The Terrestrial Biodiversity Compliance Statement for the Matsopa Minerals Prospecting Right Application

(Ref. 10631 PR)

Koppies, Fezile Dabi District Municipality

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CLIENT

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Submitted to	CABANGA environmental
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Declaration	The Biodiversity Company and its associates operate as independent consultants under the auspice of the South African Council for Natural Scientific Professions. We declare that we have no affiliation with or vested financial interests in the proponent, other than for work performed under the Environmental Impact Assessment Regulations, 2017. 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.

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1 Introduction

The Biodiversity Company was commissioned to conduct a terrestrial ecology (fauna and flora) survey and to compile a compliance statement for the proposed Environmental Authorisation, related to the Matsopa Minerals (Pty) Ltd Prospecting Right Application over the farms Geluk 237 and Goudlaagte 238 near the town of Koppies, Free State. The application relates to the search for commercially viable ore bodies of the following minerals:

- Clay, including Bentonite Clay (CB),
- Clay (General),
- Shale/Brick Clay (CS), and
- Illite-Montmorillinte Group (Clay) (CI).

In order to assess the baseline ecological state of the project area and to present a detailed description of the receiving environment, both a desktop assessment as well as a field survey were conducted during January 2022. Furthermore, the identification and description of any sensitive receptors was conducted over the project area, and the manner in which these sensitive receptors may be affected by the proposed disturbances was also investigated.

This assessment was conducted in accordance with the amendments to the Environmental Impact Assessment Regulations, 2014 (No. 326, 7 April 2017) of the National Environmental Management Act (NEMA), 1998 (Act No. 107 of 1998). The approach has taken cognisance of the recently published Government Notice 320 in terms of NEMA dated 20 March 2020 as well as the Government Notice 1150 in terms of NEMA dated 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”. The National Web based Environmental Screening Tool has characterised the terrestrial biodiversity for the project area as ‘Very High’ sensitivity.

The purpose of the specialist studies is to provide relevant input into the overall assessment and application process. 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 project and the impacts that its implementation may have on the natural environment.

2 Project Area

The project area is located approximately 10 km north of the town of Koppies within the Ngwathe Local Municipality of the Fezile Dabi District Municipality. The project area is composed of two separate properties, the farm Geluk (No. 237) with a total size of 166 Ha, and the farm Goudlaagte (No. 238) with a total size of 167 Ha. A single, non-related farm lies between the two farms of interest, separating them by approximately 500 m.

The majority of both farms have historically been used for agriculture (cultivation), with smaller areas allocated to active grazing land. This remains the current land use for the project area.

The project area assessed is presented in Figure 2-1 below, and the regional overview is illustrated in Figure 2-2.

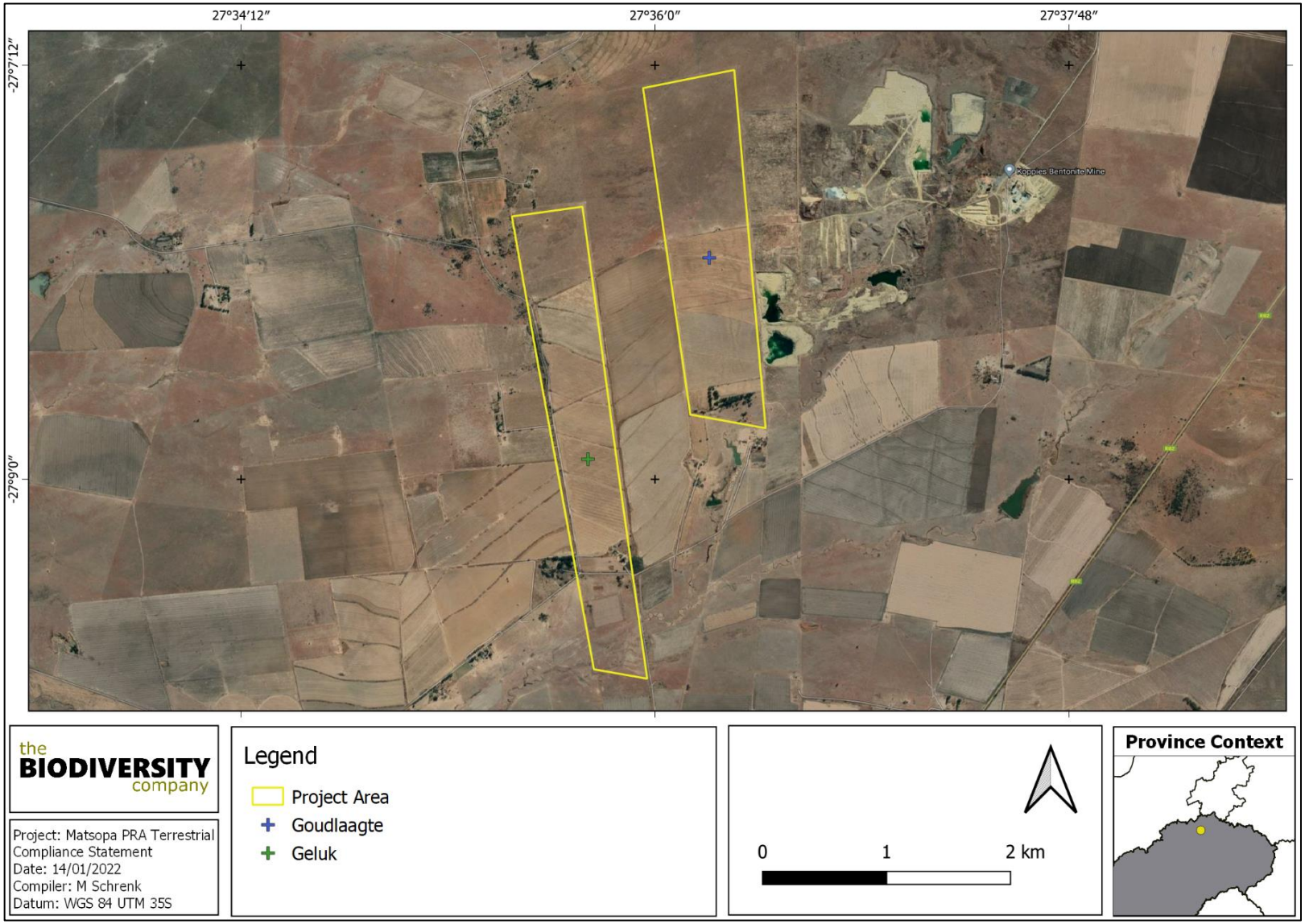


Figure 2-1 Project Area

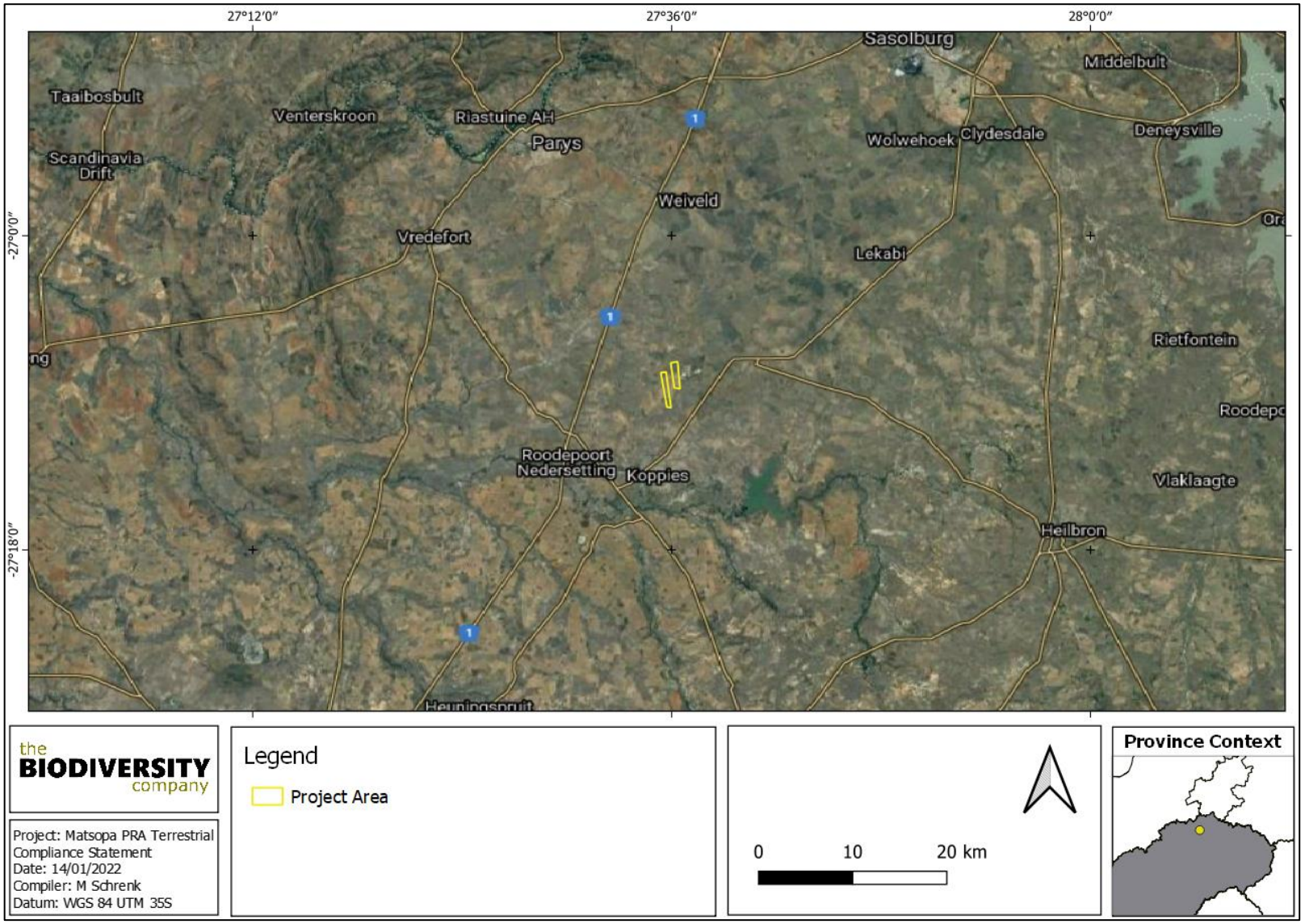


Figure 2-2 Regional overview of the project area

3 Terms of Reference

The principal aim of the assessment was to adequately assess the current state of the terrestrial biodiversity in order to identify any significant and/or sensitive ecological receptors that may be impacted upon by the proposed prospecting activities. The following are the Terms of Reference that guide the project aim:

- Description of the baseline receiving environment specific to the field of expertise (general surrounding area as well as site specific environment);
- Identification and description of any sensitive receptors in terms of relevant specialist disciplines (biodiversity) that occur in the project area, and the manner in which these sensitive receptors may be affected by the activity;
- Identification of 'significant' ecological, botanical and faunal features within the proposed project area;
- Identification of conservation significant habitats around the project area which might be impacted;
- Screening to identify any critical issues (potential fatal flaws) that may result in a rejection of the application;
- Provide a map to identify sensitive receptors in the project area, based on available maps and database information; and
- Presentation of recommend mitigation measures (outcomes to be included in the Management Plan) that should be used to mitigate or minimise impacts from the activity, either on terrestrial habitat or ecology directly.

4 Key Legislative Requirements

The legislation, policies and guidelines listed below are applicable to the current project in terms of biodiversity and ecological support systems. The list below, although extensive, is not exhaustive and other legislation, policies and guidelines may apply in addition to those listed below (Table 4-1).

Table 4-1 A list of key legislative requirements relevant to these studies in the Free State Province

Region	Legislation
International	Convention on Biological Diversity (CBD, 1993)
	The Convention on Wetlands (RAMSAR Convention, 1971)
	The United Nations Framework Convention on Climate Change (UNFCC,1994)
	The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES, 2013)
	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 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 Protected Areas Act (Act No. 57 of 2003)
	The National Environmental Management Biodiversity Act (Act No. 10 of 2004)
	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 Environmental Management Air Quality Act (No. 39 of 2004)
	National Protected Areas Expansion Strategy (NPAES)
	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 No. 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)
	National Water Act (NWA, 1998)
Provincial	Free State Nature Conservation Ordinance 8 of 1969
	Boputhatswana Nature Conservation Act 3 of 1973
	Free State Province Biodiversity Plan V1.0 of 2015

5 Methods

5.1 Geographic Information Systems (GIS) Mapping

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

- 2018 National Biodiversity Assessment (NBA, 2018) (Skowno *et al.,* 2019);
- Vegetation Map of South Africa, Lesotho and Swaziland (SANBI, 2018);
- Free State Province Biodiversity Plan V1.0 of 2015 (Collins, 2015);

Brief descriptions of the standardised methodologies applied are provided below. More detailed descriptions of survey methodologies are available upon request.

5.2 Desktop Vegetation and Botanical Assessment

The desktop vegetation and botanical assessment encompassed an assessment of all the vegetation units and habitat types within the project area. The focus was on an ecological assessment of pre-anthropogenic habitat types as well as the identification of any Red Data and protected species within the known distribution of the project area. The South African National Biodiversity Institute (SANBI) provides an electronic database system, namely the Botanical Database of Southern Africa (BODATSA-POSA, 2019), which was used to access distribution records on Southern African plants and generate an expected species list. This new database replaces the old Plants of Southern Africa database which provided distribution data of flora at the quarter degree square (QDS) resolution. The Red List of South African Plants website (SANBI, 2016) was utilized to provide the most current account of the national conservation status of flora.

Additional information regarding ecosystems, vegetation types, protected flora and Species of Conservation Concern (SCC) was obtained from the following sources:

- The Vegetation of South Africa, Lesotho and Swaziland (Mucina & Rutherford, 2012);
- Red List of South African Plants (Raimondo *et al.,* 2009; SANBI, 2016);
- Provincially Protected Plant Species (Free State Nature Conservation Ordinance 8 of 1969); and
- List of Protected Tree Species (DEFF-2, 2021).

5.3 Floristic Fieldwork Survey and Analysis

The wet season fieldwork (completed during January 2022) and sample sites were placed within targeted areas (i.e. target sites) perceived as ecologically sensitive based on the preliminary interpretation of satellite imagery (Google Corporation) and GIS analysis (which included the latest applicable biodiversity datasets) available prior to the fieldwork. The focus of the fieldwork was therefore to maximise coverage and navigate to each target site in the field in order to perform a rapid vegetation and ecological assessment at each sample site. Emphasis was placed on sensitive habitats, especially those overlapping with the proposed project area.

Homogenous vegetation units were subjectively identified using satellite imagery and existing land cover maps. The floristic diversity and search for protected plants and flora SCC were conducted through timed meanders within representative habitat units delineated during the scoping fieldwork. Emphasis was placed on any sensitive habitats overlapping with the proposed project area.

The timed random meander method is a highly efficient method for conducting floristic analysis, specifically in detecting protected plants and flora SCC and maximising floristic coverage. In addition, the method is time and cost effective and highly suited for compiling observed flora species lists and therefore gives a rapid indication of flora diversity. The timed meander search was performed based on the original technique described by Goff *et al.* (1982). Suitable habitat for SCC were identified according to Raimondo *et al.* (2009) and targeted as part of the timed meanders.

At each sample site notes were made regarding current impacts (e.g. roads, erosion etc.), and this included the subjective recording of dominant vegetation species and any sensitive features (e.g. wetlands, outcrops etc.). In addition, opportunistic observations were made while navigating through the project area.

Relevant field guides and texts consulted for identification purposes in the field during the surveys included the following:

- A field guide to Wild flowers (Pooley, 1998);
- Orchids of South Africa (Johnson & Bytebier, 2015);
- Guide to the Aloes of South Africa (Van Wyk & Smith, 2014);
- Mesembs of the World (Smith *et al.,* 1998);
- Medicinal Plants of South Africa (Van Wyk *et al*., 2013);
- Freshwater Life: A field guide to the plants and animals of southern Africa (Griffiths & Day, 2016);
- Identification guide to southern African grasses. An identification manual with keys, descriptions and distributions (Fish *et al.,* 2015); and
- Field guide to trees of Southern Africa, Struik Publishers (Van Wyk & Van Wyk, 1997).

The field work methodology included the following survey techniques:

- Timed meanders;
- Sensitivity analysis based on structural and species diversity;
- Identification of protected floral species and
- Identification of floral red-data or red-listed species (Species of Conservation Concern).

5.4 Faunal Assessment

5.4.1 Desktop Assessment

The faunal desktop assessment involved the following:

- Compilation of expected species lists;
- Identification of any Red Data species or Species of Conservation Concern (SCC) potentially occurring in the area; and
- Emphasis was placed on the probability of occurrence of species of provincial, national and international conservation importance.

Distribution and SCC data was obtained from the following information sources:

- Animal Demography Unit (ADU, 2020);
- Southern African Bird Atlas Project 2 (SABAP2, 2019);
- South African Reptile Conservation Assessment (SARCA) (sarca.adu.org);
- Atlas and Red list of Reptiles of South Africa, Lesotho and Swaziland (Bates *et al.,* 2014);
- Checklist of Birds (Birdlife South Africa, 2015);
- Atlas and Red Data Book of Frogs of South Africa, Lesotho and Swaziland (Mintner *et al.,* 2004);
- The 2016 Red List of Mammals of South Africa, Lesotho and Swaziland (www.ewt.org.za) (EWT, 2016); and
- The International Union for Conservation of Nature's Red List of Threatened Species. Version 2021-3 (IUCN, 2021).

5.4.2 Field Survey

The field survey component of the assessment utilised a variety of sampling techniques including, but not limited to, the following:

- Visual observations (involving the use of binoculars and specialist camera equipment);
- Identification of tracks and signs; and
- Utilisation of local knowledge (discussions with the landowners).

Relevant field guides and texts consulted for identification purposes in the field during the survey included the following:

- Roberts Bird Guide, Second Edition (Chittenden *et al.,* 2016);
- A Guide to the Reptiles of Southern Africa (Alexander & Marais, 2007);
- Field guide to Snakes and other Reptiles of Southern Africa (Branch, 1998);
- A Complete Guide to the Frogs of Southern Africa (du Preez & Carruthers, 2009);
- The Mammals of the Southern African Subregion (Skinner & Chimimba, 2005); and
- Bats of Southern and Central Africa (Monadjem *et al.,* 2010).

5.5 Site Ecological Importance

The different habitat types within the assessment area were delineated and identified based on observations during the field assessment as well as available satellite imagery. These habitat types were assigned Ecological Importance (EI) categories based on their ecological integrity, conservation value, the presence of SCC 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).

BI is a function of Conservation Importance (CI) and the Functional Integrity (FI) of the receptor. The criteria for the CI and FI ratings are provided in Table 5-1 and Table 5-2, respectively.

Table 5-1 Summary of Conservation Importance criteria

Conservation Importance	Fulfilling Criteria
Very High	Confirmed or highly likely occurrence of CR, EN, VU or Extremely Rare or Critically Rare species that have a global 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 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 5-2 Summary of Functional Integrity 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.

Functional Integrity	Fulfilling Criteria
	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 5-3.

Table 5-3 Matrix used to derive Biodiversity Importance from Functional Integrity and Conservation Importance

Biodiversity Importance		Conservation Importance				
		Very high	**High**	**Medium**	**Low**	**Very low**
Functional Integrity	**Very high**	Very high	Very high	High	Medium	Low
	High	Very high	High	Medium	Medium	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 5-4.

Table 5-4 Summary of Receptor Resilience 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 remaining at a site even when a disturbance or impact is occurring, or species that have a very high likelihood of 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 remaining at a site even when a disturbance or impact is occurring, or species that have a high likelihood of 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 remaining at a site even when a disturbance or impact is occurring, or species that have a moderate likelihood of 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 remaining at a site even when a disturbance or impact is occurring, or species that have a low likelihood of 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 remain at a site even when a disturbance or impact is occurring, or species that are unlikely to return to a site once the disturbance or impact has been removed.

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

Table 5-5 Matrix used to derive Site Ecological Importance from Receptor Resilience and Biodiversity Importance

Site Ecological Importance		Biodiversity Importance				
		Very high	High	Medium	Low	Very low
Receptor Resilience	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 activities is provided in Table 5-6.

Table 5-6 Guidelines for interpreting Site Ecological Importance in the context of the proposed 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.
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.

6 Limitations and Assumptions

The following limitations and assumptions should be noted for the assessment:

- It is assumed that all information received from the client is accurate;
- All datasets accessed and utilised for this assessment are considered to be representative of the most recent and suitable data for the intended purposes; and
- Only a single season survey was conducted for this assessment, namely a wet season survey.

7 Receiving Environment

7.1 Desktop Spatial Assessment

Table 7-1 below has been produced as a result of the spatial data collected and analysed (as provided by various sources such as the national and provincial environmental authorities and SANBI). It presents a summative breakdown of the ecological boundaries considered and the associated relevance that each has to the region or project area.

Table 7-1 Desktop spatial features examined

Desktop Information Considered	Relevant/Not relevant	Section
Free State Province Biodiversity Plan, 2015	Relevant: The project area overlaps with ESA1 and ESA2 areas	7.1.1
Ecosystem Threat Status (NBA, 2018)	The project area falls within an ecosystem of Least Concern (LC)	7.1.2.1
Ecosystem Protection Level (NBA, 2018)	The project area is within a Poorly Protected (PP) ecosystem	7.1.2.2
Protected and Conservation Areas	Irrelevant: The project area is not within 5km of any protected or conservation area	-
Important Bird and Biodiversity Areas (IBA)	Irrelevant: There are no IBAs near the project region	-
National Protected Areas Expansion Strategy (NPAES, 2016)	Irrelevant: The project area does not overlap with any NPAES focus area	-

7.1.1 Free State Province Biodiversity Plan

The Free State Province Biodiversity Plan classifies areas within the province on the basis of their contributions to reaching the conservation targets within the province. These areas are primarily classified as either Critical Biodiversity Areas (CBAs) or Ecological Support Areas (ESAs).

Critical Biodiversity Areas (CBAs) are terrestrial 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 biodiversity targets cannot be met (SANBI, 2017).

Ecological Support Areas (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).

As shown in Figure 7-1 and according to the Free State Province Biodiversity Plan, the project area is situated mostly within an ESA2 area, with certain portions towards the north and south overlapping with ESA1 area. The closest CBA area is a CBA1 portion of land 3 km west of the project area.

According to SANBI (2017), an ESA1 area is a portion of land currently either in a good or fair ecological condition and the objective is to maintain it in at least a fair ecological condition; while an ESA2 area is in a severely modified condition where the objective is to avoid further deterioration in ecological condition.

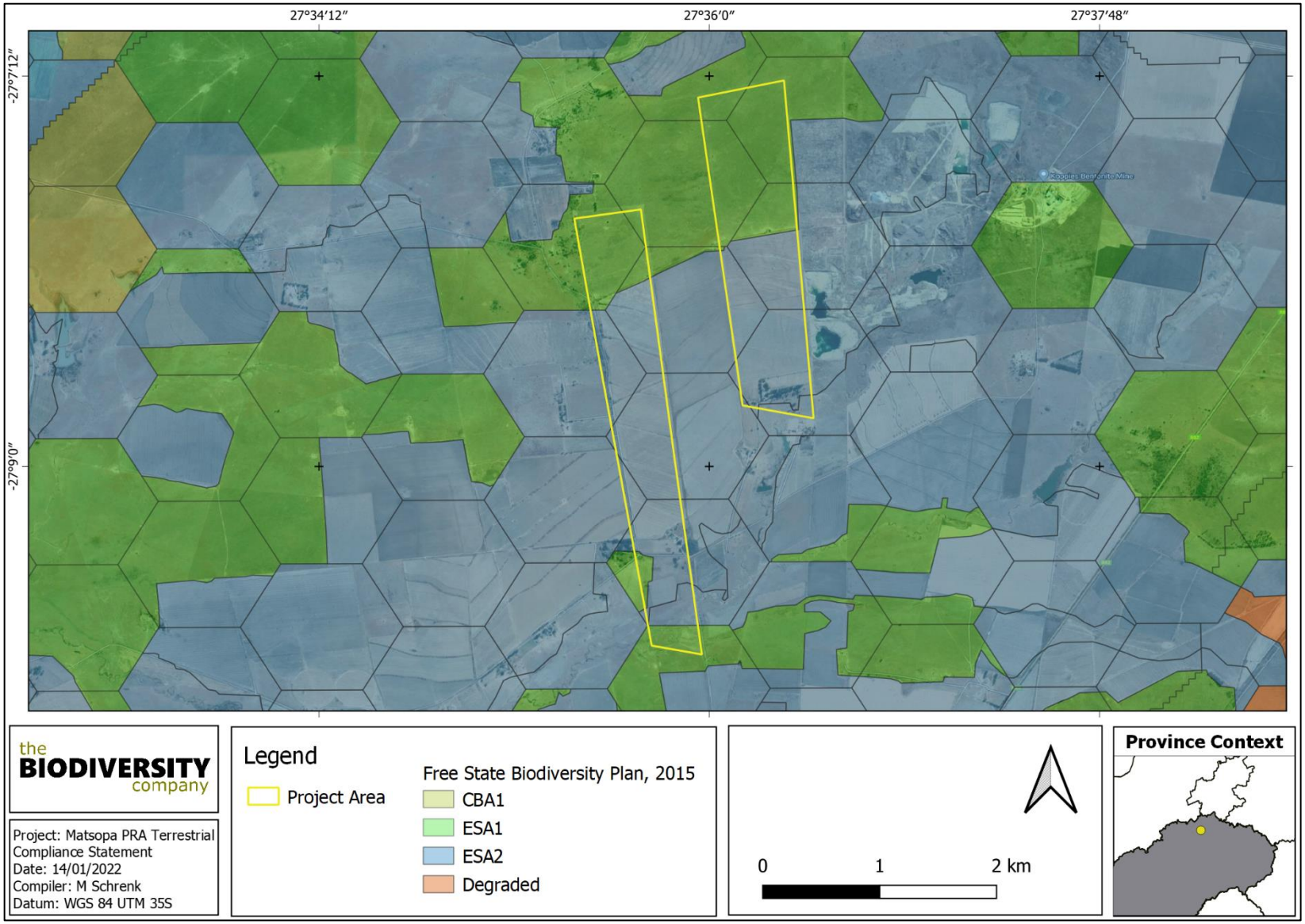


Figure 7-1 The project area superimposed on the Free State Biodiversity Plan (Collins, 2015)

7.1.2 The National Biodiversity Assessment

The National Biodiversity Assessment (NBA) was completed as a collaboration between the South African National Biodiversity Institute (SANBI), the Department of Environmental Affairs (DEA), and other stakeholders including scientists and biodiversity management experts throughout the country over a three-year period (Skowno *et al*., 2019).

The purpose of the NBA is to assess the state of South Africa's biodiversity with a view to understanding trends over time and informing policy and decision-making across a range of sectors (Skowno *et al*., 2019).

The two headline indicators assessed in the NBA are *ecosystem threat status* and *ecosystem protection level* (Skowno *et al*., 2019).

7.1.2.1 Ecosystem Threat Status

Ecosystem threat status outlines the degree to which ecosystems are still intact or alternatively losing vital aspects of their structure, function, and composition, on which their ability to provide ecosystem services ultimately depends (Skowno *et al*., 2019).

Ecosystem types are categorised as Critically Endangered (CR), Endangered (EN), Vulnerable (VU) or Least Concern (LC), based on the proportion of each ecosystem type that remains in good ecological condition (Skowno *et al*., 2019).

The project area was superimposed on the terrestrial ecosystem threat status database, and it falls across a Least Concern (LC) ecosystem. This means that most of the ecosystem type associated with the project area (see section 7.2.1) is still relatively intact/healthy across its entire national range.

7.1.2.2 Ecosystem Protection Level

Ecosystem protection level informs on whether ecosystems are adequately protected or under-protected. Ecosystem types are categorised as Not Protected (NP), Poorly Protected (PP), Moderately Protected (MP) or Well Protected (WP), based on the proportion of each ecosystem type that occurs within a protected area recognised in the Protected Areas Act (Skowno *et al*., 2019).

The project area was superimposed on the ecosystem protection level map to assess the protection status of terrestrial ecosystem associated with the project activity. Based on the dataset, the terrestrial ecosystem associated with the project area is rated as Poorly Protected (PP). This means that a low portion of the ecosystem associated with the project area is protected within the national protected areas network.

7.2 Ecological Desktop Assessments

7.2.1 Vegetation Assessment

The project area is situated within the Grassland Biome. The Grassland Biome in South Africa occurs mainly on the Highveld, the inland areas of the eastern seaboard, the mountainous areas of KwaZulu-Natal and the central parts of the Eastern Cape. The topography is mainly flat to rolling, but also includes mountainous regions and the Escarpment (Mucina & Rutherford, 2006). Major macroclimatic traits that characterise the Grassland Biome include:

a) Summer to strong summer rainfall and winter drought; and

b) Frost is common, and fog is found on the upper slopes of the Great Escarpment and seaward scarps (Mucina & Rutherford, 2006).

Grasslands characteristically contain herbaceous vegetation of a relatively short and simple structure that is dominated by graminoids, usually of the family Poaceae. Woody plants are rare (usually made up of low or medium-sized shrubs), absent, or confined to specific habitats such as smaller escarpments or koppies. Core grassland areas usually have deep, fertile soils although a wide spectrum of soil types occurs (Mucina & Rutherford, 2006).

The Grassland Biome is comprised of 4 parent bioregions and a total of 72 different vegetation types. The project area is situated within the Central Free State Grassland of the Dry Highveld Grassland Bioregion (Figure 7-2).

7.2.1.1 Central Free State Grassland

This vegetation type is characterised by undulating plains supporting short grassland, in natural condition dominated by *Themeda triandra* while *Eragrostis curvula* and *E. chloromelas* become dominant in degraded habitats. Dwarf karoo bushes establish in severely degraded clayey bottomlands. Overgrazed and trampled low-lying areas with heavy clayey soils are prone to *Vachellia karroo* encroachment (Mucina & Rutherford, 2006).

Some Important Taxa occurring within the Central Free State Grassland

Graminoids: *Aristida adscensionis, A. congesta, Cynodon dactylon, Eragrostis chloromelas, E. curvula.*

Succulent Herb: *Tripteris aghillana var. integrifolia.*

Low Shrubs: *Felicia muricata, Anthospermum rigidum subsp. pumilum, Helichrysum dregeanum, Melolobium candicans, Pentzia globosa.*

Conservation Status of the Central Free State Grassland

The conservation status of this vegetation community was listed by Mucina and Rutherford (2006) as Vulnerable. The national conservation target is 24%, but only small portions are protected within public and private Nature Reserves. Almost a quarter of the area has been transformed for either cultivation or the building of dams, however no serious infestation by alien flora has been observed.

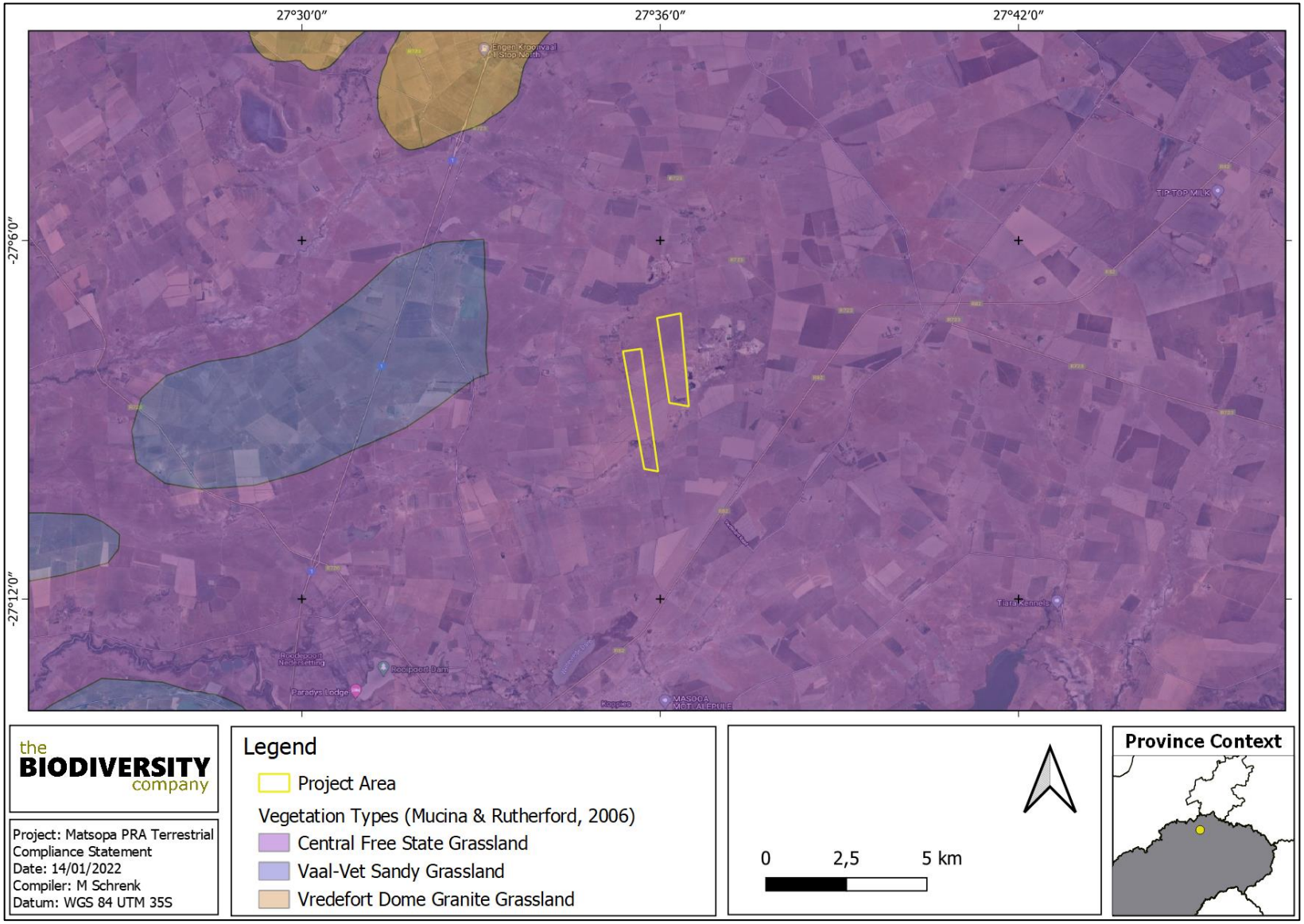


Figure 7-2 The project area showing the regional vegetation types (BGIS, 2018)

7.2.2 Botanical Assessment

Based on the Plants of Southern Africa (BODATSA-POSA, 2019) database, 516 plant species have the potential to occur in the project area and its surroundings. Of these 516 plant species, 1 species is listed as being a Species of Conservation Concern (SCC) and 23 are listed as provincially protected plants (Table 7-2).

Table 7-2 Protected Plants and Plant Species of Conservation Concern potentially occurring in the project area

Family	Taxon	Author	IUCN	SANBI	Legislation	Ecology
Amaryllidaceae	*Ammocharis coranica*	(Ker Gawl.) Herb.	LC	LC	Free State Protected Plant	Indigenous
Asphodelaceae	*Aloe davyana*	Schonland	-	-	Free State Protected Plant	Indigenous; Endemic
Anacampserotaceae	*Anacampseros filamentosa subsp. filamentosa*	(Haw.) Sims	-	-	Free State Protected Plant	Indigenous; Endemic
Anacampserotaceae	*Anacampseros subnuda subsp. subnuda*	Poelln.	LC	-	Free State Protected Plant	Indigenous
Amaryllidaceae	*Boophone disticha*	(L.f.) Herb.	-	LC, declining	Free State Protected Plant	Indigenous
Amaryllidaceae	*Brunsvigia radulosa*	Herb.	LC	-	Free State Protected Plant	Indigenous
Amaryllidaceae	*Crinum bulbispermum*	(Burm.f.) Milne-Redh. & Schweick.	LC	LC, declining	Free State Protected Plant	Indigenous
Araliaceae	*Cussonia paniculata subsp. sinuata*	Eckl. & Zeyh.	LC	-	Free State Protected Plant	Indigenous
Hyacinthaceae	*Eucomis autumnalis subsp. amaryllidifolia*	(Mill.) Chitt.	-	-	Free State Protected Plant	Indigenous
Orchidaceae	*Eulophia ovalis var. ovalis*	Lindl.	LC	-	Free State Protected Plant	Indigenous
Euphorbiaceae	*Euphorbia clavarioides*	Boiss.	LC	-	Free State Protected Plant	Indigenous
Euphorbiaceae	*Euphorbia rhombifolia*	Boiss.	LC	-	Free State Protected Plant	Indigenous
Euphorbiaceae	*Euphorbia striata*	Thunb.	LC	-	Free State Protected Plant	Indigenous
Iridaceae	*Gladiolus permeabilis*	D.Delaroche	LC	-	Free State Protected Plant	Indigenous
Asteraceae	*Helichrysum callicomum*	Harv.	LC	-	Free State Protected Plant	Indigenous
Asteraceae	*Helichrysum cerastioides var. cerastioides*	DC.	LC	-	Free State Protected Plant	Indigenous
Asteraceae	*Helichrysum kraussii*	Sch.Bip.	LC	-	Free State Protected Plant	Indigenous
Asteraceae	*Helichrysum nudifolium var. nudifolium*	(L.) Less.	LC	LC	Free State Protected Plant	Indigenous
Asteraceae	*Helichrysum paronychioides*	DC.	LC	-	Free State Protected Plant	Indigenous
Asteraceae	*Helichrysum rugulosum*	Less.	LC	LC	Free State Protected Plant	Indigenous
Asteraceae	*Helichrysum setosum*	Harv.	LC	-	Free State Protected Plant	Indigenous
Asphodelaceae	*Kniphofia typhoides*	Codd	NT	NT	International and National Red List, and Free State Protected Plant	Indigenous; Endemic
Proteaceae	*Protea caffra subsp. caffra*	Meisn.	LC	-	Free State Protected Plant	Indigenous

Provincially protected plants are legally protected by the Free State Nature Conservation Ordinance 8 of 1969, and Red Listed plants (SCC) are those that are threatened to some degree with extinction and must be protected to ensure their survival in the wild.

7.2.2.1 Previous Report Findings

A vegetation assessment was conducted by Dimela Eco Consulting during January 2017 for the existing Koppies Bentonite Mine, less than 2 km east of the project area. Based on this report and its findings, two SCC were recorded on the mine property, namely *Boophone disticha* and *Crinum bulbispermum.* Additionally, five provincially protected plants were observed, specifically *Boophone distichia, Crinum bulbipsermum, Ammocharis corranica, Aloe greatheadii,* and *Gladiolus crassifolius* (Eyssell, 2017).

7.2.3 Faunal Assessment

Largely based on the South African Bird Atlas Project Version 2 (SABAP2, 2017) and the Animal Demography Unit (ADU, 2020) databases, Table 7-3 summarises the total number of animal species that have the potential to occur in or around the project area, and the corresponding number of SCC.

Table 7-3 Total number of potential fauna species present, and corresponding SCC

Fauna Type	Total Potential No.	Total SCC
Avifauna	162	5
Mammals	17	3
Herpetofauna	20	1

These numbers exclude any animals that only occur within nature reserves and private reserves. Of the five avifaunal SCC, four have a moderate to high likelihood of project area occurrence, *Circus maurus* (Black Harrier), *Glareola nordmanni* (Black-winged Pratincole), *Sagittarius serpentarius* (Secretarybird) and *Tyto capensis* (African Grass Owl). The other SCC, the Curlew Sandpiper, is unlikely to occur within the project area due to a lack of suitable habitat and the associated disturbed nature of portions of the project area and surrounds.

Of the four total mammal and herpetofaunal (reptiles and amphibians) SCC listed, all four have a moderate to high likelihood of occurring in the project area. These are *Atelerix frontalis* (South Africa Hedgehog), *Leptailurus serval* (Serval), *Otomys auratus* (Southern African Vlei Rat, Grassland type) and *Smaug giganteus* (Sungazer Lizard).

Note: The total potential number of mammal and herpetofaunal species counted during the desktop assessment is irregularly low and this is likely due to a low number of historical recordings uploaded to the datasets for the particular region. Thus, this is not taken to be representative of the true number/diversity of species that is likely to occur within the project region.

7.2.3.1 Previous Report Findings

A faunal species assessment was conducted by Barbara Kasl during January 2017 for the nearby existing Koppies Bentonite Mine. The report did not record any faunal SCC on the property; however, it is noted that several endemic species were observed during the survey (Kasl, 2017).

7.3 Field Survey

This section details the observations recorded during an on-site field survey conducted to ground truth the floral, faunal, and habitat features of the project area. These observations pertain to the current state of the area as of January 2022.

7.3.1 Terrestrial Fauna and Flora

During the terrestrial survey the floral and faunal communities within the project area were assessed and photographs were captured, some of which are provided in this section of the report. For ease of reading, the observations and discussions pertaining to both the floral species and faunal species recorded are separated below.

7.3.1.1 Flora and Vegetation

The central to southern portions of the project area showed little to no indigenous flora or healthy species diversity due to the fact that large areas are currently, and have historically been, used for agriculture (Figure 7-3). The boundaries of these cultivated areas are dominated by dense stands of the indigenous *Asparagus laricinus* and *Gomphocarpus fruticosus*, both commonly found in disturbed areas (Figure 7-4). Southern sections are dominated by mature, invasive *Eucalyptus* trees.

The northern sections of the project area (including the southern section of the farm Geluk, see Figure 2-1) were found to contain a healthy population and diversity of indigenous graminoides (grasses), including *Cymbopogon caesius, Themeda triandra, Digitaria eriantha,* and *Setaria sphacelata var. sericea*. These grasses are mostly climax and decreaser grasses, characteristically found in well-established ecosystems that have not been recently disturbed or overgrazed (Figure 7-5).

Other than the presence of healthy graminoides, these sections were also well populated by a diverse community of indigenous herbaceous plants including *Commelina africana, Hibiscus microcarpus* and *Scabiosa columbaria* (Figure 7-6). Small *Delosperma* and *Ledebouria* herbs were observed throughout these portions as well (Figure 7-7), and certain specific areas contained *Vachellia* and *Ziziphus* trees.

Minor ingress of the invasive *Solanum campylacanthum* was recorded, as well as the presence of numerous indigenous *Berkheya* weeds (Figure 7-8).

The southernmost portion of the farm Geluk (Figure 7-9) contained more wetland-type grasses such as the *Setaria sphacelata var. sericea* as well as *Cyperus* spp. And large areas of this section were dominated by *Berkheya* weeds and some exotic herbaceous plants such as the *Mirabilis* spp. Smaller portions of the project area contained minor seeps and depressions which also supported hydrophilic vegetation.

Notably, one protected plant was found in large quantities throughout the northern sections of the project area, namely *Boophone disticha (*Figure 7-10*)*. A map of the observed *Boophone* locations is provided in Figure 7-11 below, note it is likely that more individuals are present on site and only the observed plants are recorded in the map.

Figure 7-3 Large areas are used for active agriculture, limited indigenous flora present

Figure 7-4 Asparagus laricinus is common in areas surrounding the agricultural land

Figure 7-5 Themeda triandra (as observed and pictured above) is common within undisturbed/healthy open grassland

Figure 7-6 Scabiosa columbaria was widespread throughout the northern areas

Figure 7-7 The small bulbous herb, Ledebouria, was well dispersed across northern sections

Figure 7-8 Berkheya weeds are encroaching into large portions of the project area

Figure 7-9 Wetland sections of the project area are dominated by a wide diversity of hydrophilic grasses and sedges

Figure 7-10 The protected Boophone disticha occurs throughout the northern sections

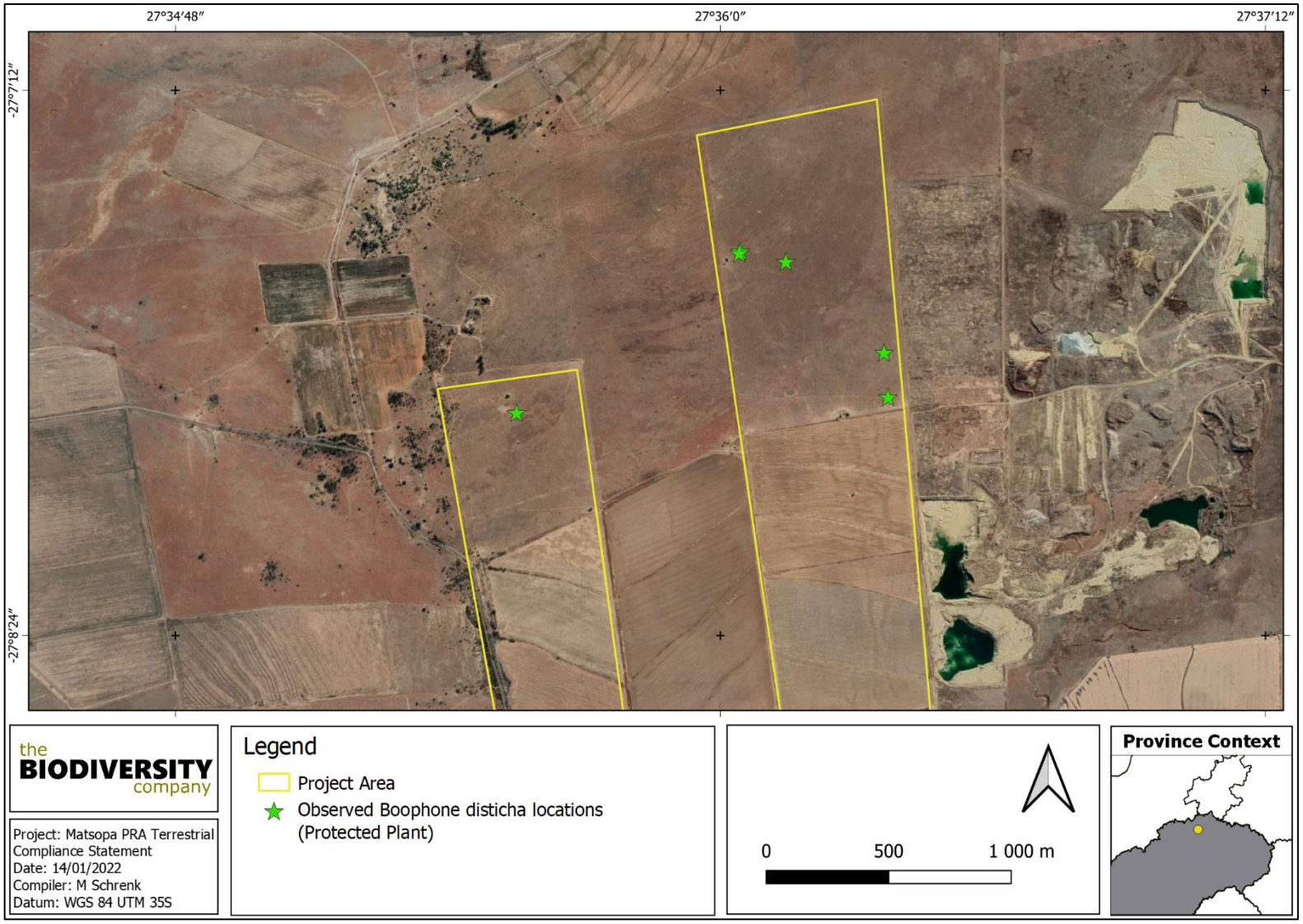


Figure 7-11 Boophone disticha locations as recorded during the field survey

7.3.1.2 Fauna

Due to the large project area as well as the relatively undisturbed state of the northern and southern sections, numerous observations of locally common avifaunal species were recorded, however no avifaunal SCC were identified. Mammal species directly observed included the Cape ground squirrel and the Cape porcupine (Figure 7-12), both of which are confirmed to nest throughout the project area due to the numerous burrows sighted throughout the northern and southern portions. A single mongoose skull and a shed puff adder skin was also noted (Figure 7-13). No mammal SCC were recorded however the landowner reported sightings of the protected and red-listed *Atelerix frontalis* (South Africa Hedgehog).

Reptile and amphibian activity was low and although no herpetofaunal SCC were directly observed, several burrows were recorded within the project area which are highly characteristic of the red listed and sensitive *Smaug giganteus* (Sungazer lizard), see Figure 7-14. Additionally, interviews with the landowner indicate previous sightings of the Sungazer in the northern portion of the farm Geluk. The Sungazer is listed as vulnerable on both a regional and international scale and it is also a Free State protected species according to the Free State Nature Conservation Ordinance 8 of 1969. Specialist recommendations are provided in section 9.1 pertaining to the possible presence of this highly sensitive and endemic species.

Large sections of the habitat within the project area and immediate surrounds are conducive to supporting the nesting or regular foraging of the faunal SCC recorded via the desktop study, and as such it is possible that more faunal SCC, in addition to the possible Sungazer and Hedgehog presence, are present or have recently been present in the area. The main factors noted which support this notion are the large size of the property area, the presence of numerous water sources and wetland habitat, and the minimal disturbances that have occurred across certain areas.

Figure 7-12 Cape Porcupine observed within the project area

Figure 7-13 Confirmed presence of puff adder within the project area

Figure 7-14 Possible Sungazer presence within the project area

7.3.2 Habitat Survey and Site Ecological Importance

The main habitat types identified across the project area were initially identified and pre-delineated largely based on aerial imagery from early 2021. These main habitat types were then refined based on the field coverage and data collected during the survey. Four habitat units are delineated for the project area: transformed habitat, degraded grassland, grassland, and wetland.

The transformed habitat unit represents sections of the project area that have been completely cleared of any remaining healthy and functioning natural vegetation, these are the portions of the project area that have been historically utilised for agriculture and are correctly classified by the Free State Biodiversity Plan as critically modified ESA2 vegetation. Degraded grassland is a relatively small, delineated portion of habitat for the project area and contains a mix of overgrazed or previously harvested agricultural land or pasture, in addition to alien invasive species and pioneer grasses and shrubs such as *Asparagus*.

The grassland habitat covers only the northern sections of the project area and represents the most in-tact and functioning ecosystem of the area, due to the high diversity of established climax grasses, indigenous herbaceous plants, and a healthy community of indigenous wild mammals. The presence of numerous protected *Boophone disticha* as well as the possible presence of the Sungazer lizard adds to this habitat's importance. If this land was not competing with adjacent land uses it would likely be assigned a CBA2 category according to the Free State Biodiversity Plan. The final delineated habitat unit, the wetland habitat, largely occurs across the southernmost portion of the farm Geluk, with minor seeps, dams and depressions scattered across the rest of the project area. These areas support a rich diversity of hydrophilic grasses and sedges and are likely to attract diverse avifaunal and mammal species throughout the year due to the presence of water and unique foraging/nesting medium.

Based on the criteria provided in section 5.5 of this report the four delineated habitat types have each been allocated a sensitivity category, or SEI, and this breakdown is presented in Table 7-4 below. In order to identify and spatially present sensitive features in terms of the relevant specialist discipline, the sensitivities of each of the habitat types delineated within the project area are mapped in Figure 7-15.

It is important to note that the map does not replace any local, provincial, or national government legislation relating to these areas or the land use capabilities or sensitivities of these environments.

Table 7-4 Site Ecological Importance assessment summary of the habitat types delineated within the project area

Habitat	Conservation Importance	Functional Integrity	Biodiversity Importance	Receptor Resilience	Site Ecological Importance
Transformed	Low	Medium	Low	High	Very Low
Degraded Grassland	Low	Medium	Low	Medium	Low
Grassland	Very High	High	Very High	Medium	Very High
Wetland	High	Medium	Medium	Low	High

Consider the following guidelines when interpreting SEI in the context of any proposed development or disturbance activities:

Very Low: Minimisation mitigation includes -

- Development activities of medium to high impact acceptable and restoration activities may not be required.

Low: Minimisation and restoration mitigation includes -

- Development activities of medium to high impact acceptable followed by appropriate restoration activities.

Medium: Minimisation and restoration mitigation includes -

- Development activities of medium impact acceptable followed by appropriate restoration activities.

High: Avoidance mitigation wherever possible. Minimisation mitigation includes –

- Changes to project infrastructure design to limit the amount of habitat impacted, limited development activities of low impact acceptable; and
- Offset mitigation may be required for high impact 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); and
- Destructive impacts for species/ecosystems where persistence target remains.

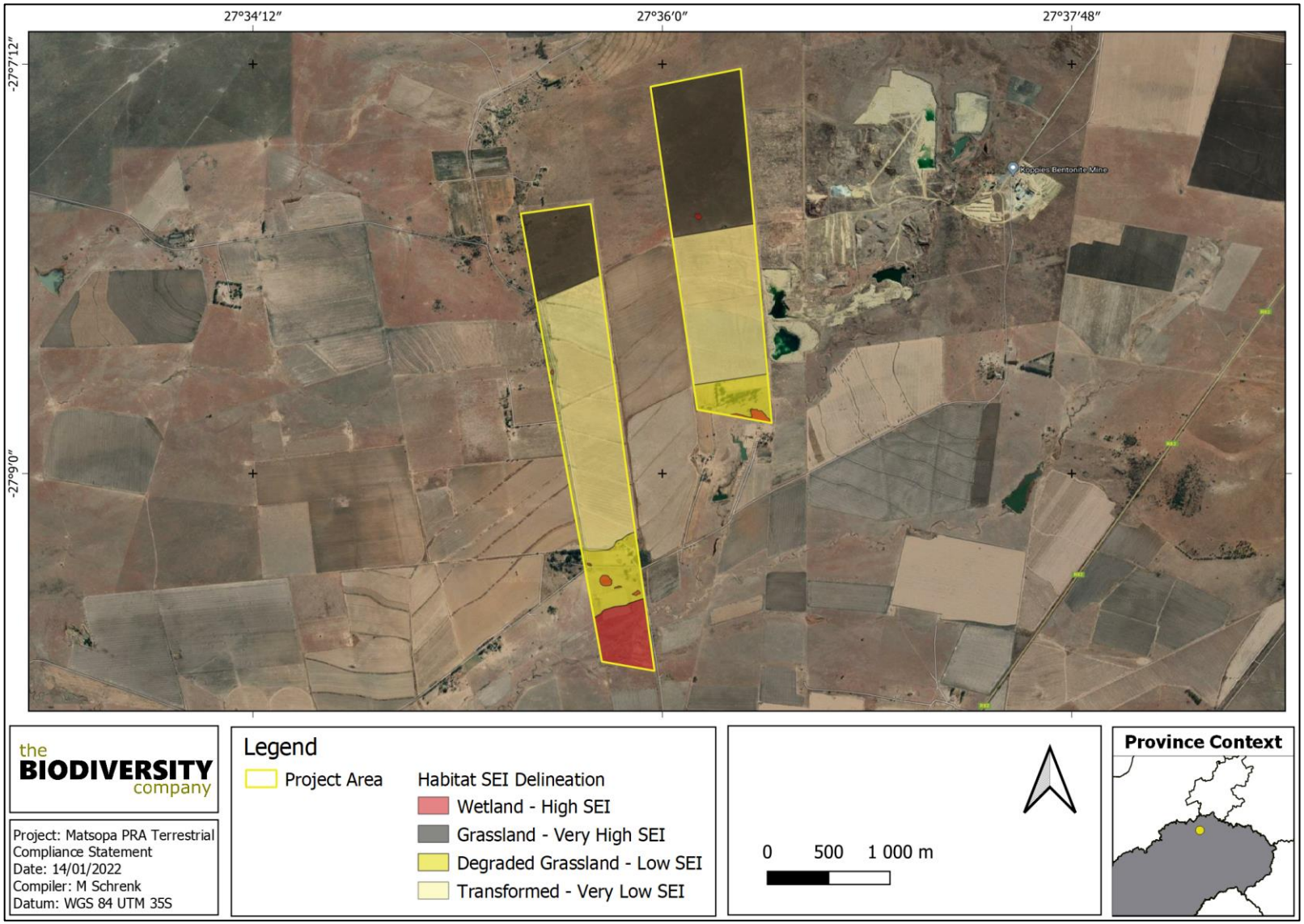
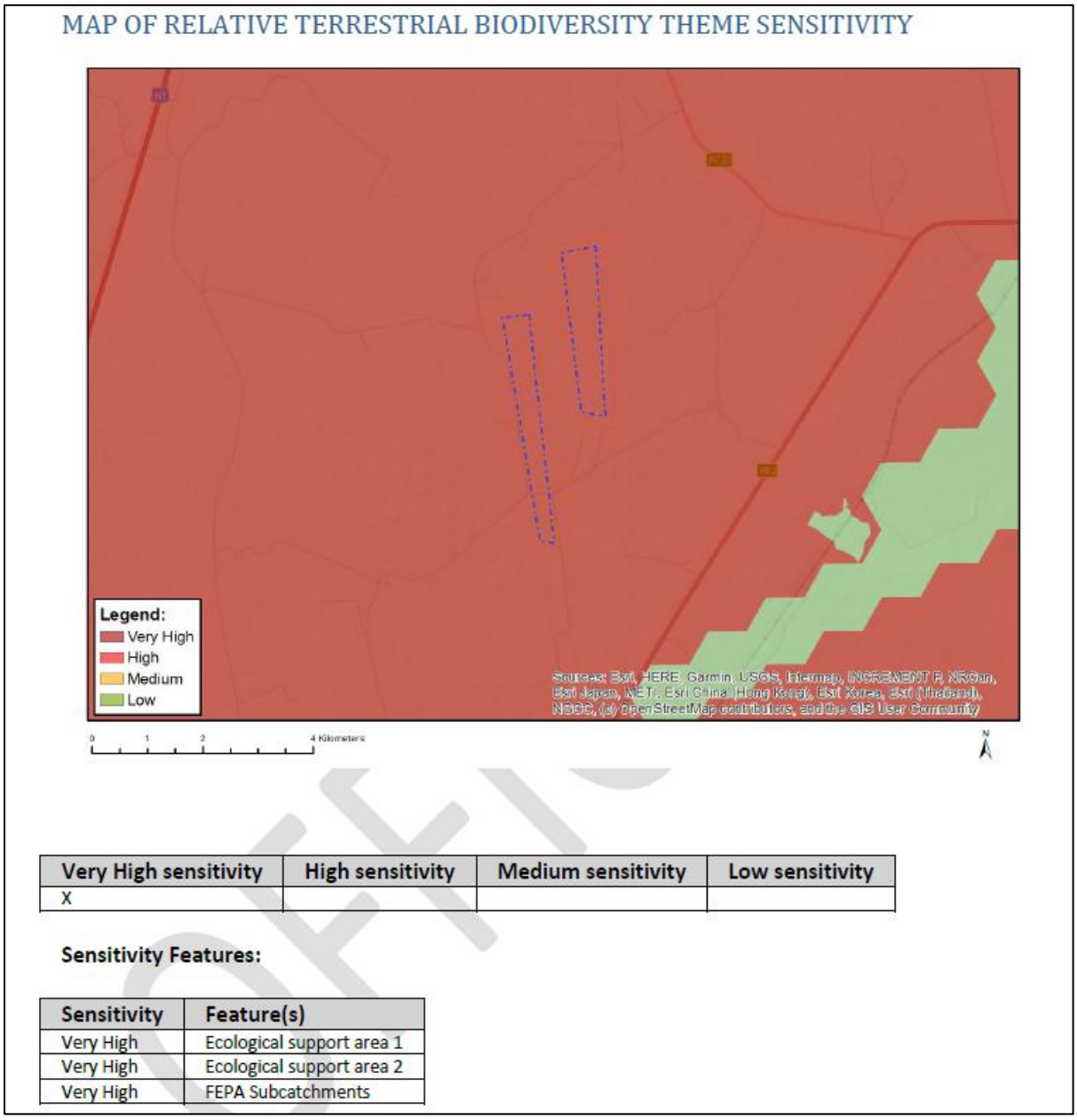


Figure 7-15 Biodiversity SEI delineation relevant to the project area

The terrestrial biodiversity theme sensitivity as indicated in the screening report (compiled by the National Web based Environmental Screening Tool) was derived to be 'Very High' (Figure 7-16), mainly due to the ESA status of the area.



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Very High	Ecological support area 1
Very High	Ecological support area 2
Very High	FEPA Subcatchments

Figure 7-16 Biodiversity Sensitivity of the project area according to the Screening Report

The completion of the terrestrial biodiversity desktop and field assessments confirms the 'Very High' sensitivity presented by the screening report. As discussed above, the project area contains large portions of land that are classified as having a 'Very High' to 'High' overall terrestrial biodiversity sensitivity. It is noted however, that approximately 55% of the total project area has been assigned a 'Very Low' to 'Low' sensitivity.

The screening report classified the animal species theme sensitivity as being of a 'Medium' sensitivity and the plant species theme as 'Low' sensitivity. Following the findings of the field survey, both the animal and plant species themes may be re-classified as having 'High'

sensitivities. This is due to the presence of protected flora as well as the possible presence of highly sensitive fauna (Sungazer).

8 Proposed Impact Management Plan

The aim of the management outcomes is to present mitigation actions in such a way that they can be incorporated into the Environmental Management Programme (EMPr) for the project, which should in turn allow for a more successful implementation and auditing of the mitigations and monitoring guidelines. Table 8-1 presents the recommended mitigation measures and the respective timeframes, targets, and performance indicators relative to the terrestrial study.

The focus of mitigation measures is to reduce the significance of potential impacts associated with the development and thereby to:

- Prevent the further loss and fragmentation of vegetation communities and the ESA areas in the vicinity of the project area;
- Reduce the negative fragmentation effects of the development and enable the safe movement of faunal species; and
- Prevent the direct and indirect loss and disturbance of faunal species and communities (including any potentially occurring Species of Conservation Concern).

Special attention must be paid to the ‘Vegetation and Habitats’ and ‘Fauna’ sections below as these sections provide recommended and important mitigation measures pertaining to the protected flora recorded and the possible reptile SCC, in addition to any further SCC that are likely to occur within the project area.

Table 8-1 Mitigation measures from the terrestrial assessment; including requirements for timeframes, roles, and responsibilities

Management outcome: Vegetation and Habitats				
Impact Management Actions	**Implementation**		**Monitoring**	
	Phase	Responsible Party	Aspect	Frequency
High visibility flags must be placed near any protected or threatened plants (SCC) in order to avoid any damage or destruction of the species until the relevant permit is obtained for destruction or translocation (if necessary). All red-data plants located in any sections that are to be disturbed should be relocated. Any individual protected plant that was observed needs a relocation or destruction permit for any individual that may be removed or destroyed as a result of the activities. Preferably, the plants should be relocated to an area that will not be impacted on by future activities.	Planning Phase, Pre-Prospecting	Project manager, Environmental Officer & Contractor	Plant species	Ongoing
All highly sensitive areas should be considered as "no-go areas". Any planned activities should be realigned to prioritise prospecting within low/medium sensitivity areas. Prospecting in high sensitivity areas must be informed by the wetland assessment.	Prospecting/Drilling Phase	Project manager, Environmental Officer	Prospecting footprint	During phase
Areas of indigenous vegetation, even secondary communities outside of the direct project footprint, should not be fragmented or disturbed further.	All Phases	Project manager, Environmental Officer	Areas of indigenous vegetation	Ongoing
All activities must be restricted to within the low/medium sensitivity areas. No unnecessary loss of highly sensitivity areas should be permitted. It is recommended that areas to be disturbed be specifically demarcated so that during the activity phase, only the demarcated areas be impacted upon.	Prospecting/Drilling Phase	Project manager, Environmental Officer	Prospecting within demarcated areas	During phase
All vehicles and personnel should make use of any existing roads and walking paths as far as possible, especially operational vehicles.	All Phases	Environmental Officer & Design Engineer	Roads and paths used	During phase
All laydown, chemical toilets etc. should be restricted to low/medium sensitivity areas. Any materials may not be stored for extended periods of time and must be removed from the project area once the prospecting has been concluded. No storage of vehicles or equipment will be allowed outside of the designated project areas at any time.	All Phases	Environmental Officer & Design Engineer	Laydown areas and material storage & placement	During phase
Any areas that are denuded during prospecting need to be re-vegetated with indigenous vegetation to prevent erosion during flood events and strong winds. This will also reduce the likelihood of encroachment by alien invasive plant species.	Closure Phase/Rehabilitation phase	Environmental Officer & Contractor	Assess the state of rehabilitation and encroachment of alien vegetation	Quarterly for up to two years after the closure
Any significantly disturbed areas are to be rehabilitated and landscaped. Rehabilitation of the disturbed areas existing in the project area must be made a priority. Topsoil must also be utilised,	Closure Phase/Rehabilitation phase	Environmental Officer & Contractor	Rehabilitation	Quarterly monitoring

and any disturbed area must be re-vegetated with plant and grass species which are endemic to the project area vegetation type.				
Progressive rehabilitation of prospecting areas or cleared areas will enable topsoil to be returned more rapidly, thus ensuring more recruitment from the existing seedbank.	Closure Phase/Rehabilitation phase	Environmental Officer & Contractor	Prospecting footprint rehabilitation	During Phase
A hydrocarbon spill management plan must be put in place to ensure that should there be any chemical spill out or over that it does not run into the surrounding areas. The Contractor shall be in possession of an emergency spill kit that must always be complete and available on site. Drip trays or any form of oil absorbent material must be placed underneath vehicles/machinery and equipment when not in use. No servicing of equipment is to take place on site unless absolutely necessary. All contaminated soil shall be treated in situ or removed and be placed in containers for disposal at a licensed facility. It is important to appropriately contain any diesel storage tanks and/or machinery spills (e.g., accidental spills of hydrocarbons oils, diesel etc.) in such a way as to prevent them leaking and entering the environment.	All Phases	Environmental Officer & Contractor	Spill events, Vehicles dripping	Ongoing
Leaking equipment and vehicles must be repaired immediately or be removed from project area to facilitate repair.	All Phases	Environmental Officer & Contractor	Leaks and spills	Ongoing
It should be made an offence for any staff to take/bring any plant species into/out of any portion of the project area. No plant species whether indigenous or exotic should be brought into/taken from the project area, to prevent the spread of exotic or invasive species or the illegal collection of plants.	All Phases	Project manager, Environmental Officer	Any instances	Ongoing
A fire management plan needs to be complied and implemented.	Closure Phase/Rehabilitation phase	Environmental Officer & Contractor	Fire Management	During Phase
A monitoring and management plan needs to be implemented for any remaining highly sensitive areas and no future activities within these areas should be allowed unless a Full EIA authorises it. This plan must include access control, monitoring and environmental awareness.	All Phases	Estate manager, Project manager, Environmental Officer	Greenbelt Management and conservation	Ongoing
Management outcome: Fauna				
Impact Management Actions	**Implementation**		**Monitoring**	
	Phase	Responsible Party	Aspect	Frequency
No trapping, killing, or poisoning of any wildlife is to be allowed. Signs must be put up to enforce this.	All Phases	Environmental Officer	Evidence of trapping etc	Ongoing
Once a drilled hole is completed and no longer required it must be permanently covered, preferably with backfilling and adequate compacting. This will prevent small mammals, reptiles, and amphibians from falling in and getting killed.	Prospecting/Drilling Phase and Closure	Environmental Officer & Contractor	Presence of trapped animals and open holes	During phase

A qualified environmental control officer must be on site when prospecting first begins. The area must be walked though at least once prior to first location prospecting to ensure no faunal species remain in the habitat and get killed. Should animals not move out of the area on their own relevant specialists must be contacted to advise on how the species can be relocated.	Prospecting/Drilling Phase	Environmental Officer, Contractor	Presence of any floral or faunal species	During phase
The drilling of boreholes must be done in a progressive manner in order to allow burrowing animals time to move off and to prevent trapping. Should any holes remain open overnight they must be covered temporarily to ensure no fauna species fall in.	Planning and Prospecting/Drilling Phase	Environmental Officer & Contractor, Engineer	Presence of trapped animals and open holes	Ongoing
Should any SCC fauna be observed on site before or during drilling, all activities must cease immediately, and a relevant specialist must be consulted in order to facilitate the capture or removal of the animal.	All Phases	Environmental Officer, Contractor, and estate manager	SCC fauna	Ongoing
The areas to be prospected must be specifically demarcated to prevent movement of staff or any individual into highly sensitive areas and the surrounding environments. Signs must be put up to enforce this.	Planning and Prospecting/Drilling Phase	Project manager, Environmental Officer	Infringement into these areas	During phase
The duration of the drilling programme should be minimised to as short a term as possible, to reduce the period of disturbance on fauna.	Prospecting/Drilling Phase	Project manager, Environmental Officer & Design Engineer	Activity timeframe	During phase
Outside lighting (if applicable) should be designed and limited to minimize impacts on fauna. Fluorescent and mercury vapor lighting should be avoided, and sodium vapor (yellow) lights should be used wherever possible.	Prospecting/Drilling Phase	Project manager, Environmental Officer & Design Engineer	Light pollution and period of light	During phase
All operational motor vehicle operators should undergo an environmental induction that includes instruction on the need to comply with speed limits, to respect all forms of wildlife. Speed limits must still be enforced to ensure that road killings and erosion is limited.	Prospecting/Drilling Phase	Health and Safety Officer	Compliance to the training	During phase
Schedule activities and operations during least sensitive periods, to avoid migration, nesting, and breeding seasons.	All Phases	Project manager, Environmental Officer & Design Engineer	Activities should take place during the day	Ongoing
Signs must be put up in order to show the importance and sensitivity of the wetland areas and their functions.	All Phases	Environmental Officer	Presence and condition of signs	Ongoing
Use environmentally friendly dust suppressant products.	Prospecting/Drilling Phase	Environmental Officer & Contractor, Engineer	Presence of chemicals in and around the project area	Ongoing
Management outcome: Alien Vegetation and fauna				
Impact Management Actions	**Implementation**		**Monitoring**	
	Phase	Responsible Party	Aspect	Frequency

The compilation and implementation of an alien vegetation management plan is very important, especially because of the numerous invasive species identified on site which, if left unchecked, will continue to grow, and spread prolifically leading to further and more significant deterioration to the health of the natural environment within the property area. The plan must especially pertain to any recently cleared and changed areas.	All Phases	Project manager, Environmental Officer & Contractor	Assess presence and encroachment of alien vegetation	Quarterly monitoring
The footprint area of the prospecting activities should be kept to a minimum. The footprint area must be clearly demarcated to avoid unnecessary disturbances to adjacent areas.	Prospecting/Drilling Phase	Project manager, Environmental Officer & Contractor	Footprint Area	During phase
Waste management must be a priority and all waste must be collected and stored adequately. It is recommended that all waste be removed from site on a weekly basis to prevent rodents and pests from entering the site and proliferating.	All Phases	Environmental Officer & Health and Safety Officer	Presence of waste	Life of operation
Management outcome: Dust				
Impact Management Actions	**Implementation**		**Monitoring**	
	Phase	Responsible Party	Aspect	Frequency
Dust-reducing mitigation measures must be put in place and must be strictly adhered to, particularly for all roads that are to be frequently used. This includes the wetting of exposed soft soil surfaces and not conducting activities on windy days which will increase the likelihood of dust being generated. Only environmentally friendly suppressants may be used to avoid the pollution of water sources. Speed limits must be put in place to reduce erosion, and speed bumps should also be constructed.	All Phases	Contractor	Dustfall	Ongoing, as per the dust monitoring program
Management outcome: Waste management				
Impact Management Actions	**Implementation**		**Monitoring**	
	Phase	Responsible Party	Aspect	Frequency
Waste management must be a priority and all waste must be collected and stored adequately. It is recommended that all waste be removed from site on a weekly basis to prevent rodents and pests entering the site. • **Refuse bins will be emptied and secured;** • **Temporary storage of domestic waste shall be in covered waste skips; and** • **Maximum domestic waste storage period will be 10 days.**	All Phases	Environmental Officer & Health and Safety Officer	Presence of waste	Life of operation
Any litter, spills, fuels, chemical and human waste in and around the project area must be removed and disposed of timeously and responsibly.	Prospecting/Drilling Phase and Closure	Environmental Officer & Health and Safety Officer	Presence of Waste	Daily

A minimum of one toilet must be provided per 10 persons. Portable toilets must be pumped dry to ensure that the system does not degrade over time and spill into the surrounding area.	All Phases	Environmental Officer & Health and Safety Officer	Number of toilets per staff member. Waste levels	Daily
The Contractor should supply sealable and properly marked domestic waste collection bins and all solid waste collected shall be disposed of at a licensed disposal facility.	All Phases	Environmental Officer & Health and Safety Officer, Contractor	Availability of bins and the collection of the waste	Ongoing
Where a registered disposal facility is not available close to the project area, the Contractor/ shall provide a method statement with regards to waste management. Under no circumstances may domestic waste be burned on site.	All Phases	Environmental Officer, Contractor & Health and Safety Officer	Collection/handling of the waste	Ongoing
Management outcome: Environmental awareness training				
Impact Management Actions	**Implementation**		**Monitoring**	
	Phase	Responsible Party	Aspect	Frequency
All personnel to undergo Environmental Awareness Training. A signed register of attendance must be kept for proof. Discussions are required on all sensitive environmental receptors within the project area to inform contractors and site staff of the presence of protected flora, their identification, conservation status and importance, biology, habitat requirements and management requirements in line with the Environmental Authorisation and within the EMPr.	All Phases	Health and Safety Officer	Compliance to the training	Ongoing
Contractors and employees must all undergo a strict environmental induction and be made aware of the designated "no-go" areas (areas to be avoided).	All Phases	Health and Safety Officer	Compliance to the training	Ongoing
Homeowners and staff are to receive an Environmental Awareness programme which also covers the surrounding area. This programme must be used to inform of the importance of these areas and their conservation.	All Phases	Estate manager	Environmental Awareness	Ongoing

9 Conclusion

The project area is well classified by the Free State Biodiversity Plan such that central portions are representative of ESA2 areas, and the northern and southern sections are representative of ESA1 areas. However, the northern and southern portions are regarded as being in a good ecological condition and would likely be categorised as CBA2 areas were it not for their close competition with harmful land-use practices.

While over half of the project area has been critically modified from its historical state, there are still major portions that closely resemble healthy functioning habitat which are likely to contain SCC or additional protected flora. Thus, it is very important that the management outcomes presented above be adhered to, in order to mitigate any negative environmental impacts that might stem from the prospecting activities.

Completion of the terrestrial biodiversity assessment led to an agreement with the 'Very High' classification for the terrestrial biodiversity theme sensitivity as allocated by the National Environmental Screening Tool. This is due to the fact that a large portion of the project area has been assigned a 'High' to 'Very High' sensitivity, because of the numerous protected plants recorded and the possible presence of the sensitive Sungazer lizard, in addition to the rich diversity of indigenous grass and herbaceous plant species observed. It is noted that just over half of the project area is however allocated a 'Low" to 'Very Low' sensitivity due to the severe levels of environmental degradation present.

The portions of land within the project area that are classified as having a sensitivity rating of 'Very Low' to 'Low", namely the transformed and degraded grassland habitats, are likely to face minimal further impacts from any low to medium impact prospecting activities, and as such the proposed activities may only proceed within these areas.

The project area contains a sharply contrasting set of habitats and thus recommendations are provided below which may serve to guide the project progress in this regard.

9.1 Specialist Recommendations

The grassland habitat is currently assigned a sensitivity rating of 'Very High', however this rating is primarily assigned due to the likely presence of the Sungazer lizard (highly characteristic burrows observed) and other SCC. The Sungazer lizard (*Smaug giganteus*) is a highly sensitive and protected endemic species, the following databases and legislations apply:

- A listing of 'Vulnerable' on both regional and international (IUCN) red lists;
- Provincially protected as per schedule 1 of the Free State Nature Conservation Ordinance 8 of 1969;
- Nationally protected as per the latest published list of Threatened or Protected Species (TOPS); and
- Internationally protected and listed on the Convention on International Trade in Endangered Species (CITES) Appendix II.

A moderate to high likelihood of the *Sagittarius serpentarius* (Secretarybird) occurring within the project area has been indicated. The nesting of the species is typically in acacia trees, often foraging in the adjacent agricultural lands. Disturbance to any breeding pairs must be mitigated, this includes limiting noise levels from the prospecting activities by means of best practice guidelines. The prospecting activities will have a limited impact (in area) to the agricultural fields, allowing for other agricultural areas to be foraged by the species.

It is recommended that a further specialist field survey be conducted in order to confirm or disprove the presence of the Sungazer in the project area. Until this survey can be conducted and completed, the grassland habitat (as delineated in Figure 7-15 above) should be classified as a strict 'no-go' area. Should the survey reveal that no Sungazer lizards occur within the project area, the sensitivity rating for the grassland habitat may be de-escalated to 'Medium'.

It is important to note that the Sungazer is found only in the grasslands of the northern Free State and the southwestern parts of Mpumalanga with an estimated Extent of Occurrence (EOO) of 37 617 km² (Alexander *et al.,* 2018). The species is considered to be a habitat specialist, that is highly philopatric (tending to return to or remain near a particular site or area) for burrowing sites. Sungazers also won't easily disperse across the landscape to make new burrows should its habitat be destroyed (Alexander *et al.,* 2018). The species faces mounting threats due to habitat loss from agriculture and mining activities occurring throughout the grassland habitats, and it also is highly threatened with illegal collection for the pet trade to the extent that it is one of the most exported species from South Africa. Due to the sensitivity of this species, especially in regard to its illegal collection, no waypoints will be displayed or provided in this report.

A large number of provincially protected *Boophone disticha* plant species were recorded across the grassland portions of the project area. According to section 30 (3) of the Free State Nature Conservation Ordinance 8 of 1969: Except under authority of a permit which may be issued by the Administrator, no person shall pick any protected plant - subject to certain provisions. The species is listed as "Declining" by the SANBI National Red List of South African Plants because it is harvested extensively for traditional medicine and threatened with habitat transformation. It is thus recommended that, provided the grassland habitat sensitivity is downgraded as discussed above, all species of this plant be avoided during the drilling activities. If this cannot be avoided, then the plants should be translocated to formally protected areas.

The delineated wetland habitats have been assigned a 'High' sensitivity, due to their national status as Critically Endangered ecosystems (SANBI, 2019). Prospecting within these areas must be informed by the wetland assessment.

The portions of land within the project area that are classified as having a sensitivity rating of 'Very Low' to 'Low", namely the transformed and degraded grassland habitats (see Figure 7-15), are likely to face minimal further impacts from any low to medium impact activities, and as such the proposed activities may only proceed within these areas – following strict accordance to the Impact Management Plan outlined in section 8 above.

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11 Appendices

Appendix A Specialist declarations

DECLARATION

I, Michael Schrenk, 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.

Michael Schrenk

Environmental Consultant

The Biodiversity Company

January 2022

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

Terrestrial Ecologist

The Biodiversity Company

January 2022

Appendix B Specialist CVs

Michael Schrenk

B.Sc Civil and Environmental Engineering

Cell: +27 76 529 2652
Email: mike@thebiodiversitycompany.com
Identity Number: 9204165023085
Date of birth: 16 April 1992

Profile Summary

Extensive project management experience

Experience with green engineering, ecological evaluation, terrestrial biodiversity, and conservation

Expertise include terrestrial biodiversity assessment and ecological restoration

Areas of Interest

Mining, Oil & Gas, Renewable Energy & Bulk Services Infrastructure Development, Farming, Land contamination, Sustainability and Conservation

Key Experience

- Environmental Impact Assessments (EIA)
- Environmental Management Programmes (EMP)
- Ecological assessments
- Rehabilitation Plans and Monitoring
- Veld management and Veld condition
- Terrestrial biodiversity management

Country Experience

South Africa

Nationality

South African

Languages

English – Proficient

Qualifications

- BSc (University of the Witwatersrand) – Civil and environmental engineering
- Cand Sci Nat (Pending)

SELECTED PROJECT EXPERIENCE

Project Name: Olivedale Retirement Village Erf1250 rehabilitation
Personal position / role on project: Project manager and assistant terrestrial ecologist
Location: Olivedale, Gauteng, South Africa
Main project features: Assist in the securing of environmental authorisation and general authorisation for the rehabilitation of Erf 1250. Assist/Manage the terrestrial and ecological assessment and rehabilitation process.

Project Name: Golden Harvest Park ecological assessments
Personal position / role on project: Assistant terrestrial ecologist and engineer
Location: Hunters Hill AH, Gauteng, South Africa
Main project features: To plan and conduct various assessments with regards to the management and rehabilitation of the natural areas within the Golden Harvest Park.

Project Name: Wild Serve terrestrial biodiversity management plan
Personal position / role on project: Project manager and terrestrial ecologist
Location: North Riding AH, Gauteng, South Africa
Main project features: Develop and implement a provincial terrestrial biodiversity management plan for Gauteng, with a focus on the habitat requirements for urban and fringe dwelling fauna.

OVERVIEW

An overview of the specialist technical expertise include the following:

- Project management
- Ecological assessments and management plans
- Terrestrial biodiversity management
- Rehabilitation plans
- Low-level green engineering design and construct

TRAINING

Some of the more pertinent training undergone includes the following:

- Tree Identification and Analysis; University of the Witwatersrand
- Ecological management and Assessment; GDARD and Department of Environmental Affairs

EMPLOYMENT EXPERIENCE

Project manager at Wild Serve NPC (March 2016 – January 2021)

Managed various terrestrial biodiversity and ecological related projects throughout Gauteng, involving ecological restoration, biodiversity management and conservation, education, and community engagement.

Project Lead for the National Geographic Society funded project: "Creating Innovative and Sustainable Environmental Solutions for Modern, Urban-based Communities" (March 2019 – April 2020)

Manage a team to conduct an urban sustainability project involving the youth.

Project manager and engineer for Breed Life Farms (June 2018 – June 2019)

Lead the planning, design, and construction of urban agriculture related solutions.

ACADEMIC QUALIFICATIONS

University of the Witwatersrand, Johannesburg (2016): Bachelor of Science (BSc) in Civil and Environmental Engineering (with honours).

Andrew Husted

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

Cell: +27 81 319 1225
Email: andrew@thebiodiversitycompany.com
Identity Number: 7904195054081
Date of birth: 19 April 1979

Profile Summary

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

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

- Familiar with 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

Botswana, Cameroon
Democratic Republic of Congo
Ghana, Ivory Coast, Lesotho
Liberia, Mali, Mozambique
Nigeria, Republic of Armenia,
Senegal, 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

CURRICULUM VITAE: Andrew Husted

EMPLOYMENT EXPERIENCE

The Biodiversity Company (January 2015 – Present)

Director / Ecologist.

Digby Wells Environmental (August 2008 – December 2014)

Freshwater & Terrestrial Ecologist

PREVIOUS EMPLOYMENT: Econ@UJ (University of Johannesburg)

Freshwater Ecologist

ACADEMIC QUALIFICATIONS

University of Johannesburg, Johannesburg, South Africa (2009): MAGISTER SCIENTIAE (MSc) - Aquatic Health:

Title: *Aspects of the biology of the Bushveld Smallscale Yellowfish (Labeobarbus polylepis): Feeding biology and metal bioaccumulation in five populations.*

Rand Afrikaans University (RAU), Johannesburg, South Africa (2004): BACCALAUREUS SCIENTIAE CUM HONORIBUS (Hons) – Zoology

Rand Afrikaans University (RAU), Johannesburg, South Africa (2001 - 2004): BACCALAUREUS SCIENTIAE IN NATURAL AND ENVIRONMENTAL SCIENCES. Majors: Zoology and Botany.

PUBLICATIONS

Desai M., Husted A., Fry C., Downs C.T., & O'Brien G.C. 2019. Spatial shifts and habitat partitioning of ichthyofauna within the middle–lower region of the Pungwe Basin, Mozambique. *Journal of Freshwater Ecology*, 34(1), 685–702. doi: 10.1080/02705060.2019.1673221

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Tomschi H., Husted A., O'Brien G.C., Cloete Y., Van Dyk C., Pieterse G.M., Wepener V., Nel A. and Reisinger U. 2009. Environmental study to establish the baseline biological and physical conditions of the Letsibogo Dam near Selebi Phikwe, Botswana. EC Multiple Framework Contract Beneficiaries.8 ACP BT 13 – Mining Sector (EDMS). Specific Contract N° 2008/166788. Beneficiary Country: Botswana. By: HPC HARRESS PICKEL CONSULT AG

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