Soil and Agricultural Report for the proposed Harmony Gold Mponeng Lower Compartment Tailings Storage Facility

Merafong Local Municipality, West Rand District Municipality, Gauteng West Province, South Africa

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Report Name	**Soil and Agricultural Report for the proposed Harmony Gold Mponeng Lower Compartment Tailings Storage Facility**
Specialist Theme	Soil and Agricultural Theme
Project Reference	Mponeng TSF Lower Compartment
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Environmental Assessment Practitioner	EIMS ENVIRONMENTAL IMPACT MANAGEMENT SERVICES
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Declaration	The Biodiversity Company and its associates operate as independent consultants under the auspice of the South African Council for Natural Scientific Professions. We declare that we have no affiliation with or vested financial interests in the proponent, other than for work performed under the Environmental Impact Assessment Regulations, 2017 (as amended). We have no conflicting interests in the undertaking of this activity and have no interests in secondary developments resulting from the authorisation of this project. We have no vested interest in the project, other than providing a professional service within the constraints of the project (timing, time, and budget) based on the principals of science.

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1 Introduction

1.1 Background

The Biodiversity Company was appointed to conduct a soil and agricultural potential assessment in support of the environmental authorisation application process for the proposed Mponeng Lower Compartment Tailings Storage Facility (TSF) project. The proposed project involves recommencing deposition on the Mponeng Lower Compartment TSF (hereafter referred to as Mponeng TSF). The Mponeng TSF is currently not in operation and is used as a holding dam and partially as a landfill facility. Furthermore, the Mponeng TSF is situated in close proximity to Carletonville, Merafong Local Municipality, West Rand District Municipality, Gauteng Province (Figure 1-1).

The approach adopted for this assessment has taken cognisance of Government Notice 320 in terms of the National Environmental Management Act, 1998 (Act 107 of 1998) (NEMA) dated 20 March 2020: “Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of Sections 24(5)(a) and (h) and 44 of the NEMA, 1998, when applying for Environmental Authorisation”. The National Web based Environmental Screening Tool (DFFE, 2025) has characterised the agricultural theme sensitivity of the project area as evenly “Medium” and “High”, with a marginal “Low” sensitivity, with a key consideration of this assessment being the determination of agricultural theme sensitivities for the project. Based on the verified baseline findings, the proposed project area was found to have a predominately “Low” sensitivity, with marginal “Medium” sensitive areas. Also, according to the Government Gazette 43110, Government Notice No. 320, a site is found to be of a “medium” or “low” sensitivity if the application is for a linear activity, for which impacts on the agricultural resource are temporary and the land in the opinion of the soil scientist or agricultural specialist, based on the mitigation and remedial measures, can be returned to the current land capability within two years of the completion of the construction phase. GNR 320 requirements of an Agricultural Compliance Statement stipulate that a 50 m buffered development envelope be considered.

This report aims to present and discuss the findings from the soil resources identified within the 50 m buffered area. The report will also identify the soil suitability and land potential of these soils; the land uses within the assessment area and the risks associated with the proposed project from an agricultural and soil resources management perspective.

This report should be interpreted after taking into consideration the findings and recommendations provided by the specialist. Further, this report should inform and guide the Environmental Assessment Practitioner (EAP) and regulatory authorities, enabling informed decision making, as to the soil resources of the proposed project.

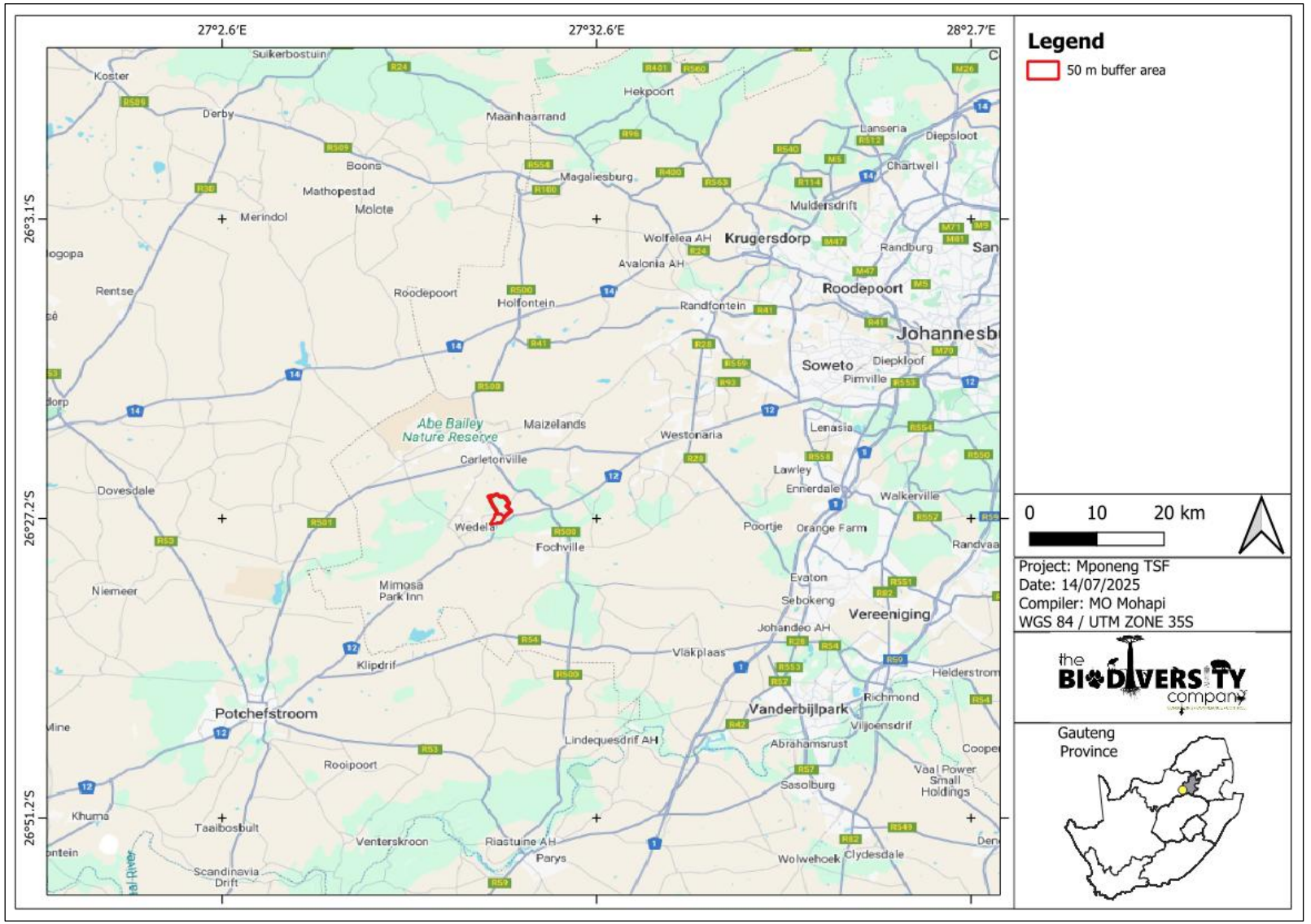


Figure 1-1 Map showing the approximate location of the proposed project area

1.2 Project Description

Harmony Gold Mining Company Limited (hereafter referred to as the applicant) has appointed Environmental Impact Management Services (Pty) Ltd (EIMS) as the Environmental Assessment Practitioner (EAP) to undertake the necessary environmental authorisation and associated consultation processes. EIMS will compile and submit the required documentation in support of applications for:

- Environmental Authorisation (EA) in accordance with the NEMA- Listed activity/ies:

  - GNR983 Listing Notice 1, Activities 10, 12, 19, 21D, and 21F.
  - GNR984 Listing Notice 2, Activity 6 and 15.
  - GNR985 Listing Notice 3, Activities 12, 14, 23, and 26.

- Waste Management Licence in accordance with the requirements of the National Environmental Management: Waste Act- NEM: WA (Act 59 of 2008) - Listed activity/ies:

  - GNR921 Categories A14, B7, B10 and B11.

- Water Use Licence (WUL) in accordance with the National Water Act – NWA (Act 36 of 1998) - Listed activity/ies:

  - Section 21 (c), (g) and (i).

Additional listed activities and/or water uses may be identified during the process.

The applicant owns and operates a number of Gold Mines and Plants in the West Wits region in the Gauteng Province. The Savuka Plant currently deposits tailings onto the Savuka 7a & 7b Tailings Storage Facilities (TSFs). However, these facilities are approaching their final and approved height, and the current planned Life of Mine (LOM) for the West Wits region exceeds the available deposition capacity of these TSFs. Accordingly, the applicant is undertaking a feasibility assessment to recommence deposition on the Mponeng TSF Lower Compartment.

The Mponeng TSF is located at 26°27'11.18"S; 27°24'43.88"E. Mponeng Lower TSF is an existing TSF, however, the Mponeng Lower Compartment TSF is no longer in operation and is currently utilised as a Holding Dam, and a portion of it is used as an authorised Landfill Facility. In order to redeposit on the Mponeng TSF, from the Savuka Plant, slurry pipelines will need to be constructed from the Savuka Plant to the TSF. The proposed slurry and return water pipes extend from the south of Savuka Plant at starting point 26°25'24.95"S; 27°23'58.94"E, extending southwards, parallel to each other until reaching the northern extent of Mponeng TSF where they split. Thereafter, the slurry pipeline extends to west before connecting to Mponeng TSF while the return water pipeline extends east then south around the TSF to the return water dam. There is an alternative slurry and return water pipeline route which extends to the east through Western Deep Levels then south along Mponeng Gold Mine before heading to the west where it connects to Mponeng TSF.

The proposed layout is illustrated in Figure 1-2 below:

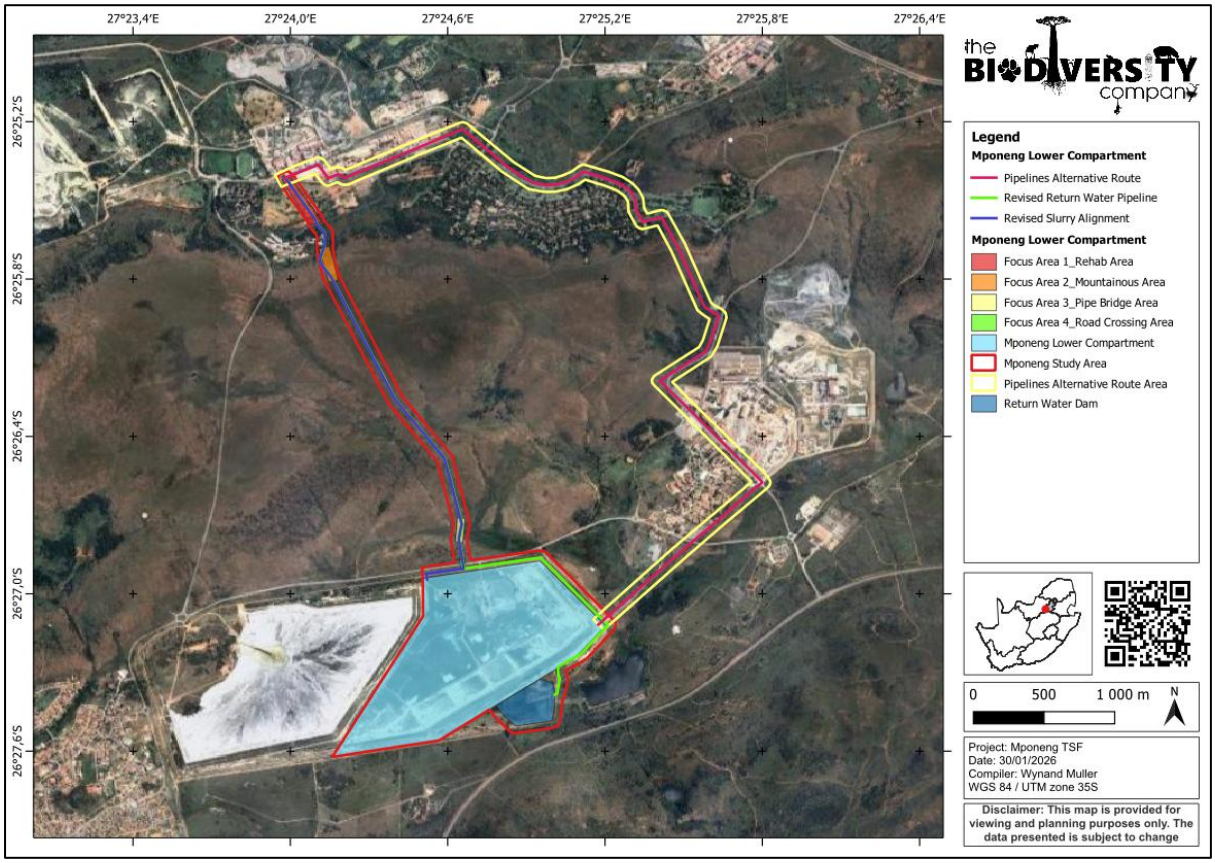


Figure 1-2 Proposed layout of the Project

1.3 Scope of Work

In addition to the requirements stipulated in GNR 320, the following Terms of Reference apply to the Agricultural Compliance Statement:

- Ensure a thorough assessment, which includes both the desktop assessment of databases and aerial photography; a description of the on-site verification of the agricultural potential of the area; and the soil forms present in the development area;
- Identify and assess potential impacts on both agricultural potential and soil resulting from the proposed project;
- Identify and describe potential cumulative soil, agricultural potential and land capability impacts resulting from the proposed project in relation to proposed and existing developments in the surrounding area; and
- Recommend mitigation, management, and monitoring measures, to minimise impacts and/or optimise benefits associated with the proposed project.

1.4 Assumptions and Limitations

The following aspects were considered as limitations;

- Only the slopes affected by the proposed development have been assessed;
- It has been assumed that the extent of the development area provided by the responsible party is accurate;

- The GPS used for ground truthing is accurate to within five meters. Therefore, the soil and the observation site's delineation plotted digitally may be offset by up to five meters to either side; and

- No heavy metals have been assessed, nor fertility been analysed for the relevant classified soils.

1.5 Key Legislative Requirements

The report follows the protocols as stipulated for agricultural assessment in Government Notice 320 of 2020 (GNR 320). This Notice provides the procedures and minimum criteria for reporting in terms of Sections 24(5)(a) and (h) and 44 of the National Environmental Management Act (No. 107 of 1998) (NEMA).

The above mentioned are supported by additional legislation that aims to manage the impact of development on the environment and the natural resource base of the country. Related legislation to this effect includes:

- Conservation of Agricultural Resources Act (Act 43 of 1983);

- National Environmental Management Act (Act 107 of 1998);

- National Water Act (Act 36 of 1998); and

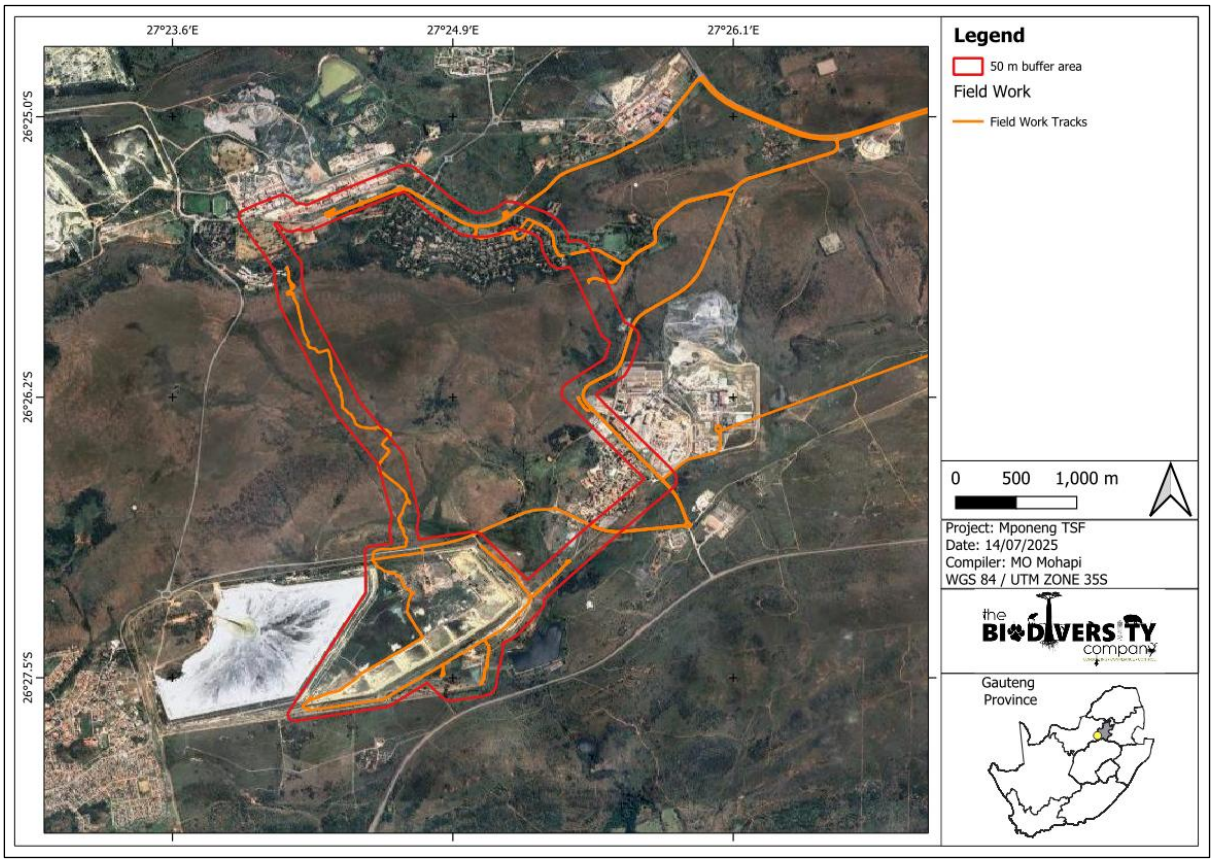
- Preservation and Development of Agricultural Land Act (Act No. 39 of 2024).

1.6 Legislative Framework

In line with the protocol for the specialist assessment and minimum report content requirements for environmental impacts on soil and agricultural assessment as per the Government Notice 320 published in terms of NEMA, dated 20 March 2020: "Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of Sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, when applying for Environmental Authorisation".

2 Fieldwork

The fieldwork assessment for the proposed project area was conducted on the 3rd of July 2025, to determine the available soil forms and current land uses within the assessed area.



3 Results and Discussion

3.1 Desktop Information

3.1.1 Climate

The project area falls within the Gauteng Shale Mountain Bushveld vegetation. The area experiences summer rainfall with dry winters. The mean annual precipitation for the area ranges between 600 to 750 mm, west to east, respectively. The area also experiences frequent frost in the western and southern parts (Mucina & Rutherford, 2006; Figure 3-1).

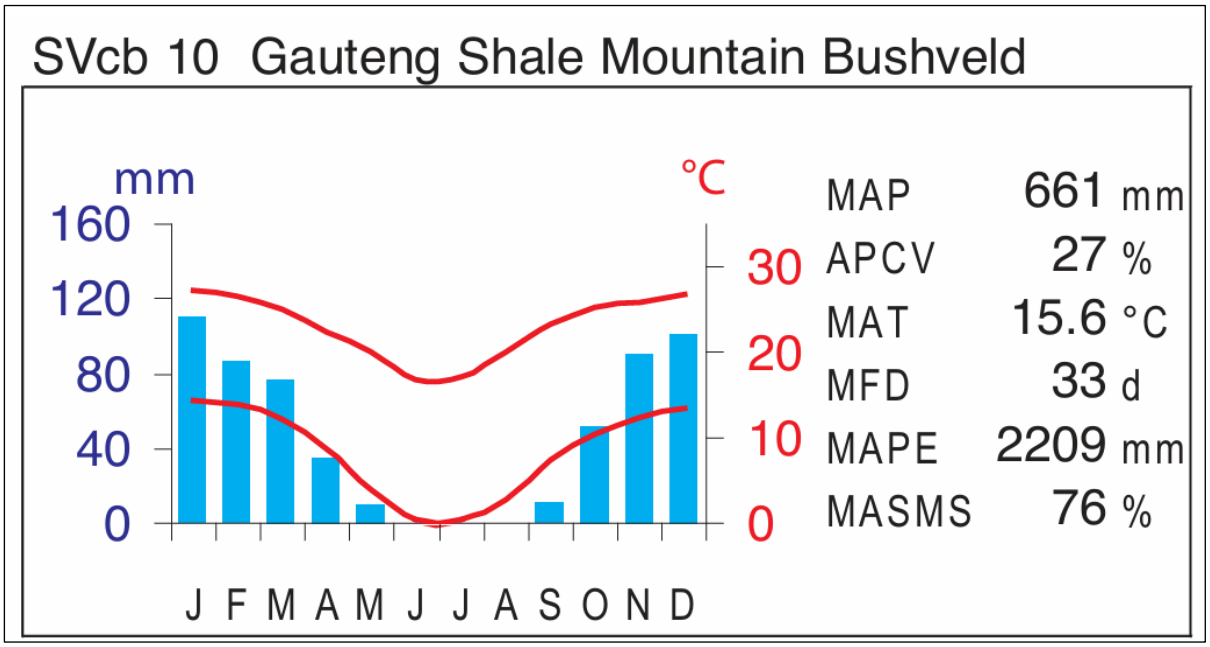


Figure 3-1 Summarised climate for the region (Mucina & Rutherford, 2006)

3.1.2 Geology & Soils

The geology of the area includes the sedimentary rocks such as the shale and andesite from the Pretoria Group (Transvaal Supergroup). The area is also underlain by Malmani dolomites of the Chuniespoort Group (Transvaal Supergroup). The area is characterised by land type Fb and Ib, with shallow Mispah soils forms.

According to the land type database (Land Type Survey Staff, 1972 - 2006) the assessment area to be focused on mainly falls within the Fb 5 and Fb 15 land types (Figure 3-2). The Fb 5 and Fb 15 land types consist of Mispah, Glenrosa, Hutton, Arcadia, Rensburg, Oakleaf and Dundee soil forms according to the Soil classification working group (1991), with the occurrence of other soils and rocky areas within the landscape. The Fb land types are characterised with shallow soils such as Glenrosa and Mispah soil forms. Lime is usually rare in the upper landscape but generally present in the lower terrains. The land terrain units for the featured land types are illustrated in Figure 3-3 and Figure 3-4, with the expected soils listed in Table 3-1 and Table 3-2.

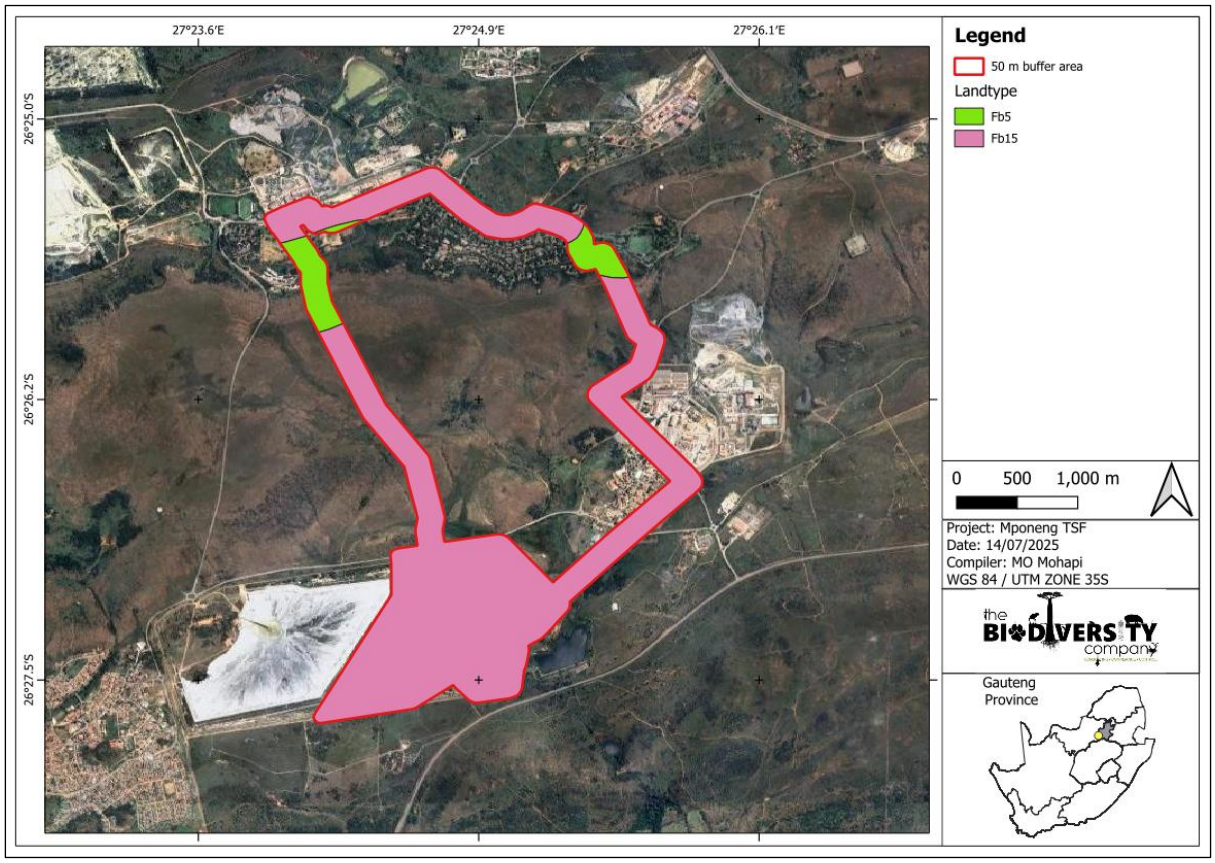


Figure 3-2 Land type associated with the proposed project area

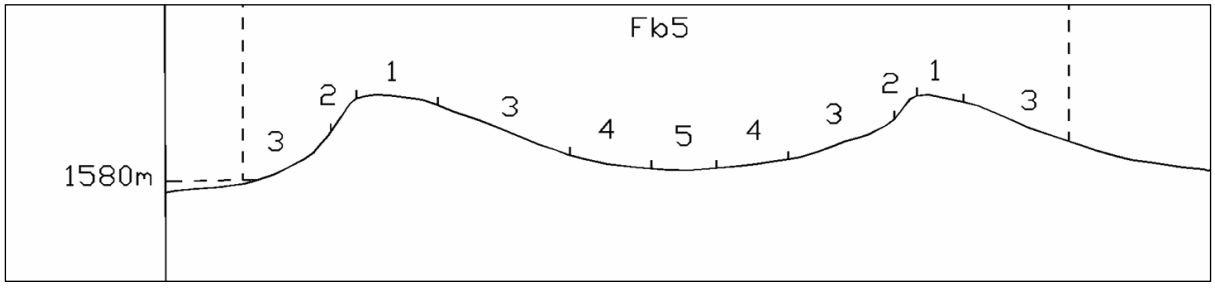


Figure 3-3 Illustration of land type Fb 5 terrain units (Land Type Survey Staff, 1972 – 2006)

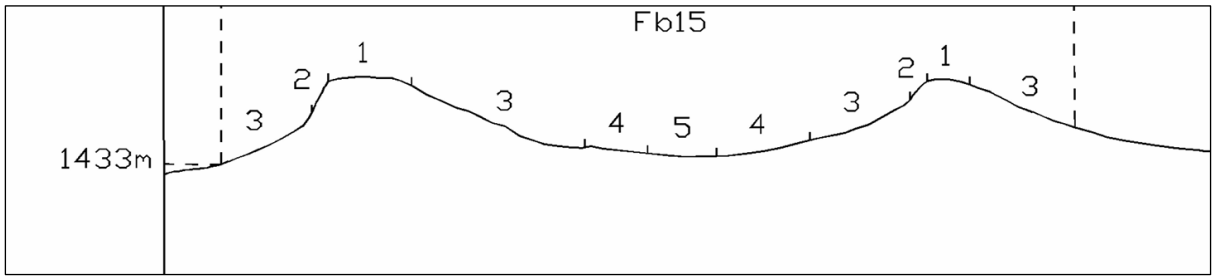


Figure 3-4 Illustration of land type Fb 15 terrain units (Land Type Survey Staff, 1972 – 2006)

Table 3-1 Soils expected at the respective terrain units within the Fb 5 land type (Land Type Survey Staff, 1972 - 2006)

Terrain Units									
1 (15%)		**2 (5%)**		**3 (33%)**		**4 (42%)**		**5 (5%)**	
Bare Rock	40%	Bare Rock	70%	Glenrosa	29%	Hutton	48%	Arcadia, Rensburg	52%
Mispah	33%	Mispah	20%	Mispah	25%	Glenrosa	12%	Mispah	16%
Glenrosa	23%	Glenrosa	10%	Hutton	23%	Mispah	11%	Bare Rock	12%
Hutton	4%			Bare Rock	21%	Clovelly	10%	Stream beds	10%
				Hutton, Shortland	2%	Oakleaf, Dundee	9%		
						Bare Rock	5%		
						Hutton, Shortland	3%		
						Avalon	2%		

Table 3-2 Soils expected at the respective terrain units within the Fb 15 land type (Land Type Survey Staff, 1972 - 2006)

Terrain Units									
1 (15%)		**2 (5%)**		**3 (33%)**		**4 (42%)**		**5 (5%)**	
Bare Rock	40%	Bare Rock	70%	Glenrosa	29%	Hutton	48%	Arcadia, Rensburg	52%
Mispah	33%	Mispah	20%	Mispah	25%	Glenrosa	12%	Mispah	16%
Glenrosa	23%	Glenrosa	10%	Hutton	23%	Mispah	11%	Bare Rock	12%
Hutton	4%			Bare Rock	21%	Clovelly	10%	Oakleaf, Dundee	10%
				Hutton, Shortlands	2%	Oakleaf, Dundee	9%	Avalon	10%
						Bare Rock	5%		
						Hutton, Shortlands	3%		
						Avalon	2%		

3.2 Baseline Findings

The six (6) representative soil forms identified within the proposed project area include the Carolina, Glenrosa, Mispah and three technosols (Witbank, Stilfontein and Johannesburg) soil forms (Figure 3-5). Based on the verified baseline findings, the proposed Mponeng TSF lower compartment was found to be dominated by the disturbed Witbank soils from the mine tailings deposits. The Witbank soils resulted due to human intervention and are collected from the surrounding mining dumps. Due to extensive disturbance, the Witbank soils lack evidence of morphological order and are considered to have low suitability for agricultural potential. Artificial waterbodies with Stilfontein soils were also identified adjacent to the proposed Mponeng TSF lower compartment. The Stilfontein soils comprise of anthropogenic materials that have undergone saturation due to human activities. In addition, the northern portion of the proposed project area was found to be dominated by Johannesburg technosols. The Johannesburg technosols refers to urban developments such as roads, buildings, construction buildings and recreational areas. All the technosols for the purpose of this project are considered to have a low suitability, due to their morphological composition that extensively inhibits agricultural activities.

Furthermore, the proposed pipeline was found to be dominated by the semi-impermeable to impermeable Mispah and Glenrosa soil forms, while its significant portion comprised of Carolina soil forms. The Mispah soil form comprises of an orthic topsoil on top of a hard rock horizon. The Glenrosa soil form comprises of an orthic topsoil on top of a lithic subsoil horizon. Lastly, the Carolina soil form

comprises of an orthic topsoil on top of a yellow brown apedal subsoil that is underlain by a hard rock horizon. The Mispah soils are marked by shallow depth, impermeable underlying horizons, and the presence of parent materials. Due to their restricted permeability, the Mispah soils have limited root penetration and water movement, which inhibits crop production. Consequently, the soils are concluded to have a low sensitivity and low productivity, which are more suitable for grazing and supporting natural vegetation rather than intensive crop production. The identified Glenrosa soil forms are characterised by gleylithic subsoil, with signs of wetness. The gleylithic subsoil horizons were shallow with the presence of weathering parent material. Lastly, the Carolina soil form is characterised by very shallow apedal soils with freely drained upper horizons and restrictive underlying horizon. The soils are mostly suitable for shallow rooted crops and is considered to have a moderate agricultural potential. Some of the identified soil horizons within the proposed project area are illustrated in Figure 3-6 and Figure 3-7.

Accordingly, following Smith, (2006) which the national DAFF, (2017) land capabilities protocols were further expanded from, the above-mentioned identified soil forms are restricted to land capability classes IV (i.e. Carolina soil form) categorised by LC 6-8 (Low to Moderate), land capability VI (i.e. Glenrosa and Mispah soil forms) categorised by LC 1-5 (Very low to Low), land capability VII (i.e. Stilfontein and Witbank soil forms) categorised by LC 1-5 (Very low), and land capability VIII (i.e. Johannesburg soil forms) categorised by LC 1-5 (Very low). The baseline soil land capability was aligned and compared to the National Land Capability data (DAFF, 2017). A climate capability level 8 has been assigned to the area given the low Mean Annual Precipitation (MAP) and the high Mean Annual Potential Evapotranspiration (MAPE) rates.

By using the determined land capability for the most sensitive soil (Carolina soil form) and the determined climate capability, a land potential of “L6” was calculated. Furthermore, the calculated land potential for less sensitive soils (i.e. Glenrosa and Mispah soil forms) is land potential L7, and technosols including Johannesburg, Stilfontein and Witbank is land potential L8. According to Smith (2006), the “L6” land potential is characterised by very restricted potential with regular and or severe limitations due to soil, slope, temperature or rainfall. The “L7” land potential level is characterised by a low potential with a severe limitation due to soil, slope, temperatures, or rainfall. The “L8” land potential level is characterised by a very low potential with very severe limitations due to soil, slope, temperatures, or rainfall. The areas associated with the “L6, L7 and L8” land potentials are considered to be non-arable (Figure 3-8). Therefore, the proposed project area falls predominately on non-arable soils.

The following land potential levels have been determined;

- Land potential level 6 (this land potential is characterised by very restricted potential. Regular and/ or severe limitations due to soil, slope, temperatures or rainfall). Non-arable;
- Land potential level 7 (this land potential is characterised by low potential. Severe limitations due to soil, slope, temperatures or rainfall). Non-arable; and
- Land potential level 8 (this land potential is characterised by very low potential. Very severe limitations due to soil, slope, temperatures or rainfall). Non-arable.

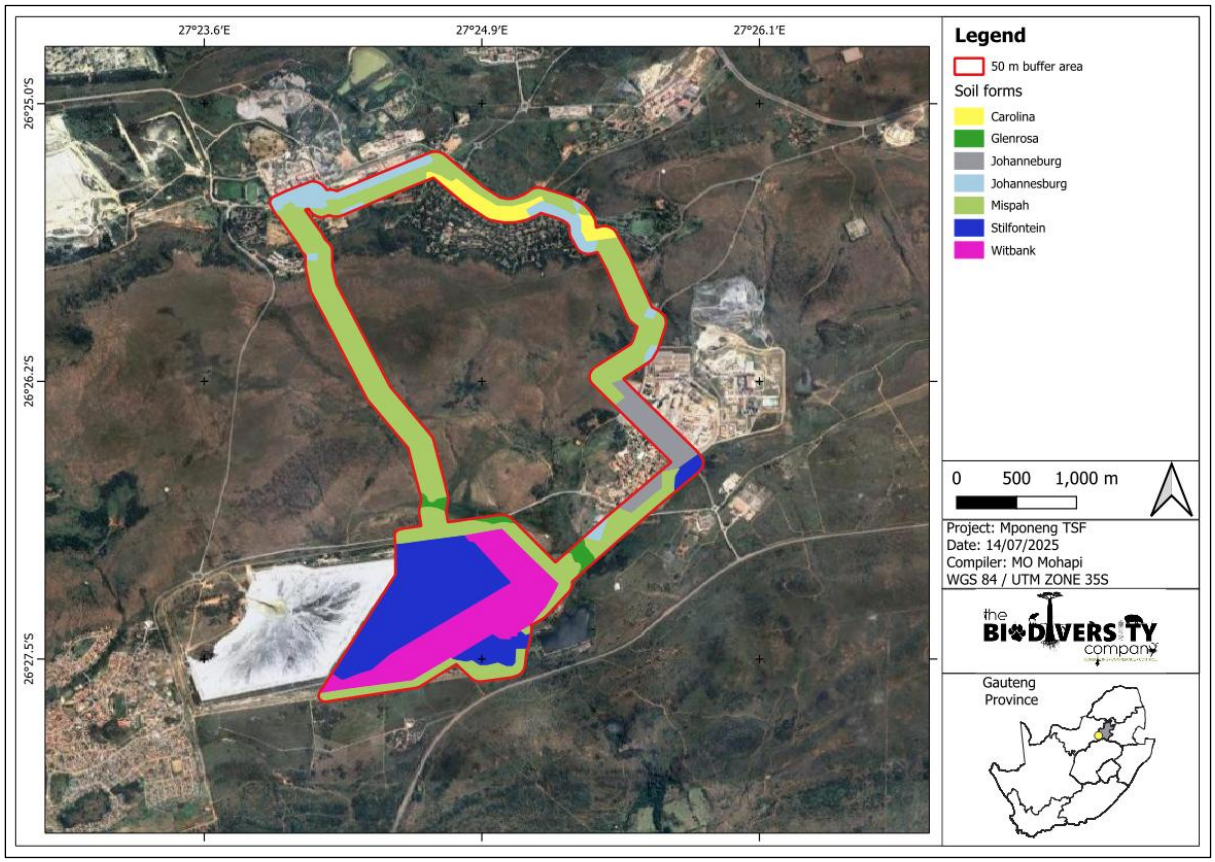


Figure 3-5 Soil forms found within the proposed project area

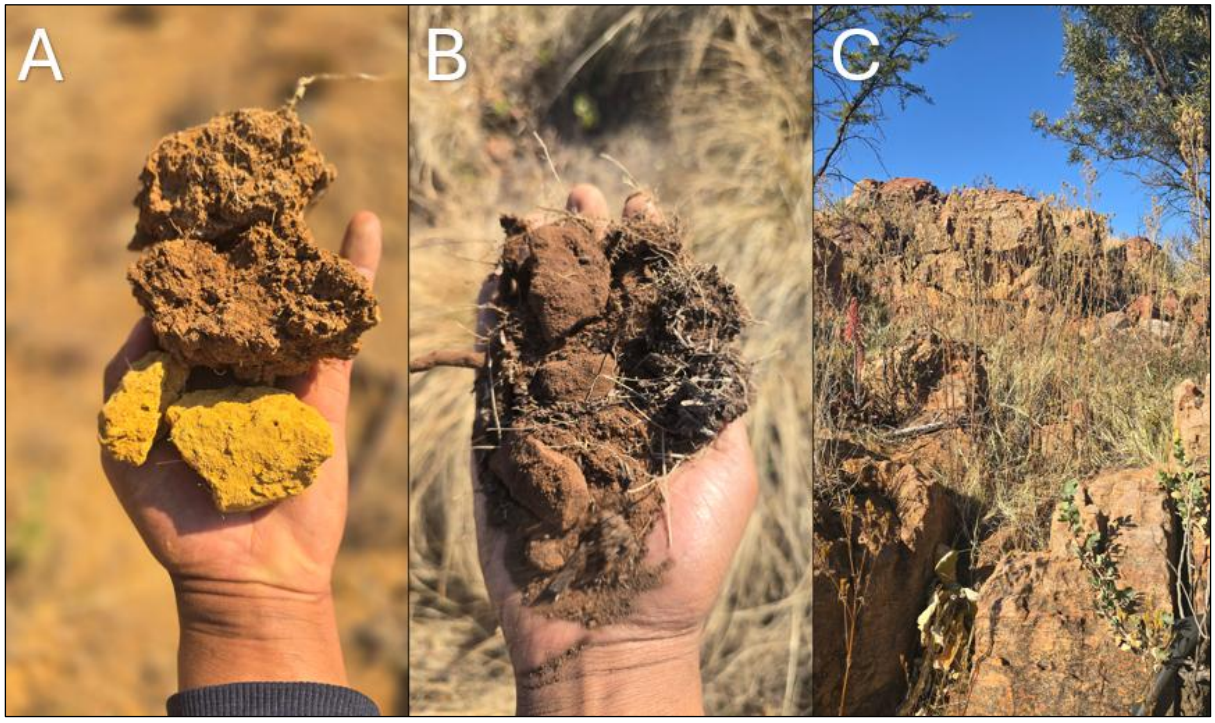


Figure 3-6 Soil forms found within the proposed project area; A) Carolina soil form; B) Glenrosa soil form; and C) Mispah soil form

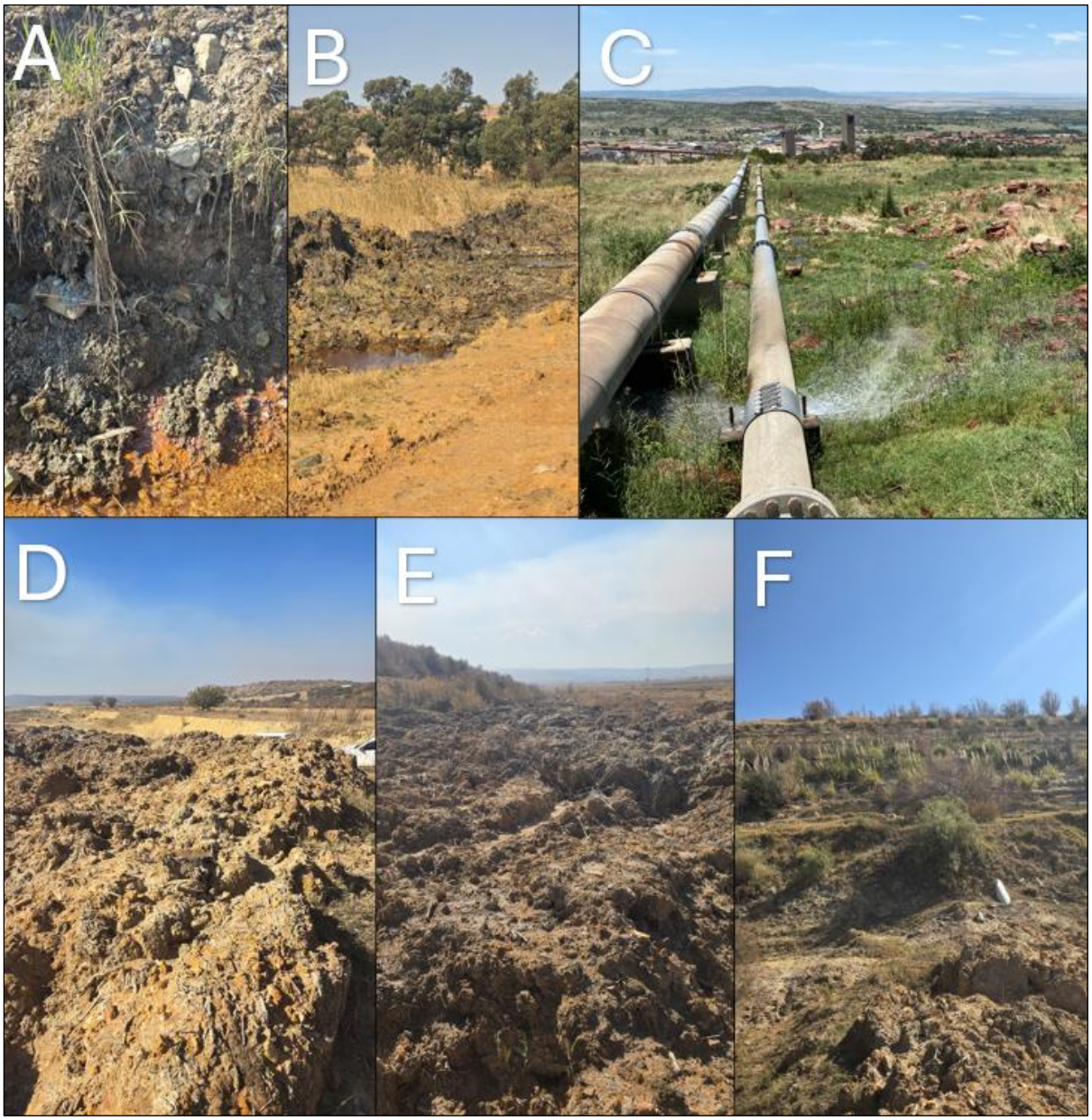


Figure 3-7 Anthrosols and Technosols; A and B) Stilfontein; C) Johannesburg; D to F) Witbank

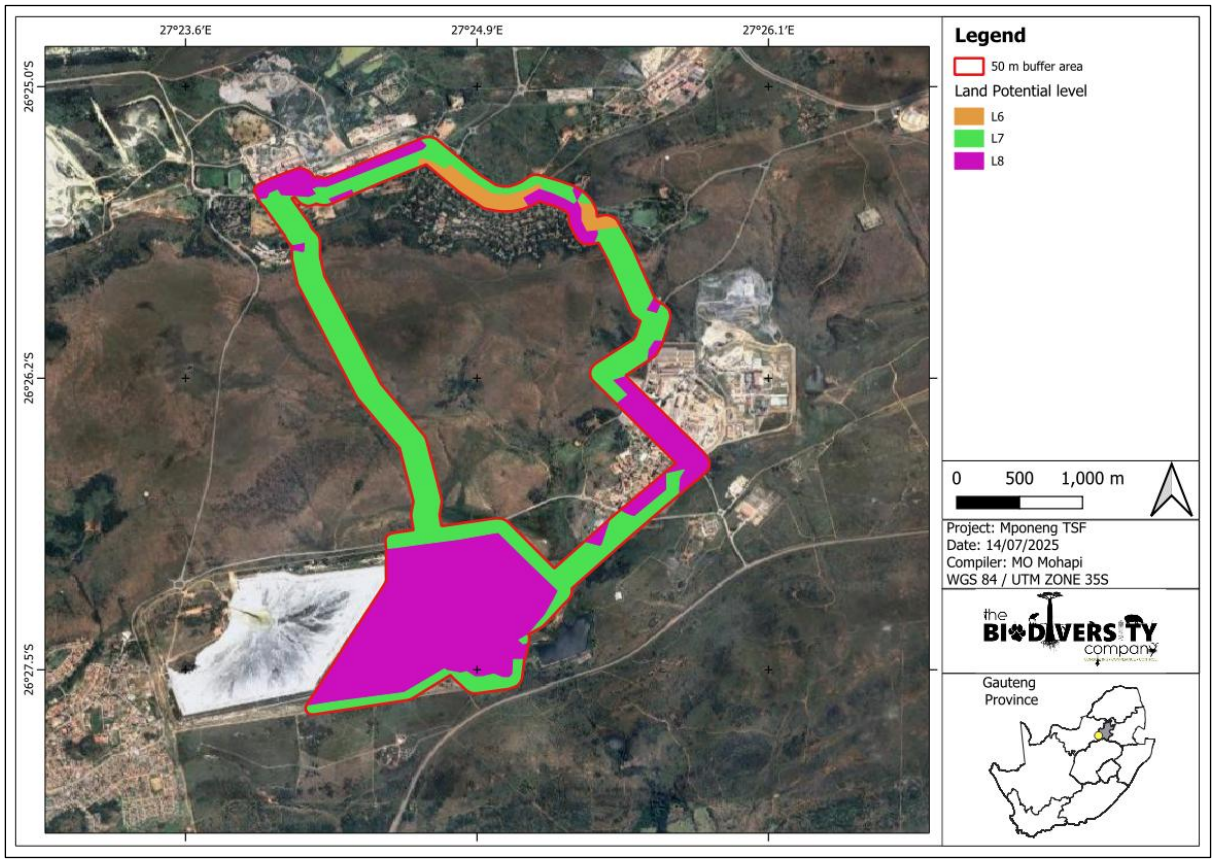


Figure 3-8 Land Potential of the proposed project area

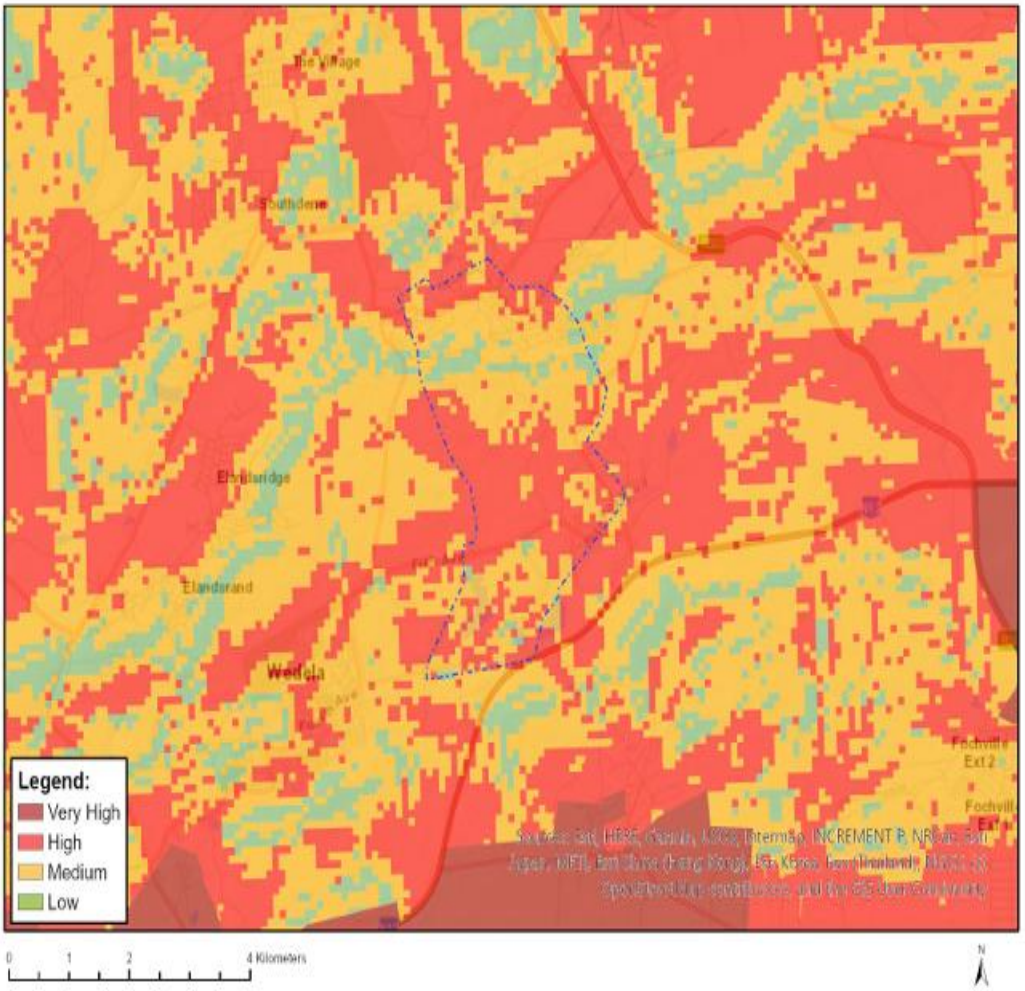
3.3 Sensitivity Verification

3.3.1 Screening Report – Moponeng TSF Lower Compartment

The following is deduced from the National Web-based Environmental Screening Tool Regulation 16(1)(v) of the Environmental Impact Assessment Regulations 2014, as amended):

- Agriculture Theme Sensitivity indicates that the proposed 50 m Buffer of the project area falls within the 'Low to High' agricultural sensitivity (Figure 3-9).

MAP OF RELATIVE AGRICULTURE THEME SENSITIVITY



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
	X		

Sensitivity Features:

Sensitivity	Feature(s)
High	08. Moderate
High	09. Moderate-High
High	10. Moderate-High
Low	04. Low-Very low
Low	05. Low
Medium	06. Low-Moderate
Medium	07. Low-Moderate

Figure 3-9 Map of Relative Agricultural Theme Sensitivity for the Mponeng TSF Lower Compartment generated by the Environmental Screening Tool Site Ecological Importance (SEI)

Fifteen land capabilities have been digitised by (DAFF, 2017) across South Africa, of which seven potential land capability classes are located within the assessment area, including;

- Land Capability 4 to 5 (Very Low to Low Sensitivity);
- Land Capability 6 to 8 (Low-Moderate to Moderate Sensitivity); and
- Land Capability 9 to 10 (Moderate High Sensitivity).

The land capability dataset (DAFF, 2017) indicates that the proposed project area falls evenly within the “Low to Moderate” land capability sensitivity and the “Moderate to High” land capability sensitivity, with a marginal having a “Very low to Low” land capability sensitivity. No field crop boundaries were identified within the proposed project area, according to the agricultural screening tool (DAFF, 2017).

The baseline soil findings and the current land uses dispute all areas associated with the “Moderate to High” land capability sensitivity. It further concurs with the “Low to Moderate” land capability sensitivity to an extent and fully correlates with the demarcated “Very low to Low” land capability sensitivity. Based on the verified findings, the moderate to high land capability areas were found to be dominated by very low to low potential soils including the Glenrosa, Mispah and technosols. Furthermore, the marginal confirmed low to moderate land capability areas are comprised of moderate potential soils i.e. Carolina soil form. The remaining very low to low land capability areas are comprised of low potential soils including the Mispah and Glenrosa soil forms.

The proposed project and the associated activities are expected to have acceptable changes to the soil resources, and they are anticipated to have minimal impact on the soil resources. Therefore, the overall site sensitivity of the proposed project area is concluded to be predominately “Low”, with a marginal “Medium” agricultural sensitivity.

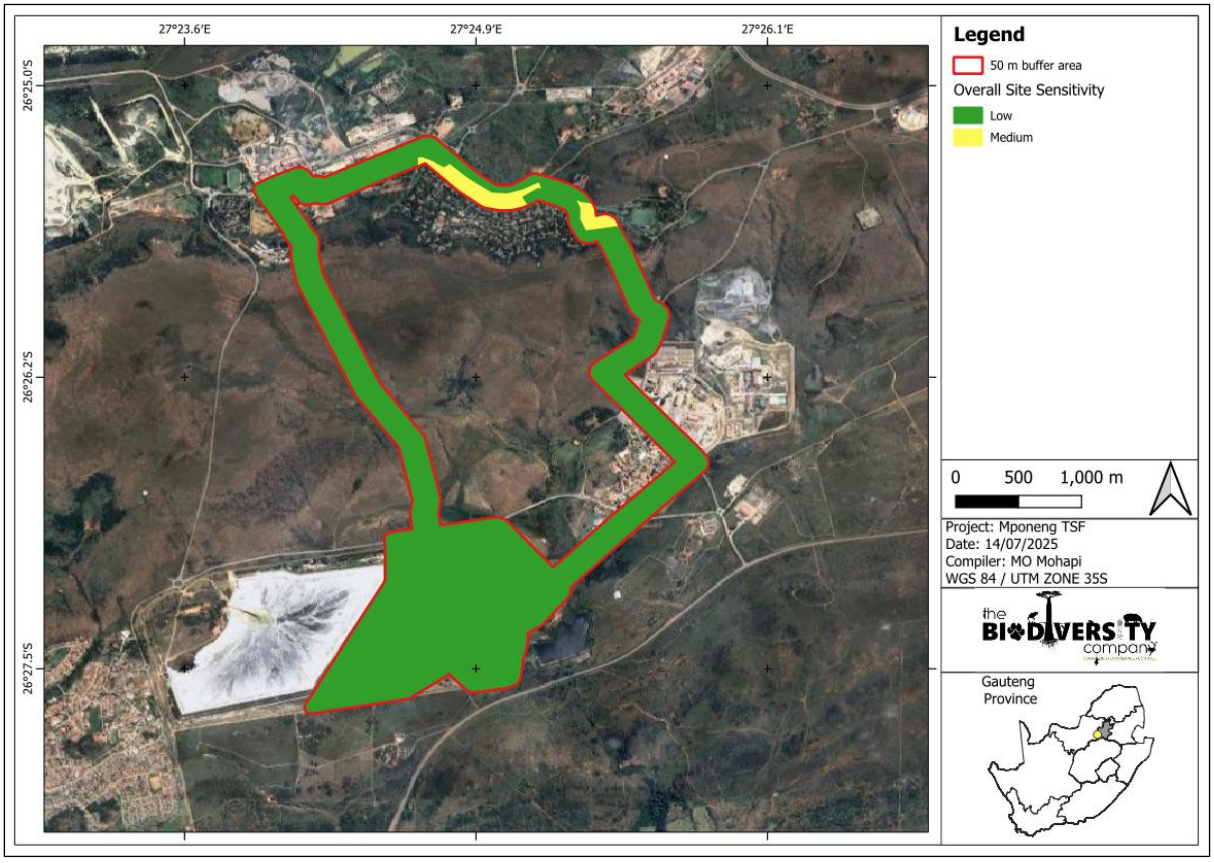


Figure 3-10 Overall site verified sensitivity of the proposed project area

Considering the soil properties, agricultural potential as well as the current land use of the proposed development area, the overall sensitivity of the proposed project area is categorized as “Low,” with marginal “Medium” sensitivity. The allocated sensitivities for the theme are either disputed or validated in Table 3-3 below.

Table 3-3 Summary of the screening tool vs specialist assigned sensitivities

Screening Tool Theme	Feature	Screening Tool	Specialist	Tool Validated or Disputed by Specialist - Reasoning
Agricultural Theme	LC 9 - 10 Moderate to High	High	Low	Disputed – Land Capability Very low to Low. Presence of low potential soils i.e., technosols including Stilfontein, Witbank and Johannesburg.
	LC 6-8 Low to Moderate	Medium	Medium	Validated – Land Capability Low to Moderate. Presence of moderately potential soils including soil form.
	LC 6-8 Low to Moderate	Medium	Low	Disputed – Land Capability Very Low to Low. The presence of restrictive soils including the Mispah and Glenrosa soil forms
	LC 4- 5 Very low to Low	Low	Low	Validated. Land Capability Very Low to Low. The presence of restrictive soils including the Mispah and Glenrosa soil forms

4 CARA Requirements

Under Conservation of Agricultural Resources Act (no. 43 of 1983, CARA), approvals are necessary for various activities, such as cultivating virgin land, veld burning, cultivating localized alien plants for commercial purposes and the draining of wetland systems.

For the cultivation of virgin land, CARA specifies that only arable land should be cultivated. However, disturbances to topsoil resulting from the construction of proposed activities does not fall under this category of cultivation as defined by CARA but rather soil disturbance. Therefore, the construction and operation of the camps do not require consent under CARA.

Additionally, since the proposed development does not involve veld burning or the commercial cultivation of localized alien plants, it does not require consents under those provisions of CARA.

Similarly, a specialist wetland assessment was undertaken for the required authorisations. The proposed layout and the associated infrastructures will have minimal impact on the available watercourses. Furthermore, the proposed project will not result in the direct draining of the water regimes due to the activities. The overall residual impact to the wetland systems was determined to be moderately low. The project is compliant and will not require consent under CARA for any activities.

In summary, the proposed project and the associated infrastructure is compliant with CARA regulations and does not necessitate consent under the Act following the site confirmation

5 Impact and Management Measures

5.1 TSF activities Impact Assessment

In accordance with the requirements for Environmental Authorisation as per NEMA, an EIA assessment must take place to determine the potential state of the environment prior to development taking place as well as the likely impacts that the development has had on the area. The following list provides the identified impacts which contributed to the loss of land capability:

- Soil erosion: Bare soil surfaces within the proposed project area contributed to increased susceptibility to wind and water erosion, leading to loss of topsoil;

- Soil compaction from vehicle traffic: The movement and operation of vehicles within the project footprint, resulted in increased soil compaction, which adversely affected soil structure and permeability;
- Soil contamination: Surface flow from septic tank and bunded diesel storage can led to soil contamination, impacting soil health and productivity, and
- Soil compaction and degradation from the construction of existing infrastructure: The presence of existing infrastructure such as stockpiles, offices, firebreak, bunded diesel storages, to mention the few caused further soil compaction and land degradation, disturbing soil structure and reducing overall soil quality.

The following table provides the framework for the prospective impacts, albeit limited, for the proposed project (Table 5-1).

Table 5-1 Summative results of the Impact Assessment conducted for the proposed project

Impact	Phase	Pre-Mitigation Impact	Post-mitigation Impact	Final Significance
Soil compaction, Soil erosion, Land degradation and Soil contamination	Construction	Medium to Low-	Low -	Low -
Loss of grazing potential	Construction	Medium to Low-	Low -	Medium to Low -
Mitigation Measures				
• Minimise project footprint as far as possible. Manage location of topsoil stripping stockpiling, demarcation of topsoil stockpiles and prevention of stockpile erosion and contamination. This can protect the topsoil stockpiles to keep it viable for rehabilitation purposes. • Make use of existing roads or upgrades tracks before new roads are constructed. The number and width of internal access routes must be kept to a minimum. Usually, areas with sandy soils are avoided as far as possible for heavy vehicles, areas dominated with sandy soils, dust suppressions methods should be implemented to reduce wind erosion during this phase; • Implementation of embedded controls such as geotextiles, gabion baskets to effectively control soil erosion on-site; • Associated infrastructure foundations must be (preferably) located in already disturbed areas where possible; • Losses of fuel and lubricants from vehicles to be contained during construction and the TSF activities, use of biodegradable fluids where possible, avoid waste disposal on undesigned areas which are not contained. • Dust-reducing mitigation measures must be put in place and must be strictly adhered to, for all roads and bare (unvegetated) areas. • Reduce the dust generated by operational vehicles and earth moving machinery, through wetting the soil surface (with “dirty water”) and putting up signs to enforce speed limits to enforce reduced speeds. • No non-environmentally friendly suppressants may be used as this could result in pollution of water sources. • A stormwater management plan must be implemented for the development. The plan must provide input into the road network and management measures; • Rehabilitation of the area must be initiated from the onset of the project. Soil stripped from infrastructure placement can be used for rehabilitation efforts; and • An alien invasive plant species and control programme must be implemented from the onset of the project.				

Soil compaction, Soil erosion, Land degradation and Soil contamination	Operation	Medium to low -	Low -	Medium to Low -
Loss of grazing potential	Operation	Medium to Low-	Low -	Low -

Mitigation Measures

- Dust-reducing mitigation measures must be put in place and must be strictly adhered to, for all roads and bare (unvegetated) areas.
- No non-environmentally friendly suppressants or cleaning agents may be used as this could result in pollution of water sources.
- A stormwater management plan must be implemented for the development. The plan must provide input into the road network and management measures;
- Rehabilitation of the area must be initiated from the onset of the project. Soil stripped from infrastructure placement can be used for rehabilitation efforts; and
- An alien invasive plant species and control programme must be implemented from the onset of the project.

Soil compaction, Soil erosion, Land degradation and Soil contamination	Decommissioning	Low -	Low -	low -
Loss of grazing potential	Decommissioning	Low -	Low -	low -

Mitigation Measures

- Install erosion and sediment control measures (silt fences, sediment basins, straw bales).
- Remove infrastructure, like office and electrical infrastructure. Remove all above-ground and below-ground cabling, foundations, and concrete pads.
- Remove hazardous materials (batteries, oils, chemicals) for proper disposal.
- Decompact soils in areas affected by heavy machinery (use subsoiling or deep ripping).
- Replace and evenly spread any stockpiled topsoil.
- Reseed or replant with native or pre-existing vegetation suited to the soil capability including the stockpiling areas.
- Maintain erosion and sediment controls until vegetation is re-established
- Conduct post-restoration soil assessments (compaction, fertility, structure).
- Document and report restoration outcomes to relevant authorities.

Soil compaction, Soil erosion, Land degradation and Soil contamination	Rehab and Closure	Low -	Low -	Low -
Loss of grazing potential	Reb and Closure	Low -	Low -	low -

Mitigation Measure

- Install erosion and sediment control measures (silt fences, sediment basins, straw bales).
- Remove all construction debris and waste from the site.
- Decompact soils in areas affected by heavy machinery (use subsoiling or deep ripping).
- Replace and evenly spread any stockpiled topsoil.
- Reseed or replant with native or pre-existing vegetation suited to the soil capability.
- Maintain erosion and sediment controls until vegetation is re-established
- Conduct post-restoration soil assessments (compaction, fertility, structure).
- Document and report restoration outcomes to relevant authorities.

Table 5-2 Anticipated impacts for the proposed support infrastructure on agricultural resources

Main Impact	Project activities that can cause loss/impacts to Soils (especially regarding the proposed infrastructure areas)	Secondary impacts anticipated
Loss of land capability	• Construction, operation and decommissioning of roads; • Construction, operation and decommissioning of construction camps, layout areas and office space; • Potential waste water treatment leaks or spillage (i.e. hydrocarbons or untreated waste); • Mixing of soil; • Soil dust precipitation in surface or gravel access roads; • Dust precipitation; and • Removal of vegetation for the proposed support infrastructure	• Erosion; • Soil degradation; • Compaction; • Increase in salinity; • Land contamination; and • Loss of soil via aeolian processes.

5.2 Management Measures

The assessment of impact significance considers pre-mitigation as well as implemented post-mitigation scenarios. The aim of the management outcomes (below) is to present the mitigation measures in such a way that they can be incorporated into the Environmental Management Programme (EMPr) for the project, allowing for more successful implementation and auditing of the mitigations and monitoring guidelines. The project management measures for the soils and agriculture resources during the construction phase presents the prescribed mitigation measures for construction phase for the assessment are presented in Table 5-3. Table 5-3 presents the prescribed mitigation for operational phase for the assessment. Table 5-3 presents the prescribed mitigation measures for the decommissioning, rehabilitation and closure phases for the assessment.

Table 5-3 Mitigation Measures and Management Outcomes

No	Mitigation Measures	Phase	Timeframe	Responsible Party for Implementation	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
Soi1	Cleared areas must be rehabilitated and stabilised to avoid impacts to adjacent areas	Construction	Prior to construction and ongoing throughout lifespan of mine	Contractor/ Environmental Officer	Throughout phase	Rehabilitation implemented	Implement a rehabilitation plan
Soi2	Make use of existing access routes as much as possible before new routes are considered. Any selected "new" route must be authorized, minimizing disturbances to the wetland areas.	Construction	Prior to construction and ongoing throughout lifespan of mine	Contractor/ Environmental Officer	Throughout phase	All routes authorised	Design engineer to consider this for final layout
Soi3	Keep excavation and soil heaps clear of potential contaminates or waste	Construction	Prior to construction and ongoing throughout lifespan of mine	Contractor/ Environmental Officer	Throughout phase	Soil heaps are managed	Separate topsoil and sub-soil
Soi4	Lightly till any disturbed soil around the development footprint to avoid compaction	Construction	Prior to construction and ongoing throughout lifespan of mine	Contractor/ Environmental Officer	Throughout phase	Plan is implemented	Implement a rehabilitation plan
Soi5	Ensure soil stockpiles sand are sufficiently safeguarded against rain wash	Construction	Prior to construction and ongoing throughout lifespan of mine	Contractor/ Environmental Officer	Throughout phase	Plan is implemented	Implement soil management plan
Soi6	The use of herbicides is not recommended (opt for mechanical removal).	Construction	Prior to construction and ongoing throughout lifespan of mine	Contractor/ Environmental Officer	Throughout phase	Avoided buffer area	Demarcate buffer area
Soi7	Make sure all excess consumables are removed from site and deposited at an appropriate waste facility	Construction	Prior to construction and ongoing throughout lifespan of mine	Contractor/ Environmental Officer	Throughout phase	Restricted to demarcated area	Restrict to designated working/storage/service areas
Soi8	Appropriately contain any generator diesel storage tanks, machinery spills (e.g., accidental spills of hydrocarbons oils, diesel etc.) or construction materials on site (e.g., concrete) in such a way as to	Construction	Prior to construction and ongoing throughout lifespan of mine	Contractor/ Environmental Officer	Throughout phase	Restricted to demarcated area	Restrict to designated working/storage/service areas

	prevent them leaking and entering wetlands or buffer areas						
Soi9	Provide appropriate sanitation facilities for workers during construction and service them regularly	Construction	Prior to construction and ongoing throughout lifespan of mine	Contractor/ Environmental Officer	Throughout phase	Ablution facilities provided and serviced	Provide service ablution for contractors/labour
Soi10	The Contractor should supply sealable and properly marked domestic waste collection bins and all solid waste collected must be disposed of at a licensed disposal facility	Construction	Prior to construction and ongoing throughout lifespan of mine	Contractor/ Environmental Officer	Throughout phase	Plan is implemented	Implement waste management plan
Soi11	The Contractor must be in possession of an emergency spill kit that must be complete and available at all times on site	Construction	Prior to construction and ongoing throughout lifespan of mine	Contractor/ Environmental Officer	Throughout phase	Plan is implemented	Implement spill response plan
Soi12	Any possible contamination of topsoil by hydrocarbons must be avoided. Any contaminated soil must be treated in situ or be placed in containers and removed from the site for disposal in a licensed facility	Construction	Prior to construction and ongoing throughout lifespan of mine	Contractor/ Environmental Officer	Throughout phase	Plan is implemented	Implement spill response plan
Soi13	Implement dust suppression on stockpiles like the gravel roads.	Construction Operational	Prior to construction and ongoing throughout lifespan of mine	Contractor/ Environmental Officer	Throughout phase	Plan is implemented	Implement scheduled dust suppression plan
Soi14	Implement erosion control methods like mulching, geotextile sheets, reduce soil compaction, chemical spills which can affect soil fertility.	Operational	From operational and ongoing throughout lifespan of mine	Environmental Officer	Throughout phase	Implement an alien vegetation management plan	Implement an alien vegetation management plan
Soi15	Ensure successful rehabilitation of areas disturbed during construction and these areas are stabilized to avoid impacts to adjacent areas	Operational Decommissioning and rehab	From operational and ongoing throughout lifespan of mine including Rehabilitation and closure Phase	Contractor/ Environmental Officer	Throughout phase	Implement soil re-vegetation, spillage or residual waste contamination rehabilitation plan	Should be assessed once a year for soil compaction, fertility, and erosion.

Soi16	Rehabilitation of the Project area will be undertaken, including the ripping of the compacted soil surfaces and establishment of vegetation.	Decommissioning and rehab	Rehabilitation and closure Phase	Contractor/ Environmental Officer	Throughout phase	Implement soil compaction rehabilitation	Implement erosion control, revegetation and alien vegetation management plan on disturbed areas
Soi17	Ensure rehabilitation of contaminated soil by removal of pollutants by implementing methods such as bioremediation and phytoremediation	Decommissioning and rehab	Rehabilitation and closure Phase	Contractor/ Environmental Officer	Throughout phase	Implement soil spillage or residual waste contamination rehabilitation plan	Should be assessed once a year for soil compaction, fertility, and erosion.

6 Conclusion

Six (6) soil forms were identified within the proposed project area namely; Carolina, Glenrosa, Mispah, technosols (Stilfontein, Johannesburg and Witbank). The proposed project area falls predominately on the disturbed soils i.e. Witbank, Johannesburg and Stilfontein, which are characterised by low potential soils. Areas along the pipeline comprised of restrictive soils including the Mispah and Glenrosa soil forms, which are characterised by a low agricultural potential. Lastly, a marginal area within the proposed project area comprised of moderate potential soils i.e. the Carolina soil form.

The land capability sensitivity (DAFF, 2017) indicated that the proposed project area falls evenly within the “Low to Moderate” and “Moderate to High” land capability sensitivity, with a marginal portion having “Very low to Low” land capability sensitivity. The verified baseline findings dispute all areas associated with “Moderate to High” land capability. They further correlate with some few portions characterised with “Low to Moderate”. All areas that were demarcated with a “Very low to Low” land capability sensitivity were confirmed.

It is the specialist’s opinion that the proposed project and the associated infrastructure will have an overall low residual impact on the agricultural production ability of the land. The proposed project and associate infrastructure may be favourably considered for development.

6.1 Specialist Statement

The proposed development area will have an overall low residual impact on the soil capability and agricultural production capability of the area. The proposed development can be favourably considered for authorisation. The following serves to substantiate this statement:

- The site verified land capability of the proposed project area ranges from low to medium;
- The agricultural potential of the area ranges is low;
- No active crop farming was only identified within the 50 m buffer of the project area; and
- The overall agricultural sensitivity for the project area is categorised as low, with a marginal medium sensitivity.

6.2 Statement Conditions/Layout Approval

An updated project layout has been received (Figure 6-1**Error! Reference source not found.**). The project may be favourably considered for authorisation with no conditions and no new risks are associated with the layout change.

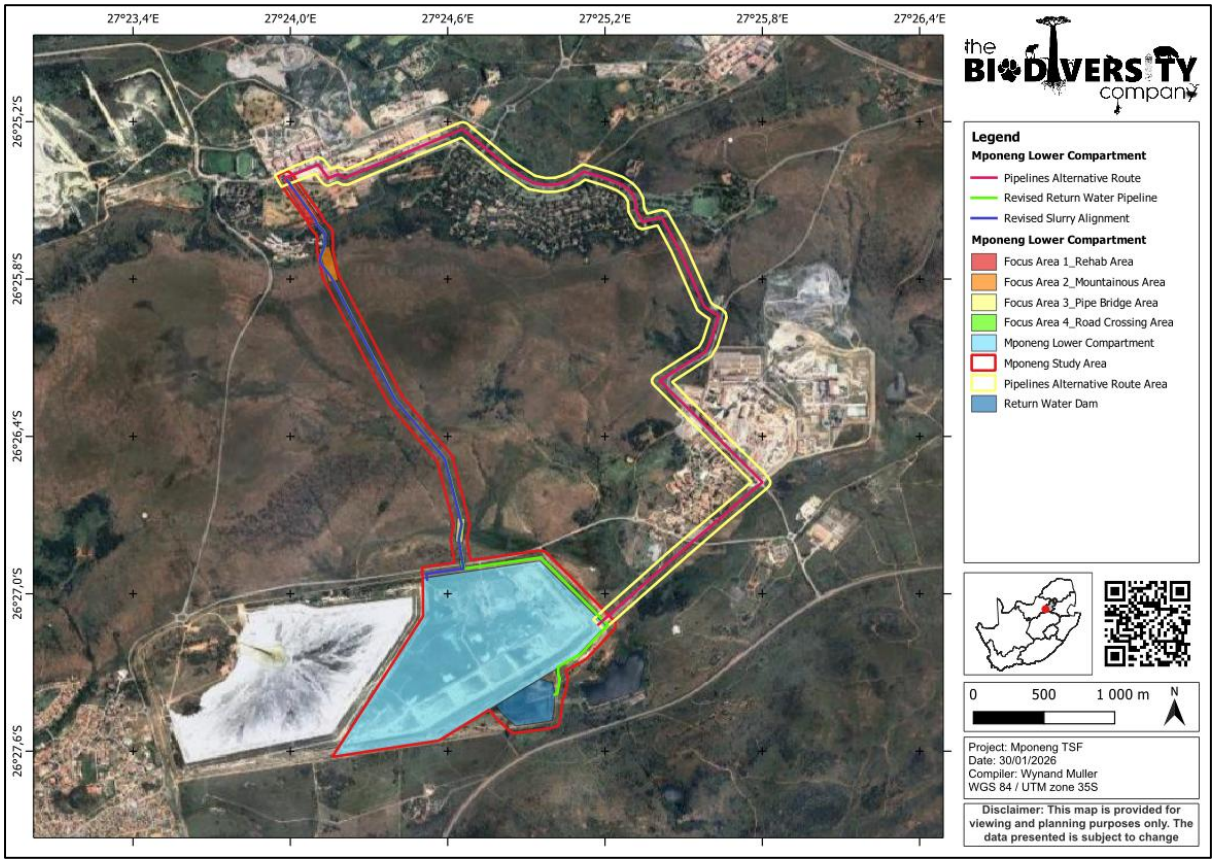


Figure 6-1 Updated layout for the proposed project

7 References

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8 Appendix Items

8.1 Appendix A: Methodology

8.1.1 Desktop Assessment

As part of the desktop assessment, baseline soil information was obtained using published South African Land Type Data. Land type data for the site was obtained from the Institute for Soil Climate and Water (ISCW) of the Agricultural Research Council (ARC) (Land Type Survey Staff, 1972 - 2006). The land type data is presented at a scale of 1:250 000 and comprises of the division of land into land types.

8.1.2 Field Survey

The site was traversed on foot. A soil auger was used to determine the soil form/family and depth. The soil was hand augured to the first restricting layer or 1.2 m. Soil survey positions were recorded as waypoints using a handheld GPS. Soils were identified to the soil family level as per the "Soil Classification: A Taxonomic System for South Africa" (Soil Classification Working Group, 2018). Landscape features such as existing open trenches were also helpful in determining soil types and depth.

8.1.3 Land Capability

Land capability and agricultural potential will be determined by a combination of soil, terrain, and climate features. Land capability is defined by the most intensive long-term sustainable use of land under rain-fed conditions. At the same time an indication is given about the permanent limitations associated with the different land use classes.

Land capability is divided into eight classes, and these may be divided into three capability groups. Table 8-1 shows how the land classes and groups are arranged in order of decreasing capability and ranges of use. The risk of use increases from class I to class VIII (Smith, 2006).

Table 8-1 Land capability class and intensity of use (Smith, 2006)

Land Capability Class	Increased Intensity of Use									Land Capability Groups
I	W	F	LG	MG	IG	LC	MC	IC	VIC	Arable Land
II	W	F	LG	MG	IG	LC	MC	IC		
III	W	F	LG	MG	IG	LC	MC			
IV	W	F	LG	MG	IG	LC				
V	W	F	LG	MG						Grazing Land
VI	W	F	LG	MG						
VII	W	F	LG							
VIII	W									Wildlife
W - Wildlife		MG - Moderate Grazing			MC - Moderate Cultivation					
F- Forestry		IG - Intensive Grazing			IC - Intensive Cultivation					
LG - Light Grazing		LC - Light Cultivation			VIC - Very Intensive Cultivation					

The land potential classes are determined by combining the land capability results and the climate capability of a region as shown in the table below. The final land potential results are then described in the subsequent table.

Table 8-2 The combination table for land potential classification

Land capability class	Climate capability class							
	C1	C2	C3	C4	C5	C6	C7	C8
I	L1	L1	L2	L2	L3	L3	L4	L4
II	L1	L2	L2	L3	L3	L4	L4	L5
III	L2	L2	L3	L3	L4	L4	L5	L6
IV	L2	L3	L3	L4	L4	L5	L5	L6
V	Vlei	Vlei	Vlei	Vlei	Vlei	Vlei	Vlei	Vlei
VI	L4	L4	L5	L5	L5	L6	L6	L7
VII	L5	L5	L6	L6	L7	L7	L7	L8
VIII	L6	L6	L7	L7	L8	L8	L8	L8

Table 8-3 The Land Potential Classes

Land potential	Description of land potential class
L1	Very high potential: No limitations. Appropriate contour protection must be implemented and inspected.
L2	High potential: Very infrequent and/or minor limitations due to soil, slope, temperatures, or rainfall. Appropriate contour protection must be implemented and inspected.
L3	Good potential: Infrequent and/or moderate limitations due to soil, slope, temperatures, or rainfall. Appropriate contour protection must be implemented and inspected.
L4	Moderate potential: Moderately regular and/or severe to moderate limitations due to soil, slope, temperatures, or rainfall. Appropriate permission is required before ploughing virgin land.
L5	Restricted potential: Regular and/or severe to moderate limitations due to soil, slope, temperatures, or rainfall.
L6	Very restricted potential: Regular and/or severe limitations due to soil, slope, temperatures, or rainfall. Non-arable
L7	Low potential: Severe limitations due to soil, slope, temperatures, or rainfall. Non-arable
L8	Very low potential: Very severe limitations due to soil, slope, temperatures, or rainfall. Non-arable

The land capability of the proposed footprint will be compared to the National Land Capability which was refined in 2014- 2016. The National Land Capability methodology is based on a spatial evaluation modelling approach and a raster spatial data layer consisting of fifteen (15) land capability evaluation values (Table 8-4), usable on a scale of 1:50 000 – 1:100 000 (DAFF, 2017). The previous system is based on a classification approach, with 8 classes (Table 8-1). Land capability and land potential will also be determined in consideration of the screening tool to ultimately establish the accuracy of the land capability sensitivity from (DAFF, 2017).

Table 8-4 National Land Capability Values (DAFF,2017)

Land Capability Evaluation Value	Land Capability Description
1	Very low
2	
3	Very Low to Low
4	
5	Low
6	Low to Moderate
7	
8	Moderate
9	Moderate to High
10	
11	High
12	High to Very High
13	

14 15	Very High

8.2 EIMS Impact Assessment for the proposed activities - Loss of Land Capability

Pre-Mitigation												Post-Mitigation														
Aspect	Impact	Phase	Pre-Nature	Pre-Extent	Pre-Duration	Pre-Magnitude	Pre-Reversibility	Consequence	Pre-Probability	Pre-Mitigation Significance Score	Pre-Mitigation Significance	Post-Nature	Post-Extent	Post-Duration	Post-Magnitude	Post-Reversibility	Consequence2	Post-Probability	Post-mitigation Significance Score	Post-Mitigation Significance	Confidence	Cumulative Impact	Irreplaceable loss	Priority Factor	Final score	Final Significance
Loss of Land Capability	Soil compaction, Soil erosion, Land degradation and Soil contamination	Construction	-1	3	3	3	3	-3	2	-6	Medium to low -	-1	2	2	2	3	-2,25	1	-2,25	Low -	Medium	2	3	1,38	-3,09	Low -
Loss of Land Capability	Soil compaction, Soil erosion, Land degradation and Soil contamination	Operation	-1	2	3	2	2	-2,25	2	-4,5	Medium to low -	-1	2	2	2	1	-1,75	1	-1,75	Low -	Low	2	3	1,38	-2,41	Low -
Loss of Land Capability	Soil compaction, Soil erosion, Land degradation and Soil	Decommissioning	-1	1	2	2	3	-2	2	-4	Low -	-1	1	2	1	3	-1,75	2	-3,5	Low -	Low	2	2	1,25	-4,38	Medium to low -

	contamination																								
Loss of Land Capability	Soil compaction, Soil erosion, Land degradation and Soil contamination	Rehab and Closure	-1	1	2	2	2	-1,75	2	-3,5	Low -	-1	1	2	1	2	-1,5	1	-1,5	Low -	Low	1	2	1,13	-1,69	Low -

8.3 EIMS Impact Assessment for the proposed activities - Loss of Land Grazing Potential

Pre-Mitigation											Post-Mitigation												
Aspect	Impact	Phase	Pre-Nature	Pre-Extent	Pre-Duration	Pre-Magnitude	Pre-Reversibility	Consequence	Pre-Probability	Pre-Mitigation Significance Score	Pre-Mitigation Significance	Post-Nature	Post-Extent	Post-Duration	Post-Magnitude	Post-Reversibility	Consequence2	Post-Probability	Post-mitigation Significance Score	Post-Mitigation Significance	Confidence	Cumulative Impact	Irreplaceable loss	Priority Factor	Final score	Final Significance
Loss of Land Grazing Potential	Soil compaction, Soil erosion, Land degradation and Soil contamination	Construction	-1	3	2	3	3	-2,75	2	-5,5	Medium to low -	-1	2	2	2	3	-2,25	1	-2,25	Low -	Medium	2	2	1,25	-2,81	Low -
Loss of Land Grazing Potential	Soil compaction, Soil erosion,	Operation	-1	2	3	2	2	-2,25	2	-4,5	Medium to low -	-1	2	2	2	1	-1,75	2	-3,5	Low -	Low	2	2	1,25	-4,38	Medium to low -

	Land degradation and Soil contamination																								
Loss of Land Grazing Potential	Soil compaction, Soil erosion, Land degradation and Soil contamination	Decommissioning	-1	1	2	2	2	-1,75	2	-3,5	Low -	-1	1	2	1	2	-1,5	1	-1,5	Low -	Low	1	2	1,13	-1,69	Low -
Loss of Land Grazing Potential	Soil compaction, Soil erosion, Land degradation and Soil contamination	Rehab and Closure	-1	1	2	2	2	-1,75	2	-3,5	Low -	-1	1	2	1	2	-1,5	1	-1,5	Low -	Low	1	2	1,13	-1,69	Low -

8.4 Appendix C: Specialist Declarations

DECLARATION

I, Maletsatsi Mohapi, declare that:

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting 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 realise that a false declaration is an offence in terms of Regulation 48 and is punishable in terms of Section 24F of the Act.

Maletsatsi Mohapi

Soil Scientist

The Biodiversity Company

July 2025

I, Matthew Mamera, declare that:

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting 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 realise that a false declaration is an offence in terms of Regulation 48 and is punishable in terms of Section 24F of the Act.

Dr Matthew Mamera

Soil Scientist

The Biodiversity Company

July 2025

8.5 Appendix D: Curriculum Vitae

Maletsatsi Octovia Mohapi

Master of Science (M.Sc) Agriculture - Soil Science (*Cand Nat Sci)*

Cell: +27 736592695
Email: maletsatsi@thebiodiversitycompany.com
Identity Number: 9506260425084
Date of birth: 26 June 1995

Profile Summary

Working experience throughout South Africa.

Specialist has experience in agriculture and wetland ecology.

Specialist expertise include soil identification and classification, soil chemistry, physics, pedology, wetland delineation, rehabilitation, and management.

Areas of Interest

Farming, Mining, Soil and Wetlands sustainability and conservation, Infrastructure development, Vegetation monitoring and rehabilitation.

Key Experience

- Soil taxonomic classification
- Soil chemical and physical laboratory analysis
- Wetland delineations
- Vegetation Monitoring
- Rehabilitation Plans
- Agriculture potential assessments
- Environmental Impact Assessments (EIA)
- Environmental Management Programmes (EMP)

Country Experience

South Africa: All Provinces

Nationality

South African

Languages

English – Proficient

Sesotho, Setswana, and Sepedi – Proficient

Qualifications

- MSc (University of the Free State) – Agriculture (Soil Science)
- BSc Honours (University of the Free State) – Soil Science (Soil chemistry, Pedology, Biology and Physics)
- BSc Geography and Environmental science (Geography, Soil science and Ecology)
- SSSSA- Membership no: 1092
- Cand Nat Sci: 154457

Matthew Mamera

PhD Soil Science (*SACNASP Reg - 116356*)

Cell: +27 785 772 668
Email: matthew@thebiodiversitycompany.com
Identity Number: 8810315983183
Date of birth: 31 October 1988

Profile Summary

Working experience throughout South Africa

Specialist experience with pedology and agriculture.

Specialist expertise include hydropedology, pedology, land contamination, agricultural potential, land rehabilitation, rehabilitation management and wetlands resources.

Experience hydropedological modelling

Areas of Interest

Mining, Farming, Soil and Water quality contamination, Soil Sanitation management, Soil Carbon, Sustainability and Conservation.

Key Experience

- Environmental Impact Assessments (EIA)
- Environmental Management Programmes (EMP)
- Wetland delineations
- Rehabilitation Plans
- Soil taxonomic classification (SA forms and WRB groups)
- Soil Hydropedology assessments
- Agriculture potential assessments
- Land contamination assessments

Country Experience

South Africa: All Provinces

Zambia - Kitwe and Mufulira

Angola- Zenza – Cacuso; Luena – Saurimo

Namibia

Nationality

South African Permanent Residence

Languages

English – Proficient

Ndebele, Xhosa, Shona – Proficient

Qualifications

- PhD (University of the Free States)- Soil Science (Hydropedology, Sanitation and Water quality management)
- MSc (University of Fort Hare) – Soil Science (Hydropedology, Sanitation and Water quality management)
- BSc Honours *Cum laude* (University of Fort Hare) – Soil Science (Hydropedology, wetlands delineation and rehabilitation)
- BSc Agricultural Soil Science
- Cand Nat Sci 116356
- SSSSA- SSSSA 201