



TERRESTRIAL BIODIVERSITY MITIGATION HEIRARCHY

Nooitgedacht Mega-Tailings Storage Facility (MTF)

Matjhabeng and Masilonyana Local Municipalities, Lejweleputswa District Municipality, Free State Province, South Africa

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1 Executive Summary

This report presents the mitigation hierarchy analysis for the proposed Nooitgedacht Mega-Tailings Storage Facility (MTF) in the Free State Province, South Africa. The assessment was undertaken in accordance with the National Environmental Management Act (NEMA), the National Environmental Management: Biodiversity Act (NEMBA), and the Endangered Wildlife Trust (EWT) Draft Mitigation Hierarchy Guideline (2023), and is informed by a combination of desktop screening, review of previous specialist studies, national and provincial screening tool outputs, and recent ground-truthing site visits.

Site Selection and Sensitivity:

The Nooitgedacht site was selected as the preferred alternative following a multi-phase site selection process that prioritized avoidance of the most sensitive ecological features at a regional scale. Despite this, the site overlaps with areas of "Very High" biodiversity sensitivity, including Critical Biodiversity Areas (CBAs), Ecological Support Areas (ESAs), Endangered ecosystems, and a significant population of *Sensitive Species 15*, a Threatened or Protected Species (TOPS) and Species of Conservation Concern (SCC). The site also contains important wetland systems and soils of moderate to high agricultural potential.

Application of the Mitigation Hierarchy:

- **Avoidance:** The project footprint was refined to avoid the highest-value ecological features and to minimize overlap with sensitive habitats, as far as is feasible. Complete avoidance of all sensitive features is not possible if the project proceeds.
- **Minimization:** The design incorporates buffer zones around wetlands and sensitive habitats, restricts construction to already disturbed or lower-value areas, and includes best-practice erosion and sediment controls. These measures are supported by both desktop and field data.
- **Rehabilitation/Restoration:** Restoration actions are planned for degraded grassland and wetland buffer zones, focusing on enhancing ecological connectivity, stabilizing soils, and controlling invasive species. Rehabilitation potential is moderate to high in these areas, but full recovery of *Sensitive Species 15* habitat is unlikely due to the species' site fidelity.
- **Offsetting:** Offsetting is recognized as a last resort for residual, unavoidable impacts, particularly for wetlands and degraded grassland. For *Sensitive Species 15* populations and irreplaceable habitats, offsetting is only considered if all other options are demonstrably insufficient and must be based on robust scientific evidence and regulatory approval.

Legislative and Best Practice Alignment:

The assessment and recommended mitigation measures are fully aligned with NEMA, NEMBA, and the EWT Draft Mitigation Hierarchy Guideline (2023). The process has included meaningful stakeholder engagement and is designed to ensure that all reasonable measures are taken to avoid, minimize, and rehabilitate impacts, with offsetting only considered for residual impacts.

Key Recommendations:

- Continue to refine the project footprint to maximize avoidance and minimization of impacts.
- Implement strict buffer zones and adaptive management during construction.
- Develop and implement a robust rehabilitation plan for all disturbed areas.
- Engage with authorities and stakeholders to determine appropriate offset requirements for residual impacts, with a focus on local conservation priorities.

-
- Any consideration of *Sensitive Species 15* translocation and/or offsetting must be based on the latest scientific evidence, regulatory guidance, and multi-level stakeholder engagement.

Conclusion:

The Nooitgedacht MTF project demonstrates a strong commitment to the mitigation hierarchy and responsible environmental management. While some residual impacts are unavoidable, the integrated approach outlined in this report provides a clear pathway for balancing development needs with the long-term conservation of the region's unique biodiversity and ecosystem services.

2 Introduction

2.1 Background

The Biodiversity Company was appointed to undertake an assessment of the past and current status of the proposed Nooitgedacht Mega-Tailings Storage Facility (MTF). The proposed project involves the reclamation and remining of 43 existing tailings storage facilities, which will require an overall storage footprint to approximately 10km² (1000ha). In 2007, a strategic approach was undertaken by Harmony Gold Ltd. to evaluate possible sites for the MTF in terms of environmental, social and economic data. This resulted in five preferential areas identified for consideration. Multiple specialist studies were undertaken to assess each of preferential areas in order to rank the sites by predetermined sustainability criteria. A fatal flaw identified in Site 5, resulted in its exclusion. Of the four potential MTF sites, the Nooitgedacht site (Site 1), was identified as the most favourable based on the lowest potential for environmental impacts. The project is located, near the town of Welkom, Matjhabeng and Masilonyana Local Municipality and the Lejweleputswa District Municipalities, Free State Province. The regional context of the Project Area of Influence (PAOI) can be seen in Figure 2-1. The proposed PAOI can be seen illustrated in Figure 2-2, which will henceforth be defined as all five sites considered for the project.

A large population of *Sensitive Species 15* was however found to inhabit the Nooitgedacht site. A translocation of the population has been brought forward as a possible course of action to facilitate the MTF at this site. Given the vast impacts suffered by *Sensitive Species 15* across their distribution (resulting in a present protection status of Near Threatened (NT)), their unique ecological life strategy, and the notable difficulties associated with translocations of this species – it became necessary to carefully review all available information and pursue multi-level stakeholder engagement. Translocation is considered a last-resort mitigation measure within the mitigation hierarchy for TOPS species. The mitigation hierarchy, as outlined in South African environmental legislation (notably NEMA and NEMBA) and the EWT draft guidelines, is a structured approach to managing biodiversity impacts from development. Translocation is only justified when avoidance, minimization, and rehabilitation are demonstrably insufficient, and only if a robust, science-based plan is in place. It is not a routine or preferred mitigation option, but a measure of last resort for unavoidable, significant impacts on *Sensitive Species 15* populations or habitat.

This assessment was conducted in accordance with the amendments to the Environmental Impact Assessment Regulations, 2014 (2024 NEMA as amended) of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA). The approach has taken cognisance of the recently published Government Notices (GN) 320 (20 March 2020) and GN 1150 (30 October 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" (Reporting Criteria). This report also takes into account the EWT Draft Mitigation Hierarchy Guideline (2023).

The purpose of the specialist studies is to provide relevant input into the impact assessment process and to provide a report for the proposed activities associated with the development. This report, after taking into consideration the findings and recommendations provided by the specialist herein, should inform and guide the Environmental Assessment Practitioner (EAP) and regulatory authorities, enabling informed decision making as to the ecological viability of the proposed project.

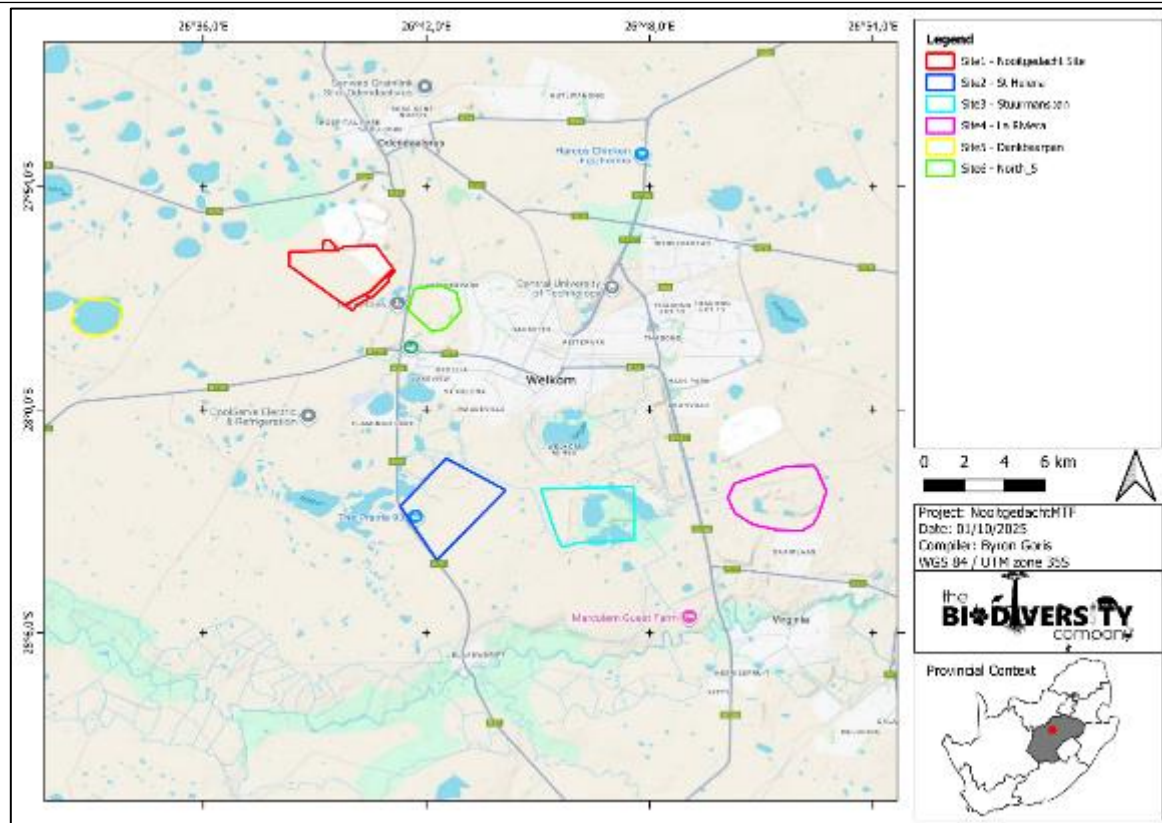


Figure 2-1 The location of the Project Sites in relation to the nearby towns.

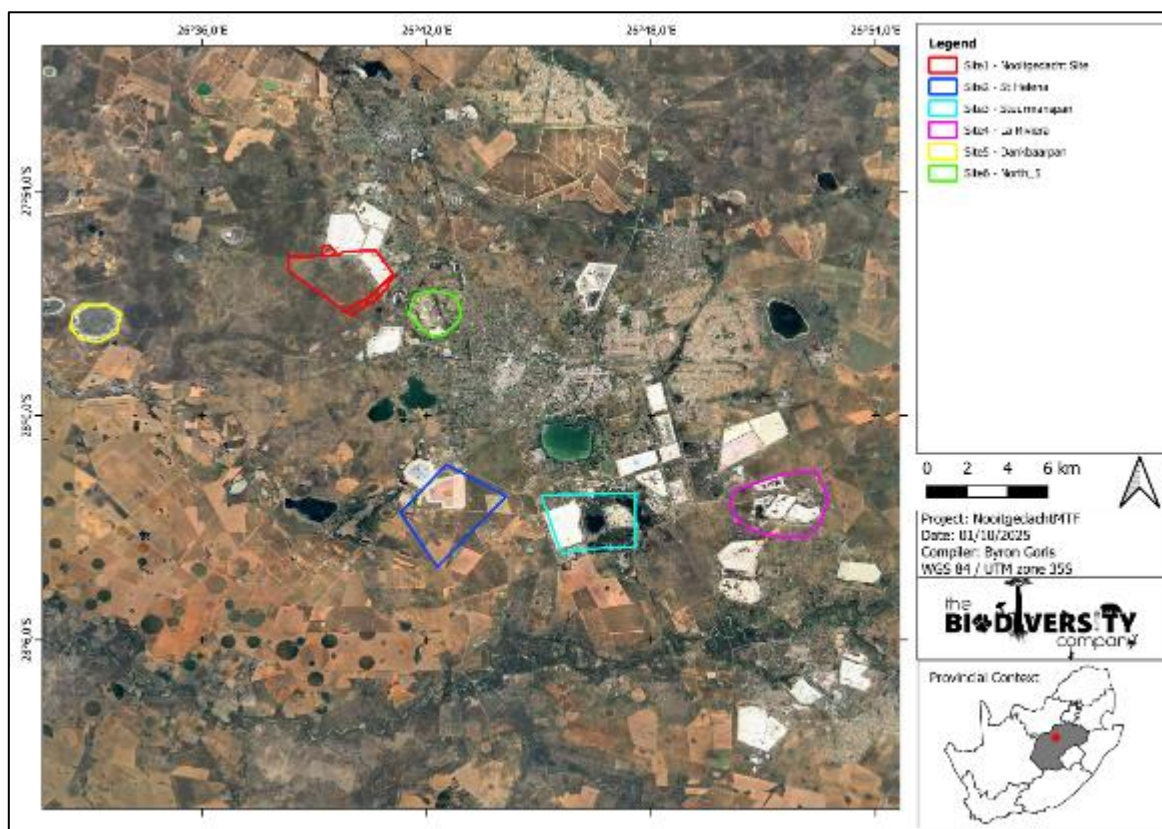


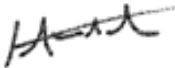


Figure 2-2 Layout of the various sites.

2.2 Specialist Details

Report Name	TERRESTRIAL BIODIVERSITY MITIGATION HEIRARCHY	
Reference	Nooitgedacht Mega-Tailings Storage Facility (MTF)	
Submitted to		
Report Writer	Byron Goris (Cert. Sci. Nat. 170720)	
Contributor and Reviewer	Andrew Husted (Pr Sci Nat. 400213/11)	
Declaration	<p>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. 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 to provide a professional service within the constraints of the project (timing, time and budget) based on the principals of science.</p>	

2.3 Scope of Work

The primary objective of this assessment is to systematically evaluate the potential terrestrial biodiversity impacts associated with the proposed Nooitgedacht Mega-Tailings Storage Facility (MTF) and to guide the application of the mitigation hierarchy in line with current legislation and best-practice guidelines. The scope of work encompasses the following key components:

- **Desktop Assessment:** Analyse up-to-date spatial and biodiversity datasets to map current ecological sensitivities at all project sites.
- **Review of Specialist Studies:** Summarize key findings and gaps from previous and recent ecological, wetland, and soil reports.
- **Site Verification:** Use recent field surveys to confirm desktop findings and identify any new or unrecorded ecological risks.
- **Impact and Risk Assessment:** Identify and evaluate potential biodiversity impacts and risks associated with the proposed development.
- **Mitigation Hierarchy Application:** Apply the mitigation hierarchy (avoid, minimize, rehabilitate, offset) in line with legal and best-practice requirements.
- **Recommendations:** Provide clear, practical recommendations for impact management, monitoring, and stakeholder engagement.

This integrated approach is designed to inform decision-making by the Environmental Assessment Practitioner (EAP), regulatory authorities, and project stakeholders, ensuring that biodiversity considerations are fully addressed throughout the project lifecycle and that legal and best-practice obligations are met.

3 Key Legislative Requirements

The legislation listed below in Table 3-1 are applicable to the current project. The list below, although extensive, may not be complete and other legislation, policies and guidelines may apply in addition to those listed below.

Table 3-1 *A list of key legislative requirements relevant to biodiversity and conservation in the Free State*

Region	Legislation
International	Convention on Biological Diversity (CBD, 1993)
	The Convention on Wetlands (RAMSAR Convention, 1971)
	The United Nations Framework Convention on Climate Change (UNFCCC, 1994)
	The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES 1973)
	The Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention, 1979)
National	Constitution of the Republic of South Africa (Act No. 108 of 2006)
	The National Environmental Management Act (NEMA) (Act No. 107 of 1998)
	The National Environmental Management Protected Areas Act (Act No. 57 of 2003)
	The National Environmental Management Biodiversity Act (Act No. 10 of 2004)
	The National Environmental Management Act (NEMA) (Act No. 107 of 1998) Section 24, No 42946 (January 2020)
	The National Environmental Management Act (NEMA) (Act No. 107 of 1998) Section 24, No 43110 (March 2020)
	The National Environmental Management: Waste Act, 2008 (Act 59 of 2008);
	The Environment Conservation Act (Act No. 73 of 1989) and associated EIA Regulations
	National Protected Areas Expansion Strategy (NPAES)
	Environmental Conservation Act (Act No. 73 of 1983)
	Natural Scientific Professions Act (Act No. 27 of 2003)
	National Biodiversity Framework (NBF, 2009)
	National Forest Act (Act No. 84 of 1998)
	National Veld and Forest Fire Act (101 of 1998)
	National Spatial Biodiversity Assessment (NSBA)
	World Heritage Convention Act (Act No. 49 of 1999)
	National Heritage Resources Act, 1999 (Act 25 of 1999)
	Municipal Systems Act (Act No. 32 of 2000)
	Alien and Invasive Species Regulations, 2014
	South Africa's National Biodiversity Strategy and Action Plan (NBSAP)
	Conservation of Agricultural Resources Act, 1983 (Act 43 of 1983)
	Sustainable Utilisation of Agricultural Resources (Draft Legislation).
	White Paper on Biodiversity
Provincial	Boputhatswana Nature Conservation Act 3 of 1973
	Free State Nature Conservation Ordinance 8 of 1969
	Free State Province Biodiversity Plan V1.0 of 2015

4 Methods

4.1 Review of Past Assessments

A high-level review of previous studies within the PAOI was undertaken to assess the scope of past work conducted during the Nooitgedacht site selection process.

The documentation contributing to the body of past studies are provided below.

Table 4-1 Past assessments of the PAOI

Type of Report	Report Description	Relevance to Terrestrial Biodiversity
Pre-Feasibility Studies	<ul style="list-style-type: none"> • Pre-Feasibility Study for the Cooke Tailings Storage Facility • Pre-Feasibility Study for the Evander Tailings Storage Facility • Pre-Feasibility Study for the Remining and Processing of the Tailings Facilities – Sustainable Development • Remining and Mega Tailings Facility Pre-Feasibility Summary Report • Pre-Feasibility Study for the Randfontein Mega Tailings Facility – Site Identification • Pre-Feasibility Study for the Bulk Water Supply Scheme • Engineering Concept for Proposed Mega Tailings Facility – Feasibility Study • Coordination and Town Planning for the Pre-Feasibility Study on the Mega Tailings Facility 	Yes
Site Evaluation	<ul style="list-style-type: none"> • Final Site Evaluation to Inform the Tailings Storage Facility (TSF) Site Selection Process • Final Site Evaluation Report • Final Environmental Fatal Flaw Assessment 	Yes
Management Plans	<ul style="list-style-type: none"> • Environmental Management Programme (EMPr) • Compensation Measures for Affected Stakeholders (Version 2) • Compensation Protocol for Project-Affected Persons 	N/A
Mining Process Reporting	<ul style="list-style-type: none"> • Cyclone and Tailings Distribution System for the Mage Tailings Facility • Re-mining and Processing of Tailings Facility • Geochemical Characterisation Study • Integrated Regulatory Process • Integrated Regulatory Process – Scope of Work, Schedule and Costs 	N/A
Specialist Assessments	<ul style="list-style-type: none"> • Aquatic Biodiversity Assessment • Aquatic Biodiversity Assessment (Second Assessment/Update) • Ecological Specialist Environmental Impact Assessment • EIA Final Scoping Report • EIA - Phase 1 Groundwater • Strategic Environmental Assessment to Inform Site Selection • Groundwater and Sub-surface Characterisation Study • Groundwater Impact of Deposition of Reprocessed Tailings – North TSF • Groundwater Impact of Deposition of New Tailings on St Helena TSF • Groundwater Impact of Reclamation of Existing TSFs • Source Term Study • Surface and Groundwater Requirements and Supply Potential for the Mega Dump • Surface Water Specialist Study (2008) • Surface Water Specialist Study – Phase 2 (2009) • Assessment of Hydrogeology of Geluksdal • Socio-Economic Assessment 1 • Socio-Economic Assessment 2 	Yes
Compliance	<ul style="list-style-type: none"> • Project Saints Phase 1 - Water Use License Application • TSF Due Diligence Study on Witfontein TSF • DWAF Comments and Responses 	N/A

4.2 Desktop Assessment Methodology

Refer to Appendix 9, section 9.1.

4.3 Assumptions and Limitations

The following assumptions and limitations are applicable for this assessment:

- The assessment area was based on the area provided by the client and any alterations to the footprint and/or missing GIS information pertaining to the assessment area would have affected the area surveyed;
- The impact description included is preliminary and is solely based on the screening survey and desktop information; and
- All datasets accessed and utilised for this assessment are considered to be representative of the most recent and suitable data for the intended purposes.
- Field verification was limited to certain seasons and access, so some features may not have been observed. The site visits were conducted during the dry season, during September 2025.
- Cumulative impacts from unrelated future developments are not included.
- Recommendations are based on current information and should be revisited if new data or project changes arise. Assessments and recommendations in this report do not supersede those made by specialists in previous studies included herein.

5 Results & Discussion

5.1 Desktop Assessment

This section provides an updated overview of the current spatial features and ecological classifications across the various project sites, utilizing the latest available GIS datasets and national/provincial biodiversity databases. The desktop assessment establishes the present-day environmental context and sensitivity of each site, serving as a foundation for the subsequent review of historical specialist studies and informing the overall mitigation hierarchy analysis.

5.1.1 Ecologically Important Landscape Features

The relevance of the proposed development to ecologically important landscape features are summarised in Table 5-1.

Table 5-1 *Summary of relevance of the proposed project to ecologically important landscape features*

Desktop Information Considered	Relevance	Reasoning
Ecosystem Threat Status (RLE 2021)	Relevant	Overlaps with 'Endangered (EN)' and 'Least Concern (LC)' ecosystems.
Ecosystem Protection Level	Relevant	Overlaps with 'Not Protected (NP)', 'Poorly Protected (PP)' ecosystems.
Provincial Conservation Plan	Relevant	Overlaps with Other Natural Areas (ONAs), Ecological Support Areas 1 & 2 (ESAs 1 & 2), Degraded Areas (DAs) as well as Critical Biodiversity Areas 1 & 2 (CBAs 1 & 2).
South Africa Protected Areas Database - SAPAD and South Africa Conservation Areas Database - SACAD	Relevant	Falls in the vicinity of Newlands and Thabong Game Ranches, as well as Tara Wildlife Safaris.
National Protected Areas Expansion Strategy (NPAES)	Irrelevant	The PAOI has no overlaps with NPAES Priority Focus Areas.
Key Biodiversity Areas (KBA)	Irrelevant	The nearest KBA is situated over 100 km from the PAOI.
South African Inventory of Inland Aquatic Ecosystems (SAIIAE)	Relevant	The PAOI overlaps with 'Least Concern' (LC) wetlands.
National Freshwater Ecosystem Priority Area	Relevant	The PAOI overlaps with non-priority FEPA wetlands.
Strategic Water Source Areas (SWSA)	Irrelevant	The PAOI does not overlap with any SWSA.

5.1.1.1 Ecosystem Threat Status

The Ecosystem Threat Status is an indicator of an ecosystem's wellbeing, based on the level of change in structure, function or composition. Ecosystem types are categorised as Critically Endangered (CR), Endangered (EN), Vulnerable (VU), or Least Concern (LC), based on the proportion of the original extent of each ecosystem type that remains in good ecological condition.

According to the spatial dataset the PAOI overlaps with EN and LC ecosystems, with Site 1 and Site 5 exclusively occurring in LC ecosystems (Figure 5-1).

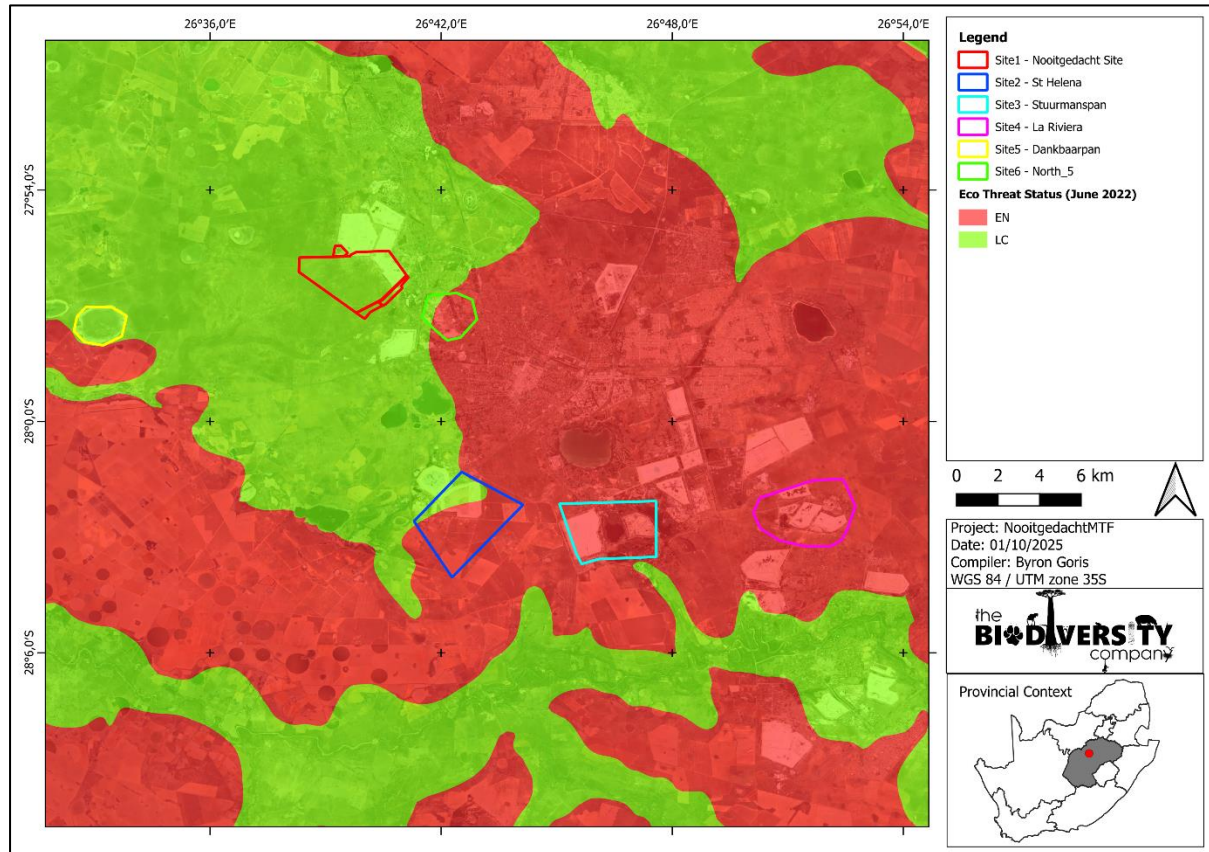


Figure 5-1 Map illustrating the ecosystem threat status associated with the PAOI

5.1.1.2 Ecosystem Protection Level

This is an indicator of the extent to which ecosystems are adequately protected or under-protected. Ecosystem types are categorised as Well Protected (WP), Moderately Protected (MP), Poorly Protected (PP), or Not Protected (NP), based on the proportion of the biodiversity target for each ecosystem type that is included within one or more protected areas. NP, PP or MP ecosystem types are collectively referred to as under-protected ecosystems.

The PAOI overlaps with NP and PP ecosystems (Figure 5-2).

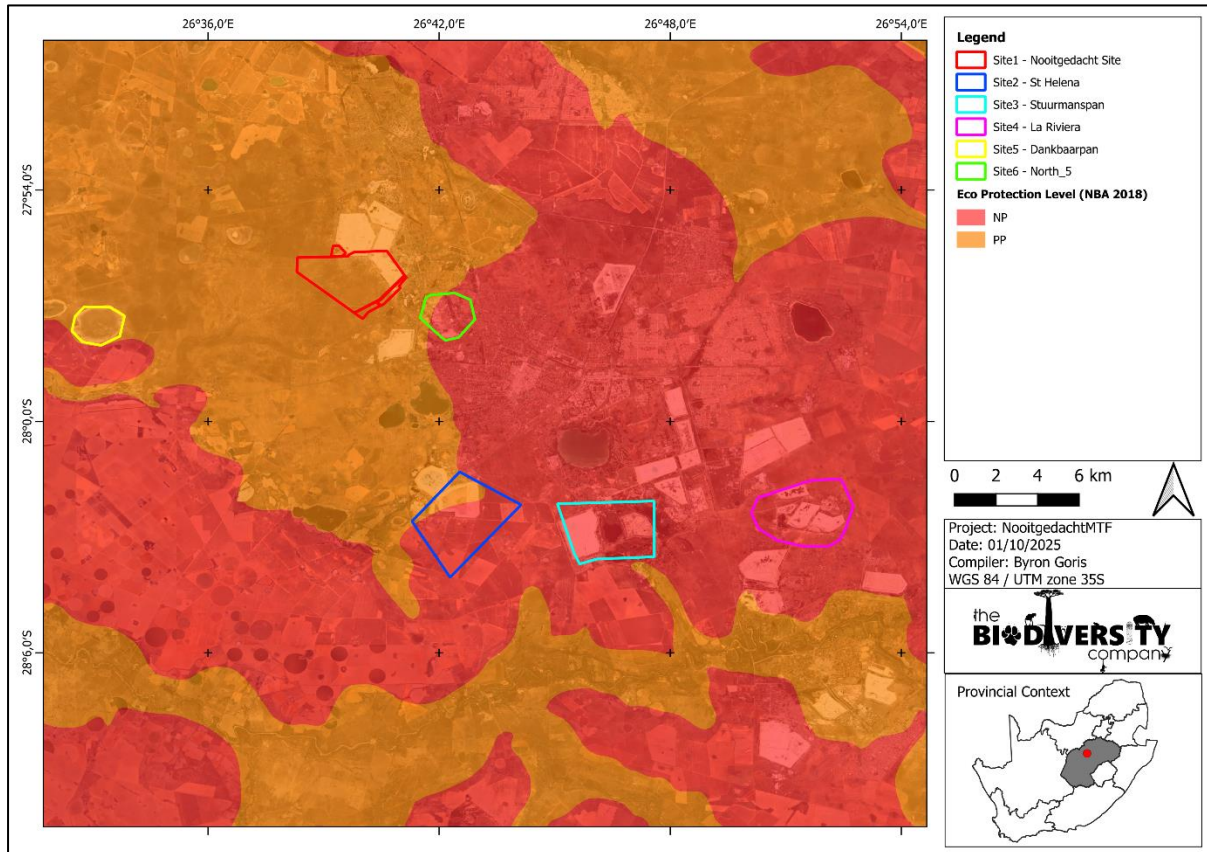


Figure 5-2 Map illustrating the ecosystem protection level associated with the PAOI.

5.1.1.3 Critical Biodiversity Areas and Ecological Support Areas

The Free State Conservation (Version 4) classified areas within the province on the basis of its contribution to reach the conservation targets within the province. These areas are classified as Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs) to ensure sustainability in the long term. The CBAs are classified as either 'Irreplaceable' (must be conserved), or 'Important'.

Figure 5-3 shows the PAOI superimposed on the Free State Conservation Plan dataset. Site 1 overlaps with ONAs, CBA, ESA 2, ESA 1, and Degraded Areas. Site 2, 3 and 4 overlap with ESA 2, CBA 1, ONAs and Degraded Areas. Site 5 falls entirely in CBA 1, while Site 6 overlaps with ESA 2 and Degraded Areas.

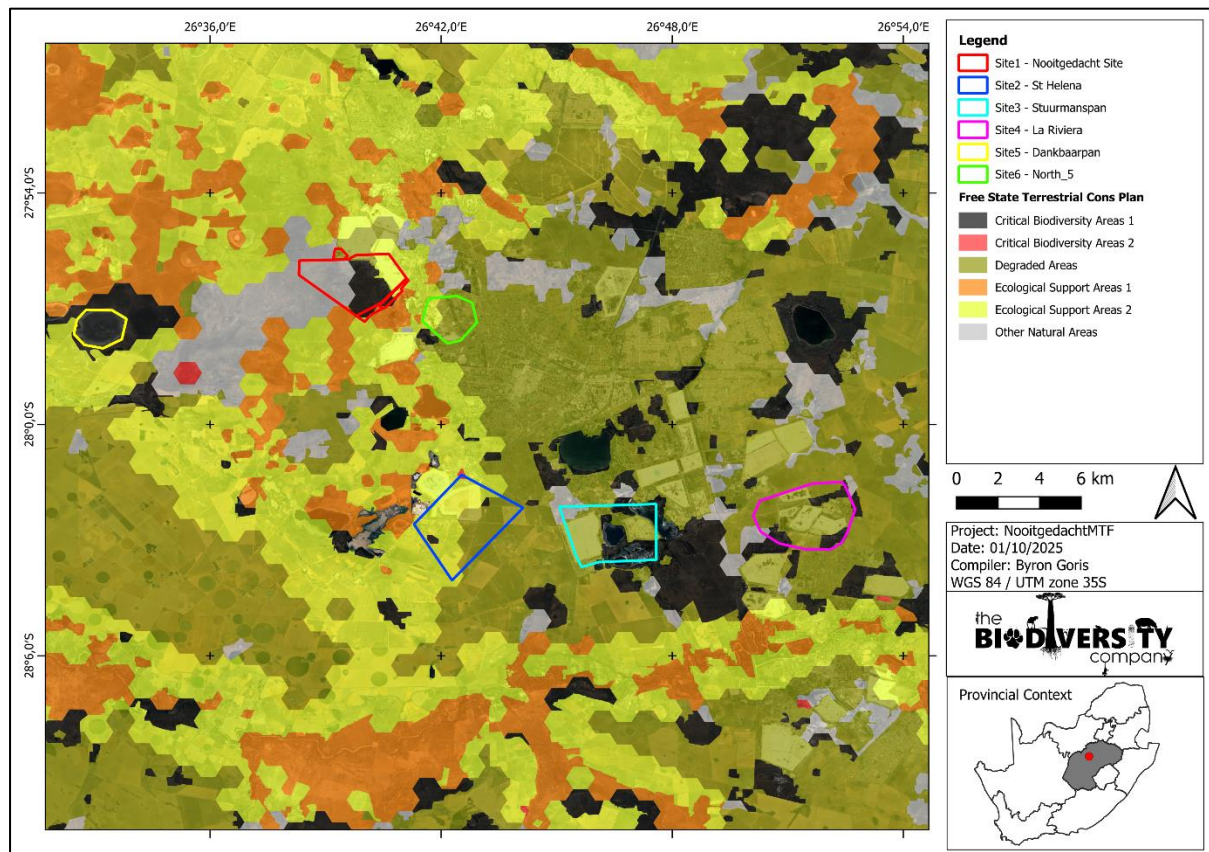


Figure 5-3 Map illustrating the PAOI in relation to the provincial conservation plan

5.1.1.4 Protected Areas

The Department of Forestry, Fisheries and the Environment maintains a spatial database on Protected Areas and Conservation Areas. Protected Areas and Conservation Areas (PACA) Database scheme that used for classifying protected areas (South Africa Protected Areas Database-SAPAD) and conservation areas (South Africa Conservation Areas Database-SACAD) into types and sub-types in South Africa.

The PAOI falls <3 km from Thabong Game Ranch at Site 4, and <13 km from Newlands Nature Reserve at Site 5 (Figure 5-4)

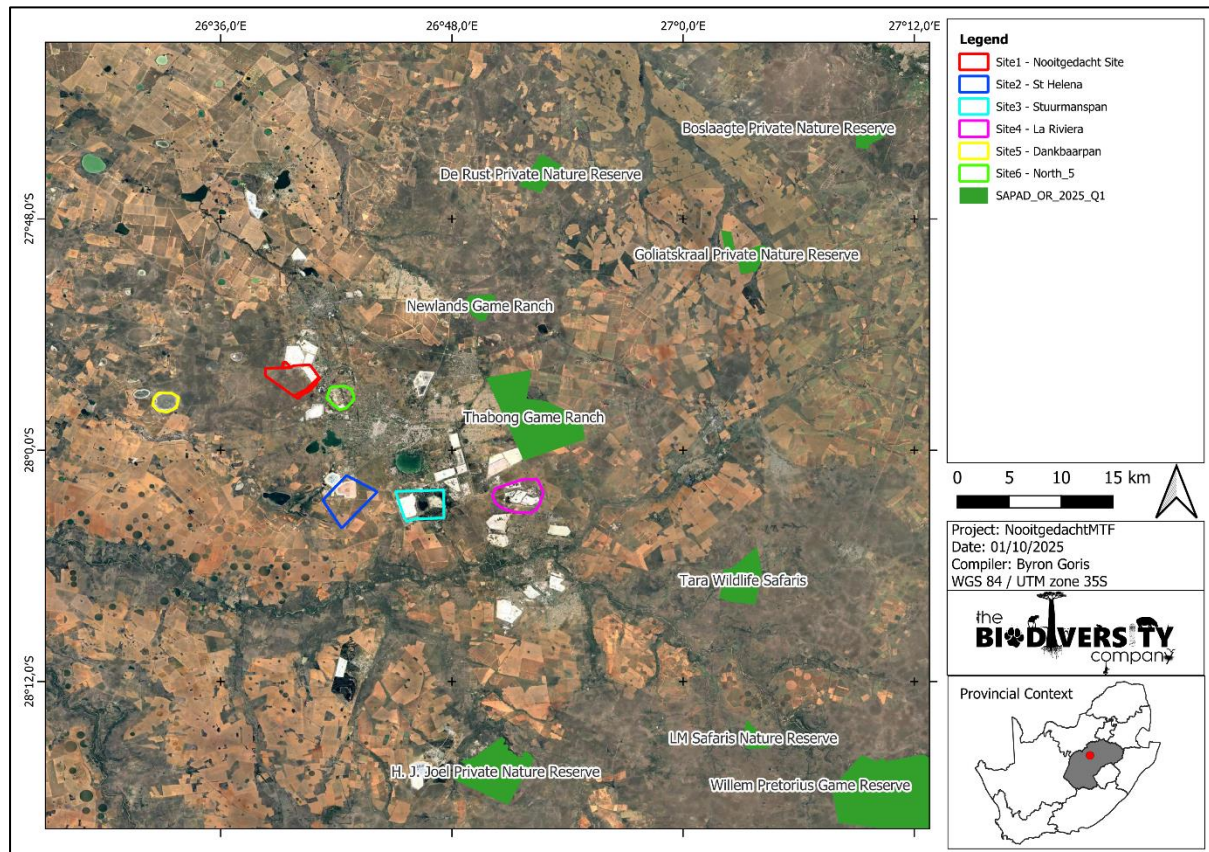


Figure 5-4 Map illustrating the PAOI in relation to the SAPAD areas

5.1.1.5 National Protected Area Expansion Strategy

National Protected Area Expansion Strategy 2010 (NPAES) were identified through a systematic biodiversity planning process. They present the best opportunities for meeting the ecosystem-specific protected area targets set in the NPAES and were designed with strong emphasis on climate change resilience and requirements for protecting freshwater ecosystems. These areas should not be seen as future boundaries of protected areas, as in many cases only a portion of a particular focus area would be required to meet the protected area targets set in the NPAES. They are also not a replacement for fine scale planning which may identify a range of different priority sites based on local requirements, constraints and opportunities (NPAES, 2010).

The PAOI does not overlap with NPAES Priority Focus Areas (Figure 5-5).

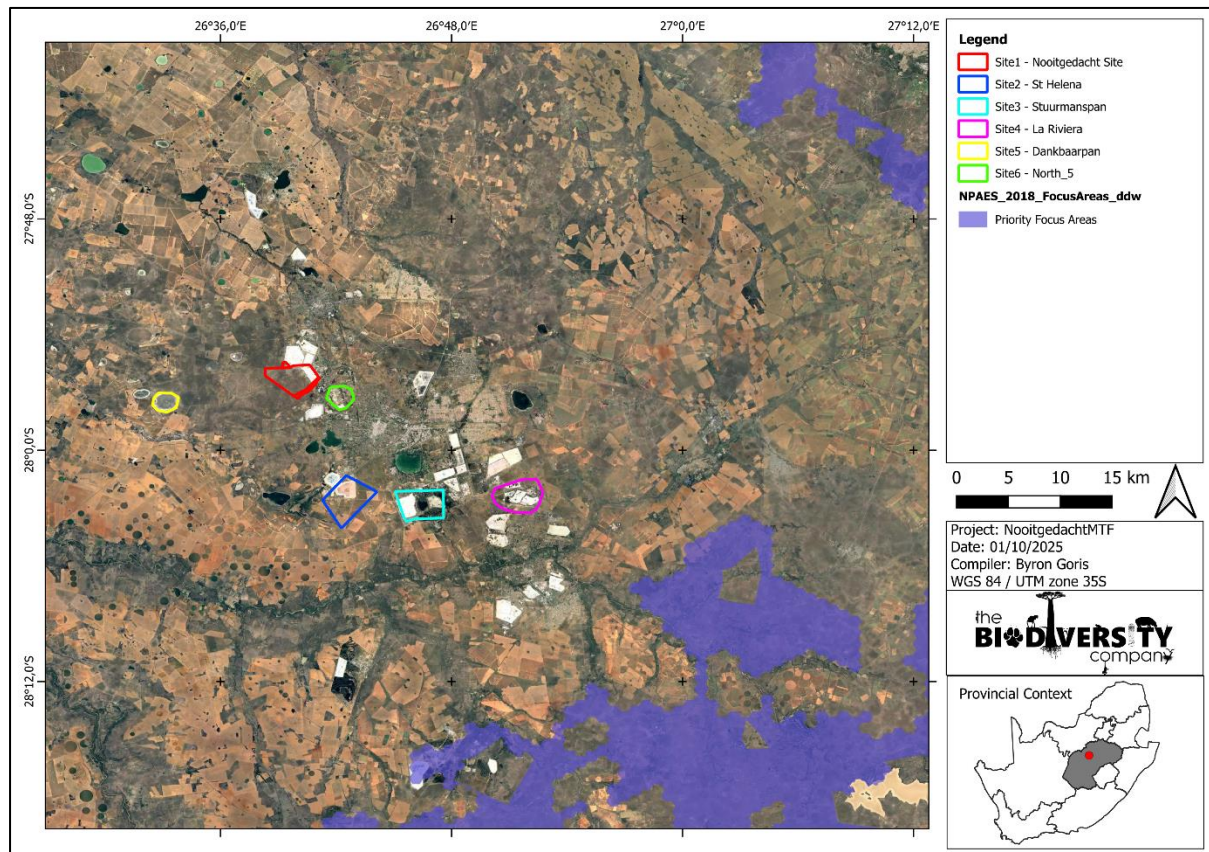


Figure 5-5 The PAOI in relation to the NPAES dataset

5.1.2 South African Inventory of Inland Aquatic Ecosystems

According to the South African Inventory of Inland Aquatic Ecosystems (SAIIAE) dataset, alternative 2 traverses a depression with alternative 4 and 5 traversing a different depression wetland. Additionally, two other depressions and a seep wetland are located within the corridor but are not intersected by the proposed routes and an unchanneled valley-bottom is located in east in proximity of alternative 3 and 6 (Figure 5-6).

- LC wetlands are scattered within Site 2, 3 and 4. Site 3 overlaps with particularly large LC wetlands which drain into the Sand River. Site 5 overlaps entirely with a LC wetland.
- Site 2, 3 and 4 occur north of the Sand River (Class D: Largely Modified), while Site 1 and 6 occur adjacent to an unnamed river with Class E-F (Not an Acceptable Class).

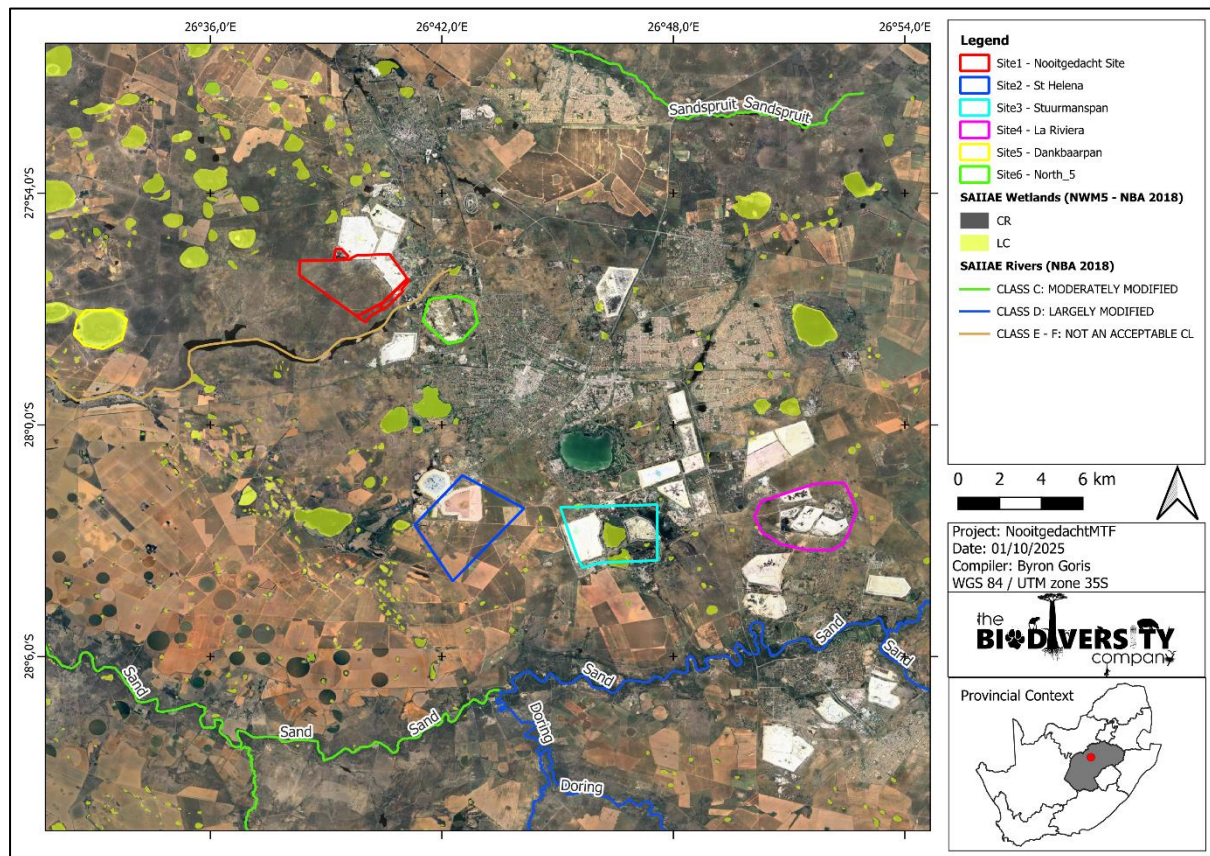


Figure 5-6 SAIIE dataset for the project

5.1.3 National Freshwater Ecosystem Priority Area

According to National Freshwater Ecosystem Priority Area (NFEPA) dataset Site 1 overlaps with three (3) small seep wetlands; Site 2 overlaps with two (2) small seep wetlands and marginally with an unchanneled valley-bottom wetland; Site 3 overlaps with large unchanneled valley-bottom and depression wetlands; and Site 4 overlaps with three (3) seeps and a flat (which appears to be a water treatment/storage facility) (Figure 5-7). Site 5 overlaps entirely with a depression wetland while Site 6 does not overlap with any wetlands.

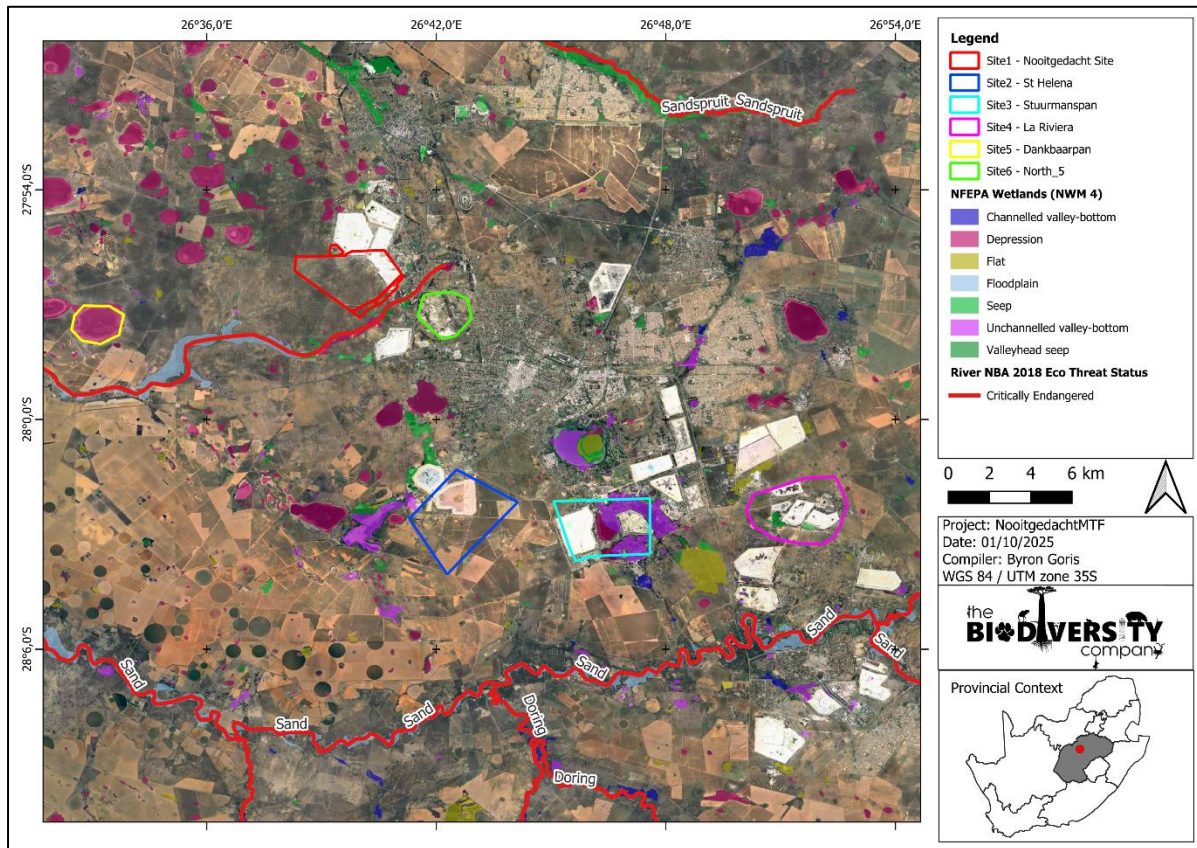


Figure 5-7 NFEPA wetlands for the project

5.1.4 Vegetation

The PAOI is situated in the Grassland biome.

The Grassland Biome is centrally located in southern Africa, and adjoins all except the desert, fynbos, and succulent Karoo biomes (Mucina & Rutherford, 2006). Major macroclimatic traits that characterise the grassland biome include:

- Seasonal precipitation; and
- The minimum temperatures in winter (Mucina & Rutherford, 2006).

The grassland biome is found chiefly on the high central plateau of South Africa, and the inland areas of KwaZulu-Natal and the Eastern Cape. The topography is mainly flat and rolling but includes the escarpment itself. Altitude varies from near sea level to 2 850 m above sea level.

Grasslands are dominated by a single layer of grasses. The amount of cover depends on rainfall and the degree of grazing. The grassland biome experiences summer rainfall and dry winters with frost (and fire), which are unfavourable for tree growth. Thus, trees are typically absent, except in a few localized habitats. Geophytes (bulbs) are often abundant. Frosts, fire, and grazing maintain the grass dominance and prevent the establishment of trees.

Site 3 and 4 overlap with the Vaal-Vet Sandy Grassland, which Site 2 also partially overlaps. Site 1 and 5 overlap with Western Free State Clay Grassland, while Site 6 overlaps with both Vaal-Vet Sandy and Western Free State Clay Grasslands (Figure 5-8).

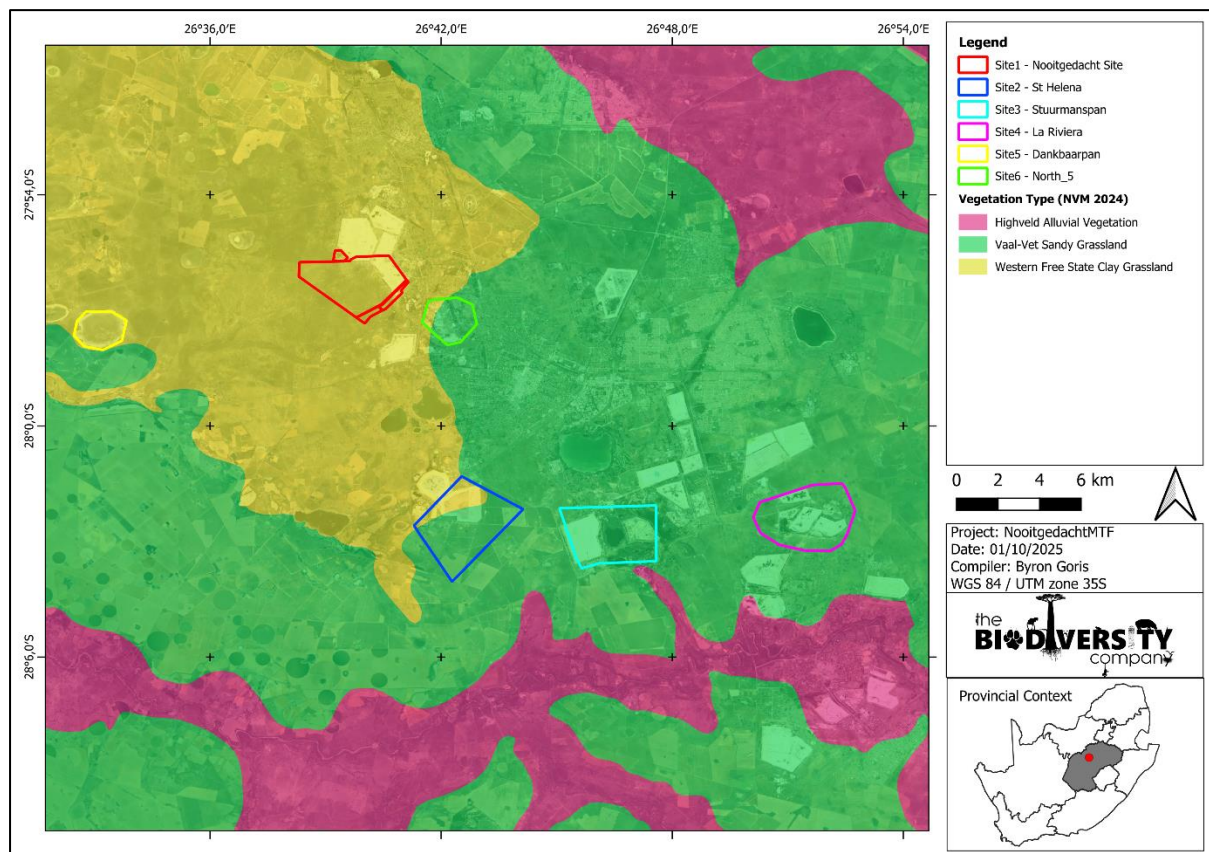


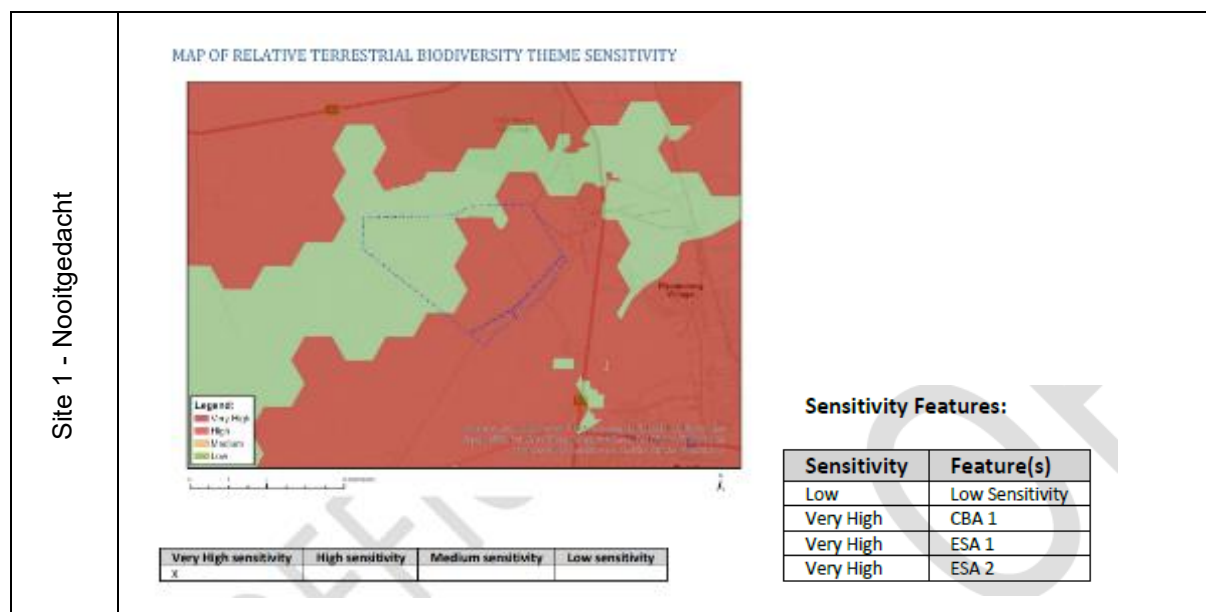
Figure 5-8 Vegetation types associated with the PAOI.

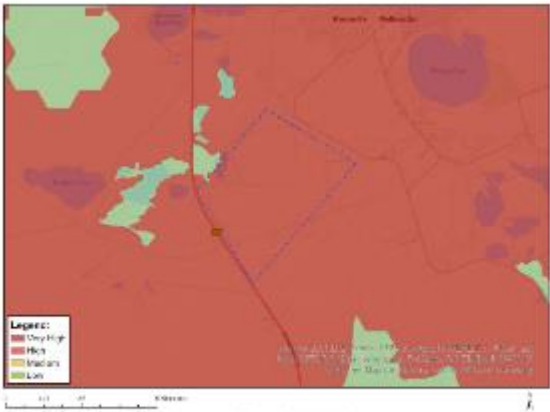


6 DFFE Screening Tool

According to the Screening Tool Report generated (Regulation 16(1)(v) of the Environmental Impact Assessment Regulations 2014, as amended), the following sensitivity classifications were gathered from the National Web-based Environmental Screening Tool:

- Terrestrial Biodiversity Theme sensitivity is Very High for the PAOI, due to the area overlapping with CBA 1, CBA 2, ESA 1, ESA 2, NPAES, and an Endangered Vegetation type (Table 6-1);
- Plant Species Theme sensitivity is Low for the PAOI, with no sensitive species predicted to occurring within the PAOI (Table 6-2);
- Animal Species Theme sensitivity is High for Site 1 and 2; Medium for Site 3, 4 and 5; and Low for Site 6; with the possibility of various sensitive species being present (Table 6-3);
- Aquatic Biodiversity Theme sensitivity is Low for Site 4 and 6, while the other sites are Very High with the possibility of various wetlands (Table 6-4).
- Agricultural Theme sensitivity is Very High for Site 2 and High for the other 5 sites (Table 6-5).

Table 6-1 The Terrestrial Biodiversity Theme sensitivity for the PAOI



Site 2 - St Helena	<p>MAP OF RELATIVE TERRESTRIAL BIODIVERSITY THEME SENSITIVITY</p>  <p>Very High sensitivity High sensitivity Medium sensitivity Low sensitivity</p> <p>Sensitivity Features:</p> <table border="1"> <thead> <tr> <th>Sensitivity</th><th>Feature(s)</th></tr> </thead> <tbody> <tr> <td>Low</td><td>Low Sensitivity</td></tr> <tr> <td>Very High</td><td>CBA 1</td></tr> <tr> <td>Very High</td><td>CBA 2</td></tr> <tr> <td>Very High</td><td>ESA 2</td></tr> <tr> <td>Very High</td><td>EN_Vaal-Vet Sandy Grassland</td></tr> </tbody> </table>	Sensitivity	Feature(s)	Low	Low Sensitivity	Very High	CBA 1	Very High	CBA 2	Very High	ESA 2	Very High	EN_Vaal-Vet Sandy Grassland
Sensitivity	Feature(s)												
Low	Low Sensitivity												
Very High	CBA 1												
Very High	CBA 2												
Very High	ESA 2												
Very High	EN_Vaal-Vet Sandy Grassland												
Site 3 - Stuurmanspan	<p>MAP OF RELATIVE TERRESTRIAL BIODIVERSITY THEME SENSITIVITY</p>  <p>Very High sensitivity High sensitivity Medium sensitivity Low sensitivity</p> <p>Sensitivity Features:</p> <table border="1"> <thead> <tr> <th>Sensitivity</th><th>Feature(s)</th></tr> </thead> <tbody> <tr> <td>Very High</td><td>CBA 1</td></tr> <tr> <td>Very High</td><td>EN_Vaal-Vet Sandy Grassland</td></tr> </tbody> </table>	Sensitivity	Feature(s)	Very High	CBA 1	Very High	EN_Vaal-Vet Sandy Grassland						
Sensitivity	Feature(s)												
Very High	CBA 1												
Very High	EN_Vaal-Vet Sandy Grassland												
Site 4 - La Riviera	<p>MAP OF RELATIVE TERRESTRIAL BIODIVERSITY THEME SENSITIVITY</p>  <p>Very High sensitivity High sensitivity Medium sensitivity Low sensitivity</p> <p>Sensitivity Features:</p> <table border="1"> <thead> <tr> <th>Sensitivity</th><th>Feature(s)</th></tr> </thead> <tbody> <tr> <td>Very High</td><td>CBA 1</td></tr> <tr> <td>Very High</td><td>EN_Vaal-Vet Sandy Grassland</td></tr> </tbody> </table>	Sensitivity	Feature(s)	Very High	CBA 1	Very High	EN_Vaal-Vet Sandy Grassland						
Sensitivity	Feature(s)												
Very High	CBA 1												
Very High	EN_Vaal-Vet Sandy Grassland												



<p>Site 5 – Dankbaarpan</p>	<p>MAP OF RELATIVE TERRESTRIAL BIODIVERSITY THEME SENSITIVITY</p>  <p>Legend:</p> <ul style="list-style-type: none"> Very High High Medium Low <p>Very High sensitivity High sensitivity Medium sensitivity Low sensitivity</p> <p>Sensitivity Features:</p> <table border="1"> <thead> <tr> <th>Sensitivity</th> <th>Feature(s)</th> </tr> </thead> <tbody> <tr> <td>Very High</td> <td>CBA 1</td> </tr> <tr> <td>Very High</td> <td>ESA 2</td> </tr> <tr> <td>Very High</td> <td>EN_Vaal-Vet Sandy Grassland</td> </tr> </tbody> </table>	Sensitivity	Feature(s)	Very High	CBA 1	Very High	ESA 2	Very High	EN_Vaal-Vet Sandy Grassland
Sensitivity	Feature(s)								
Very High	CBA 1								
Very High	ESA 2								
Very High	EN_Vaal-Vet Sandy Grassland								
<p>Site 6 - North 5</p>	<p>MAP OF RELATIVE TERRESTRIAL BIODIVERSITY THEME SENSITIVITY</p>  <p>Legend:</p> <ul style="list-style-type: none"> Very High High Medium Low <p>Very High sensitivity High sensitivity Medium sensitivity Low sensitivity</p> <p>Sensitivity Features:</p> <table border="1"> <thead> <tr> <th>Sensitivity</th> <th>Feature(s)</th> </tr> </thead> <tbody> <tr> <td>Low</td> <td>Low Sensitivity</td> </tr> <tr> <td>Very High</td> <td>ESA 2</td> </tr> <tr> <td>Very High</td> <td>EN_Vaal-Vet Sandy Grassland</td> </tr> </tbody> </table>	Sensitivity	Feature(s)	Low	Low Sensitivity	Very High	ESA 2	Very High	EN_Vaal-Vet Sandy Grassland
Sensitivity	Feature(s)								
Low	Low Sensitivity								
Very High	ESA 2								
Very High	EN_Vaal-Vet Sandy Grassland								

Table 6-2 The Plant Theme sensitivity for the PAOI.

Site 1 - Nooitgedacht

MAP OF RELATIVE PLANT SPECIES THEME SENSITIVITY

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low Sensitivity

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
			X

Site 2 - St Helena

MAP OF RELATIVE PLANT SPECIES THEME SENSITIVITY

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low Sensitivity

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
			X

Site 3 - Stuurmanspan

MAP OF RELATIVE PLANT SPECIES THEME SENSITIVITY

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low Sensitivity

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
			X

Site 4 - La Riviera

MAP OF RELATIVE PLANT SPECIES THEME SENSITIVITY

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low Sensitivity

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
			X

Site 5 – Dankbaarpan

MAP OF RELATIVE PLANT SPECIES THEME SENSITIVITY

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low Sensitivity

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
			X

Site 6 - North 5

MAP OF RELATIVE PLANT SPECIES THEME SENSITIVITY

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low Sensitivity

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
			X

Table 6-3 The Animal Theme sensitivity for the PAOI.

Site 1 - Nooitgedacht

MAP OF RELATIVE ANIMAL SPECIES THEME SENSITIVITY

Sensitivity Features:

Sensitivity	Feature(s)
High	Aves-Hydroprogne caspia
High	Aves-Mycteria ibis
High	Sensitive species 15
Low	Subject to confirmation
Medium	Aves-Hydroprogne caspia

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
	X		

Site 2 - St Helena

MAP OF RELATIVE ANIMAL SPECIES THEME SENSITIVITY

Sensitivity Features:

Sensitivity	Feature(s)
High	Aves-Mycteria ibis
Low	Subject to confirmation
Medium	Sensitive species 15

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
	X		

Site 3 - Stuurmanspan

MAP OF RELATIVE ANIMAL SPECIES THEME SENSITIVITY

Sensitivity Features:

Sensitivity	Feature(s)
Low	Subject to confirmation
Medium	Aves-Hydroprogne caspia
Medium	Mammalia-Hydrictris maculicollis

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
		X	

Site 4 - La Riviera

MAP OF RELATIVE ANIMAL SPECIES THEME SENSITIVITY

Sensitivity Features:

Sensitivity	Feature(s)
Low	Subject to confirmation
Medium	Sensitive species 15

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
		X	

Site 5 – Dankbaarpan

MAP OF RELATIVE ANIMAL SPECIES THEME SENSITIVITY

Sensitivity Features:

Sensitivity	Feature(s)
Low	Subject to confirmation
Medium	Aves-Hydroprogne caspia

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
		X	

Site 6 - North 5

MAP OF RELATIVE ANIMAL SPECIES THEME SENSITIVITY

Sensitivity Features:

Sensitivity	Feature(s)
Low	Subject to confirmation

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
			X

Table 6-4 The Aquatic Biodiversity Theme sensitivity for the PAOI.

Site 1 - Nooitgedacht

MAP OF RELATIVE AQUATIC BIODIVERSITY THEME SENSITIVITY

Legend:

- Very High
- High
- Medium
- Low

Scale: 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low Sensitivity
Very High	Wetlands Depression

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Site 2 - St Helena

MAP OF RELATIVE AQUATIC BIODIVERSITY THEME SENSITIVITY

Legend:

- Very High
- High
- Medium
- Low

Scale: 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low Sensitivity
Very High	Wetlands Depression

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Site 3 - Stuurmanspan

MAP OF RELATIVE AQUATIC BIODIVERSITY THEME SENSITIVITY

Legend:

- Very High
- High
- Medium
- Low

Scale: 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low Sensitivity
Very High	Wetlands Depression

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Site 4 - La Riviera

MAP OF RELATIVE AQUATIC BIODIVERSITY THEME SENSITIVITY

Legend:

- Very High
- High
- Medium
- Low

Scale: 0 1 2 Kilometers

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low Sensitivity

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
			X

Site 5 – Dankbaarpan

MAP OF RELATIVE AQUATIC BIODIVERSITY THEME SENSITIVITY

Legend:

- Very High
- High
- Medium
- Low

Scale: 0 1 2 Kilometers

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low Sensitivity
Very High	Wetlands Depression

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Site 6 - North 5

MAP OF RELATIVE AQUATIC BIODIVERSITY THEME SENSITIVITY

Legend:

- Very High
- High
- Medium
- Low

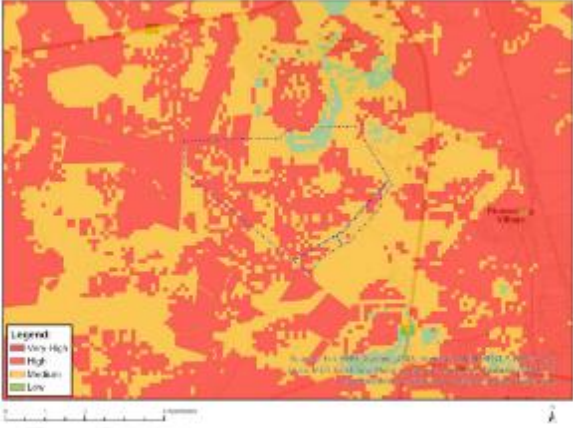
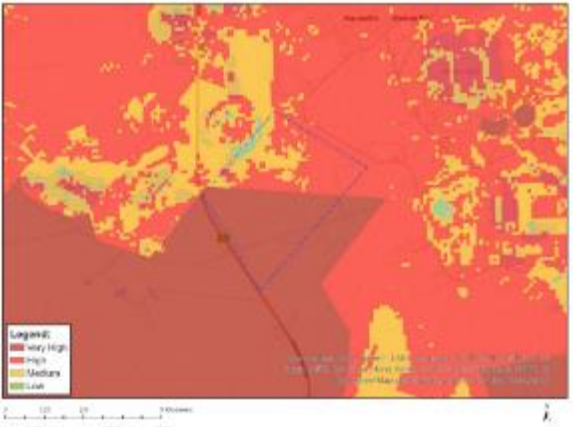

Scale: 0 1 2 Kilometers


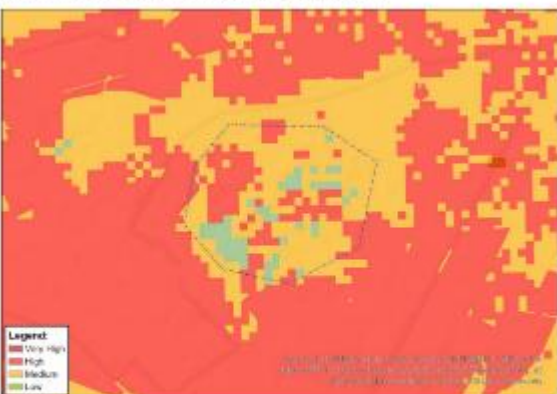
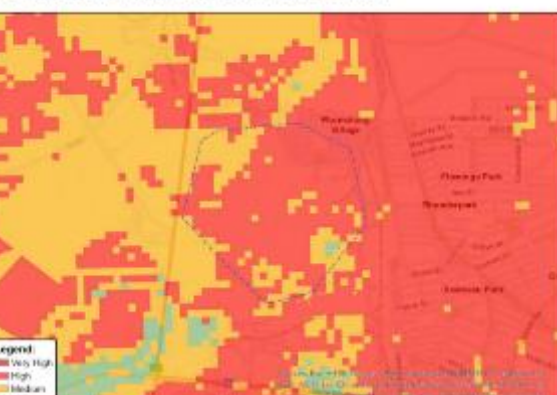
Sensitivity Features:

Sensitivity	Feature(s)
Low	Low Sensitivity

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
			X

Table 6-5 The Agricultural Theme sensitivity for the PAOI.

Site 1 - Nooitgedacht	<p>MAP OF RELATIVE AGRICULTURE THEME SENSITIVITY</p>  <p>Sensitivity Features:</p> <table border="1"> <thead> <tr> <th>Sensitivity</th><th>Feature(s)</th></tr> </thead> <tbody> <tr> <td>High</td><td>Old Fields</td></tr> <tr> <td>High</td><td>08. Moderate</td></tr> <tr> <td>High</td><td>09. Moderate-High</td></tr> <tr> <td>Low</td><td>04. Low-Very low</td></tr> <tr> <td>Low</td><td>05. Low</td></tr> <tr> <td>Medium</td><td>07. Low-Moderate</td></tr> <tr> <td>Medium</td><td>06. Low-Moderate</td></tr> </tbody> </table>	Sensitivity	Feature(s)	High	Old Fields	High	08. Moderate	High	09. Moderate-High	Low	04. Low-Very low	Low	05. Low	Medium	07. Low-Moderate	Medium	06. Low-Moderate				
Sensitivity	Feature(s)																				
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Low	04. Low-Very low																				
Low	05. Low																				
Medium	07. Low-Moderate																				
Medium	06. Low-Moderate																				
Site 2 - St Helena	<p>MAP OF RELATIVE AGRICULTURE THEME SENSITIVITY</p>  <p>Sensitivity Features:</p> <table border="1"> <thead> <tr> <th>Sensitivity</th><th>Feature(s)</th></tr> </thead> <tbody> <tr> <td>High</td><td>Revised Annual Crop Cultivation / Planned Pastures</td></tr> <tr> <td>High</td><td>Shaded</td></tr> <tr> <td>High</td><td>09. Moderate-High</td></tr> <tr> <td>High</td><td>08. Moderate</td></tr> <tr> <td>Low</td><td>05. Low</td></tr> <tr> <td>Low</td><td>04. Low-Very low</td></tr> <tr> <td>Medium</td><td>07. Low-Moderate</td></tr> <tr> <td>Medium</td><td>06. Low-Moderate</td></tr> <tr> <td>Very High</td><td>Wet River PAI</td></tr> </tbody> </table>	Sensitivity	Feature(s)	High	Revised Annual Crop Cultivation / Planned Pastures	High	Shaded	High	09. Moderate-High	High	08. Moderate	Low	05. Low	Low	04. Low-Very low	Medium	07. Low-Moderate	Medium	06. Low-Moderate	Very High	Wet River PAI
Sensitivity	Feature(s)																				
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Medium	07. Low-Moderate																				
Medium	06. Low-Moderate																				
Very High	Wet River PAI																				
Site 3 - Stuurmanspan	<p>MAP OF RELATIVE AGRICULTURE THEME SENSITIVITY</p>  <p>Sensitivity Features:</p> <table border="1"> <thead> <tr> <th>Sensitivity</th><th>Feature(s)</th></tr> </thead> <tbody> <tr> <td>High</td><td>09. Moderate-High</td></tr> <tr> <td>High</td><td>08. Moderate</td></tr> <tr> <td>Low</td><td>05. Low</td></tr> <tr> <td>Low</td><td>04. Low-Very low</td></tr> <tr> <td>Low</td><td>03. Low-Very low</td></tr> <tr> <td>Medium</td><td>06. Low-Moderate</td></tr> <tr> <td>Medium</td><td>07. Low-Moderate</td></tr> </tbody> </table>	Sensitivity	Feature(s)	High	09. Moderate-High	High	08. Moderate	Low	05. Low	Low	04. Low-Very low	Low	03. Low-Very low	Medium	06. Low-Moderate	Medium	07. Low-Moderate				
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High	08. Moderate																				
Low	05. Low																				
Low	04. Low-Very low																				
Low	03. Low-Very low																				
Medium	06. Low-Moderate																				
Medium	07. Low-Moderate																				

Site 4 - La Riviera	<p>MAP OF RELATIVE AGRICULTURE THEME SENSITIVITY</p>  <p>Legend:</p> <ul style="list-style-type: none"> Very High High Medium Low <p>Very High sensitivity High sensitivity Medium sensitivity Low sensitivity</p> <p>Sensitivity Features:</p> <table border="1"> <thead> <tr> <th>Sensitivity</th> <th>Feature(s)</th> </tr> </thead> <tbody> <tr> <td>High</td> <td>06. Parks</td> </tr> <tr> <td>High</td> <td>04. Intended Annual Crop Cultivation / Planned Pastures</td> </tr> <tr> <td>High</td> <td>09. Moderate-High</td> </tr> <tr> <td>High</td> <td>08. Moderate</td> </tr> <tr> <td>Low</td> <td>05. Low</td> </tr> <tr> <td>Low</td> <td>04. Low-Very low</td> </tr> <tr> <td>Medium</td> <td>07. Low-Moderate</td> </tr> <tr> <td>Medium</td> <td>06. Low-Moderate</td> </tr> </tbody> </table>	Sensitivity	Feature(s)	High	06. Parks	High	04. Intended Annual Crop Cultivation / Planned Pastures	High	09. Moderate-High	High	08. Moderate	Low	05. Low	Low	04. Low-Very low	Medium	07. Low-Moderate	Medium	06. Low-Moderate
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Site 5 – Dankbaarpan	<p>MAP OF RELATIVE AGRICULTURE THEME SENSITIVITY</p>  <p>Legend:</p> <ul style="list-style-type: none"> Very High High Medium Low <p>Very High sensitivity High sensitivity Medium sensitivity Low sensitivity</p> <p>Sensitivity Features:</p> <table border="1"> <thead> <tr> <th>Sensitivity</th> <th>Feature(s)</th> </tr> </thead> <tbody> <tr> <td>High</td> <td>04. Intended Annual Crop Cultivation / Planned Pastures</td> </tr> <tr> <td>High</td> <td>09. Moderate-High</td> </tr> <tr> <td>High</td> <td>08. Moderate</td> </tr> <tr> <td>Low</td> <td>05. Low</td> </tr> <tr> <td>Low</td> <td>04. Low-Very low</td> </tr> <tr> <td>Medium</td> <td>07. Low-Moderate</td> </tr> <tr> <td>Medium</td> <td>06. Low-Moderate</td> </tr> </tbody> </table>	Sensitivity	Feature(s)	High	04. Intended Annual Crop Cultivation / Planned Pastures	High	09. Moderate-High	High	08. Moderate	Low	05. Low	Low	04. Low-Very low	Medium	07. Low-Moderate	Medium	06. Low-Moderate		
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Low	04. Low-Very low																		
Medium	07. Low-Moderate																		
Medium	06. Low-Moderate																		
Site 6 - North 5	<p>MAP OF RELATIVE AGRICULTURE THEME SENSITIVITY</p>  <p>Legend:</p> <ul style="list-style-type: none"> Very High High Medium Low <p>Very High sensitivity High sensitivity Medium sensitivity Low sensitivity</p> <p>Sensitivity Features:</p> <table border="1"> <thead> <tr> <th>Sensitivity</th> <th>Feature(s)</th> </tr> </thead> <tbody> <tr> <td>High</td> <td>09. Moderate-High</td> </tr> <tr> <td>High</td> <td>08. Moderate</td> </tr> <tr> <td>Low</td> <td>05. Low</td> </tr> <tr> <td>Medium</td> <td>07. Low-Moderate</td> </tr> <tr> <td>Medium</td> <td>06. Low-Moderate</td> </tr> </tbody> </table>	Sensitivity	Feature(s)	High	09. Moderate-High	High	08. Moderate	Low	05. Low	Medium	07. Low-Moderate	Medium	06. Low-Moderate						
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High	09. Moderate-High																		
High	08. Moderate																		
Low	05. Low																		
Medium	07. Low-Moderate																		
Medium	06. Low-Moderate																		

6.1 Review of Past Assessments

Previous assessments of the PAOI occurred between November 2007 and March 2009 to determine, amongst five regional options, the most suitable site location for the proposed development. The potential sites were defined as: Site 1 – Nooitgedacht, Site 2 – St Helena, Site 3 – Stuurmanspan, Site 4 – La Riviera, Site 5 – Dankbaarpan and Site 6 – North 5. However, early assessments identified that Site 6 (North 5) was too small to facilitate the MTF and a fatal flaw was associated with Site 5, resulting in the early exclusion of that site.

Site visits were conducted in 2025 to ground truth the previous specialist findings and verify the current land-uses and biodiversity receptors.

6.1.1 Overview of the Site Selection Process

Initially, the proposed sites were assessed in 2007, by a Strategic Environmental Assessment (SEA) committee (list of committee members available in SEA Site Selection document) according to social, economic and environmental baseline data. A strategic assessment framework was employed by the SEA to evaluate the performance of each site. Potential impacts associated with each site were identified through a workshop process with stakeholders that included, but was not limited to, government representatives; relevant consultant bodies; local organisations and the committee. Criteria with limited or no information were highlighted as data gaps.

- Based on this preliminary assessment and the information that was available in 2007, Site 3 (Stuurman) was identified as the most favourable site for development. Rietpan (now Nooitgedacht) was the least favourable site based on air quality, water quality, energy consumption, and catchment considerations. The occurrence of *Sensitive species 15* and expected impact to the species was also noted.

The main themes used to evaluate the proposed sites by the SEA are provided below, in order of importance:

1. Economic Performance
2. Agriculture
3. Air Quality
4. Water Quantity
5. Biodiversity – ecosystems
6. Water Quality
7. Climate Change
8. Waster and Energy Use
9. Poverty
10. Living Conditions.

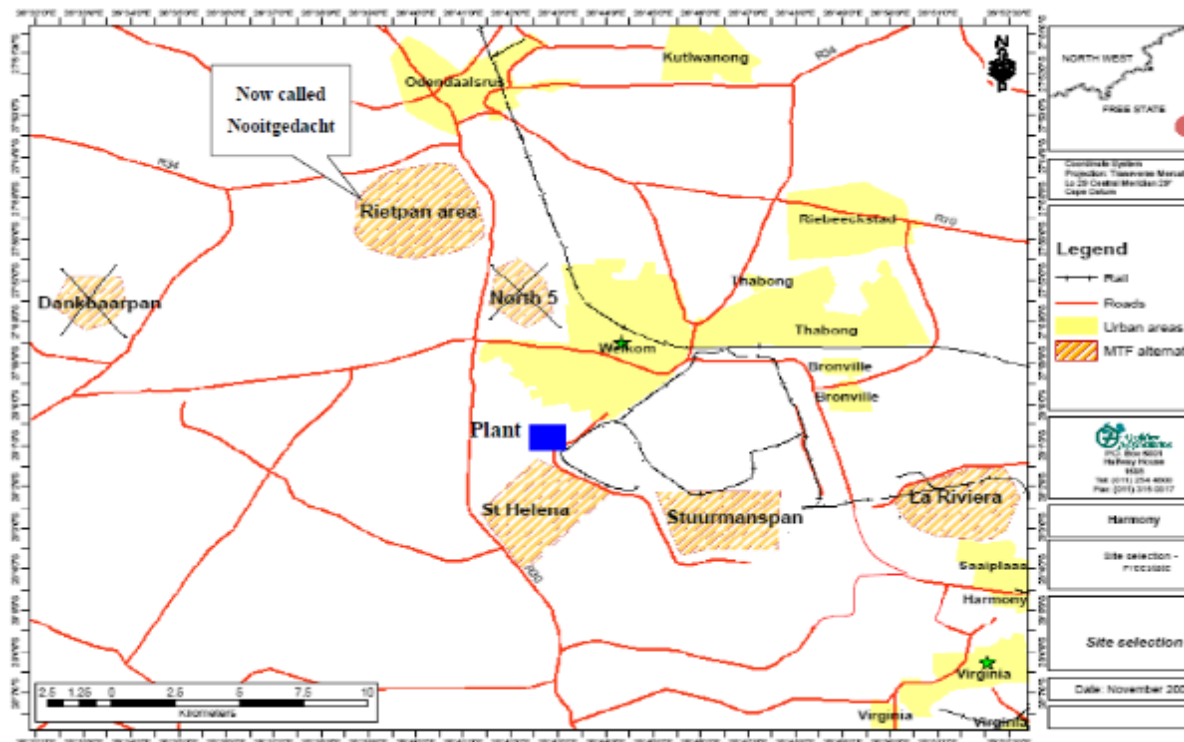


Figure 6-1 The location of the proposed development sites.

Following the first SEA in 2007, and the data gaps highlighted, all proposed sites were assessed (according to relevant legislation at the time) by in-depth specialist studies to quantify the biophysical, social and economic sustainability criteria. These sustainability criteria were implemented as a qualitative ranking system to assess the potential suitability of the proposed sites.

A second SEA was conducted in January 2008, whereby the 4 previously assessed site were reassessed together with two other potential sites (favoured from an engineering perspective), ultimately leading to the formation of Figure 6-2. Site 1 (Nooitgedacht) was at this point agreed upon by the appointed Steering Committee as the preferred site.

The terrestrial biodiversity theme was quantified within the biophysical criteria through the Ecosystem Productivity and Species Diversity categories. These categories were broadly defined as:

- **Ecosystem Productivity** – the ability of the site to support ecological processes, biodiversity and the proportion of natural habitats. The aspects evaluated within this category included:
 - Degree of impact/disturbance at the site;
 - The presence of land with ecosystem potential in the future;
 - Ability of the site to enhance or maintain ecosystem function and;
 - Likelihood of the site to support ecological connectivity.
- **Species Diversity** – the species richness, composition and abundance of plant and animal species existing at each site. This included:
 - Identification of important, rare or protected species.

- Impact of site selection and development on biological communities.

6.2 Summary of findings for each past proposed site

A summary of key findings for each site is provided below.





The key findings for each site indicate the major advantages and disadvantages, with suggestions of alternative strategies to reduce environmental and human impact. Current data is represented by the summary table from the DFFE Screening Tool Report generated (Regulation 16(1)(v) of the Environmental Impact Assessment Regulations 2014, as amended). The full screening reports are provided as Supplementary materials.

6.2.1 Site 1 – Nooitgedacht





Site 1 - Nooitgedacht	Previous Studies	<p>SEA – Golder Associates (July 2007)</p> <ul style="list-style-type: none">○ Rietpan (Nooitgedacht) the least favoured according to Steering Committee.○ Winds expected to transport dust across urban areas.○ Negligible impacts expected for agriculture and ecosystems.○ <i>Sensitive species 15</i> known to occur and impacts from MTF are likely.○ Poor water quality performance, high energy consumption expected.○ Site drains into western catchment, impacts from failures likely to impact water quality. <p>SEA – Golder Associates (January 2008)</p> <ul style="list-style-type: none">○ Preferred by the Steering Committee as the ideal position for a tailings facility.○ Largely brownfields with partial greenfields take.○ Existing tailings facilities nearby may be used for additional disposal.○ Low agricultural potential, resulting in negligible negative impacts on agriculture and ecosystem.○ Favourable water quality due to distance from the Sand River and clean water systems.○ Supported from an engineering perspective.○ Potential dust transport to residential areas, but mitigation measures will be identified.○ <i>Sensitive Species 15</i> present; relocation planned as mitigation.○ A second relocation of <i>Sensitive Species 15</i> was proposed by a SEA attendee, according to the following statement: “It will be possible to once more relocated <i>*species name omitted*</i> previously relocated from Dankbaar pan to Nooitgedacht” (Appendix A). <p>Ecological SEI study - Golder Associates (May 2008)</p> <ul style="list-style-type: none">○ This study occurred from 28th January to 1st February (five days) and assessed a total of six (6) Harmony mining sites within the vicinity of Welkom.○ The site visits were conducted in the correct seasonality for fauna and flora of the area, including <i>Sensitive Species 15</i>.○ It is important to note that during this initial ecological study the specialists did not record <i>Sensitive Species 15</i> at Site 1, although a large population of this species known to occur there as mentioned in the first and second SEA reports.○ <i>Sensitive Species 15</i> was included in an expected species list for the region but was erroneously stated as “Not listed” and not included in the relevant Red Data assessment. At the time, this species was red-listed as “Vulnerable” (Van Wyk, 1992).○ The report stated that a lack of time was a factor and an extensive survey was not conducted.																																																		
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Ground Truth Site Visit (multiple from 2023 to 2025, with the most recent focused solely on <i>Sensitive Species 15</i> in July 2025)																																																				
Observations	<ul style="list-style-type: none">● Large population of <i>Sensitive Species 15</i> found on site.● Heavily disturbed grassland with limited sensitive terrestrial and flora receptors.● Patches of historical agriculture.● High alien and invasive plant (AIP) presence.● <i>Themeda triandra</i> dominated grassland patches (which house the <i>Sensitive Species 15</i> populations).																																																			

Site Pictures			
Note: Images of Sensitive Species 15 not represented here to maintain integrity & protection of the species.			





6.2.2 Site 2 - St Helena

Site 2 - St Helena	Previous Studies	SEA – Golder Associates (January 2008) <ul style="list-style-type: none">○ Second choice site, already impacted by tailings facilities (Free State South 6, 7, 8).○ No additional impact on agricultural productivity expected.○ Previously a drainage canal, now heavily impacted by mining.○ Polluted water present, which may be improved through treatment and reuse.○ Close to water resources and processing plant, reducing energy use for pumping.○ Limited residential areas nearby, reducing dust/noise/visual impacts.○ Poor ecosystem productivity due to proximity to an artificial, polluted wetland.○ Local winds may blow dust to northern Virginia; further mitigation to be addressed in EIA.																																																				
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Terrestrial Biodiversity Theme	X																																																					
Ground Truth Site Visit (September 2025)																																																						
Observations	<ul style="list-style-type: none">● High levels of active agriculture land-use across >50% of the site● A low number of small drainage/wetland features● Actively maintained TSF and associated facilities● Water storage and excess polluted water run-off forming wetland-like areas● Limited natural terrestrial features remaining● No SCCs recorded nor expected																																																					
Site Pictures	<div></div>																																																					

6.2.3 Site 3 - Stuurmanspan

Site 3 - Stuurmanspan	Previous Studies	SEA – Golder Associates (January 2008) <ul style="list-style-type: none">○ Likely to have the least impact on air quality, especially wind-blown dust.○ Majority brownfields (~50%), but includes some prime agricultural land.○ Close to urban areas (Saaiplaas and Harmony), so impacts on living conditions must be addressed in the EIA.																																																					
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Ground Truth Site Visit (September 2025)																																																							
Observations	<ul style="list-style-type: none">● Heavily degraded due to historical gold mining-related activities.● Large wetlands present. Although these are heavily impacted by surrounding mining activities such as run-off from TSFs, they exhibited ecologically-functioning characteristics such as nesting wetland avifauna and various riparian flora species.● Close proximity to Witpan, which is situated ~1.6km north.● Direct drainage into Sand river (5km south) which presents risk to wider environment and downstream ecosystem health● Actively used by locals for livestock grazing.● Some informal settlements noted.● Small patch of degraded but recovering secondary grassland in northwestern corner of site inhabited by common terrestrial fauna and avifauna.● Active agriculture immediately adjacent to the site.● No SCCs recorded nor expected, however avifauna SCCs may temporarily pass through the site due to the large wetlands.																																																						
Site Pictures	<div></div>																																																						

6.2.4 Site 4 - La Riviera

Site 4 - La Riviera	Previous Studies	SEA – Golder Associates (January 2008) <ul style="list-style-type: none">○ About 40% of the footprint already impacted; scores poorly for ecosystem due to greenfield land take.○ Some areas developing wetland characteristics.○ Historically used for grazing and cropping; 60% of site still agricultural.○ Cultural/historical importance as the first gold mine in the Free State; earmarked for tourism development.																																																				
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Ground Truth Site Visit (September 2025)																																																						
Observations	<ul style="list-style-type: none">• Small wetland-like areas created from excess water from mining processes on-site (small NFEPA seeps)• Some residential areas located in northeastern corner• Historical croplands areas which show signs of secondary grassland recovery and use by common terrestrial fauna and avifauna (located throughout the periphery of the TSF areas). Could have potential for more agricultural use.• Limited patches of grassland in southeastern section. These were heavily impacted and degraded, not suitable for <i>Sensitive Species 15</i>. Low likelihood of occurrence for this species.• Harmony Gold Saaiplaas Plant (active)• Active agriculture immediately adjacent to the site.• No SCCs recorded nor expected, however avifauna SCCs may temporarily pass through the site due to the wetlands.																																																					
Site Pictures	<div></div>																																																					

6.2.5 Site 5 – Dankbaarpan

Site 5 – Dankbaarpan	Previous Studies	SEA – Golder Associates (January 2008) <ul style="list-style-type: none">○ Immediately considered fatally flawed by the Department of Water Affairs and Forestry due to being situated directly on a pan.																																																						
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Ground Truth Site Visit																																																								
Not evaluated further.																																																								
Note that there are large, heavily impacted populations of <i>Sensitive Species 15</i> known to occur in this area surrounding Dankbaarpan.																																																								

6.2.6 Site 6 - North 5

Site 6 - North 5	Previous Studies	SEA – Golder Associates (January 2008) <ul style="list-style-type: none">○ Evaluated as a TSF site, but proximity to residential areas (~200m) led to exclusion from selection.○ Not evaluated further.																																																						
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<div>A</div>	<div>B</div>	<div>C</div>				
Preferred site (least - impact)	Intermediate site	Worst performing site (most - impact)				
Sustainability	Sites					
	Nooitgedacht	Site 2 St Helena	Site 3 Stuurmanspan	Site 4 La Riviera	Dankbaarpan	North 5
Biophysical						
Air Quality					Fatally Flawed	Site excluded from further assessment
Agricultural Productivity						
Water Quantity						
Water Quality						
Ecosystem Productivity						
Species Diversity						
Social						
Poverty Levels					Fatally Flawed	Site excluded from further assessment
Equal Opportunity						
Living Conditions						
Health						
Health & safety at work						
Education						
Infrastructure use						
Crime						
Cultural Heritage						
Economic						
Economic					Fatally Flawed	Site excluded from further assessment
Economic Performance						
Level of trade						
SMME Status						
Energy efficiency & waste management						
Ranking						
A	10	3	6	4		
B	9	15	14	15		
C	1	2	0	1		

Figure 6-2 Overview of assessments for the site options.

1	2	3	4	5	6
Nooitgedacht	Stuurmanspan	La Riviera	St Helena	North 5 (Excluded for further assessment)	Dankbaarpan (Fatally flawed)

Figure 6-3 Final ranking of preference for site options.

6.2.7 Process of the Mitigation Hierarchy identified from past proposed sites

Mitigation Hierarchy measures taken by Golder 2008 assessments	Site 1 – Nooitgedacht (based on old assessments pre-2015)	Site 2 - St Helena	Site 3 - Stuurmanspan	Site 4 – La Riviera
Avoidance Measures	<ul style="list-style-type: none"> Areas of lowest ecological value were selected for development. 	<ul style="list-style-type: none"> Areas of lowest ecological value were selected for development 	<ul style="list-style-type: none"> High-value conservation areas were excluded from the development footprint. 	<ul style="list-style-type: none"> Infrastructure was re-routed to bypass areas that held significant ecological value.
Minimization Strategies	<ul style="list-style-type: none"> Restricting construction activities to disturbed areas. Implementing buffer zones around sensitive habitats. 	<ul style="list-style-type: none"> Construction was limited to areas that already exhibited disturbance. Protective buffers were implemented around sensitive habitats. 	<ul style="list-style-type: none"> The timing of construction activities was selected to avoid sensitive periods for local fauna. Sediment control measures were implemented. 	<ul style="list-style-type: none"> The area of the project footprint was reduced. Erosion and sediment controls were implemented through best practices.
Restoration Actions	<ul style="list-style-type: none"> Rehabilitation adjacent degraded habitats to enhance ecological connectivity. 	<ul style="list-style-type: none"> Rehabilitation focused on degraded habitats to enhance ecological connectivity. 	<ul style="list-style-type: none"> Re-vegetation efforts were undertaken to restore temporarily disturbed areas. Re-vegetation efforts only employed native species. 	<ul style="list-style-type: none"> Restoration focused on replanting indigenous vegetation. Restoration activities were undertaken to stabilize disturbed soils.
Offsetting	<ul style="list-style-type: none"> Only considered after all avoidance, minimization and restoration options have been implemented, with a focus on local ecological gains. 	<ul style="list-style-type: none"> Offsetting was only considered after all reasonable avoidance, minimization, and restoration options had been exhausted. Preference was given to local offsets to maintain landscape integrity. 	<ul style="list-style-type: none"> Offsetting was used as a last resort. Offsetting focused on similar habitats within the same catchment area. 	<ul style="list-style-type: none"> Offsetting was only considered after all other measures. Offsets were designed to quantifiably improve biodiversity gains at a local scale.

6.2.8 Nooitgedacht Site 1: Latest Specialist Findings

This section presents a synthesis of the most recent specialist studies undertaken for the Nooitgedacht Site 1, the preferred location for the proposed Mega-Tailings Storage Facility (MTF) and associated infrastructure. The findings are based on comprehensive terrestrial ecology, soil and agricultural potential, and wetland baseline and risk assessments, all conducted in 2023–2024 in accordance with current legislative and regulatory requirements.

The Nooitgedacht site is situated within a complex landscape of high biodiversity value, supporting sensitive grassland ecosystems, a network of wetlands, and soils of varying agricultural potential. Notably, the site harbours a significant population of *Sensitive Species 15*, a species of conservation concern, as well as several provincially protected plant species and important wetland habitats. The area is also subject to a range of existing anthropogenic pressures, including mining, agriculture, and infrastructure development.

The following sub-sections provide a summary of the key findings from each specialist discipline, highlighting the ecological sensitivities, potential impacts, and recommended mitigation measures relevant to the proposed development. This integrated overview is intended to inform decision-making, guide the application of the mitigation hierarchy, and ensure that biodiversity, soil, and water resource considerations are fully addressed in project planning and implementation.

6.2.8.1 Terrestrial Ecology Assessment (TBC, 2024)

The Nooitgedacht site supports a mosaic of grassland habitats, including areas of high ecological sensitivity. The site is home to a population of *Sensitive Species 15*, a Threatened or Protected Species (TOPS) and a key Species of Conservation Concern (SCC). Completion of the terrestrial biodiversity assessment led to an overall validation of the 'Very High' classification for the terrestrial biodiversity theme sensitivity as allocated by the National Environmental Screening Tool. This is because the PAOI (associated with the TSF) is mostly comprised of Very High and High sensitivity habitat, which is regarded as an ecologically viable contribution to the local CBA1, ESA1 and ESA2 portions. The animal species theme is assigned a high sensitivity, validating the screening tool report. These validations are due to the presence of SCC and protected species within the PAOI. The plant species theme is assigned a Low sensitivity, also validating the project screening tool report for the most part.

Key Findings:

- **Habitat Types:** Six main terrestrial habitat types were delineated, including sensitive grasslands, wetlands, secondary and degraded grasslands, disturbed grassland, and modified/artificial wetlands. The *Sensitive Species 15* population is of particular concern due to its vulnerability and habitat fidelity.
- **Flora:** 60 indigenous plant species were recorded, including two provincially protected species (*Eucomis autumnalis* and *Ammocharis coranica*). No floral SCCs were recorded or expected.
- **Fauna:** 60 bird species, 8 mammal species, and 1 reptile species were recorded.
- **Site Sensitivity:** Grassland habitats supporting *Sensitive Species 15* are classified as "Very High" ecological importance, requiring avoidance of destructive development. Wetlands and secondary grasslands are of "Medium" to "High" importance.
- **Impacts:** Anticipated impacts include habitat loss, fragmentation, spread of alien invasive species, direct mortality of fauna, and pollution. The presence of *Sensitive Species 15* triggers a strong recommendation for avoidance and, if not possible, a search and rescue operation in collaboration with the Endangered Wildlife Trust (EWT).

- **Mitigation:** Strict adherence to the mitigation hierarchy is recommended, with avoidance as the priority. If avoidance is not feasible, robust mitigation and monitoring plans must be implemented, especially for *Sensitive Species 15* populations.

Latest findings regarding the *Sensitive Species 15* population

Various field assessments focussed on the *Sensitive Species 15* population found at Nooitgedacht have been carried out to date, with the latest conducted in July 2025. A full-scale translocation operation is being considered as a possible offset mitigation to conserve the population.

6.2.8.2 Soil and Agricultural Potential Assessment (TBC, 2024)

The soils at Nooitgedacht are diverse, with varying agricultural potential. The site includes areas of moderate to high land capability (Avalon and Pinedene soil forms), as well as areas of low to very low capability (Glenrosa and Witbank forms). The overall agricultural sensitivity ranges from "Medium" to "High," but climatic limitations (low rainfall, high evapotranspiration) restrict crop production potential.

Key Findings:

- **Soil Types:** Dominant soils include Avalon, Pinedene, Clovelly, Molopo, Etosha, Sepane, Katspruit, Glenrosa, and Witbank forms, each with specific characteristics affecting land use and erosion potential.
- **Land Capability:** Most of the site is suitable for livestock grazing and rainfed cropping, aligning with current land uses. Some areas have high land capability but are not actively cultivated.
- **Erosion Potential:** Several soil forms (Sepane, Glenrosa, Witbank, Katspruit) have a high potential for erosion, necessitating careful management during construction and operation.
- **Impacts:** The TSF expansion and pipeline will result in the loss of some soils with good land capability, but most affected areas are not actively cultivated. Impacts on agricultural production are expected to be limited if mitigation is implemented.
- **Mitigation:** Recommendations include avoiding actively cultivated fields where possible, stakeholder engagement for compensation if avoidance is not feasible, and strict soil management and rehabilitation measures to minimize erosion and compaction.

6.2.8.3 Wetland Baseline and Risk Assessment (TBC, 2024)

The Nooitgedacht site contains a network of wetlands, including unchannelled and channelled valley bottoms and depressions. These wetlands provide important ecosystem services but are already impacted by mining, agriculture, and infrastructure.

Key Findings:

- **Wetland Types:** Nine hydrogeomorphic (HGM) units were identified: four unchannelled valley bottoms, two channelled valley bottoms, and three depressions. Multiple artificial wetlands and drainage features are also present.
- **Ecological Status:** Wetlands range from "Largely Modified" (PES D) to "Seriously Modified" (PES E), mainly due to historic and ongoing anthropogenic impacts.
- **Ecosystem Services:** Wetlands provide flood attenuation, streamflow regulation, sediment trapping, and water purification. Some units (e.g., HGM 5) are particularly important for waterbirds and nutrient assimilation.

- **Sensitivity:** Valley bottom and seep wetlands are of "High" importance and sensitivity; depression wetlands are of "Moderate" sensitivity.
- **Impacts:** The TSF and pipelines will result in direct wetland loss (~63 ha), altered hydrology, increased erosion, and potential water quality impairment. Post-mitigation risks are rated as "Moderate" to "Low."
- **Mitigation:** Strict buffer zones (46 m for TSF, 15 m for pipelines post-mitigation) are recommended. Loss of wetland area must be compensated through on-site rehabilitation and, if necessary, offset strategies. A Water Use License is required due to the nature of the activities.

6.3 Mitigation Hierarchy Analysis

The mitigation hierarchy is a structured, stepwise approach to managing biodiversity impacts from development, as required by South African environmental legislation (NEMA, NEMBA) and best-practice guidelines (EWT, SANBI, DFFE). The hierarchy prioritizes:

1. Avoidance
2. Minimization
3. Rehabilitation/Restoration
4. Offsetting
 - This section evaluates the application of the mitigation hierarchy to the Nooitgedacht MTF project, based on desktop screening, review of previous studies, screening tool outputs, and recent site verification.

6.3.1 Avoidance

Desktop and Screening Tool Analysis:

- The Nooitgedacht site was selected through a multi-phase process, including a Strategic Environmental Assessment (SEA), specialist studies, and GIS-based screening.
- The site overlaps with areas of "Very High" terrestrial biodiversity sensitivity, including Critical Biodiversity Areas (CBAs), Ecological Support Areas (ESAs), Endangered ecosystems, and a significant population of *Sensitive Species 15*, a Threatened or Protected Species (TOPS) and Species of Conservation Concern (SCC).
- The DFFE Screening Tool flagged the site for "Very High" terrestrial and aquatic biodiversity sensitivity, and "Very High" agricultural potential in some areas.

Previous Study Review:

- Multiple alternative sites were considered. Sites 5 and 6 were excluded due to fatal flaws (proximity to residential areas, insufficient size, or direct overlap with sensitive wetlands).
- The Nooitgedacht site was ultimately selected as the least environmentally damaging option, with the lowest potential for negative impacts on agriculture and water resources, and the best engineering feasibility.

Ground-Truth Site Visit Findings:

- Field surveys confirmed the presence of a large *Sensitive Species 15* population, patches of high-quality grassland, and several provincially protected plant species.
- However, much of the site is already disturbed (historic agriculture, alien invasive plants, degraded grassland), and the project footprint was designed to avoid the most sensitive patches where possible.

Legislative and Guideline Context:

- NEMA and NEMBA require that avoidance of impacts on listed ecosystems and protected species is prioritized.
- The EWT Draft Mitigation Hierarchy Guideline (2023) states that avoidance is mandatory for "Very High" sensitivity areas, especially where irreplaceable populations or habitats are present.

Conclusion:

- The site selection process demonstrates a strong application of avoidance at the regional scale, but complete avoidance of impacts to *Sensitive Species 15* habitat and sensitive grasslands within the site is not possible if the project proceeds.
- The project footprint has been refined to avoid the highest-value patches and minimize overlap with key ecological features, but residual impacts remain.

6.3.2 Minimization

Desktop and Screening Tool Analysis:

- The project design incorporates buffer zones around wetlands and sensitive habitats, and restricts construction to already disturbed or lower-value areas where feasible.

Previous Study Review:

- Minimization strategies from past assessments include:
 - Restricting construction to disturbed areas
 - Implementing buffer zones around sensitive habitats
 - Timing construction to avoid sensitive periods for fauna
 - Reducing the project footprint and using best-practice erosion and sediment controls

Ground-Truth Site Visit Findings:

- Field verification confirmed that buffer zones and construction restrictions are feasible and effective in many areas, but some *Sensitive Species 15* habitat and wetland buffers will still be affected.
- The presence of alien invasive plants and degraded areas provides opportunities to focus development in less sensitive zones.

Legislative and Guideline Context:

- NEMA and NEMBA require that all reasonable measures be taken to minimize impacts that cannot be avoided.
- The EWT guideline emphasizes the need for robust minimization, especially where avoidance is not fully possible.

Conclusion:

- Minimization measures have been integrated into the project design and are supported by both desktop and field data.
- Further refinement of the footprint, strict enforcement of buffer zones, and adaptive management during construction are recommended to maximize minimization.

6.3.3 Rehabilitation/Restoration**Desktop and Screening Tool Analysis:**

- The site includes areas of degraded grassland and historic agriculture, which are suitable for targeted rehabilitation.

Previous Study Review:

- Restoration actions proposed include:
 - Rehabilitation of adjacent degraded habitats to enhance ecological connectivity
 - Re-vegetation of temporarily disturbed areas using indigenous species
 - Restoration of wetland buffers and stabilization of disturbed soils

Ground-Truth Site Visit Findings:

- Field surveys identified specific areas where restoration can be most effective, particularly in degraded grassland and wetland buffer zones.
- Rehabilitation potential is moderate to high in these areas, but recovery of *Sensitive Species 15* habitat is not possible due to the species' site fidelity and slow recolonization.

Legislative and Guideline Context:

- NEMA and NEMBA require rehabilitation of disturbed areas to a functional state.
- The EWT guideline stresses that restoration is essential but cannot substitute for avoidance/minimization in "Very High" sensitivity areas.

Conclusion:

- Rehabilitation is feasible and necessary for degraded areas, but cannot fully compensate for loss of irreplaceable *Sensitive Species 15* habitat or high-value grassland.
- Restoration should focus on enhancing connectivity, soil stabilization, and invasive species control.

6.3.4 Offsetting**Desktop and Screening Tool Analysis:**

- Offsetting is only considered after all avoidance, minimization, and rehabilitation options have been exhausted.

Previous Study Review:

- Offsetting was not the preferred option, but is recognized as a last resort for residual, unavoidable impacts.

- Any offset must be locally relevant, quantifiable, and designed to achieve measurable biodiversity gains.

Ground-Truth Site Visit Findings:

- The loss of *Sensitive Species 15* habitat and some wetland areas is unavoidable, triggering the need for offset consideration.
- The feasibility of *Sensitive Species 15* translocation is low, and offsetting for this species is particularly challenging.

Legislative and Guideline Context:

- NEMA, NEMBA, and the EWT guideline require that offsets are only used for residual impacts and must be scientifically justified, with regulatory approval.
- Offsets for TOPS-listed species and irreplaceable habitats are generally discouraged unless no alternatives exist.

Mitigation Hierarchy Conclusion:

- Offsetting may be required for residual impacts to wetlands and grassland but is generally not appropriate for *Sensitive Species 15* populations – *except* as a last resort and only with a robust, science-based plan and regulatory approval.
- Any offset must be designed in consultation with authorities and stakeholders, and must deliver clear, additional conservation outcomes.

7 Conclusion

The assessment of the Nooitgedacht Mega-Tailings Storage Facility (MTF) has demonstrated a comprehensive and systematic application of the mitigation hierarchy, as required by South African environmental legislation (NEMA, NEMBA) and aligned with the EWT Draft Mitigation Hierarchy Guideline (2023). The process has been informed by a robust combination of desktop screening, review of previous specialist studies, national and provincial screening tool outputs, and recent ground-truthing site visits.

- The Nooitgedacht site was selected as the preferred alternative following a rigorous site selection process that prioritized avoidance of the most sensitive ecological, social, and economic features at a regional scale. Despite this, from an ecological perspective, the site still overlaps with areas of "Very High" biodiversity sensitivity, including CBAs, ESAs, Endangered ecosystems, and a significant population of *Sensitive Species 15*, a TOPS and SCC. The site also contains important wetland systems and soils of moderate to high agricultural potential.
- The project design has incorporated avoidance and minimization measures to the greatest extent feasible, including the refinement of the development footprint, the establishment of buffer zones around sensitive habitats, and the restriction of activities to already disturbed or lower-value areas where possible. Rehabilitation and restoration actions are planned for degraded grassland and wetland buffer zones, with a focus on enhancing ecological connectivity, stabilizing soils, and controlling invasive species.
- Nevertheless, unavoidable impacts remain – particularly the loss of *Sensitive Species 15* habitat and certain wetland areas. In accordance with the mitigation hierarchy and relevant legislation, offsetting is recognized as a last resort and will only be considered for these residual impacts, subject to robust scientific justification, regulatory approval, and meaningful stakeholder engagement. Any offset strategy must deliver measurable, additional conservation outcomes and prioritize local ecological integrity.

In summary, the Nooitgedacht MTF project has demonstrated application of the mitigation hierarchy, with clear evidence of avoidance, minimization, and rehabilitation measures being prioritized and integrated into project planning. The remaining residual impacts will require careful management, ongoing monitoring, and, where necessary, the implementation of scientifically robust offset strategies. Continued engagement with regulatory authorities, local stakeholders, and conservation experts will be essential to ensure that the project achieves a balance between development needs and the long-term conservation of the region's unique biodiversity and ecosystem services.

Given the irreplaceable value and vulnerability of the *Sensitive Species 15* population at Nooitgedacht, it is essential that a comprehensive Biodiversity Action Plan (BAP) and species-specific Biodiversity Management Plan (BMP) be developed. The BAP must include a scientifically justified translocation protocol – designed and implemented in line with best practice, regulatory requirements, and multi-disciplinary stakeholder input – to ensure the long-term viability and conservation of *Sensitive Species 15*.

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9 Appendix Items

9.1 Desktop Assessment Methodology

The desktop assessment was principally undertaken using a Geographic Information System (GIS) to access the latest available spatial datasets to develop digital cartographs and species lists. These datasets and their date of publishing are provided below.

9.1.1 Ecologically Important Landscape Features

Existing ecologically relevant data layers were incorporated into a GIS to establish how the proposed project might interact with any ecologically important entities. Emphasis was placed around the following spatial datasets:

- National Biodiversity Assessment 2018 (Skowno *et al*, 2019) (NBA) - The purpose of the NBA is to assess the state of South Africa's biodiversity based on best available science, with a view to understanding trends over time and informing policy and decision-making across a range of sectors. The NBA deals with all three components of biodiversity: genes, species, and ecosystems; and assesses biodiversity and ecosystems across terrestrial, freshwater, estuarine and marine environments. The two headline indicators assessed in the NBA are:
- Ecosystem Threat Status – indicator of an ecosystem's wellbeing, based on the level of change in structure, function or composition. Ecosystem types are categorised as Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Near Threatened (NT) or Least Concern (LC), based on the proportion of the original extent of each ecosystem type that remains in good ecological condition. The revised list [known as the **Red List of Ecosystems (RLE 2022)**] is based on assessments that followed the International Union for Conservation of Nature (IUCN) Red List of Ecosystems Framework (version 1.1) and covers all 456 terrestrial ecosystem types described in South Africa (Mucina and Rutherford 2006; with updates described in Dayaram *et al.*, 2019). The revised list identifies 120 threatened terrestrial ecosystem types (55 Critically Endangered, 51 Endangered and 14 Vulnerable types). The revised list was published in the Government Gazette (Gazette Number 47526, Notice Number 2747) and came into effect on 18 November 2022 (Skowno & Monyeke, 2021).
- Ecosystem Protection Level – indicator of the extent to which ecosystems are adequately protected or under-protected. Ecosystem types are categorised as Well Protected (WP), Moderately Protected (MP), Poorly Protected (PP), or Not Protected (NP), based on the proportion of the biodiversity target for each ecosystem type that is included within one or more protected areas. NP, PP or MP ecosystem types are collectively referred to as under-protected ecosystems.
- Protected areas - South Africa Protected Areas Database (SAPAD) (DEA, 2023) – The SAPAD Database contains spatial data pertinent to the conservation of South African biodiversity. It includes spatial and attribute information for both formally protected areas and areas that have less formal protection. SAPAD is updated on a continuous basis and forms the basis for the Register of Protected Areas, which is a legislative requirement under the National Environmental Management: Protected Areas Act, Act 57 of 2003.
- National Protected Areas Expansion Strategy (NPAES) (SANBI, 2018) – The NPAES provides spatial information on areas that are suitable for terrestrial ecosystem protection. These focus areas are large, intact and unfragmented and therefore, of high importance for biodiversity, climate resilience and freshwater protection.
- Conservation/Biodiversity Sector Plans:

- The Free State Province Biodiversity Plan classifies areas within the province on the basis of their contributions to reaching the associated conservation targets within the province. These areas are primarily classified as either Critical Biodiversity Areas (CBAs) or Ecological Support Areas (ESAs). These biodiversity priority areas, together with protected areas, are important for the persistence of a viable representative sample of all ecosystem types and species, as well as the long-term ecological functioning of the landscape as a whole.
- CBAs are areas of the landscape that need to be maintained in a natural or near-natural state to ensure the continued existence and healthy functioning of important species and ecosystems and the delivery of ecosystem services. Thus, if these areas are not maintained in a natural or near natural state then provincial biodiversity targets cannot be met (SANBI, 2017).
- ESAs are areas that are not essential for meeting biodiversity representation targets but play an important role in supporting the ecological functioning of ecosystems as well as adjacent Critical Biodiversity Areas, and/or in delivering ecosystem services that support socio-economic development (SANBI, 2017).
- Provincial CBAs and ESAs are often further classified into sub-categories, such as CBA1 and CBA2 or ESA1 and ESA2. These present fine scale habitat and biodiversity area baseline requirements and associated land management objectives or outcomes. The highest categorisation level is often referred to as an 'Irreplaceable Critical Biodiversity Area' which usually represents pristine natural habitat that is very important for conservation.
- Key Biodiversity Areas (KBAs) (SANBI, 2024) – KBAs are identified using the Global Standard for the Identification of KBAs, developed by the International Union for the Conservation of Nature (IUCN). The standard involves applying five criteria to gauge an area's importance for biodiversity. These criteria consider the presence of threatened species or ecosystems, species with limited global distributions, pristine wilderness, significant biological processes, or irreplaceable biodiversity. Each criterion has specific quantitative thresholds to determine if they are met. As of 2023, over 16,000 KBAs have been identified globally, covering more than 20 million square kilometres. South Africa completed its first comprehensive national assessment in 2023, evaluating over 9,900 species or ecosystem types and identifying 260+ individual KBAs.

9.2 Terrestrial Site Ecological Importance

The different habitat types within the PAOI will be delineated and identified based on observations during the field assessment, and available satellite imagery. These habitat types will be assigned Ecological Importance (EI) categories based on their ecological integrity, conservation value, the presence of species of conservation concern and their ecosystem processes.

Site Ecological Importance (SEI) is a function of the Biodiversity Importance (BI) of the receptor (e.g., SCC, the vegetation/fauna community or habitat type present on the site) and Receptor Resilience (RR) (its resilience to impacts) as follows.

BI is a function of Conservation Importance (CI) and the Functional Integrity (FI) of the receptor as follows. The criteria for the CI and FI ratings are provided in Table 9-1 and Table 9-2, respectively.

Table 9-1 Summary of Conservation Importance (CI) criteria

Conservation Importance	Fulfilling Criteria
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Very High	Confirmed or highly likely occurrence of Critically Endangered (CR), Endangered (EN), Vulnerable (VU) or Extremely Rare or CR species that have a global extent of occurrence (EOO) of < 10 km ² . Any area of natural habitat of a CR ecosystem type or large area (> 0.1% of the total ecosystem type extent) of natural habitat of an EN ecosystem type. Globally significant populations of congregatory species (> 10% of global population).
High	Confirmed or highly likely occurrence of CR, EN, VU species that have a global EOO of > 10 km ² . IUCN threatened species (CR, EN, VU) must be listed under any criterion other than A. If listed as threatened only under Criterion A, include if there are less than 10 locations or < 10 000 mature individuals remaining. Small area (> 0.01% but < 0.1% of the total ecosystem type extent) of natural habitat of EN ecosystem type or large area (> 0.1%) of natural habitat of VU ecosystem type. Presence of Rare species. Globally significant populations of congregatory species (> 1% but < 10% of global population).
Medium	Confirmed or highly likely occurrence of populations of Near Threatened (NT) species, threatened species (CR, EN, VU) listed under Criterion A only and which have more than 10 locations or more than 10 000 mature individuals. Any area of natural habitat of threatened ecosystem type with status of VU. Presence of range-restricted species. > 50% of receptor contains natural habitat with potential to support SCC.
Low	No confirmed or highly likely populations of SCC. No confirmed or highly likely populations of range-restricted species. < 50% of receptor contains natural habitat with limited potential to support SCC.
Very Low	No confirmed and highly unlikely populations of SCC. No confirmed and highly unlikely populations of range-restricted species. No natural habitat remaining.

Table 9-2 Summary of Functional Integrity (FI) criteria

Functional Integrity	Fulfilling Criteria
Very High	Very large (> 100 ha) intact area for any conservation status of ecosystem type or > 5 ha for CR ecosystem types. High habitat connectivity serving as functional ecological corridors, limited road network between intact habitat patches. No or minimal current negative ecological impacts, with no signs of major past disturbance.
High	Large (> 20 ha but < 100 ha) intact area for any conservation status of ecosystem type or > 10 ha for EN ecosystem types. Good habitat connectivity, with potentially functional ecological corridors and a regularly used road network between intact habitat patches. Only minor current negative ecological impacts, with no signs of major past disturbance and good rehabilitation potential.
Medium	Medium (> 5 ha but < 20 ha) semi-intact area for any conservation status of ecosystem type or > 20 ha for VU ecosystem types. Only narrow corridors of good habitat connectivity or larger areas of poor habitat connectivity and a busy used road network between intact habitat patches. Mostly minor current negative ecological impacts, with some major impacts and a few signs of minor past disturbance. Moderate rehabilitation potential.
Low	Small (> 1 ha but < 5 ha) area. Almost no habitat connectivity but migrations still possible across some modified or degraded natural habitat and a very busy used road network surrounds the area. Low rehabilitation potential. Several minor and major current negative ecological impacts.
Very Low	Very small (< 1 ha) area. No habitat connectivity except for flying species or flora with wind-dispersed seeds. Several major current negative ecological impacts.

BI can be derived from a simple matrix of CI and FI as provided in Table 9-3.

Table 9-3 Matrix used to derive Biodiversity Importance (BI) from Functional Integrity (FI) and Conservation Importance (CI)

Biodiversity Importance (BI)		Conservation Importance (CI)				
		Very high	High	Medium	Low	Very low
Functional Integrity (FI)	Very high	Very high	Very high	High	Medium	Low
	High	Very high	High	Medium	Medium	Low

Biodiversity Importance (BI)		Conservation Importance (CI)				
		Very high	High	Medium	Low	Very low
	Medium	High	Medium	Medium	Low	Very low
	Low	Medium	Medium	Low	Low	Very low
	Very low	Medium	Low	Very low	Very low	Very low

The fulfilling criteria to evaluate RR are based on the estimated recovery time required to restore an appreciable portion of functionality to the receptor, as summarised in Table 9-4.

Table 9-4 Summary of Receptor Resilience (RR) criteria

Resilience	Fulfilling Criteria
Very High	Habitat that can recover rapidly (~ less than 5 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a very high likelihood of: (i) remaining at a site even when a disturbance or impact is occurring, or (ii) returning to a site once the disturbance or impact has been removed.
High	Habitat that can recover relatively quickly (~ 5–10 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a high likelihood of: (i) remaining at a site even when a disturbance or impact is occurring, or (ii) returning to a site once the disturbance or impact has been removed.
Medium	Will recover slowly (~ more than 10 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a moderate likelihood of: (i) remaining at a site even when a disturbance or impact is occurring, or (ii) returning to a site once the disturbance or impact has been removed.
Low	Habitat that is unlikely to be able to recover fully after a relatively long period: > 15 years required to restore ~ less than 50% of the original species composition and functionality of the receptor functionality, or species that have a low likelihood of: (i) remaining at a site even when a disturbance or impact is occurring, or (ii) returning to a site once the disturbance or impact has been removed.
Very Low	Habitat that is unable to recover from major impacts, or species that are unlikely to: (i) remain at a site even when a disturbance or impact is occurring, or (ii) return to a site once the disturbance or impact has been removed.

Subsequent to the determination of the BI and RR, the SEI can be ascertained using the matrix as provided in Table 9-5.

Table 9-5 Matrix used to derive Site Ecological Importance from Receptor Resilience (RR) and Biodiversity Importance (BI)

Site Ecological Importance		Biodiversity Importance (BI)				
		Very high	High	Medium	Low	Very low
Receptor Resilience (RR)	Very Low	Very high	Very high	High	Medium	Low
	Low	Very high	Very high	High	Medium	Very low
	Medium	Very high	High	Medium	Low	Very low
	High	High	Medium	Low	Very low	Very low
	Very High	Medium	Low	Very low	Very low	Very low

Interpretation of the SEI in the context of the proposed project is provided in Table 9-6.

Table 9-6 Guidelines for interpreting Site Ecological Importance in the context of the proposed development activities

Site Ecological Importance	Interpretation in relation to proposed development activities
Very High	Avoidance mitigation – no destructive development activities should be considered. Offset mitigation not acceptable/not possible (i.e., last remaining populations of species, last remaining good condition patches of ecosystems/unique species assemblages). Destructive impacts for species/ecosystems where persistence target remains.

Site Ecological Importance	Interpretation in relation to proposed development activities
High	Avoidance mitigation wherever possible. Minimisation mitigation – changes to project infrastructure design to limit the amount of habitat impacted, limited development activities of low impact acceptable. Offset mitigation may be required for high impact activities.
Medium	Minimisation and restoration mitigation – development activities of medium impact acceptable followed by appropriate restoration activities.
Low	Minimisation and restoration mitigation – development activities of medium to high impact acceptable followed by appropriate restoration activities.
Very Low	Minimisation mitigation – development activities of medium to high impact acceptable and restoration activities may not be required.

The SEI evaluated for each taxon can be combined into a single multi-taxon evaluation of SEI for the assessment area. Either a combination of the maximum SEI for each receptor should be applied, or the SEI may be evaluated only once per receptor but for all necessary taxa simultaneously. For the latter, justification of the SEI for each receptor is based on the criteria that conforms to the highest CI and FI, and the lowest RR across all taxa.

9.3 Appendix A – Specialist Declaration of Independence

I, Byron Goris, 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 71 and is punishable in terms of Section 24F of the Act.



Byron Goris

Terrestrial Ecologist

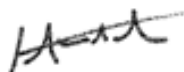
The Biodiversity Company

October 2025

DECLARATION

I, Andrew Husted, 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 71 and is punishable in terms of Section 24F of the Act.



Andrew Husted

Ecologist

The Biodiversity Company

October 2025

9.4 Appendix B – Specialist CVs

Byron Goris

B.Sc Hons in Global Socio-Ecological
Systems Change (Cert. Nat. Sci.)

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Email: byron@thebiodiversitycompany.com

Identity Number: 9904145161083

Date of birth: 14 April 1999



Profile Summary

Environmental work experience across South Africa (3 years).

Theoretical and practical understanding of methodology in both aquatic, terrestrial, and global change ecology.

General training and experience in aspects of conservation, biogeography, and socio-economic sustainability.

Areas of Interest

Ecological systems approaches, global environmental change, socio-economic sustainability, multi/trans-disciplinarity, sports ecology, traditional medicinal plant science.

Key Experience

- Terrestrial Ecological Assessments, as well as some Aquatic and Wetland experience
- Environmental Field work and basic field methodology
- Business sustainability
- Sports Ecology Research
- Habitat delineation
- Field work and research

Country Experience

South Africa

Nationality

South African

Languages

English – Proficient

Afrikaans – Basic

Qualifications

- BSc (Hons) Animals, Plants, and Environmental Sciences; University of the Witwatersrand
- BSc Biology, University of the Witwatersrand
- Certificated Natural Scientist (SACNASP 170720)

CURRICULUM VITAE: Byron Goris

Andrew Husted

M.Sc Aquatic Health (*Pr Sci Nat*)

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Identity Number: 7904195054081

Date of birth: 19 April 1979



Profile Summary

Working experience throughout South Africa, West and Central Africa and also Armenia & Serbia.

Specialist experience in exploration, mining, engineering, hydropower, private sector and renewable energy.

Experience with project management for national and international multi-disciplinary projects.

Specialist guidance, support and facilitation for the compliance with legislative processes, for in-country requirements, and international lenders.

Specialist expertise include Instream Flow and Ecological Water Requirements, Freshwater Ecology, Terrestrial Ecology and also Ecosystem Services.

Areas of Interest

Sustainability and Conservation.

Instream Flow and Ecological Water Requirements.

Publication of scientific journals and articles.

Key Experience

- World Bank, Equator Principles and the International Finance Corporation requirements
- Environmental, Social and Health Impact Assessments (ESHIA)
- Environmental Management Programmes (EMP)
- Ecological Water Requirement determination experience
- Wetland delineations and ecological assessments
- Rehabilitation Plans and Monitoring
- Fish population structure assessments
- The use of macroinvertebrates to determine water quality.
- Aquatic Ecological Assessments
- Aquaculture

Country Experience

Angola, Botswana, Cameroon
Democratic Republic of Congo
Ghana, Ivory Coast, Lesotho
Liberia, Mali, Mauritius, Mozambique
Nigeria, Republic of Armenia,
Senegal, Serbia, Sierra Leone, South Africa
Tanzania

Nationality

South African

Languages

English – Proficient

Afrikaans – Conversational

German - Basic

Qualifications

- MSc (University of Johannesburg) – Aquatic Health.
- BSc Honours (Rand Afrikaans University) – Aquatic Health
- BSc Natural Science
- Pr Sci Nat (400213/11)
- Certificate of Competence: Mondi Wetland Assessments
- Certificate of Competence: Wetland WET-Management
- SASS 5 (Expired) – Department of Water Affairs and Forestry for the River Health Programme
- EcoStatus application for rivers and streams

Signed:

Andrew Husted

CURRICULUM VITAE: Andrew Husted