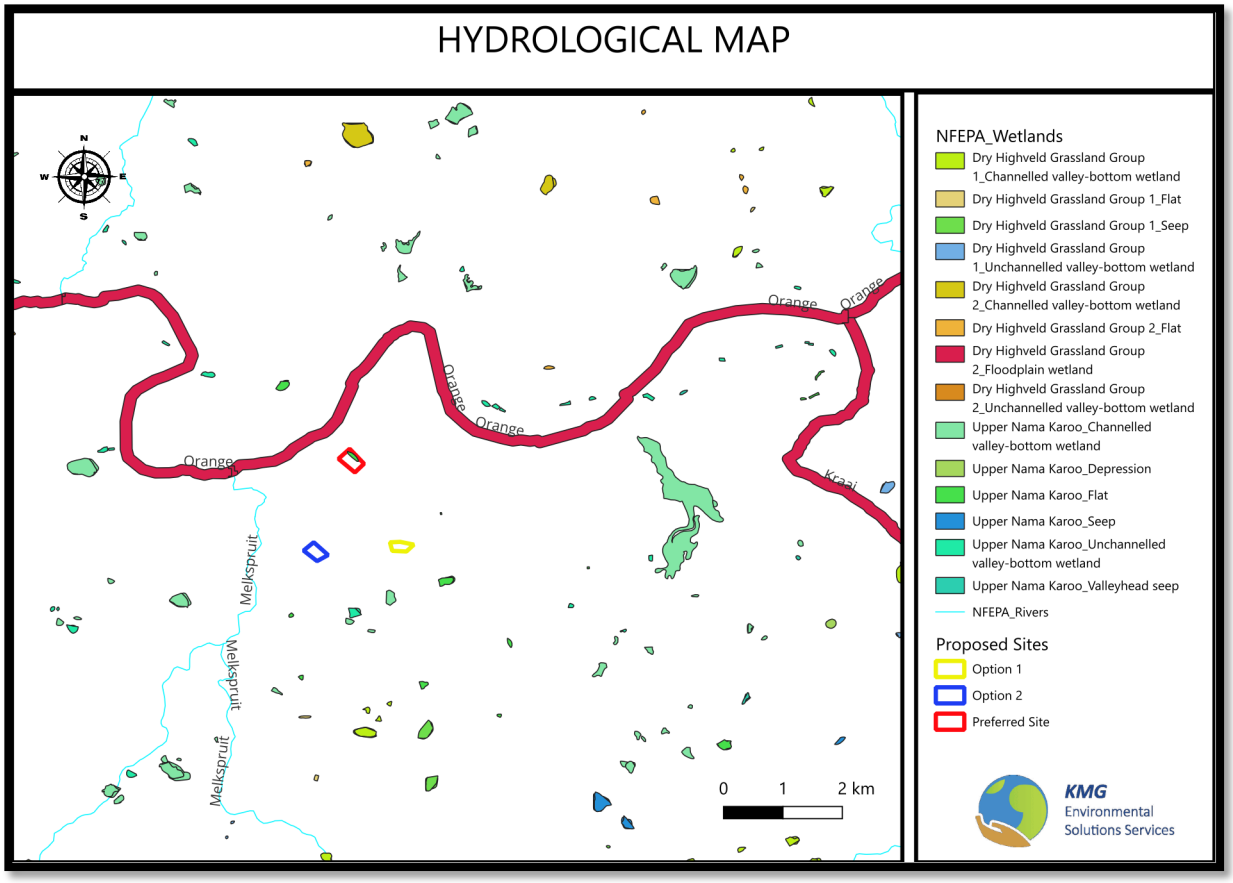


Figure 11: NFEPA hydrological features associated with the study area.

6.9 Agricultural Protected Areas

The Agricultural Protected Areas Map identifies Irrigation Protected Agricultural Areas and Rain-fed Protected Agricultural Areas within the broader regional landscape. None of the three candidate footprints directly overlaps the mapped protected agricultural areas shown on the supplied dataset.

This indicates that none of the alternatives is situated directly within the mapped protected agricultural areas represented by this dataset. However, the absence of such overlap does not imply that the land has no agricultural value. The land-capability and grazing-capability datasets indicate that the candidate sites continue to form part of a functional agricultural landscape.

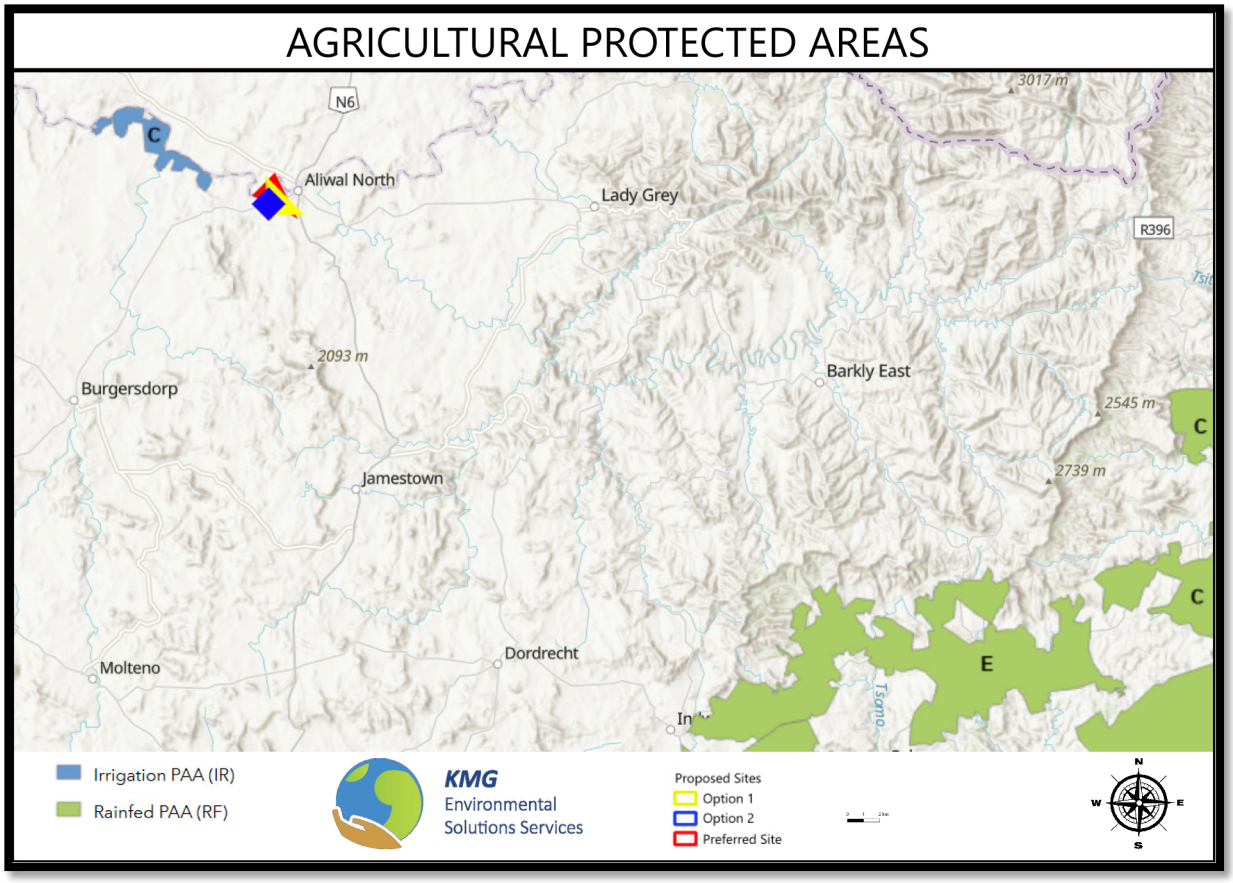


Figure 12 : Agricultural Protected Areas in relation to the proposed candidate sites.

6.10 Summary of Desktop Findings

The desktop assessment indicates that the Preferred Site, Option Site 1 and Option Site 2 occur within a broadly comparable agricultural environment characterised predominantly by grazing-capability land, natural or semi-natural grassland, moderate annual rainfall and gently undulating terrain.

Table 5 : Consolidated Desktop Findings

Environmental / Agricultural Attribute	Preferred Site	Option Site 1	Option Site 2	Overall Interpretation
Regional Setting	Rural/peri-urban western Maletswai	Rural south-western Maletswai	Rural south-western Maletswai	All alternatives occur within the same broader agricultural landscape.
Topography	Gentle to gently undulating	Gentle to gently undulating	Gentle to gently undulating	No major topographic distinction for agricultural capability.

Land Cover	Natural land with stronger association with mapped cultivation	Predominantly natural	Predominantly natural	Preferred Site has greater mapped association with agricultural transformation.
Current Desktop Land Use	Temporary commercial dryland cultivation	Unimproved grassland	Unimproved grassland	Preferred Site shows greater desktop evidence of cultivation; alternatives are more grazing-oriented.
Agricultural Land Capability	Predominantly grazing	Predominantly grazing	Predominantly grazing	Grazing is the dominant mapped agricultural capability across all alternatives.
Grazing Capability	Functional mapped grazing resource	Functional mapped grazing resource	Functional mapped grazing resource	Broadly comparable grazing potential.
Principal SOTER Soil Association	LVx – Chromic Luvisols	Near LPe/LVx transition	LVx – Chromic Luvisols	Soil variability exists between and within mapped units; regional mapping requires field verification.
Soil Profile Implication	Luvisol association with argic subsurface horizon	Greater potential influence of Leptosol conditions	Luvisol association with argic subsurface horizon	Rootable depth, texture, drainage and stoniness require field confirmation.
Rainfall	±500–550 mm/year	±500–550 mm/year	±500–550 mm/year	Similar climatic limitation across alternatives; generally favourable for grazing but less reliable for intensive rain-fed cultivation.
Major Hyd				

7. FIELD VERIFICATION AND SITE ASSESSMENT

7.1 Field Assessment

A field verification and Agricultural Impact Assessment site investigation was undertaken by KMG Environmental Solutions Services (Pty) Ltd on 30 July 2026. The assessment covered the Preferred Site, Option Site 1 and Option Site 2 identified for the proposed Maletswai Landfill development.

The purpose of the field investigation was to verify the actual agricultural conditions of the candidate sites and supplement the desktop assessment with site-specific observations. Particular attention was given to current land use, livestock activity, vegetation cover, terrain, surface soil characteristics, surrounding land uses, existing infrastructure and potential constraints to agricultural utilisation.

The field assessment included visual inspection of all three candidate sites, recording of general site conditions, inspection of surface soils, hand-auger soil sampling, observation of livestock activity and verification of surrounding infrastructure and land uses.

The locations of the three candidate sites and their spatial relationship to Maletswai, the Orange River, R58, N6 and surrounding infrastructure are presented in Figure below.

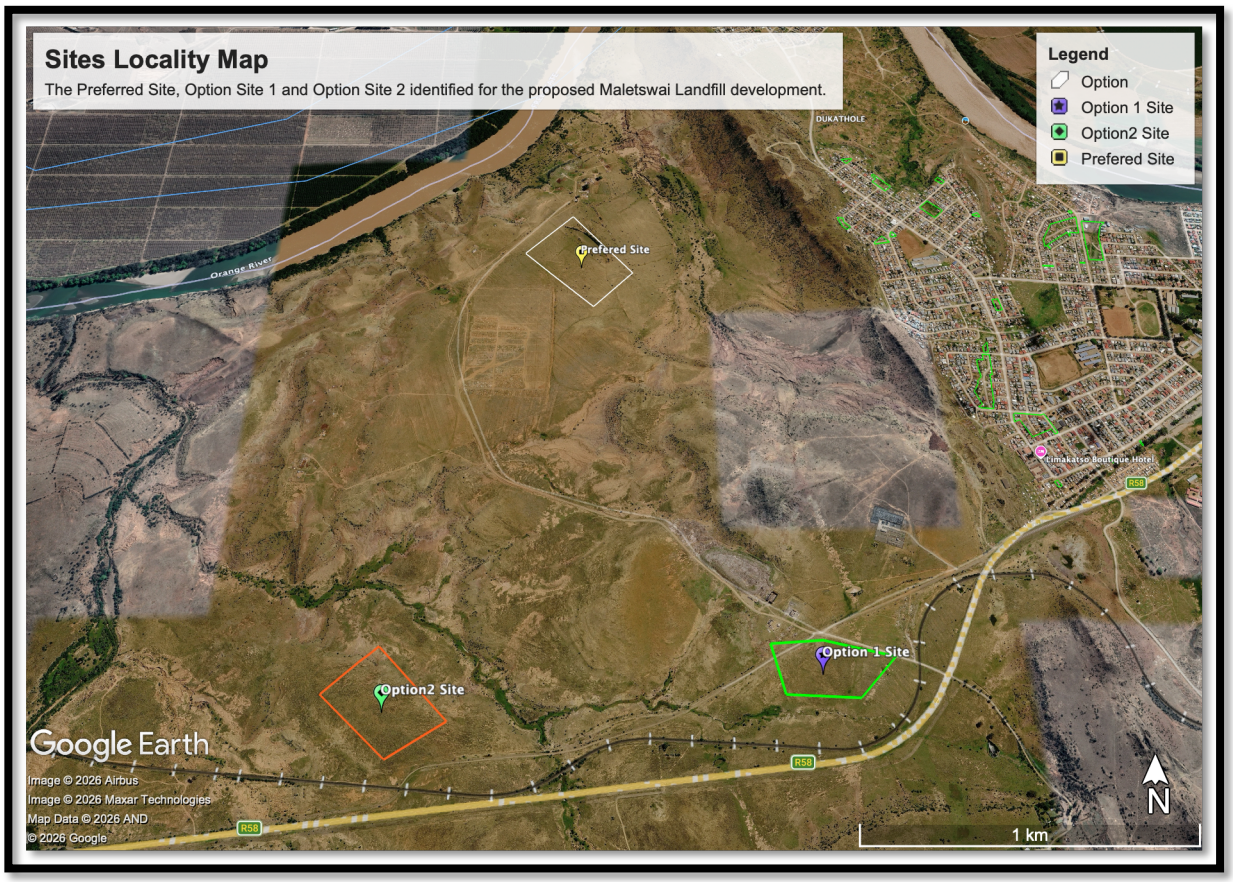


Figure 13 : Locality of the Preferred Site, Option Site 1 and Option Site 2 within the Maletswai project area.

7.2 General Field Conditions and Agricultural Land Use

Field verification confirmed that all three candidate sites occur within a predominantly rural grazing landscape. The sites are characterised primarily by open grassland, with scattered shrubs and locally occurring woody vegetation.

The photographs taken during the assessment show relatively extensive open grass-covered areas suitable for livestock movement and grazing. The terrain is generally gentle to gently undulating, with locally rocky hills forming part of the surrounding landscape.

Evidence of livestock utilisation was directly observed at several locations. This included cattle dung and other indications of domestic livestock activity. Based on the field verification, the three candidate sites are predominantly utilised for grazing by cattle, sheep, goats and other domestic animals.



Figure 14 : General grassland and grazing conditions observed across the project area during the field assessment on 30 July 2026.



Figure 15 : Field evidence of livestock utilisation within the assessed sites.

These observations correspond with the Agricultural and Land Capability Map, which places the three alternatives predominantly within grazing-capability land.

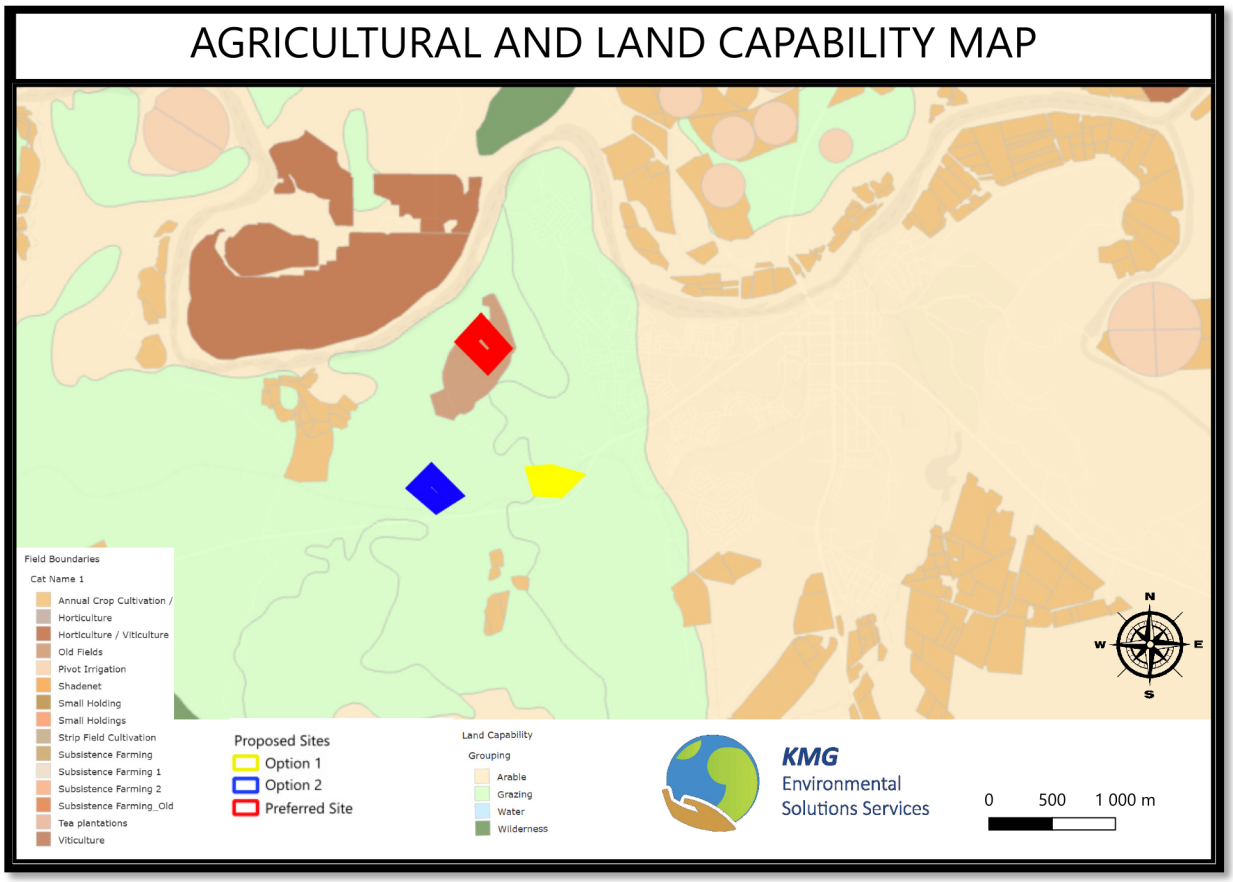


Figure 16 : Agricultural and land capability of the Preferred Site and alternative sites.

The field observations provide an important refinement of the desktop land-use information. Although the Current Land Use Map identifies the Preferred Site within an area mapped as temporary commercial dryland cultivation, no active crop cultivation was observed at the Preferred Site during the field assessment. The actual condition observed on 30 July 2026 was predominantly grass-covered land utilised for grazing.

The mapped cultivated classification at the Preferred Site may therefore represent previous cultivation or a broader-scale land-use classification. For the purposes of the current field assessment, the dominant observed agricultural use of all three alternatives was livestock grazing.

7.3 Soil Sampling and Field Soil Investigation

Representative soil sampling was undertaken across the three candidate sites to support the agricultural assessment. Three sampling points were established within the Preferred Site to provide greater representation of spatial variability, while one representative sampling location was established within each alternative site.

The locations of the soil sampling points are presented in Table below.

Table 6 : Soil Sampling Locations

Site	Sample ID	Latitude	Longitude
Preferred Site	Preferred Site S1	30°41'24.31"S	26°39'48.66"E
Preferred Site	Preferred Site S2	30°41'28.95"S	26°39'51.60"E
Preferred Site	Preferred Site S3	30°41'34.36"S	26°39'53.18"E
Option Site 1	Option Site 1 S1	30°42'23.15"S	26°40'25.01"E
Option Site 2	Option Site 2 S1	30°42'28.11"S	26°39'29.25"E

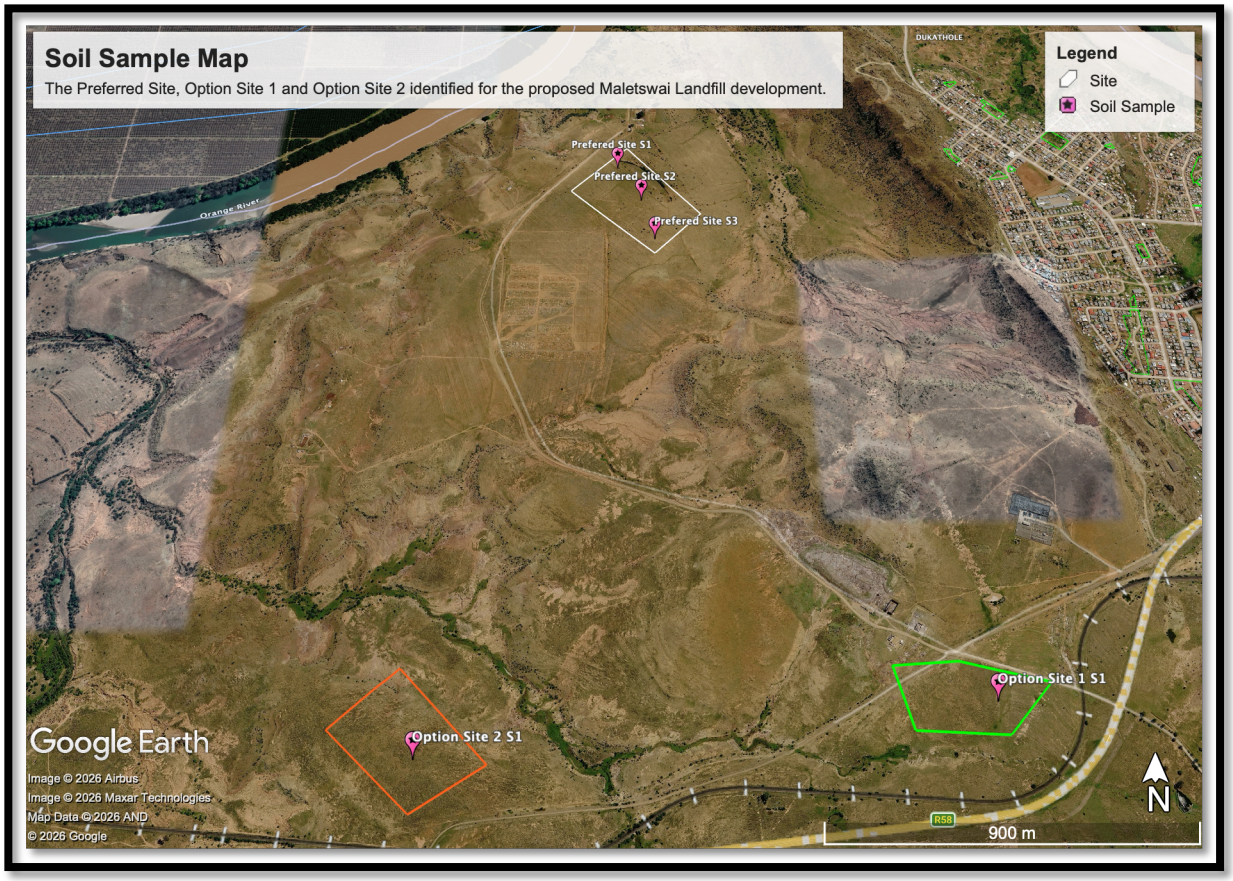


Figure 17 : Location of soil sampling points within the Preferred Site, Option Site 1 and Option Site 2.

Soil samples were collected using a hand auger. The field photographs show variation in the colour and apparent physical characteristics of recovered soil material, ranging from brown and reddish-brown to darker brown material. Localised coarse fragments and rocky surface conditions were also observed within portions of the study area.



Figure 18 : Hand-auger soil investigation and representative soil material recovered during the field assessment.



Figure 19 : Collection and preparation of representative soil samples during the field investigation.

The observations support the project-specific information indicating spatial variation in the near-surface soil environment. The project geotechnical investigation describes the broader development area as containing a relatively thin topsoil horizon over transported and residual soils comprising predominantly silty sands and sandy silts associated with weathered Beaufort Group sedimentary material.

The field photographs are used as supporting evidence of site conditions and should not independently be interpreted as confirmation of specific soil forms.

7.4 Preferred Site

The Preferred Site was observed to comprise predominantly open grassland with scattered shrubs and occasional woody vegetation. The site is presently utilised primarily for livestock grazing, and no active cultivation was observed during the field assessment.

The terrain is generally open and gently undulating. Soil investigation at three locations showed visible variability in the recovered material, supporting the interpretation that soil characteristics are not completely uniform across the footprint.



Figure 20 : General landscape and grazing conditions within the Preferred Site.



Figure 21 : Soil investigation undertaken within the Preferred Site.

A significant surrounding land-use consideration is the existing graveyard/cemetery situated adjacent to the Preferred Site. While this does not directly affect the intrinsic agricultural capability of the soil, it represents an important existing land-use and social constraint that should be considered during overall site selection.



Figure 22 : Existing graveyard/cemetery situated adjacent to the Preferred Site.

From an agricultural perspective, the Preferred Site retains functional value as grazing land. The desktop identification of portions of the area as commercial dryland cultivation also indicates possible previous agricultural utilisation beyond grazing.

7.5 Option Site 1

Option Site 1 was observed to comprise predominantly grassland with scattered shrubs and woody vegetation. Evidence of livestock utilisation was present, confirming that the site forms part of the existing grazing landscape.



Figure 23 : General landscape and grazing conditions observed at Option Site 1.



Figure 24 : Representative soil investigation undertaken at Option Site 1.

A significant characteristic of Option Site 1 is its proximity to the existing dumping/disposal site. Consequently, the surrounding environment has already experienced a degree of anthropogenic disturbance associated with waste-management activities.

Existing electrical powerlines and associated servitudes are also present within or close to the site, while a railway line occurs nearby. These infrastructure features contribute to fragmentation of the surrounding grazing landscape and may constrain the usable development footprint.

Despite the existing disturbances and infrastructure, the undeveloped portions of Option Site 1 remain functional grazing land.

7.6 Option Site 2

Option Site 2 comprises predominantly open grassland with scattered shrubs and occasional woody vegetation. Evidence of livestock utilisation was observed, and the site is presently used primarily for grazing.



Figure 25 : Open grassland and grazing conditions observed at Option Site 2.



Figure 26 : Representative soil investigation undertaken at Option Site 2.

Option Site 2 is located relatively close to the main road and railway infrastructure. Electrical powerlines and associated infrastructure are also present within the surrounding landscape.

The site was observed to be comparatively open and exposed, with fewer substantial natural wind barriers than Option Site 1. This exposure may increase visibility from surrounding transport routes and potentially allow greater unrestricted movement of wind across the site.

7.7 Surface Water and Drainage Observations

A localised surface-water feature was observed within the broader assessment area. The feature comprised shallow standing water surrounded by grass and relatively dense woody vegetation.



Figure 27 : Localised surface-water and wetter landscape conditions observed during the field assessment.

The observation indicates that localised differences in drainage and soil moisture occur within the broader landscape. Such areas may provide different seasonal grazing conditions compared with the surrounding upland grassland and may be more sensitive to physical disturbance and soil compaction.

The regional hydrological mapping similarly identifies drainage and wetland features within the wider study area.



Figure 28 : Hydrological features associated with the broader project area.

7.8 Existing Infrastructure and Land-Use Constraints

Field verification identified distinct surrounding land-use and infrastructure conditions associated with each alternative.

The Preferred Site is distinguished principally by its proximity to the existing graveyard/cemetery. Option Site 1 occurs adjacent to the existing dumping site and is influenced by existing electrical servitudes and nearby railway infrastructure. Option Site 2 is situated close to the main road and railway and is comparatively more exposed, with electrical infrastructure also occurring within the surrounding landscape.

Table 7 : Comparative Field Verification

Assessment Attribute	Preferred Site	Option Site 1	Option Site 2
Current Agricultural Use	Grazing	Grazing	Grazing
Livestock Evidence	Present	Present	Present
Active Cultivation Observed	No	No	No
General Vegetation	Grassland with scattered shrubs	Grassland with shrubs and woody vegetation	Open grassland with scattered shrubs
Terrain	Gentle to gently undulating	Gentle to gently undulating	Gentle to gently undulating
Soil Sampling Points	3	1	1

Key Adjacent Land Use	Graveyard/cemetery	Existing dumping site	Main road
Powerline/Servitude Influence	Not dominant	Present	Present
Railway Influence	Less prominent	Nearby	Nearby
Landscape Exposure	Moderate	Comparatively more enclosed	Comparatively exposed
Existing Disturbance	Moderate	Comparatively higher	Moderate
Principal Agricultural Function	Livestock grazing	Livestock grazing	Livestock grazing

Table 8 : Examples of existing infrastructure and surrounding land-use conditions associated with the candidate sites.

Land Use Field Picture	Description
	Existing graveyard/cemetery situated adjacent to the Preferred Site. The cemetery represents an established community land use
	Existing waste disposal/dumping area with associated access tracks and small structures. The area is already significantly disturbed by waste-management activities.
	Open grassland influenced by existing electrical infrastructure, including an electrical substation and powerlines. Grazing remains possible within undeveloped portions.

	Predominantly grazing grassland traversed by electrical powerlines and associated servitudes. The infrastructure contributes to fragmentation of the agricultural landscape.
	Open grazing land traversed by an existing railway line. The railway represents an established linear infrastructure feature within the agricultural landscape.
	Disturbed grassland and unpaved access road with visible waterlogging/muddy conditions. Surrounding land remains predominantly available for livestock grazing.

	Rural residential/smallholding land use with informal or farm-related structures, fencing and livestock enclosures. The surrounding grassland supports domestic livestock activities.

7.9 Field Verification Conclusion

The field verification undertaken on 30 July 2026 confirmed that the Preferred Site, Option Site 1 and Option Site 2 are all presently characterised predominantly by grazing land. Direct evidence of livestock utilisation was observed across the study area, and no active crop cultivation was identified within the assessed footprints at the time of the investigation.

The field observations therefore confirm that the principal agricultural function of the three candidate sites is livestock grazing. This is consistent with the regional land capability mapping, which classifies the immediate project landscape predominantly as grazing-capability land.

The alternatives nevertheless differ in their surrounding environmental and land-use context. The Preferred Site is adjacent to an existing graveyard/cemetery. Option Site 1 is located adjacent to an existing dumping site and is influenced by electrical servitudes and nearby railway infrastructure. Option Site 2 is located close to the main road and railway infrastructure and is comparatively open and exposed.

From a strictly agricultural land-use perspective, the field investigation did not identify a substantial difference in the current agricultural function of the three alternatives, as all are predominantly used for livestock grazing. The final agricultural preference should therefore be determined through integration of the field observations with soil characteristics, agricultural land capability, agricultural sensitivity, existing disturbance and the extent and permanence of land transformation associated with each alternative.

8. SOIL ANALYTICAL RESULTS, LAND CLASSIFICATION AND AGRICULTURAL CAPABILITY

8.1 Introduction

The agricultural capability of the Preferred Site, Option Site 1 and Option Site 2 was evaluated through integration of the field verification findings, soil analytical results, regional

soil classification, existing land use, land capability, grazing capability, agricultural sensitivity and climatic and terrain conditions.

This integrated approach is consistent with the SOTER principle that land should be interpreted as a combination of soil and terrain characteristics rather than from an individual soil parameter alone. SOTER identifies attributes such as soil profile characteristics, rootable depth, drainage, texture, bulk density, pH and exchangeable cations as relevant components of soil resource characterisation.

The laboratory results are therefore not used independently to classify agricultural capability. They are interpreted together with the mapped and field-verified characteristics of each alternative.

8.2 Laboratory Soil Analysis

Five soil samples collected during the field assessment were submitted to NviroTek Laboratories for analysis. Three samples were collected from the Preferred Site, while one representative sample was collected from each alternative.

The samples were received by the laboratory on 04 August 2026 and analysed under Certificate of Analysis WO 207429:264476, reported on 12 August 2026.

The analytical suite included soil pH (KCl), Bray I phosphorus, exchangeable potassium, sodium, calcium and magnesium, exchangeable acidity, base proportions, acid saturation, cation ratios, S-value, T-value, density and sulphur. These parameters provide an indication of soil reaction, nutrient availability, exchangeable base status and general chemical conditions relevant to plant growth.

Table 9 : Soil Laboratory Results

Parameter	Unit	Preferred Site S1	Preferred Site S2	Preferred Site S3	Option Site 1 S1	Option Site 2 S2
Laboratory Number	–	G41-76226	G41-76227	G41-76228	G41-76229	G41-76230
pH (KCl)	–	6.12	5.78	6.35	6.43	5.26
Phosphorus (P), Bray I	mg/kg	3	4	3	5	3
Potassium (K), AmAc	mg/kg	133	257	185	113	304
Sodium (Na), AmAc	mg/kg	24	15	27	29	10
Calcium (Ca), AmAc	mg/kg	1,861	1,637	2,353	2,497	1,057
Magnesium (Mg), AmAc	mg/kg	785	846	1,340	187	327
Exchangeable Acidity, KCl	cmol(+)/kg	0.00	0.00	0.00	0.00	0.00

Calcium (Ca) Base Proportion	%	57.50	51.68	50.41	86.50	60.13
Magnesium (Mg) Base Proportion	%	39.75	43.76	47.05	10.61	30.52
Potassium (K) Base Proportion	%	2.10	4.14	2.03	2.00	8.85
Sodium (Na) Base Proportion	%	0.65	0.43	0.51	0.89	0.50
Acid Saturation	%	0.00	0.00	0.00	0.00	0.00
Ca:Mg Ratio	–	1.45	1.18	1.07	8.15	1.97
(Ca+Mg):K Ratio	–	46.23	23.05	47.99	48.55	10.24
Mg:K Ratio	–	18.89	10.57	23.17	5.30	3.45
S-Value	cmol(+)/kg	16.18	15.84	23.34	14.43	8.79
Na:K Ratio	–	0.31	0.10	0.25	0.44	0.06
T-Value	cmol(+)/kg	16.18	15.84	23.34	14.43	8.79
Density	g/ml	1.08	1.11	1.08	1.03	1.01
Sulphur (S), AmAc	mg/kg	2.86	3.30	2.37	16.80	3.97

The values above are transcribed from the laboratory Certificate of Analysis; where the available extract does not show the complete Option Site 2 row, values have not been inferred.

8.3 Soil Reaction (pH)

Soil pH is an important agricultural parameter because it influences nutrient availability, microbial activity and the efficiency with which plants utilise nutrients.

The analysed soils range from pH(KCl) 5.26 to 6.43.

The Preferred Site shows moderate internal variability, with values of 5.78–6.35. Option Site 1 recorded the highest pH at 6.43, while Option Site 2 recorded the lowest at 5.26.

The results indicate that Option Site 2 has the comparatively more acidic soil condition of the assessed sites. The Preferred Site and Option Site 1 generally display less acidic conditions.

No exchangeable acidity was reported for the samples shown in the laboratory certificate, which indicates that strong exchangeable acidity is not evident in the analysed samples.

8.4 Phosphorus Status

Bray I phosphorus concentrations range from 3 to 5 mg/kg across the five samples.

The relatively narrow range indicates that phosphorus status is broadly similar across the alternatives. From an agricultural perspective, the measured phosphorus concentrations suggest that phosphorus availability would represent a management consideration if the land were used for more intensive crop production.

This parameter does not materially distinguish the three alternatives because all samples show similarly low measured concentrations.

8.5 Exchangeable Potassium

Potassium concentrations show greater variation, ranging from 113 mg/kg at Option Site 1 to 304 mg/kg at Option Site 2.

The Preferred Site samples range between 133 and 257 mg/kg, indicating spatial variability within the site itself.

Option Site 2 recorded the highest potassium concentration and the highest reported potassium base proportion at 8.85%, whereas Option Site 1 recorded the lowest measured potassium concentration.

These differences demonstrate why agricultural capability should not be determined using any single nutrient parameter.

8.6 Calcium and Magnesium Status

Calcium and magnesium show substantial differences between the sampling locations.

Option Site 1 recorded the highest calcium concentration at 2,497 mg/kg but comparatively low magnesium at 187 mg/kg. In contrast, the Preferred Site recorded magnesium concentrations ranging from 785 to 1,340 mg/kg.

The calcium proportion at Option Site 1 is 86.50%, substantially higher than the 50.41–57.50% recorded across the Preferred Site samples. Conversely, magnesium represents only 10.61% at Option Site 1 compared with 39.75–47.05% across the Preferred Site.

This indicates distinctly different cation balances between the sites rather than a simple difference in overall fertility.

8.7 Overall Soil Chemical Interpretation

The analytical results indicate that the soils are chemically variable both between and within the candidate sites.

The Preferred Site demonstrates the greatest documented within-site variability because three sampling locations were analysed. Option Site 1 is characterised by comparatively high calcium and low magnesium, while Option Site 2 displays the lowest pH and highest measured potassium concentration.

No laboratory result, considered individually, indicates that one alternative represents exceptionally high agricultural-potential soil.

The results should also be considered within the context of the physical soil environment. The project geotechnical investigation identifies predominantly silty sands, sandy silts and fine-grained residual soils over weathered mudstone and shale.

Table 10: Interpretation of the Soil Analytical Results

Parameter	Result Pattern	Agricultural Interpretation
pH (KCl)	5.26–6.43	The samples range from more acidic conditions at Option Site 2 to comparatively less acidic conditions at Option Site 1. The Preferred Site shows moderate spatial variability.
Phosphorus	3–5 mg/kg	Low and relatively uniform across all sampling locations. Phosphorus availability would be a fertility-management consideration for intensive cropping.
Potassium	113–304 mg/kg	Variable across the sites. Option Site 2 records the highest concentration (304 mg/kg), while Option Site 1 records the lowest (113 mg/kg).
Sodium	10–29 mg/kg	Relatively low concentrations across all samples. No sample shows a high sodium base proportion.
Calcium	1,057–2,497 mg/kg	Considerable variation. Option Site 1 records the highest calcium concentration, while Option Site 2 records the lowest.
Magnesium	187–1,340 mg/kg	Strong spatial variation. Preferred Site S3 records the highest concentration, while Option Site 1 records a distinctly lower concentration.
Exchangeable Acidity	0.00 cmol(+)/kg throughout	No exchangeable acidity was reported in any of the five samples.
Acid Saturation	0.00% throughout	No acid saturation was reported by the laboratory for the analysed samples.
Ca Base Proportion	50.41–86.50%	Calcium dominates the exchangeable base composition at all sites, particularly Option Site 1.
Mg Base Proportion	10.61–47.05%	Preferred Site samples have comparatively high Mg proportions, while Option Site 1 is substantially lower.
K Base Proportion	2.00–8.85%	Option Site 2 has a distinctly higher K proportion than the remaining samples.
Na Base Proportion	0.43–0.89%	Sodium represents less than 1% of the reported base proportions in all samples.
Ca:Mg Ratio	1.07–8.15	Preferred Site samples have relatively similar ratios of 1.07–1.45, while Option Site 1 is strongly calcium-dominated at 8.15.
(Ca+Mg):K Ratio	10.24–48.55	Considerable variation in the relative balance between Ca/Mg and K; Option Site 2 has the lowest ratio because of its comparatively high K.

Mg:K Ratio	3.45–23.17	Highest at Preferred Site S3 and lowest at Option Site 2, demonstrating variation in cation balance.
S-Value	8.79–23.34 cmol(+)/kg	Preferred Site S3 records the highest sum of exchangeable bases, while Option Site 2 records the lowest.
T-Value	8.79–23.34 cmol(+)/kg	Values mirror the S-Value because exchangeable acidity was reported as zero.
Density	1.01–1.11 g/ml	Relatively narrow variation across the five analysed samples.
Sulphur	2.37–16.80 mg/kg	Option Site 1 records a markedly higher sulphur concentration than the other four samples.

8.8 Soil and Land Classification

Regional SOTER mapping identifies the broader project landscape as comprising Eutric Leptosols (LPe), Eutric Cambisols (CMe), Haplic Luvisols (LVh) and Chromic Luvisols (LVx).

The Preferred Site and Option Site 2 are principally associated with the Chromic Luvisol landscape, while Option Site 1 occurs close to the transition between Eutric Leptosols and Chromic Luvisols.

SOTER is based on an integrated soil-terrain approach in which mapping units represent combinations of landform, lithology, surface form, slope, parent material and soils. It should therefore not be interpreted as a detailed site-scale soil survey.

The SOTER information, field observations and project geotechnical findings collectively indicate a variable soil environment rather than extensive uniform high-potential arable soils.

8.9 Existing Agricultural Land Use

Field verification confirmed that the current agricultural function of all three alternatives is predominantly livestock grazing.

Cattle, sheep, goats and other domestic animals utilise the grassland resource, and direct evidence of livestock activity was observed during the site investigation.

Under the SOTER land-use hierarchy, grazing on natural or semi-natural grassland falls within the animal-husbandry/extensive-grazing category.

Although the desktop Current Land Use Map identifies the Preferred Site within a mapped temporary commercial dryland cultivation area, no active crop cultivation was observed during the field assessment on 30 July 2026.

Accordingly, the current field-verified agricultural function of the three sites is classified as grazing, while the mapped cultivated status of the Preferred Site indicates evidence of previous or broader-scale cultivation potential.

8.10 Agricultural Land Capability

Land capability represents the ability of land to support agricultural use on a sustainable basis, taking account of limitations associated with soil, terrain and climate.

For the present assessment, capability was interpreted using the combined evidence from:

- Regional land capability mapping;
- Soter soil classification;
- Field-verified land use;
- Soil and terrain conditions;
- Rainfall;
- Grazing capability;
- Soil analytical results; and
- Existing disturbances.

The Agricultural and Land Capability Map classifies the immediate landscape encompassing the three alternatives predominantly within the grazing capability grouping.

The field verification supports this classification. All three alternatives presently support grassland utilised for livestock grazing, while no active cultivation was observed.

The principal limitations to higher-intensity agricultural utilisation include variable effective soil depth, weathered sedimentary material at depth, silty-sandy soil conditions, moderate rainfall and the predominantly extensive grazing character of the landscape.

The overall agricultural land capability is therefore interpreted as moderate, with grazing representing the dominant sustainable agricultural use.

8.11 Grazing Capability

The Grazing Capability Map places the Preferred Site, Option Site 1 and Option Site 2 within broadly comparable grazing-capability conditions.

This spatial interpretation is strongly supported by the field assessment, which confirmed active livestock utilisation and extensive grassland across all three sites.

No substantial difference in grazing functionality was evident between the three alternatives during the field assessment.

Consequently, loss of land to the landfill would primarily represent a loss of livestock grazing resource rather than displacement of active intensive cropping.

8.12 Agricultural Protected Areas

The Agricultural Protected Areas Map indicates mapped Irrigation Protected Agricultural Areas and Rain-fed Protected Agricultural Areas within the broader regional landscape.

None of the three candidate footprints appears to directly overlap the mapped protected agricultural areas shown on the supplied dataset.

The absence of direct overlap reduces the agricultural constraint associated with formally mapped protected agricultural land. It does not, however, mean that the sites have no agricultural value, since all three retain functional grazing capability.

8.13 Agricultural Sensitivity

Agricultural sensitivity was determined by integrating agricultural capability, existing land use, soil conditions, grazing functionality, regional soil classification and existing disturbance.

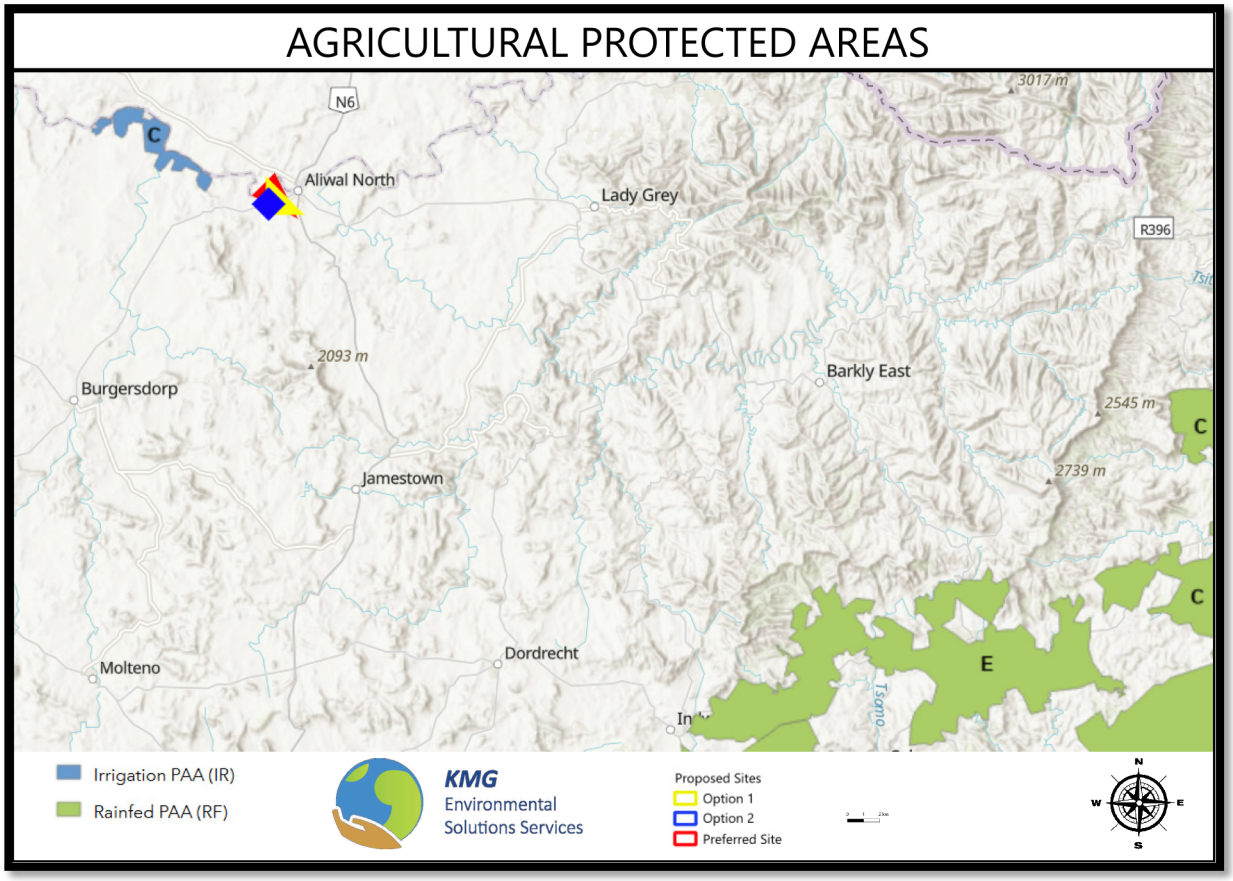


Figure 29 : Agricultural sensitivity of the proposed landfill alternatives.

The field verification indicates that none of the three alternatives presently supports intensive crop production. All are predominantly grazing land.

The Preferred Site nevertheless requires recognition of the desktop-mapped dryland cultivation classification. Option Site 1 occurs within a comparatively more disturbed setting adjacent to the existing dumping site and established infrastructure, while Option Site 2 remains functional grazing land but is similarly affected by surrounding linear infrastructure.

Based on the combined information, the sites are considered to have moderate agricultural sensitivity, primarily because they retain functional grazing value but do not represent confirmed high-potential cultivated agricultural land.

8.14 Integrated Agricultural Classification

Figure 30: Integrated Agricultural Classification of the Alternatives

Assessment Criterion	Preferred Site	Option Site 1	Option Site 2
Current Field-Verified Use	Grazing	Grazing	Grazing
Active Cultivation Observed	No	No	No
Desktop Cultivation Indication	Yes	No	No
Principal SOTER Association	Chromic Luvisol	Eutric Leptosol / Chromic Luvisol transition	Chromic Luvisol
Soil Reaction	Moderately acidic to near-neutral	Least acidic of sampled sites	Comparatively more acidic
Terrain	Gentle to gently undulating	Gentle to gently undulating	Gentle to gently undulating
Grazing Capability	Functional	Functional	Functional
Agricultural Protected Area Overlap	None mapped	None mapped	None mapped
Existing Disturbance	Moderate	Comparatively higher	Moderate
Principal Agricultural Function	Grazing	Grazing	Grazing
Overall Land Capability	Moderate / Grazing	Moderate / Grazing	Moderate / Grazing
Agricultural Sensitivity	Moderate	Moderate	Moderate

8.15 Overall Agricultural Capability Conclusion

The integrated assessment indicates that the Preferred Site, Option Site 1 and Option Site 2 occur within a predominantly grazing-oriented agricultural landscape.

The field verification confirms that all three sites are currently utilised for livestock grazing, while the regional land capability and grazing capability datasets support grazing as the principal agricultural function.

The soil analytical results demonstrate variation in soil chemistry but do not, by themselves, identify any of the three alternatives as exceptionally high-potential agricultural soil.

Similarly, none of the candidate sites directly overlaps the mapped Agricultural Protected Areas.

The agricultural capability of the three sites is therefore considered moderate and predominantly suitable for grazing, with localised potential for more intensive agricultural utilisation where soil depth, moisture availability and management conditions are favourable.

From an agricultural perspective, Option Site 1 has an important distinguishing characteristic because it occurs adjacent to an existing dumping site and within a comparatively more disturbed infrastructure setting. The Preferred Site retains grazing functionality and also carries a desktop indication of previous or mapped dryland cultivation. Option Site 2 remains functional grazing land with comparatively less evidence of historical cultivation.

These findings provide the basis for the subsequent assessment of development impacts and comparative evaluation of the three alternatives.

9. LAND CAPABILITY AND AGRICULTURAL POTENTIAL

9.1 Land Capability

The Agricultural and Land Capability Map indicates that the Preferred Site, Option Site 1 and Option Site 2 occur predominantly within land classified for grazing. This classification is supported by the field verification undertaken on 30 July 2026, during which all three sites were observed to comprise predominantly grassland actively utilised by livestock.

The terrain is generally gentle to gently undulating, with the project information indicating slopes of approximately 1–5%. These gradients are suitable for grazing and do not constitute a major agricultural limitation.

9.2 Agricultural Potential

The agricultural potential of the sites is considered moderate and predominantly grazing-oriented. The principal factors influencing agricultural capability include the mapped soil types, variable effective soil depth, silty-sandy soil characteristics, underlying weathered sedimentary material and the regional rainfall regime.

Annual precipitation is approximately 500–550 mm across the three alternatives. These conditions support grassland and livestock grazing but may constrain reliable rain-fed cultivation where soil depth and moisture-storage capacity are limited.

Although the desktop land-use mapping identifies commercial dryland cultivation at the Preferred Site, no active cultivation was observed during the field assessment. All three sites were predominantly being utilised for livestock grazing.

9.3 Grazing Capability

The Grazing Capability Map indicates broadly comparable grazing conditions across the three sites. Field observations confirmed grass cover and direct evidence of grazing by cattle, sheep, goats and other domestic livestock.

The grassland therefore represents a functional agricultural resource, and development of the landfill would result in the loss of grazing land within the final development footprint.

9.4 Agricultural Protected Areas

The supplied Agricultural Protected Areas Map indicates that none of the three candidate sites directly overlaps the mapped Irrigation Protected Agricultural Areas or Rain-fed Protected Agricultural Areas.

9.5 Comparative Agricultural Classification

Table 11 : Comparative Agricultural Classification

Criterion	Preferred Site	Option Site 1	Option Site 2
Current Agricultural Use	Grazing	Grazing	Grazing
Dominant Land Capability	Grazing	Grazing	Grazing
Active Cultivation Observed	No	No	No
Grazing Functionality	Functional	Functional	Functional
Arable Potential	Limited–Moderate	Limited–Moderate	Limited–Moderate
Agricultural Protected Area Overlap	None mapped	None mapped	None mapped
Existing Disturbance	Moderate	Comparatively higher	Moderate
Overall Agricultural Potential	Moderate	Moderate	Moderate
Agricultural Sensitivity	Moderate	Moderate–Low	Moderate

All three alternatives have agricultural value primarily as livestock grazing land and are considered to have moderate overall agricultural potential. None was observed to support active crop cultivation during the field assessment.

Option Site 1 is comparatively more disturbed due to its proximity to the existing dumping site and infrastructure, while the Preferred Site and Option Site 2 retain greater continuity with the surrounding grazing landscape. From an agricultural land-use perspective, Option Site 1 therefore presents a comparatively lower sensitivity, although it continues to provide functional grazing land.

Below is a complete replacement for Section 10. It retains the existing AIA findings—moderate, predominantly grazing-oriented capability within the candidate footprints—but expands the impact assessment to address the review comment concerning the nearby perennial nut plantations. The existing report confirms that all three candidate sites are currently grazing land and that no active crop cultivation was observed within the footprints.

10. AGRICULTURAL IMPACT ASSESSMENT

10.1 Introduction

The proposed Maletswai Landfill will result in direct and long-term transformation of soil and agricultural resources within the development footprint. The principal direct impacts include loss of grazing land, disturbance and removal of topsoil, alteration of soil profiles, soil compaction, erosion, potential contamination and reduction in future agricultural functionality.

Field verification undertaken on 30 July 2026 confirmed that the Preferred Site, Option Site 1 and Option Site 2 are predominantly utilised for livestock grazing, with no active crop cultivation observed within the assessed footprints. The three alternatives have consequently been classified as having moderate agricultural capability, predominantly associated with grazing.

However, the agricultural assessment cannot be restricted to direct transformation of the landfill footprint. The broader landscape contains cultivated agricultural land, and the review process has specifically identified nearby perennial nut plantations as agricultural receptors requiring consideration.

Perennial nut plantations represent higher-investment, long-term agricultural systems compared with the grazing land directly affected by the landfill footprint. Potential indirect impacts therefore require consideration of dust and smoke deposition on foliage, possible effects on photosynthesis and crop productivity, potential product-quality or taint concerns, windblown waste, pest/vector attraction and possible implications for export or phytosanitary requirements.

The impact assessment consequently considers both:

1. Direct impacts on soil and agricultural land within the landfill footprint; and
2. Indirect impacts on agricultural activities and perennial crops within the surrounding receiving environment.

10.2 Impact Pathways

The principal agricultural impact pathways associated with the proposed landfill are summarised below.

Source / Activity	Agricultural Pathway	Potential Agricultural Receptor	Potential Consequence
Vegetation clearing and earthworks	Direct land transformation	Grazing land	Permanent/temporary loss of agricultural land
Topsoil stripping	Removal of productive soil horizon	Soil resource	Loss of soil functionality
Heavy machinery	Compaction	Soil and grazing land	Reduced infiltration, rooting and rehabilitation potential
Exposed surfaces	Runoff and erosion	Surrounding agricultural soils	Soil loss and sediment deposition
Waste/leachate	Contamination pathway	Soil, grazing land and agricultural water resources	Reduced soil quality/productivity
Unpaved roads and earthworks	Airborne dust	Grazing vegetation and nut plantations	Foliar deposition and potential physiological effects
Landfill operations	Windblown particulate matter	Perennial tree crops	Chronic leaf-surface deposition
Landfill fire / waste burning	Smoke and fine particulate deposition	Nut plantations	Crop exposure and potential product-quality concern
Landfill gas / waste / leachate	Odorous volatile emissions	Nut plantations and agricultural properties	Nuisance and potential product-quality concern
Exposed waste	Windblown litter	Grazing land and plantations	Land pollution and agricultural hygiene impacts
Waste handling	Attraction of birds, rodents and insects	Orchards and surrounding farms	Potential biosecurity/hygiene concern
Landfill operation	Indirect product-quality effects	Commercial nut production	Potential market/export implications if product quality is affected

10.3 Construction Phase Impacts

Construction will involve vegetation clearing, topsoil stripping, excavation, establishment of landfill cells, construction of roads and supporting infrastructure, movement of heavy machinery and stockpiling of excavated soil.

The principal direct construction impacts are:

- Temporary and permanent loss of grazing land;
- Stripping and disturbance of topsoil;
- Alteration of natural soil profiles;
- Compaction from vehicles and machinery;
- Erosion of exposed surfaces;

- Mixing of topsoil with subsoil;
- Accidental contamination by fuel, oils or construction materials; and
- Temporary disruption of surrounding livestock activities.

These impacts are particularly relevant because the existing report identifies the development area as functional grazing land and confirms direct livestock utilisation across all three alternatives.

Construction will additionally introduce an indirect agricultural pathway through fugitive dust generated by excavation, soil handling, vehicle movement and exposed surfaces. Where such emissions are transported toward nearby cultivated land or perennial plantations, deposition may occur on vegetation and agricultural surfaces.

The principal management priority during construction should therefore extend beyond topsoil conservation to include prevention of excessive off-site dust deposition.

10.4 Loss of Agricultural Land and Grazing Resources

Development of any of the three alternatives will permanently remove land from conventional agricultural use within the active landfill footprint.

The existing land-capability assessment identifies the three sites predominantly as grazing-capability land. The overall capability is considered moderate, and livestock grazing represents the dominant sustainable agricultural function.

The direct loss of grazing land is unavoidable within the permanent landfill footprint and cannot be fully mitigated.

Mitigation should therefore focus on:

- Minimising the final development footprint;
- Preventing disturbance outside authorised areas;
- Maintaining livestock access to unaffected surrounding land;
- Protecting fencing and agricultural infrastructure; and
- Rehabilitating temporary disturbance areas.

The residual direct impact on agricultural land within the permanent landfill footprint remains Moderate because the land-use change is long-term and effectively irreversible during landfill operation.

10.5 Topsoil Loss and Soil Profile Disturbance

Topsoil is the principal soil resource requiring conservation because it contains the material most suitable for supporting vegetation during rehabilitation.

Excavation of landfill cells will substantially modify the existing soil profile. The project's design includes excavation and long-term waste placement, meaning that the original agricultural soil profile within the active landfill cells cannot realistically be restored after

closure. The project itself provides for approximately 3 m excavation below existing ground level and a landfill configuration extending approximately 10 m above ground.

Suitable topsoil should therefore be:

Strip → Separate → Stockpile → Protect → Reuse during rehabilitation.

Topsoil must not be mixed with waste, contaminated material or unsuitable subsoil.

10.6 Soil Compaction and Erosion

Heavy vehicles and construction equipment may compact soils outside the permanent footprint, reducing infiltration, aeration and rooting conditions.

Vegetation clearing and exposed soil will simultaneously increase susceptibility to erosion.

These impacts can be effectively reduced through controlled traffic routes, limitation of exposed areas, appropriate stormwater management, stabilisation of stockpiles, progressive rehabilitation and ripping/scarification of compacted temporary working areas.

The project's clean and contaminated stormwater separation system provides an important engineering control for limiting uncontrolled runoff.

10.7 Soil and Agricultural Land Contamination

Potential contamination pathways include fuels, oils, chemicals, municipal waste, contaminated runoff and landfill leachate.

Contamination of surrounding agricultural soils could reduce plant growth, grazing suitability and future agricultural utilisation.

The proposed engineered containment system is therefore particularly important. The project design includes a prepared subgrade, reinforced geosynthetic clay liner, 2.0 mm HDPE geomembrane, geotextile protection, leachate drainage and collection infrastructure.

The landfill also provides for separation of clean and contaminated stormwater and management of contaminated water through the leachate system and Pollution Control Dam.

Provided these systems are correctly constructed, maintained and monitored, the potential residual impact on surrounding agricultural soils is considered Low.

10.8 Impacts On Nearby Perennial Nut Plantations

10.8.1 Agricultural Importance of Perennial Plantations

The presence of nearby nut plantations introduces an agricultural receptor that differs materially from the grazing resources occupying the proposed landfill footprints.

Perennial orchards represent long-term agricultural investment because established trees remain productive over multiple seasons and are associated with ongoing management,

irrigation, pruning, harvesting, crop protection and potentially established commercial supply chains.

Consequently, agricultural impact significance cannot be determined solely from whether the landfill itself directly occupies cultivated land.

The plantation must be treated as a high-sensitivity off-site agricultural receptor because landfill-generated dust, smoke, litter, odour or contamination could potentially affect an agricultural enterprise without physically encroaching on the plantation.

10.8.2 Dust Deposition on Tree Crops

Fugitive dust may be generated from landfill construction, unpaved access roads, movement of waste vehicles, handling of cover material and exposed surfaces.

Where wind transports particulate matter toward the plantations, particles may deposit on leaves, branches and developing crop surfaces.

Scientific literature indicates that sufficiently high or persistent particulate deposition can influence plant physiological processes by coating leaf surfaces, modifying light interception and affecting stomatal functioning and gas exchange.

For perennial tree crops, the principal potential consequences include:

- Deposition of dust on foliage;
- Reduced light penetration to photosynthetic leaf surfaces;
- Interference with stomatal gas exchange;
- Altered transpiration;
- Increased plant stress where deposition is persistent;
- Deposition on developing nuts or husks; and
- Possible reduction in crop productivity where exposure is sufficiently severe and chronic.

The magnitude of impact depends on dust concentration, particle characteristics, duration of exposure, wind direction, rainfall, leaf characteristics and distance between the source and orchard.

Accordingly, the assessment does not conclude that dust deposition will automatically reduce nut yield. Rather, chronic off-site deposition represents a credible impact pathway requiring preventative management.

10.8.3 Potential Effect on Photosynthesis and Yield

Photosynthesis supports vegetative growth, flowering, fruit/nut development and accumulation of plant reserves required for subsequent production cycles.

Persistent dust deposition can potentially reduce effective photosynthetic performance where leaf surfaces become sufficiently coated to interfere with light interception or gas exchange.

For the proposed landfill, the principal risk would occur during prolonged dry conditions where:

High dust-generating activity + dry exposed surfaces + wind toward plantation + repeated deposition = increased agricultural risk.

A single short-duration dust event would not necessarily cause measurable yield reduction. The principal concern is therefore chronic or repeated exposure during important vegetative and crop-development periods.

The potential unmitigated impact is considered Moderate–High because the affected receptor is a perennial commercial crop. With effective dust suppression and plantation-oriented monitoring, the residual impact is expected to reduce to Low–Moderate.

10.8.4 Smoke Deposition and Landfill Fire Risk

Smoke represents a different agricultural pathway from ordinary mineral dust.

Uncontrolled burning of waste or accidental landfill fires could generate fine particulate matter and combustion products capable of atmospheric transport and deposition onto surrounding agricultural land.

Smoke exposure may potentially affect:

- Leaf surfaces;
- Developing crops;
- Harvested produce;
- Orchard hygiene;
- Worker conditions; and
- Product-quality perception.

No uncontrolled burning of waste should therefore be permitted.

Any landfill fire producing a visible plume toward the plantation should be treated as an environmental and agricultural incident. The incident should be documented, meteorological conditions recorded and, where significant exposure is suspected, the plantation operator should be notified and appropriate crop/product investigation undertaken.

Without fire-control measures the consequence to a commercial perennial plantation could be High. With prohibition of burning, fire prevention and effective emergency response, residual risk is considered Low.

10.8.5 Potential Odour Taint and High-Oil-Content Nut Crops

The proposed landfill may generate odorous volatile compounds associated with fresh waste, decomposing organic material, landfill gas, leachate and contaminated standing water.

The review comment specifically raises potential odour taint of a high-oil-content nut crop. This pathway requires precautionary consideration because harvested nuts represent food

products whose sensory quality and commercial acceptability may be important to marketability.

However, the available project information does not contain crop-specific exposure testing, chemical analyses or sensory studies demonstrating that landfill odours at the proposed development would cause taint of the nearby nut crop.

It would therefore be scientifically inappropriate to conclude that taint will occur.

The appropriate assessment is that persistent uncontrolled exposure to volatile or smoke-related emissions represents a potential product-quality risk requiring prevention and, if a credible complaint arises, analytical verification.

The pathway is:

Landfill odour/volatile emissions → atmospheric transport → orchard/produce exposure → potential sensory or quality concern → investigation/testing.

Operational management should therefore prevent persistent landfill odour from reaching the plantation.

10.8.6 Windblown Litter and Orchard Hygiene

Windblown waste represents an additional indirect agricultural impact.

Lightweight plastics, paper, packaging and other waste may be transported beyond the landfill boundary where waste is inadequately compacted, covered or contained.

If such material reaches agricultural properties, potential consequences include:

- Physical contamination of plantation land;
- Interference with orchard maintenance;
- Ingestion risk to livestock where mixed farming occurs;
- Visual deterioration;
- Introduction of foreign material into production areas; and
- Increased agricultural housekeeping requirements.

Litter fencing, rapid waste compaction, regular cover and routine retrieval of off-site waste should therefore be mandatory.

10.8.7 Pest and Vector Risk

Municipal waste can attract birds, rodents, flies and other opportunistic animals.

Where commercial plantations occur nearby, uncontrolled proliferation of these organisms may introduce agricultural hygiene or biosecurity concerns.

This does not mean that the landfill will necessarily introduce regulated plant pests into the orchard. However, the presence of a commercial food-production system justifies implementation of an integrated pest and vector management programme.

Monitoring should include unusual increases in:

- Rodents;
- Flies;
- Scavenging birds; and
- Other waste-associated vectors capable of moving between the landfill and agricultural properties.

10.8.8 Export and Phytosanitary Certification

The potential impact on export and phytosanitary certification requires careful distinction between actual regulatory phytosanitary requirements and broader commercial quality requirements.

Phytosanitary certification principally relates to compliance with plant-health requirements applicable to the destination market, including regulated pests and specified phytosanitary conditions.

The mere presence of a landfill near an agricultural property does not automatically invalidate phytosanitary certification.

Nevertheless, the proposed landfill could indirectly affect commercial market access if landfill-related activities resulted in demonstrable:

- Crop contamination;
- Pest or biosecurity problems;
- Smoke deposition;
- Unacceptable foreign material;
- Product-quality deterioration;
- Failure to satisfy buyer specifications; or
- Non-compliance with a specific importing country's requirements.

The impact should therefore be treated as a low-probability but potentially high-consequence commercial agricultural risk.

Where the nearby plantation supplies export markets, the landfill operator and plantation owner should maintain a communication mechanism so that any suspected landfill-related crop-quality incident can be investigated promptly.

10.9 Operational Phase Impacts

During operation, the permanent landfill footprint will remain unavailable for conventional agricultural production.

Operational impacts comprise both direct and indirect effects.

Direct impacts include permanent loss of grazing land, continued occupation of the soil resource and potential contamination where containment systems fail.

Indirect impacts include:

- Dust deposition on surrounding grazing vegetation and plantations;
- Landfill gas and odour;
- Smoke should fires occur;
- Windblown litter;
- Pest/vector attraction; and
- Potential commercial implications for nearby perennial agricultural production.

The proposed daily cover system is relevant because the design provides for approximately 150 mm daily cover and approximately 300 mm intermediate cover on inactive areas. Effective implementation will assist in controlling litter, odour, vectors and exposed waste.

10.10 Closure and Rehabilitation Phase

Following closure, the original soil profile within the landfill footprint cannot realistically be restored because of excavation, waste placement and modification of the landform.

Rehabilitation should therefore focus on establishing a stable final cover capable of supporting vegetation, controlling erosion and limiting continued disturbance of surrounding agricultural land.

Suitable conserved topsoil should be incorporated into the approved final cover where compatible with landfill engineering requirements.

The project design provides for final capping and revegetation of completed landfill areas.

Off-site agricultural monitoring should continue during early post-closure where landfill gas, litter or other residual pathways remain active.

10.11 Agricultural Impact Significance

Table 12 : Agricultural Impact Significance

Impact	Phase	Without Mitigation	Key Mitigation	Residual Impact
Permanent loss of grazing land	Construction / Operation	Moderate	Minimise permanent development footprint	Moderate
Loss/disturbance of topsoil	Construction	Moderate–High	Strip, separate, protect and reuse suitable topsoil	Low–Moderate
Soil compaction	Construction	Moderate	Restrict vehicle movement; rip temporary compacted areas	Low
Soil erosion	Construction / Operation	Moderate	Stormwater control, stabilisation and revegetation	Low

Soil contamination	Construction / Operation	Moderate–High	Spill control, engineered liner and leachate management	Low
Reduction in land capability	Operation	Moderate	Restrict permanent transformation to authorised footprint	Moderate
Disturbance of livestock activities	Construction / Operation	Moderate	Maintain fences, access and livestock controls	Low
Dust deposition on nut plantation	Construction / Operation	Moderate–High	Dust suppression, buffer management and plantation-facing monitoring	Low–Moderate
Potential reduction in photosynthetic performance	Construction / Operation	Moderate	Prevent chronic foliar dust deposition	Low
Potential crop yield effect	Operation	Moderate	Dust controls and investigate sustained deposition	Low
Smoke deposition on plantation	Construction / Operation	High	Prohibit burning; fire prevention and emergency response	Low
Odour exposure	Operation	Moderate	Waste cover, landfill gas and leachate management	Low
Potential nut taint/product-quality effect	Operation	Moderate	Prevent persistent odour/smoke; investigate credible complaints analytically	Low
Windblown litter on agricultural land	Operation	Moderate–High	Litter fencing, compaction, cover and off-site retrieval	Low
Pest/vector attraction	Operation	Moderate	Integrated pest and vector management	Low
Export/market-access implications	Operation	Moderate	Prevent contamination; maintain monitoring/incident records	Low
Phytosanitary certification implications	Operation	Low–Moderate	Biosecurity management and verification of applicable export requirements	Low
Rehabilitation failure	Closure	Moderate	Topsoil replacement, revegetation and monitoring	Low–Moderate

11. ALTERNATIVES ASSESSMENT AND SITE PREFERENCE

11.1 Introduction

The Agricultural Impact Assessment considered the Preferred Site, Option Site 1 and Option Site 2 as required by the specialist appointment. The alternatives were assessed comparatively to determine their relative suitability from an agricultural perspective and to identify whether development of any alternative would result in unacceptable impacts on agricultural resources.

The original assessment established that all three candidate footprints are currently characterised predominantly by grassland used for livestock grazing. No active crop cultivation was observed within the candidate footprints during the field assessment undertaken on 30 July 2026. Regional land-capability information similarly indicates that grazing represents the dominant agricultural function of the immediate development area.

The revised alternatives assessment additionally recognises that agricultural sensitivity extends beyond the candidate footprints. Particular consideration is given to the nearby perennial nut plantations and the potential indirect effects of landfill-related dust, smoke, odour, windblown litter, pests/vectors and potential product-quality or market-access concerns.

The alternatives are therefore compared according to both:

- Direct transformation of soil and agricultural land within the landfill footprint; and
- Potential indirect impacts on surrounding agricultural activities, particularly higher-value perennial tree crops.

11.2 Preferred Site

The Preferred Site is currently characterised predominantly by grassland utilised for livestock grazing. Field verification confirmed livestock activity, while no active crop cultivation was observed within the footprint. The desktop Current Land Use Map nevertheless associates the site with temporary commercial dryland cultivation, suggesting historical cultivation or broader arable potential.

Development will result in permanent transformation of functional grazing land and the affected soil resource. The magnitude of this direct impact is considered Moderate because the land retains agricultural functionality but has not been identified as confirmed high-potential intensive cropland.

When indirect agricultural impacts are considered, the Preferred Site has several relative advantages. The surrounding landscape contains comparatively greater vegetation and elevated terrain/hills that provide partial natural screening. These features increase aerodynamic surface roughness and may reduce near-ground wind movement, thereby providing some attenuation of coarse dust and windblown litter.

The Preferred Site is also spatially separated from the existing dumping area compared with Option Site 1. Consequently, the potential for cumulative dust, odour, litter, smoke and vector-related effects associated with two waste-management areas is comparatively reduced.

The principal agricultural constraint remains the permanent loss of grazing land and the need to ensure that off-site emissions do not affect surrounding agricultural properties, particularly the identified perennial nut plantations.

The natural terrain and vegetation should not be regarded as substitutes for engineered mitigation. However, when combined with appropriate dust suppression, landfill covering, litter fencing, landfill-gas management and agricultural receptor monitoring, they provide the Preferred Site with a comparatively favourable agricultural risk profile.

The Preferred Site is therefore ranked first.

11.3 Option Site 1

Option Site 1 comprises predominantly grassland currently utilised for livestock grazing. It occurs adjacent to the existing dumping/disposal site and is affected by electrical powerlines, associated servitudes and nearby railway infrastructure. The existing report therefore identifies the surrounding agricultural landscape as comparatively more disturbed and fragmented.

From the perspective of direct agricultural land transformation alone, this represents an advantage. Establishing the landfill within an already modified landscape would result in comparatively less additional fragmentation of intact grazing land.

However, the expanded agricultural assessment identifies an important countervailing consideration: proximity to the existing dumping site introduces the potential for cumulative waste-related impacts.

These may include:

- Cumulative fugitive dust;
- Existing and future waste-related odour;
- Windblown litter;
- Smoke/fire risk;
- Increased bird, rodent and insect attraction; and
- Cumulative pressure on surrounding agricultural properties.

This is particularly relevant to the nearby perennial nut plantations because agricultural risk is determined not only by the agricultural capability of the landfill footprint but also by potential off-site effects on established commercial agricultural production.

The electrical powerline servitude is an additional constraint. Although the servitude does not directly reduce soil capability, it creates an open infrastructure corridor, contributes to fragmentation and may restrict opportunities for establishing supplementary vegetation screening or configuring the landfill to maximise agricultural buffers.

Option Site 1 consequently loses the first agricultural preference assigned in the earlier assessment when the potential indirect effects on surrounding perennial agriculture are incorporated.

It is therefore ranked second.

11.4 Option Site 2

Option Site 2 consists predominantly of open grassland utilised for livestock grazing. No active cultivation was identified during field verification.

The site remains part of the functional grazing landscape and has less existing waste-related disturbance than Option Site 1. However, field verification identified Option Site 2 as comparatively open and exposed, with fewer substantial natural barriers. The site also occurs close to the main road and railway, with electrical infrastructure within the surrounding landscape.

The exposed landscape represents an important consideration under the revised agricultural assessment.

Where vegetation and terrain provide limited wind attenuation, there is greater potential for unrestricted movement of:

- Fugitive dust;
- Fine soil material;
- Windblown waste;
- Lightweight plastics and packaging;
- Smoke during an accidental fire; and
- Potentially odorous emissions.

Windblown litter may affect surrounding grazing land and natural areas and could introduce foreign material into agricultural properties.

The site's proximity to the road also increases the potential spatial interaction between landfill-related litter, dust and surrounding land users.

Although these impacts can be mitigated through engineered controls, Option Site 2 provides less natural assistance in containing wind-driven agricultural impacts than the Preferred Site.

Option Site 2 is therefore ranked third.

11.5 Consideration of Nearby Perennial Nut Plantations

The nearby nut plantations are treated as high-sensitivity agricultural receptors for purposes of the alternatives assessment.

The plantations represent a materially different agricultural resource from the moderate-capability grazing land directly affected by the landfill footprints. Perennial tree crops

involve established productive trees and long-term investment, and potential impacts must therefore consider crop condition and commercial production in addition to soil capability.

The principal potential landfill-to-plantation pathways are:

- Dust deposition → foliage → potential photosynthetic interference → possible productivity effect
- Smoke/fire emissions → atmospheric transport → foliage/produce deposition → potential crop-quality concern
- Landfill odour/volatile emissions → plantation exposure → potential sensory/product-quality concern
- Windblown waste → agricultural property → contamination/hygiene and land-pollution impact
- Waste attraction of vectors → movement toward plantation → potential agricultural hygiene/biosecurity concern

The assessment does not conclude that these pathways will result in crop loss, nut taint or loss of export certification. The available project information does not provide evidence sufficient to make such a conclusion. They are instead treated as credible risk pathways requiring precautionary management.

11.6 Comparative Agricultural Assessment

Table 13 : Comparative Agricultural Assessment

Assessment Criterion	Preferred Site	Option Site 1	Option Site 2
Current Agricultural Use	Livestock grazing	Livestock grazing	Livestock grazing
Active Cultivation Within Footprint	None observed	None observed	None observed
Desktop Evidence of Cultivation	Present	Not dominant	Not dominant
Dominant Land Capability	Grazing	Grazing	Grazing
Overall Agricultural Potential	Moderate	Moderate	Moderate
Grazing Functionality	Functional	Functional	Functional
Agricultural Protected Area Overlap	None mapped	None mapped	None mapped
Direct Loss of Grazing Land	Moderate	Moderate	Moderate
Existing Waste-Related Disturbance	Comparatively low	High – adjacent to existing dumping site	Comparatively low
Agricultural Landscape Integrity	Moderate	Comparatively fragmented	Moderate
Additional Landscape Fragmentation	Moderate	Comparatively lower	Moderate
Terrain/Natural Screening	Comparatively favourable	Limited	Limited
Vegetation Screening	Comparatively favourable	Limited/moderate	Limited

Landscape Exposure	Moderate	Comparatively open	High/open
Potential Fugitive Dust Transport	Moderate	Moderate–High	High
Potential Dust Impact on Perennial Crops	Low–Moderate with controls	Moderate	Moderate–High
Cumulative Waste-Related Agricultural Risk	Low–Moderate	High	Low–Moderate
Smoke/Fire Exposure Risk	Low–Moderate	Moderate–High cumulative risk	Moderate
Windblown Litter Risk	Moderate	Moderate–High	High
Odour/Product-Quality Risk	Low–Moderate	Moderate	Moderate
Pest/Vector Risk	Moderate	Moderate–High	Moderate
Potential Export/Market-Access Risk	Low with controls	Low–Moderate	Low–Moderate
Phytosanitary/Biosecurity Risk	Low with controls	Low–Moderate	Low
Electrical Infrastructure Constraint	Comparatively limited	Significant	Present in broader area
Railway Influence	Less prominent	Nearby	Nearby
Overall Agricultural Impact	Moderate	Moderate–High	Moderate–High
Agricultural Preference	1	2	3

11.7 Agricultural Site Preference

The expanded agricultural assessment supports the Preferred Site as the first agricultural preference.

This represents a revision of the earlier agricultural ranking, which identified Option Site 1 as preferable because its existing disturbed setting would result in less additional fragmentation of functional grazing land. The original basis for that ranking is documented in the report.

The revised assessment gives greater weight to the sensitivity of surrounding agricultural enterprises, particularly the perennial nut plantations.

The Preferred Site is favoured because:

- The direct agricultural land loss remains broadly comparable to the other alternatives;
- The affected footprint remains predominantly moderate-capability grazing land rather than confirmed intensive cropland;
- Surrounding terrain and vegetation provide comparatively greater partial natural screening;
- The site is less directly influenced by the existing dumping area than option site 1;
- Cumulative waste-related agricultural effects are consequently lower;
- There is comparatively greater potential to contain fugitive dust and windblown litter;
- The site provides a more favourable setting for protecting surrounding perennial agriculture through buffers and operational controls; and
- It does not contain the same direct electrical servitude constraint identified at option site 1.

The revised agricultural ranking is therefore:

1. Preferred Site – most preferred
2. Option Site 1 – second preferred
3. Option Site 2 – least preferred

11.8 Infrastructure and Agricultural Risk Considerations

Option Site 1 contains existing electrical powerlines and associated servitudes. The report identifies these as material development constraints because landfill infrastructure would need to accommodate servitude widths, infrastructure access and protection requirements.

From the revised agricultural perspective, this constraint has an additional indirect implication. Open servitude corridors provide limited opportunity for substantial vegetation screening and may constrain the positioning of agricultural buffers.

Option Site 2 is similarly influenced by road, railway and electrical infrastructure but is distinguished by its greater landscape exposure.

The Preferred Site does not exhibit the same combination of open infrastructure corridors and exposure. This reinforces its comparative advantage when agricultural receptor protection is considered together with direct land transformation.

11.9 Agricultural and Overall Site Ranking

Table 14: Agricultural and Overall Site Ranking

Alternative	Revised Agricultural Ranking	Agricultural Basis	Principal Constraint	Overall Ranking
Preferred Site	1	Moderate grazing land; comparatively favourable terrain/vegetation screening; lower cumulative waste influence; better opportunity to protect surrounding perennial agriculture	Permanent grazing-land loss; mapped historical cultivation; adjacent cemetery	1
Option Site 1	2	Already disturbed agricultural landscape and lower additional fragmentation	Existing dumping site, cumulative dust/odour/vector risk, electrical servitudes and railway	2
Option Site 2	3	Moderate grazing capability with limited existing waste influence	Open/exposed landscape, wind-driven dust/litter risk, road, railway	3

			and electrical infrastructure	

11.10 Implications for Export and Phytosanitary Agricultural Production

The presence of commercial perennial nut production warrants consideration of potential market-access implications.

However, proximity to a landfill does not by itself establish that agricultural produce will lose phytosanitary certification or export eligibility.

Such consequences would depend on an actual relevant pathway, such as:

- Introduction or proliferation of a regulated pest;
- Contamination affecting an applicable product standard;
- Crop-quality deterioration;
- Foreign-material contamination;
- Smoke or chemical deposition;
- Failure to meet a specific buyer specification; or
- Failure to satisfy an importing country's applicable phytosanitary requirements.

The alternatives assessment therefore favours the site that provides the greatest practical opportunity to prevent these pathways rather than assuming that certification will necessarily be affected.

The Preferred Site provides the comparatively stronger opportunity for such prevention because of its physical setting, partial natural screening and lower cumulative interaction with the existing waste-disposal environment.

11.11 Conditions Attached to the Preferred Site

The agricultural preference for the Preferred Site is conditional upon implementation of additional plantation-protection measures.

These should include:

- Formal recognition of the nut plantation as a high-sensitivity agricultural receptor;
- Maintenance of the maximum practicable landfill-to-agricultural buffer;
- Retention of existing vegetation screening where compatible with engineering and safety requirements;
- Plantation-facing dust-fall monitoring;
- Wind-speed and wind-direction monitoring;
- Enhanced dust suppression when winds are directed toward agricultural properties;
- Prohibition of uncontrolled waste burning;
- Landfill fire-prevention and emergency-response procedures;
- Landfill gas and odour management;
- Effective litter fencing and immediate retrieval of off-site waste;
- Integrated bird, rodent, fly and pest/vector management;
- Monitoring of visible dust deposition on plantation-facing vegetation;
- An agricultural complaints and incident register;

- Communication with affected commercial agricultural operators following significant off-site incidents; and
- Crop/product testing where a credible contamination or taint complaint is substantiated.

11.12 Specialist Opinion on Alternatives

Following incorporation of the potential impacts on nearby perennial nut plantations, the Preferred Site represents the most appropriate alternative from an agricultural perspective.

The earlier advantage assigned to Option Site 1 on the basis of existing landscape disturbance remains valid in relation to direct loss and fragmentation of grazing land. However, this advantage is outweighed by its proximity to the existing dumping site, potential cumulative waste-related emissions, infrastructure constraints and greater potential for combined dust, odour, litter and vector pressures on the surrounding agricultural environment.

Option Site 2 remains the least preferred because its open and exposed landscape provides comparatively limited natural attenuation of wind-driven dust and litter and introduces additional interaction with road and railway infrastructure.

The Preferred Site provides the most balanced agricultural outcome. It will still result in permanent transformation of moderate-capability grazing land, but its comparatively favourable terrain and vegetation setting provides better opportunity for managing indirect impacts on surrounding higher-value agricultural receptors.

Accordingly, the revised specialist ranking is:

Preferred Site → Option Site 1 → Option Site 2.

No agricultural fatal flaw has been identified for the Preferred Site. Its support is conditional upon stringent soil conservation, pollution prevention, dust suppression, fire prevention, litter control, odour management, vector control and plantation-oriented monitoring being incorporated into the EMPr and implemented throughout the landfill lifecycle.

12. MITIGATION, SOIL MANAGEMENT AND AGRICULTURAL PROTECTION MEASURES

12.1 Introduction

The proposed Maletswai Landfill will result in unavoidable disturbance and permanent transformation of soil and grazing resources within the authorised development footprint. The revised Agricultural Impact Assessment further identifies potential indirect impacts on surrounding agricultural enterprises, particularly the nearby perennial nut plantations.

Mitigation must therefore address two distinct agricultural environments:

1. The soil and grazing resources directly affected by construction and landfill development; and

2. Surrounding agricultural receptors that may potentially be affected by dust, smoke, odour, windblown litter, pest/vector activity or contamination.

The project design already incorporates important environmental protection measures, including an engineered containment system, separation of clean and contaminated stormwater, leachate collection infrastructure, a Pollution Control Dam and progressive rehabilitation.

The additional measures prescribed below should be incorporated into the EMPr and landfill operational procedures.

12.2 Pre-Construction Measures

Before vegetation clearing or earthworks commence, the approved development footprint, access roads, infrastructure areas, soil stockpile areas, agricultural buffer areas and environmental no-go areas must be clearly demarcated.

Construction activities must remain within the authorised footprint. Surrounding grazing areas and agricultural properties must not be used for unauthorised vehicle movement, material storage, waste disposal or temporary construction activities.

Pre-construction requirements should include:

- Demarcation of the authorised landfill footprint;
- Identification of surrounding agricultural properties;
- Identification of the nearby perennial nut plantation as a high-sensitivity agricultural receptor;
- Identification and protection of existing fences and livestock-management infrastructure;
- Designation of topsoil stockpile areas;
- Establishment of controlled construction access routes;
- Establishment of agricultural no-go areas;
- Identification of plantation-facing boundaries requiring enhanced dust control; and
- Photographic recording of baseline conditions along the landfill/agricultural interface.

12.3 Development Footprint Control

The permanent landfill footprint should be kept to the minimum reasonably required for safe and efficient operation.

No unnecessary clearing, excavation or vehicle movement should occur outside the authorised boundary.

This is particularly important because the field assessment confirmed that land surrounding the candidate sites remains functionally utilised for livestock grazing.

Temporary construction areas should be located, where practicable, within areas that will subsequently form part of the permanent development footprint.

12.4 Topsoil Management

Topsoil represents the most important soil resource available for rehabilitation and should be managed separately from subsoil, waste and construction material.

Suitable topsoil should be stripped before bulk earthworks commence.

The following measures are required:

- Strip suitable topsoil separately;
- Avoid mixing topsoil with subsoil;
- Stockpile topsoil in designated areas;
- Prevent disposal of waste onto topsoil stockpiles;
- Prohibit vehicle movement over stockpiles;
- Protect stockpiles against fuel, oil, chemical and leachate contamination;
- Prevent uncontrolled runoff through stockpiles;
- Stabilise long-term stockpiles where necessary;
- Control invasive vegetation on stockpiles;
- Minimise repeated handling of stored soil; and
- Preferentially reuse conserved topsoil during progressive and final rehabilitation.

The proposed landfill will substantially modify the existing soil profile through excavation and waste placement. Conserving the available topsoil is therefore essential because the original profile cannot realistically be reconstructed following landfill closure. The project design provides for excavation and long-term modification of the affected landform.

12.5 Soil Compaction

Heavy vehicles and equipment may compact agricultural soils outside the permanent landfill footprint, reducing infiltration, soil aeration, rooting conditions and vegetation-establishment potential.

Vehicle movement should therefore be restricted to designated roads and working areas.

Temporary areas that become compacted should be ripped or scarified before topsoil replacement and revegetation, where this is compatible with the approved rehabilitation design.

Unnecessary movement of heavy equipment across surrounding grazing land must be prohibited.

12.6 Erosion and Stormwater Management

Vegetation clearing, excavation and soil stockpiling will increase erosion susceptibility.

Erosion management should include:

- Limiting exposed soil at any one time;
- Maintaining clean-water diversion around disturbed areas;

- Preventing uncontrolled concentration of runoff;
- Stabilising drainage outlets;
- Protecting soil stockpiles;
- Installing erosion-control measures before significant earthworks;
- Repairing rills and gullies promptly;
- Stabilising completed surfaces; and
- Establishing vegetation as soon as practicable.

The landfill design already provides for diversion of clean runoff and collection of contaminated runoff, which should be maintained throughout construction and operation.

12.7 Prevention of Soil and Agricultural Land Contamination

Potential contamination sources include fuels, oils, chemicals, waste, contaminated stormwater and landfill leachate.

Fuel, chemical and maintenance areas should be appropriately contained. Spill-response materials must be readily available.

Any spill affecting soil should be:

- Stop source → Contain spill → Remove contaminated material → Dispose appropriately → Rehabilitate affected soil → Document incident.

Waste and leachate must not be allowed to migrate onto surrounding agricultural properties.

The engineered landfill liner and leachate collection system must be constructed, quality-controlled, inspected and maintained throughout the facility's operational life. The proposed containment design includes GCL and HDPE components together with leachate drainage and collection infrastructure.

12.8 Protection of Surrounding Grazing Land

Land outside the authorised footprint should remain available for its existing agricultural function wherever practicable.

The landfill operator and contractors should:

- Prevent unauthorised access onto grazing properties;
- Maintain agricultural fencing;
- Prevent livestock from entering active landfill areas;
- Maintain reasonable livestock access arrangements where existing routes are affected;
- Prevent waste deposition on grazing land;
- Remove windblown litter promptly;
- Prevent contaminated runoff from reaching grazing areas; and
- Rehabilitate any unnecessary disturbance outside the authorised footprint.

12.9 Protection of Nearby Perennial Nut Plantations

The nearby nut plantation should be formally designated as a high-sensitivity agricultural receptor.

Protection should focus on preventing landfill-related material from reaching the plantation rather than attempting to address impacts after crop exposure has occurred.

The primary management objectives are:

- Prevent chronic dust deposition;
- Prevent smoke exposure;
- Prevent windblown waste entering production areas;
- Minimise persistent landfill-related odour;
- Prevent contaminated runoff;
- Control waste-associated pests and vectors; and
- Maintain evidence demonstrating the effectiveness of agricultural protection measures.

12.10 Dust Management for Perennial Crops

Dust suppression should be regarded as both an air-quality and agricultural-protection requirement.

The principal controls should include:

- Regular watering of unpaved landfill roads during dry conditions;
- Enforcement of low vehicle speeds;
- Minimisation of exposed surfaces;
- Stabilisation of inactive disturbed areas;
- Management of cover-material stockpiles;
- Avoidance of excessive drop heights during soil/material handling;
- Rapid rehabilitation of temporary disturbance areas; and
- Increased suppression when winds are directed toward the plantation.

Existing vegetation between the Preferred Site and surrounding agricultural properties should be retained wherever compatible with landfill engineering, fire management and safety requirements.

The Preferred Site's terrain and vegetation provide a relative screening advantage, but these features should supplement rather than replace active dust controls.

12.11 Plantation-Facing Dust Monitoring

A plantation-oriented dust monitoring programme should be established where the final layout confirms a credible landfill-to-plantation dispersion pathway.

Monitoring should preferably include an upwind/background position, a landfill boundary position facing the plantation and a representative plantation-boundary position.

Table 15 : Agricultural Dust and Plantation Monitoring Programme

Monitoring Aspect	Location	Frequency	Indicator	Corrective Action
Background dust deposition	Representative upwind location	Monthly	Background dust-fall conditions	Establish comparative baseline
Landfill dust deposition	Plantation-facing landfill boundary	Monthly	Change in dust deposition	Identify source and strengthen suppression
Plantation boundary	Nearest appropriate agricultural boundary	Monthly	Evidence of off-site deposition	Investigate landfill contribution
Visible foliar dust	Representative plantation-edge vegetation	Monthly during dry periods	Persistent visible deposition	Review roads, earthworks and wind conditions
Wind speed/direction	Landfill meteorological point	Preferably continuous	Source–receptor pathway	Intensify controls when wind is toward plantation
Windblown litter	Agricultural interface	Weekly/after strong winds	Waste beyond landfill boundary	Retrieve immediately and improve containment

12.12 Smoke and Landfill Fire Prevention

Uncontrolled burning of waste must be prohibited.

Landfill fires could generate smoke and fine particulate matter capable of being transported onto agricultural land and perennial crops.

The landfill should maintain:

- Fire-prevention procedures;
- Suitable firefighting resources;
- Emergency-response arrangements;
- Firebreaks where appropriate;
- Monitoring of potential ignition sources;
- Prohibition of deliberate waste burning; and
- Incident-reporting procedures.

Where a landfill fire produces a visible plume toward a commercial plantation, the event should be treated as an agricultural incident.

The landfill operator should record the duration, wind direction, affected area and response actions. Where significant crop exposure is reasonably suspected, appropriate plantation inspection and product/plant analysis should be considered.

12.13 Odour and Potential Crop-Taint Management

Persistent off-site odour should be prevented through effective landfill operation.

The proposed design provides for waste placement in controlled layers, compaction and application of daily and intermediate cover.

Odour-control measures should include:

- Maintaining the smallest practicable active working face;
- Prompt waste compaction;
- Appropriate daily and intermediate cover;
- Effective landfill-gas management;
- Effective leachate management;
- Prevention of stagnant contaminated water;
- Prompt management of unusually odorous waste; and
- Investigation of persistent off-site odour.

A complaint alleging taint of harvested nuts should not automatically be attributed to the landfill. The complaint should trigger a structured investigation incorporating meteorological conditions, landfill activities, source inspection and, where warranted, appropriate crop/product analysis.

12.14 Windblown Litter and Land Pollution

Windblown litter has particular relevance to surrounding grazing areas and commercial plantations.

The landfill operator should implement:

- Perimeter fencing;
- Mobile or fixed litter screens around active areas;
- Rapid compaction of waste;
- Regular covering;
- Daily inspection of landfill boundaries;
- Inspection following strong winds; and
- Immediate retrieval of waste transported beyond the authorised footprint.

Waste reaching agricultural properties should be removed without causing unnecessary additional disturbance to crops, soil or livestock.

12.15 Pest, Bird and Vector Management

Municipal waste may attract rodents, flies, scavenging birds and other opportunistic animals.

An integrated pest and vector management programme should therefore be implemented.

The programme should include:

- Maintaining effective waste cover;
- Preventing accumulation of exposed food waste;
- Appropriate leachate management;
- Monitoring rodent activity;
- Monitoring fly populations where necessary;
- Monitoring abnormal scavenging-bird activity;
- Eliminating unnecessary standing contaminated water; and
- Implementing appropriate control measures where unacceptable increases occur.

Any significant increase in waste-associated vectors moving toward the nut plantation should trigger investigation and corrective action.

12.16 Protection of Export and Phytosanitary Agricultural Production

The landfill operator should recognise the commercial sensitivity of agricultural products potentially destined for export.

The presence of the landfill does not itself constitute a phytosanitary non-compliance. However, operational practices should prevent conditions that could create genuine crop-quality or biosecurity concerns.

Management should therefore include:

- Preventing waste from entering production areas;
- Maintaining effective pest/vector controls;
- Preventing smoke deposition;
- Minimising off-site dust;
- Preventing contaminated runoff;
- Maintaining incident records;
- Maintaining meteorological information for significant events; and
- Promptly investigating credible crop-quality concerns.

Where a significant incident could reasonably affect export produce, the affected agricultural operator should be informed so that any applicable buyer, food-quality or phytosanitary requirements can be considered.

12.17 Agricultural Incident and Complaint Response

A formal agricultural complaint mechanism should be established.

Complaints may relate to:

- Dust deposition;
- Smoke;
- Odour;
- Litter;
- Pest/vector increases;
- Contaminated runoff;
- Livestock impacts;

- Suspected crop contamination; or
- Alleged product-quality effects.

The response process should be:

- Receive complaint → Record location/time → Review wind conditions → Identify landfill activities → Inspect potential source → Inspect agricultural receptor → Implement immediate controls → Determine need for sampling/testing → Document corrective action → Follow up with complainant.

Repeated complaints should trigger review of the relevant operational controls.

12.18 Progressive Rehabilitation

Rehabilitation should occur progressively rather than being deferred until final closure.

Areas no longer required for construction or active operation should be stabilised as soon as practicable.

Rehabilitation should include:

- Removal of temporary infrastructure and waste;
- Reshaping of disturbed surfaces;
- Alleviation of compaction where necessary;
- Replacement of suitable conserved soil;
- Preparation of a suitable seedbed;
- Revegetation with appropriate locally suitable species;
- Erosion protection; and
- Follow-up monitoring.

The objective is to establish a stable vegetated surface capable of resisting erosion and minimising dust generation.

12.19 Landfill Closure

The original agricultural soil profile within the landfill cells cannot realistically be restored following closure.

Final rehabilitation should therefore aim to establish a stable final landform and functional vegetated cover rather than recreate the pre-development agricultural soil profile.

The project design provides for final capping and revegetation of completed landfill areas.

Conserved topsoil or suitable growth medium should be incorporated into the final cover where compatible with the approved landfill closure design.

Post-closure monitoring should continue where residual landfill gas, erosion, litter or other pathways could affect surrounding agricultural land.

12.20 Agricultural Monitoring Requirements

Table 16 : Agricultural Management and Monitoring Commitments

Impact / Risk	Required Management Measure	Monitoring Indicator	Expected Outcome
Loss of topsoil	Strip and conserve suitable topsoil	Stockpile condition and volumes	Soil retained for rehabilitation
Soil compaction	Restrict traffic	Compacted areas outside footprint	Maintain soil functionality
Soil erosion	Manage runoff and stabilise surfaces	Rills, gullies and sediment	Minimise soil loss
Soil contamination	Maintain containment and spill controls	Visible contamination/leachate	Protect surrounding soils
Grazing-land loss	Minimise permanent footprint	Area transformed	Limit agricultural land loss
Livestock disturbance	Maintain fencing/access controls	Livestock incidents	Protect surrounding farming activities
Plantation dust deposition	Suppress dust and monitor downwind boundary	Dust deposition/visible leaf coating	Prevent chronic crop exposure
Smoke exposure	Prohibit burning and manage fires	Fire/smoke incidents	Prevent crop exposure
Odour/taint concern	Manage waste, gas and leachate	Complaints and source inspections	Prevent persistent off-site odour
Windblown litter	Litter fencing and retrieval	Waste outside boundary	Protect agricultural properties
Pest/vector attraction	Integrated vector management	Rodent, fly and bird activity	Maintain agricultural hygiene
Export/product-quality risk	Incident prevention and documentation	Crop-quality complaints	Protect commercial agricultural integrity
Rehabilitation failure	Replace soil and revegetate	Vegetation and erosion condition	Establish stable cover

12.21 Mitigation Effectiveness

The direct permanent loss of soil and grazing capability within the landfill footprint cannot be fully mitigated because the proposed land use fundamentally transforms the affected land.

However, the majority of indirect agricultural impacts are preventable or substantially reducible.

In particular, potential effects on the nearby perennial nut plantation depend strongly on landfill operating performance. Chronic dust deposition, smoke, litter, odour and vector impacts should not be regarded as inevitable consequences of landfill development.

With appropriate source controls, monitoring and rapid corrective action, residual off-site agricultural impacts are expected to remain predominantly Low to Low–Moderate.

12.22 Mitigation Conclusion

The revised mitigation strategy recognises that protection of agricultural resources must extend beyond conservation of soils within the landfill footprint.

The nearby perennial nut plantation represents a high-sensitivity agricultural receptor because potential landfill-related effects could influence not only plant condition but also crop quality and commercial agricultural confidence.

The Preferred Site remains supported because its terrain and vegetation provide comparatively favourable partial natural screening and it has lower direct cumulative interaction with the existing dumping area than Option Site 1. These advantages nevertheless do not remove the need for active mitigation.

The principal agricultural management priorities are therefore:

- Minimise footprint → Conserve topsoil → Prevent erosion and contamination → Protect grazing land → Control dust → Prevent smoke → Control odour and litter → Manage vectors → Protect perennial crops → Monitor agricultural receptors → Respond rapidly to incidents → Rehabilitate progressively.

Provided these measures are incorporated into the EMPr and effectively implemented throughout construction, operation, closure and post-closure, the residual agricultural impacts associated with the Preferred Site are considered manageable.

13. AGRICULTURAL MONITORING AND MANAGEMENT PROGRAMME

13.1 Introduction

Agricultural monitoring should be undertaken throughout the construction, operational, closure and rehabilitation phases of the proposed Maletswai Landfill to verify that the mitigation measures prescribed in this Agricultural Impact Assessment are effectively implemented.

The monitoring programme focused primarily on development-footprint control, topsoil management, erosion, soil contamination, rehabilitation and protection of grazing land and expands these requirements to address potential indirect impacts on the nearby perennial nut plantations.

The monitoring programme therefore addresses two principal agricultural receptor groups:

- Soils, grazing land and livestock activities within and immediately surrounding the project area; and
- The nearby perennial nut plantations as high-sensitivity commercial agricultural receptors.

Monitoring of the plantations should focus particularly on dust deposition, smoke/fire incidents, windblown litter, odour, pest/vector activity and any credible crop-quality or agricultural market-access concern.

13.2 Monitoring Objectives

The objectives of the revised agricultural monitoring programme are to:

- Ensure that construction and operational disturbance remains within the authorised development footprint;
- Verify appropriate stripping, storage and reuse of topsoil;
- Identify soil erosion and degradation at an early stage;
- Prevent contamination of surrounding agricultural soils;
- Verify the integrity of agricultural buffers and no-go areas;
- Protect surrounding grazing land and livestock activities;
- Monitor rehabilitation performance;
- Identify excessive dust transport toward perennial agricultural crops;
- Detect persistent dust deposition on plantation-facing vegetation;
- Identify and respond to smoke or landfill-fire exposure;
- Identify windblown waste entering agricultural land;
- Identify persistent landfill-related odour at agricultural receptors;
- Monitor abnormal waste-associated bird, rodent, fly or other vector activity;
- Provide an early-warning system for potential impacts on the nearby nut plantation;
- Provide documented evidence for investigation of credible crop-quality concerns; and
- Implement corrective action before impacts become persistent or significant.

13.3 Soil and Agricultural Monitoring Programme

The existing soil-monitoring requirements remain applicable and should continue throughout the landfill lifecycle.

Table 17 :Agricultural and Soil Monitoring Programme

Aspect	Monitoring Indicator	Location	Frequency	Responsibility	Corrective Action
Development Footprint	Disturbance outside authorised boundary	Entire site boundary	Monthly during construction	ECO / Contractor	Stop activity and rehabilitate unauthorised disturbance

Topsoil Stripping	Separation of topsoil from subsoil	Active stripping areas	During stripping	ECO / Contractor	Correct stripping procedure and separate mixed material where practicable
Topsoil Stockpiles	Erosion, contamination, compaction and stability	Designated stockpile areas	Monthly	ECO / Site Manager	Stabilise, reshape or remediate stockpile
Soil Compaction	Unnecessary vehicle movement and compacted areas	Temporary working areas	Monthly	ECO	Restrict access and rip/scarify affected areas
Soil Erosion	Rills, gullies, sediment movement and bare surfaces	Disturbed areas	Monthly and after significant rainfall	ECO / Site Manager	Repair erosion, manage runoff and revegetate
Soil Contamination	Fuel, oil, chemicals, waste or leachate	Operational and surrounding areas	Continuous	Site Manager	Contain source, remove contaminated material and remediate
Stormwater	Drainage condition, erosion, contamination and sediment	Drainage infrastructure	Monthly and after significant rainfall	Site Manager	Clean, repair and stabilise infrastructure
Grazing Land	Disturbance outside authorised footprint	Surrounding grazing areas	Quarterly	ECO	Rehabilitate unnecessary disturbance
Livestock Interaction	Damaged fencing, blocked access or	Site/agricultural interface	Routine	Site Manager	Repair fencing and restore

	livestock entering landfill				access control
Rehabilitation	Vegetation establishment, bare ground and erosion	Rehabilitated areas	Quarterly	ECO / Rehabilitation Contractor	Reseed, stabilise and repair erosion
Invasive Plants	Presence and spread of invasive species	Rehabilitated/disturbed areas	Quarterly	Site Manager	Implement appropriate control
Final Rehabilitation	Stability and vegetation performance	Closed landfill areas	Annually after closure	Municipality / Landfill Operator	Implement corrective rehabilitation

These measures build on the soil and agricultural monitoring framework already established in the report.

13.4 Perennial Nut Plantation Monitoring

The nearby nut plantation should be treated as a high-sensitivity agricultural receptor.

The purpose of plantation monitoring is not to assume that the landfill will cause crop damage, but to establish an early-warning system capable of identifying credible landfill-to-plantation pathways before persistent agricultural impacts develop.

Monitoring should focus primarily on the plantation boundary or plantation-facing agricultural interface rather than routinely disturbing productive orchard areas.

Table 18 : Perennial Nut Plantation Monitoring Programme

Monitoring Aspect	Indicator	Monitoring Location	Frequency	Corrective Action
Dust deposition	Dust-fall / visible deposition	Plantation-facing landfill boundary	Monthly	Identify source and increase dust suppression
Background dust	Background deposition	Representative upwind point	Monthly	Use for comparison with downwind results
Plantation boundary dust	Evidence of landfill-related deposition	Appropriate nearest plantation boundary	Monthly	Investigate source–receptor pathway
Foliar condition	Persistent visible dust coating	Representative plantation-edge vegetation	Monthly during dry periods	Review dust controls and

				investigate deposition
Wind conditions	Wind speed and direction	Landfill meteorological point	Preferably continuous	Intensify controls when winds are toward plantation
Smoke	Visible smoke/plume toward plantation	Landfill/agricultural interface	Continuous operational observation	Activate fire response and investigate exposure
Odour	Persistent landfill-related odour	Plantation-facing boundary	Routine/complaint-based	Inspect waste, gas and leachate sources
Windblown litter	Waste outside landfill boundary	Landfill-to-agricultural interface	Weekly and after strong winds	Retrieve immediately and improve litter control
Pest/vector activity	Abnormal birds, rodents, flies or other vectors	Landfill/agricultural interface	Monthly	Strengthen integrated pest/vector management
Crop-quality complaint	Reported taint, contamination or quality concern	Affected agricultural property	Incident-based	Undertake structured investigation and determine need for testing
Agricultural contamination	Visible waste, contaminated runoff or unusual deposition	Agricultural boundary	Routine/incident-based	Stop source, clean affected area and investigate
Fire-related crop exposure	Smoke plume crossing agricultural property	Affected receptor	Every relevant incident	Record event and assess need for crop/leaf/product analysis

13.5 Dust Deposition Monitoring

Dust represents one of the principal indirect pathways between landfill operations and perennial agricultural crops.

Dust monitoring should therefore distinguish between general regional/background deposition and potential landfill-related deposition.

Where practicable, a minimum plantation-oriented monitoring configuration should include:

- Upwind/background point → Landfill source → Plantation-facing landfill boundary → Agricultural/plantation receptor.

This arrangement will assist in determining whether increased deposition observed at the agricultural receptor is reasonably associated with landfill activities or reflects broader regional conditions.

Dust monitoring results should be interpreted together with:

- Wind direction;
- Wind speed;
- Rainfall;
- Landfill activities;
- Road conditions;
- Earthworks;
- Exposed surfaces; and
- Unusual external dust-generating activities.

A single elevated measurement should trigger investigation rather than automatically being attributed to the landfill.

13.6 Visual Foliar Monitoring

During dry periods, representative vegetation at the plantation-facing agricultural boundary should be visually inspected for persistent dust accumulation.

The inspection should consider:

- Visible coating of leaf surfaces;
- Spatial distribution of deposition;
- Whether deposition is greater on the landfill-facing side;
- Prevailing wind conditions;
- Recent landfill earthworks or road activity; and
- Whether recent rainfall would reasonably have removed accumulated dust.

Visual observations do not establish a quantitative effect on photosynthesis or yield. Their purpose is to identify whether a potential chronic deposition pathway requires further investigation.

Where persistent abnormal deposition is identified, targeted specialist plant or dust analysis may be considered.

13.7 Meteorological Monitoring

Wind conditions are essential to determining whether a credible landfill-to-agricultural receptor pathway exists.

At minimum, the landfill should maintain records of:

- Wind speed;
- Wind direction;
- Temperature;
- Relative humidity; and
- Rainfall.

Continuous wind monitoring is preferable during operation.

Meteorological information should be linked to significant dust, odour, smoke or litter incidents.

For example, a plantation complaint should be considered more strongly indicative of a landfill pathway where the plantation was demonstrably downwind of the landfill at the time of the reported event.

13.8 Smoke and Landfill Fire Monitoring

All landfill fires should be documented.

The incident record should include:

- Date and time;
- Location of fire;
- Suspected cause;
- Duration;
- Estimated extent;
- Smoke-plume direction;
- Wind speed and direction;
- Whether agricultural properties were downwind;
- Firefighting actions;
- Photographic evidence where practicable; and
- Follow-up investigation.

Where a significant smoke plume is observed moving toward the nut plantation, the plantation operator should be informed.

Crop or leaf testing should not automatically be undertaken following every minor fire. Testing should be considered where the magnitude, duration and dispersion pathway indicate credible agricultural exposure.

13.9 Odour and Potential Taint Monitoring

Routine sensory observations should be undertaken at the landfill boundary, particularly in directions facing sensitive agricultural receptors.

Where persistent landfill-related odour is identified, the likely source should be investigated.

Potential sources include:

- Active waste working face;
- Inadequately covered waste;
- Landfill gas;
- Leachate;
- Contaminated standing water; and
- Unusually odorous incoming waste.

A complaint alleging nut taint or product-quality deterioration must not automatically be attributed to landfill odour.

The appropriate response should be:

- Complaint → Verify timing/location → Review wind direction → Inspect landfill source → Inspect agricultural receptor → Determine credible pathway → Consider appropriate product analysis → Implement corrective action where required.

13.10 Windblown Litter Monitoring

The landfill perimeter and surrounding agricultural interface should be routinely inspected for windblown waste.

Inspections should be intensified following strong wind events.

The presence of landfill-derived litter on grazing land or within a commercial plantation should trigger:

- Immediate collection;
- Identification of the likely source;
- Inspection of litter fencing;
- Review of the size and condition of the active working face;
- Review of waste covering and compaction; and
- Implementation of additional controls where necessary.

Repeated off-site litter incidents should be regarded as failure of the operational containment system.

13.11 Pest and Vector Monitoring

The landfill operator should monitor for abnormal increases in waste-associated pests and vectors.

Particular attention should be given to:

- Rodents;
- Flies;
- Scavenging birds; and
- Other organisms showing a clear increase associated with landfill activities.

The purpose is to protect both surrounding agricultural hygiene and the integrity of perennial crop production.

A measurable increase in vector activity at the agricultural interface should trigger review of waste covering, exposed organic waste, leachate, standing water and the existing pest-control programme.

13.12 Crop-Quality and Product Monitoring

Routine laboratory analysis of nuts is not considered necessary where there is no evidence of landfill-related exposure.

Product testing should be risk-triggered.

Testing may be warranted where:

- A significant smoke plume crosses the plantation;
- Persistent abnormal dust deposition is confirmed;
- Contaminated runoff reaches agricultural land;
- Waste physically enters the production area;
- A repeated credible taint complaint occurs;
- An abnormal chemical odour persists at the plantation;
- An agricultural buyer identifies a specific quality concern potentially associated with landfill activities; or
- An applicable export/phytosanitary authority identifies a specific issue requiring investigation.

The analytical programme should be designed around the suspected contaminant or quality concern rather than applying an arbitrary generic laboratory suite.

13.13 Export and Phytosanitary Monitoring Records

Where the nearby plantation supplies export markets, the monitoring programme should maintain sufficient records to assist in investigating any future market-access concern.

Records should include:

- Agricultural receptor monitoring results;
- Dust-monitoring data;
- Meteorological data;
- Pest/vector monitoring;
- Fire incidents;
- Smoke-plume observations;
- Litter incidents;
- Odour complaints;
- Contamination incidents;
- Corrective actions; and
- Laboratory results where testing has been undertaken.

These records do not constitute phytosanitary certification themselves. Their purpose is to provide traceable environmental information where an actual product-quality or plant-health concern requires investigation.

13.14 Trigger Levels and Corrective Actions

Table 19 : Agricultural Monitoring Trigger and Response Framework

Trigger	Initial Response	Escalated Response
Visible dust leaving landfill boundary toward agricultural land	Increase suppression and identify source	Targeted dust monitoring and operational review
Repeated elevated plantation-facing dust deposition	Review roads, stockpiles and exposed areas	Specialist dust/source investigation
Persistent visible leaf coating	Review wind/source pathway	Targeted plant/dust investigation
Windblown waste on agricultural property	Retrieve immediately	Improve litter fencing/working-face management
Persistent landfill odour at plantation boundary	Inspect waste, gas and leachate sources	Targeted odour/H_2S investigation
Significant smoke plume toward plantation	Activate emergency response and notify affected operator	Assess need for crop/leaf/product testing
Repeated increase in waste-associated vectors	Review waste cover and vector controls	Specialist pest/vector intervention
Contaminated runoff reaches agricultural land	Stop and contain source	Soil/water assessment and remediation
Credible nut-taint complaint	Investigate source and meteorology	Appropriate product laboratory analysis
Buyer/export concern linked to landfill incident	Compile monitoring/incident evidence	Targeted specialist/product assessment
Repeated agricultural complaints	Review entire mitigation system	Independent specialist investigation if required

13.15 Rehabilitation Performance Criteria

Rehabilitation should not be regarded as complete immediately after soil placement and seeding.

The original report requires rehabilitated surfaces to demonstrate stability, satisfactory vegetation establishment, limited bare ground, stable drainage and absence of progressive deterioration.

Successful rehabilitation should demonstrate:

- Stable soil surfaces;
- No significant rill or gully erosion;
- Satisfactory vegetation establishment;
- Limited persistent bare ground;

- Stable drainage;
- No uncontrolled contaminated runoff;
- No significant invasive-plant establishment;
- No persistent dust generation from rehabilitated areas; and
- No progressive deterioration of the final soil cover.

13.16 Corrective Action Process

Where monitoring identifies an unacceptable agricultural impact, the following process should apply:

- Identify impact → Verify source → Establish source–receptor pathway → Implement immediate control → Assess affected agricultural resource → Undertake testing where justified → Remediate → Re-inspect → Verify effectiveness → Close incident.

Corrective measures may include:

- Additional road watering;
- Reduction of vehicle speeds;
- Stabilisation of exposed soil;
- Relocation or stabilisation of stockpiles;
- Improvement of litter fencing;
- Increased waste covering;
- Landfill-gas or leachate management;
- Pest/vector control;
- Soil remediation;
- Erosion repair;
- Rehabilitation; or
- Targeted agricultural/product investigation.

13.17 Record Keeping and Reporting

Comprehensive records should be maintained throughout the landfill lifecycle.

The existing AIA already requires photographic records, inspection records, erosion incidents, contamination incidents, rehabilitation activities and corrective actions.

The revised programme should additionally retain:

- Plantation-facing monitoring records;
- Dust-fall results;
- Meteorological records;
- Smoke/fire incidents;
- Windblown litter incidents;
- Odour observations;
- Pest/vector observations;
- Agricultural complaints;
- Communications with affected agricultural operators;
- Crop/product laboratory results where applicable; and

- Evidence of corrective-action closure.

Monitoring information should be reviewed for trends rather than only individual incidents.

13.18 Roles and Responsibilities

The landfill operator should remain responsible for implementation of the operational agricultural protection programme.

The ECO should verify compliance during construction and relevant rehabilitation activities.

Where specialist interpretation is required, an appropriately qualified agricultural/soil specialist should be appointed.

Where a credible issue relates specifically to crop physiology, nut quality, food safety or phytosanitary compliance, an appropriately qualified crop, food-quality, laboratory or plant-health specialist should be engaged rather than relying solely on the AIA practitioner.

13.19 Monitoring Duration

Soil and agricultural monitoring should commence before major construction disturbance and continue throughout:

- Pre-construction → Construction → Operation → Closure → Rehabilitation → Post-closure verification.

Plantation-oriented monitoring should be maintained while a credible landfill-to-plantation exposure pathway remains.

Following closure, the intensity of monitoring may be reduced once:

- Exposed surfaces are stabilised;
- Vegetation is successfully established;
- Litter generation has ceased;
- Landfill-gas and odour conditions are stable;
- No recurring agricultural complaints are recorded; and
- No continuing off-site agricultural impact is evident.

13.20 Monitoring Conclusion

The revised agricultural monitoring programme extends beyond conventional soil and rehabilitation monitoring because the receiving environment includes a higher-sensitivity perennial agricultural enterprise.

The nearby nut plantation should therefore be incorporated into the landfill's environmental monitoring framework as a high-sensitivity agricultural receptor.

The monitoring programme is intended to provide early detection of credible landfill-related impacts rather than assume that crop damage will occur. Particular emphasis should be placed

on chronic dust deposition, smoke/fire incidents, windblown litter, odour, contaminated runoff and pest/vector activity.

No routine assumption of yield loss, nut taint or export/phytosanitary failure should be made without supporting evidence. Where a credible impact pathway is identified, the response should progress from source verification and immediate mitigation to targeted specialist or laboratory investigation where warranted.

Effective implementation of this programme will provide a defensible mechanism for protecting surrounding grazing resources and perennial agricultural production while demonstrating whether the mitigation measures prescribed for the Preferred Site remain effective throughout the landfill lifecycle.

14. SPECIALIST FINDINGS, RECOMMENDATIONS AND CONCLUSION

14.1 Summary of Key Findings

The Agricultural Impact Assessment considered the Preferred Site, Option Site 1 and Option Site 2. Field verification confirmed that all three candidate footprints are predominantly grassland used for livestock grazing, with no active crop cultivation observed. The sites have moderate agricultural capability, predominantly associated with grazing.

The assessment also recognises the nearby perennial nut plantations as high-sensitivity agricultural receptors. Potential indirect impacts include dust deposition on foliage, smoke, odour, windblown litter, pest/vector attraction and possible product-quality or market-access concerns.

The assessment does not establish that the landfill will cause reduced nut yield, product taint or loss of phytosanitary/export certification. These are potential risk pathways requiring appropriate prevention and monitoring.

14.2 Principal Agricultural Impacts

The principal direct impacts are permanent loss of grazing land, topsoil disturbance, soil compaction, erosion, potential contamination and reduced agricultural capability within the landfill footprint.

For the nearby nut plantations, the principal concerns are chronic dust deposition on foliage, which may affect photosynthetic functioning if sufficiently persistent, smoke deposition from landfill fires, windblown litter, odour and waste-associated vectors.

With appropriate mitigation, most off-site agricultural impacts are expected to reduce to Low or Low–Moderate significance.

14.3 Site Preference

The revised agricultural assessment supports the Preferred Site as the most suitable alternative.

The Preferred Site benefits from comparatively greater vegetation and surrounding terrain that provide partial natural screening against wind-driven dust and litter. It also has lower cumulative interaction with the existing dumping area than Option Site 1.

Option Site 1 is ranked second because, although already disturbed, its proximity to the existing dumping area introduces cumulative dust, odour, litter and vector risks. Electrical powerlines and associated servitudes provide an additional constraint.

Option Site 2 is ranked third because it is comparatively open and exposed, with fewer substantial natural barriers and greater potential for unrestricted wind-driven dust and litter transport.

Table 20 : Final Agricultural Ranking

Alternative	Main Consideration	Agricultural Ranking
Preferred Site	Better terrain/vegetation screening and lower cumulative waste influence	1
Option Site 1	Existing dumping site, cumulative impacts and electrical servitudes	2
Option Site 2	Open/exposed landscape and greater dust/litter dispersion potential	3

14.4 Key Recommendations

The Preferred Site should be developed subject to strict footprint control, topsoil conservation, erosion and contamination prevention, effective dust suppression, prohibition of uncontrolled waste burning, landfill fire management, litter containment, odour control and pest/vector management.

The nearby nut plantation should be treated as a high-sensitivity agricultural receptor. Plantation-facing dust monitoring, wind monitoring and routine inspection for dust, litter, smoke and odour should form part of the EMPr. Any credible crop-quality or taint complaint should be investigated using appropriate specialist or laboratory assessment.

14.5 Specialist Opinion and Conclusion

No agricultural fatal flaw has been identified for the proposed landfill.

The development will result in unavoidable permanent loss of moderate-capability grazing land within the landfill footprint. However, impacts on surrounding agricultural land and the nearby perennial nut plantations can be substantially reduced through effective mitigation and monitoring.

The Preferred Site is therefore supported as the preferred agricultural alternative because it provides the most favourable balance between direct agricultural land loss, natural terrain and vegetation screening, cumulative waste-related risk and protection of surrounding agricultural activities.

The final agricultural ranking is:

- Preferred Site → Option Site 1 → Option Site 2.

Development of the Preferred Site is considered acceptable from an agricultural perspective, provided that the mitigation and agricultural monitoring measures prescribed in this assessment are incorporated into the EMPr and implemented throughout the project lifecycle.

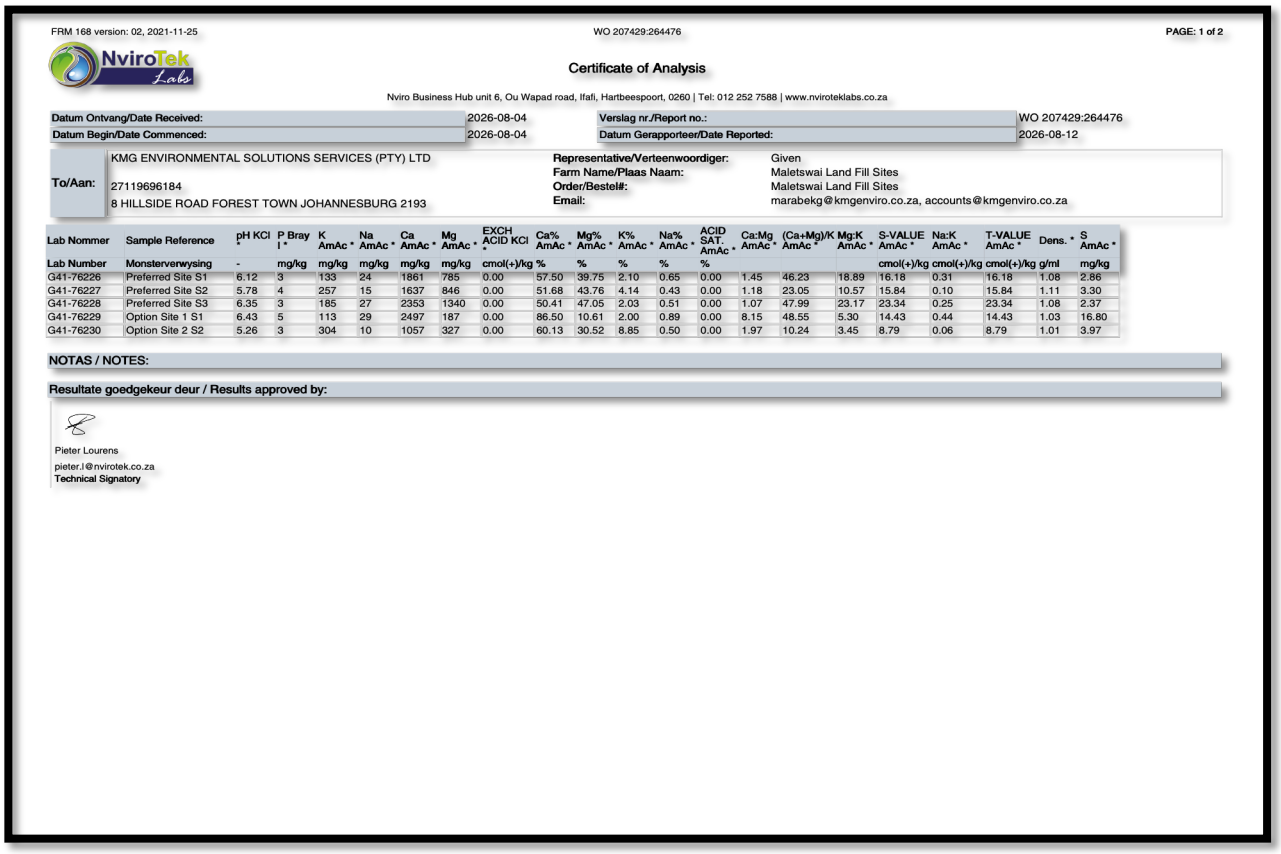
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APPENDICES

APPENDIX A: SPECIALIST DECLARATIONS AND CURRICULUM VITAE



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NviroTek Labs

Certificate of Analysis

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To/Aan: KMG ENVIRONMENTAL SOLUTIONS SERVICES (PTY) LTD
27119696184
8 HILLSIDE ROAD FOREST TOWN JOHANNESBURG 2193

Representative/Verteenwoordiger: Given
Farm Name/Plaas Naam: Maletswai Land Fill Sites
Order/Bestel#: Maletswai Land Fill Sites
Email: marabekg@kmgenviro.co.za, accounts@kmgenviro.co.za

Lab Nommer	Sample Reference	pH KCl *	P Bray I *	K AmAc *	Na AmAc *	Ca AmAc *	Mg AmAc *	EXCH ACID KCl *	Ca% AmAc *	Mg% AmAc *	K% AmAc *	Na% AmAc *	ACID SAT. AmAc *	Ca:Mg AmAc *	(Ca+Mg)/K AmAc *	Mg:K AmAc *	S-VALUE AmAc *	Na:K AmAc *	T-VALUE AmAc *	Dens. *	S AmAc *
Lab Number	Monsterverwysing	-	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	cmol(+)/kg	%	%	%	%	%				cmol(+)/kg	cmol(+)/kg	cmol(+)/kg	g/ml	mg/kg
G41-76226	Preferred Site S1	6.12	3	133	24	1861	785	0.00	57.50	39.75	2.10	0.65	0.00	1.45	46.23	18.89	16.18	0.31	16.18	1.08	2.86
G41-76227	Preferred Site S2	5.78	4	257	15	1637	846	0.00	51.68	43.76	4.14	0.43	0.00	1.18	23.05	10.57	15.84	0.10	15.84	1.11	3.30
G41-76228	Preferred Site S3	6.35	3	185	27	2353	1340	0.00	50.41	47.05	2.03	0.51	0.00	1.07	47.99	23.17	23.34	0.25	23.34	1.08	2.37
G41-76229	Option Site 1 S1	6.43	5	113	29	2497	187	0.00	86.50	10.61	2.00	0.89	0.00	8.15	48.55	5.30	14.43	0.44	14.43	1.03	16.80
G41-76230	Option Site 2 S2	5.26	3	304	10	1057	327	0.00	60.13	30.52	8.85	0.50	0.00	1.97	10.24	3.45	8.79	0.06	8.79	1.01	3.97

NOTAS / NOTES:

Resultate goedgekeur deur / Results approved by:

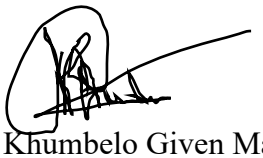
Pieter Lourens
pieter.l@nviroteklabs.co.za
Technical Signatory

APPENDIX B: SPECIALIST DECLARATIONS AND CURRICULUM VITAE

I, Khumbelo Given Marabe declare that:

- I act as the independent specialist in this application.
- I consider myself bound to the rules and ethics of the South African Council for Natural Scientific Professions (SACNASP).
- 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 the specialist report relevant to this application, 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 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 myself for submission to the competent authority.
- All the particulars furnished by me in this form are true and correct; and
- I am aware that it is an offence in terms of Regulation 48 to provide incorrect or misleading information and that a person convicted of such an offence is liable to the penalties as contemplated in section 49B(2) of the National Environmental Management Act, 1998 (Act 107 of 1998).
- I realize that a false declaration is an offence in terms of Regulation 71 of NEMA and is punishable in terms of section 24F of the Act.

Signature



Khumbelo Given Marabe
SACNASP NO: 132731

I, Tshiamo Setsioane declare that:

- I act as the independent specialist in this application.
- I consider myself bound to the rules and ethics of the South African Council for Natural Scientific Professions (SACNASP).
- 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 the specialist report relevant to this application, 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 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 myself for submission to the competent authority.
- All the particulars furnished by me in this form are true and correct; and
- I am aware that it is an offence in terms of Regulation 48 to provide incorrect or misleading information and that a person convicted of such an offence is liable to the penalties as contemplated in section 49B(2) of the National Environmental Management Act, 1998 (Act 107 of 1998).
- I realize that a false declaration is an offence in terms of Regulation 71 of NEMA and is punishable in terms of section 24F of the Act.

Tshiamo Setsioane
SACNASP NO: 114882

Specialist CV

Mr Khumbelo Given Marabe

Principal Environmental Consultant | Director – KMG Environmental Solutions Services (Pty) Ltd*SACNASP Registered*– Reg. No. **132731***WISA Professional Process Controller* – Reg. No. **39885**

Summary of Expertise:
Mr. Marabe is an experienced environmental specialist with over a decade of expertise in:

- Visual, Social, Wetland and Terrestrial Impact assessments
- Agricultural and soil capability impact assessments
- Noise, air quality, water, and dust monitoring
- Environmental awareness training
- Environmental audits and licensing applications
- NEMA and NWA compliance
- Environmental management and monitoring across sectors including mining, manufacturing, and renewable energy

Education & Certifications:

- BSc Environmental Sciences – University of Venda
- NEBOSH Environmental Management Certificate (2024)
- ISO 45001 & ISO 14001 Implementation & Internal Auditor – NOSA
- Health and Safety Regulations – HASLAC
- Certificates in Management Development (GIBS – AECI Programmes)
- Honours in Environmental Monitoring & Modelling (ongoing – UNISA)

Ms. Jeniffer Mutsila

Environmental GIS and Mapping Technician
Affiliation: KMG Environmental Solutions Services (Pty) Ltd
📍 *Junior Environmental Assessment Practitioner, Environmental Mapping & spatial analysis*

Professional Overview:
Ms. Jeniffer Mutsila is a technically skilled Environmental Mapping and GIS Technician with a background in field-based wetland delineation and spatial data analysis. He provides vital support in environmental assessments by producing geospatial products and performing site-level data validation for use in Environmental Impact Assessments (EIAs), Basic Assessments (BAs), Wetland Impact Assessments, and Water Use Licence Applications (WULAs).

With hands-on experience in both **desktop and field applications**, Jeniffer brings a valuable blend of practical and digital expertise to complex projects that require environmental sensitivity mapping, buffer zone compliance checks, and spatial integration of biodiversity datasets.

Core Competencies:

- GIS Mapping & Spatial Analysis (ArcGIS, QGIS)
- GPS-based Field Surveying and Data Collection
- Wetland and Riparian Zone Delineation Support
- Environmental Reporting: BAR, EIA, EMPr, EMP, WULA, EPR
- Legislation Knowledge: NEMA, Water Act, Waste Act, Air Quality Act, MPRDA

Key Project Contributions:

🔷 **Wetland Mapping and Sensitivity Overlay Support**

- Developed comprehensive map series for **prospecting right applications** in the North West and Limpopo provinces, including:
  - ✓ **Wetland Classification Maps** (HGM units: seep, valley-bottom, flat wetlands)
  - ✓ **30 m Riparian Buffer Sensitivity Maps**
  - ✓ **500 m Regulated Area Compliance Maps**
  - ✓ **Field-Verified Wetland Delineation Maps**

🔷 **GIS Support for Impact Assessments**

- Integrated **soil, rainfall, vegetation, and biodiversity** datasets with national layers (e.g., NFEPA, Aquatic CBAs, ESA zones) to support:
  - ✓ Wetland Impact Assessments
  - ✓ Agricultural Impact Assessments (AIA)
  - ✓ Biodiversity screening and risk mapping

🔷 **Field Data Management & GPS Verification**

- Accompanied environmental specialists on site visits to:
  - ✓ Capture **wetland and watercourse coordinates**
  - ✓ Assist with **transect layout and data recording**
  - ✓ Cross-check digital boundary outputs against **ground conditions**

🔷 **Reporting and Compliance Visuals**

- Prepared high-resolution map figures used in:
  - ✓ **Basic Assessment Reports (BARs)**
  - ✓ **Environmental Management Programmes (EMPrs)**
  - ✓ **Water Use Licence Applications (WULAs)**
- Ensured maps met **legislative and formatting standards** for submission to DMRE, DWS, and DFFE.

Professional Strengths:

- Detail-oriented and deadline-driven
- Strong spatial logic and environmental understanding
- Collaborative work ethic with specialists and field teams
- Effective communication of spatial data to technical and non-technical audiences

Summary Value to Projects:

Ms. Jeniffer GIS and mapping expertise plays an essential role in ensuring that environmental reports are **visually informative, spatially accurate, and legally aligned**. His ability to translate field data into structured spatial products enhances the defensibility and scientific integrity of environmental applications, especially those involving **wetland delineation, regulated activity compliance**, and **site sensitivity verification**.

TSHIAMO SETSIPANE

Soil Scientist | Hydropedologist |

PROFESSIONAL SUMMARY

Tshiamo is a detailed-orientated Soil Science professional well versed fields of Agriculture, Agrometeorology and Environmental Sciences. Knowledgeable about hydropedology, soil classification and the application thereof. Tshiamo currently holds a master's degree in Soil Science and has vast experience in the consulting sphere with over 100 consultancy reports (Agric potential and Hydropedology) ranging from various sectors such as: Mining, Solar Photovoltaic (PV), Residential Developments, Contamination and Monitoring Assessments.

Skills and Core Competences

- Soil classification
- Fertilization
- MS Office/Excel

EDUCATION

M.Sc. (Agric): Soil Science 01/2016 – 03/2019

- Dissertation: Characterisation of hydropedological processes and properties of a sandstone and a tillite hillslope, Kwa-Zulu Natal, South Africa.
- Graduated Cum-Laude.

B.Sc. (Agric) Honours: Soil Science 01/2014 – 11/2014

- Majored in soil fertility, soil physics, soil geography and soil chemistry.
- Research Project: Soil as an indicator of soil water regime.

B.Sc. (Agric): Soil Science and Agrometeorology 02/ 2010 – 11/2013

- Majored in soil science and agrometeorology.
- Minored in agronomy and plant pathology.

PROFESSIONAL MEMBERSHIP AND AFFILIATION

- Professional Natural Scientist with South African Council for Natural Scientific Professions (SACNASP).
- Member of the Soil Science Society of South Africa (SSSSA)
- Member, South African Soil Surveyors Organization (SASSO).
- Member of the South African Wetland Society (SAWS)

REFERENCES

AVAILABLE ON REQUEST