



The Terrestrial Biodiversity Compliance Statement for the proposed Expansion of Sports and Recreational Facilities at the Country Club Johannesburg

Johannesburg, Gauteng

February 2022

CLIENT

savannah
environmental

Prepared by:

The Biodiversity Company

Cell: +27 81 319 1225

Fax: +27 86 527 1965

info@thebiodiversitycompany.com

www.thebiodiversitycompany.com






Report Name	The Terrestrial Biodiversity Compliance Statement for the proposed Expansion of Sports and Recreational Facilities at the Country Club Johannesburg
Submitted to	
Report Writer and Fieldwork	<p>Michael Schrenk </p> <p>Michael completed his professional Civil and Environmental engineering degree at the University of the Witwatersrand in 2016. He has been working in the fields of project management, biodiversity and habitat assessment and ecological restoration for over 3 years.</p>
Report Reviewer	<p>Andrew Husted </p> <p>Andrew Husted is Pr Sci Nat registered (400213/11) in the following fields of practice: Ecological Science, Environmental Science and Aquatic Science. Andrew is an Aquatic, Wetland and Biodiversity Specialist with more than 12 years' experience in the environmental consulting field. Andrew has completed numerous wetland training courses, and is an accredited wetland practitioner, recognised by the DWS, and also the Mondi Wetlands programme as a competent wetland consultant.</p>
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>

Table of Contents

1	Introduction.....	1
2	Project Area.....	2
3	Terms of Reference.....	5
4	Key Legislative Requirements	6
5	Definitions.....	7
5.1	Species of Conservation Concern	7
5.2	Protected Species	7
6	Methods.....	8
6.1	Geographic Information Systems (GIS) Mapping.....	8
6.2	Desktop Vegetation and Botanical Assessment.....	8
6.3	Floristic Fieldwork Survey and Analysis.....	9
6.4	Faunal Assessment.....	10
6.4.1	Desktop Assessment.....	10
6.4.2	Field Survey	10
6.5	Site Ecological Importance	11
7	Limitations and Assumptions	13
8	Receiving Environment.....	14
8.1	Desktop Spatial Assessment	14
8.1.1	Gauteng Conservation Plan.....	14
8.1.2	The National Biodiversity Assessment.....	17
8.1.3	The South African Inventory of Inland Aquatic Ecosystems	17
8.2	Ecological Desktop Assessments	19
8.2.1	Vegetation Assessment.....	19
8.2.2	Botanical Assessment	21
8.2.3	Faunal Assessment.....	21
8.3	Field Survey	22
8.3.1	Terrestrial Fauna and Flora	22
8.3.2	Habitat Survey and Site Ecological Importance	30
9	Proposed Impact Management Plan.....	33
10	Conclusion.....	41

10.1	Specialist Recommendations.....	41
10.2	Specialist Opinion.....	42
11	References.....	43
12	Appendices.....	48

Tables

Table 4-1	A list of key legislative requirements relevant to these studies in the Gauteng Province	6
Table 6-1	Summary of Conservation Importance criteria	11
Table 6-2	Summary of Functional Integrity criteria.....	12
Table 6-3	Matrix used to derive Biodiversity Importance from Functional Integrity and Conservation Importance.....	12
Table 6-4	Summary of Receptor Resilience criteria.....	12
Table 6-5	Matrix used to derive Site Ecological Importance from Receptor Resilience and Biodiversity Importance	13
Table 6-6	Guidelines for interpreting Site Ecological Importance in the context of the proposed activities.....	13
Table 8-1	Desktop spatial features examined.....	14
Table 8-2	Plant Species of Conservation Concern potentially occurring in the project area	21
Table 8-3	Total number of potential fauna species present, and corresponding SCC	21
Table 8-4	Site Ecological Importance assessment summary of the habitat types delineated within the project area	30
Table 9-1	Mitigation measures from the terrestrial assessment; including requirements for timeframes, roles, and responsibilities	34

Figures

Figure 2-1	Project Area.....	3
Figure 2-2	Regional overview of the project area.....	4
Figure 5-1	Threatened species and Species of Conservation Concern (SANBI, 2016)	7
Figure 8-1	The project area superimposed on the Gauteng Conservation Plan (GDARD, 2014).....	16
Figure 8-2	The project area overlapped with the SAIIE database (Awuah, 2018 & Van Deventer et al., 2018)	18

Figure 8-3 The project area showing the regional vegetation types (BGIS, 2018)..... 20

Figure 8-4 Small sections contained the climax grass *Digitaria eriantha*, a common marker grass for good/healthy veld..... 23

Figure 8-5 Mature indigenous trees occur throughout certain sections, and some healthy habitat features were noted (rocky outcrops/mounds and old trees) 23

Figure 8-6 The protected *Eulophia ovalis* var. *bainesii* (orchid) was recorded..... 24

Figure 8-7 Over 30 individuals of the red-listed *Hypoxis hemerocallidea* were observed, all within the southwestern boundary of the project area 24

Figure 8-8 Yellow *Helichrysum* weeds invade much of the open grassland portions, divided by numerous walking paths 25

Figure 8-9 The invasive *Ipomoea purpurea* is overtopping several of the indigenous plants in the area 25

Figure 8-10 Approximately half of the project area is transformed by development of some form..... 26

Figure 8-11 The north-eastern portion contains numerous mature exotic trees 26

Figure 8-12 A map of the protected flora and floral SCC locations recorded in the project area 27

Figure 8-13 Dark-capped bulbul foraging within the project area 28

Figure 8-14 Helmeted guineafowl flocks were recorded in the open grassland portions 29

Figure 8-15 Three Juvenile Leopard tortoises were observed towards the south of the project area..... 29

Figure 8-16 Biodiversity SEI delineation relevant to the project area 31

Figure 8-17 Biodiversity Sensitivity of the project area according to the Screening Report .. 32

1 Introduction

The Biodiversity Company was commissioned by Savannah Environmental (Pty) Ltd to conduct a terrestrial ecology (fauna and flora) assessment and to compile a compliance statement for the proposed expansion of sports and recreational facilities at the Country Club Johannesburg, in the Gauteng Province.

The Country Club Johannesburg is proposing to expand their sports and recreational facilities on Portion 433 of the Farm Rietfontein IR 2, located in Woodmead, Johannesburg, within jurisdiction of the City of Johannesburg Metropolitan Municipality in the Gauteng Province. This will entail the construction of additional tennis courts and new padel courts; upgrading the existing building at the facility to include a gym, changerooms and squash courts; expanding the parking area; and upgrading the restaurant and bar to provide a modern, multi-sport and family facility for members of the Country Club Johannesburg. A development footprint of up to ~1.3 ha has been identified by Country Club Johannesburg for the expansion of their sports and recreational facilities.

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 February 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 (National Environmental Screening Tool, 2022).

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 within the property of the Country Club Johannesburg, in the suburb of Woodmead, approximately 6 km north of the Sandton CBD. The specified project area includes a 50 m buffer around the proposed development footprint, giving a total assessment area of 6.16 ha.

Historical imagery from 2001 reveals that the land use within the project area largely consisted of undeveloped open space over 20 years ago, with edge effects from the surrounding golf course, parking areas, small buildings, and walking paths. The area was then significantly fragmented in 2008/2009 when a building, parking areas and recreational facilities were developed. The project area has remained in this state since 2009, with the marginal vegetation communities remaining relatively undisturbed for at least 12 years.

The enveloping golf course property, providing a project area buffer of approximately 300 m, is one of the few portions of 'undeveloped' land within the surrounding metropolitan area. Which is characterised by sprawling and dense housing developments, commercial property, and major roadways. Several westerly watercourses occur within 1.5 km of the project area, including the Sandspruit River.

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

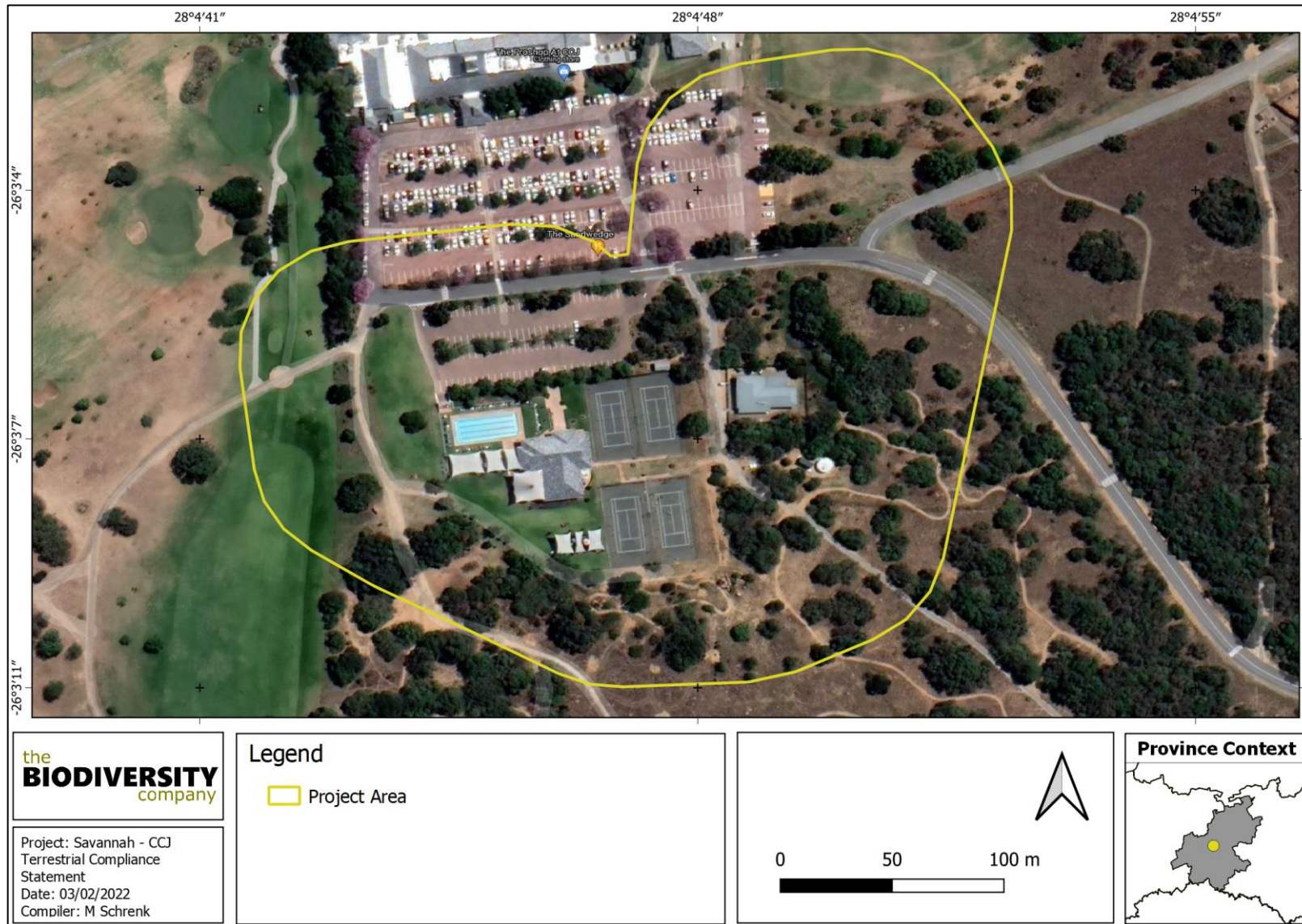


Figure 2-1 Project Area

info@thebiodiversitycompany.com

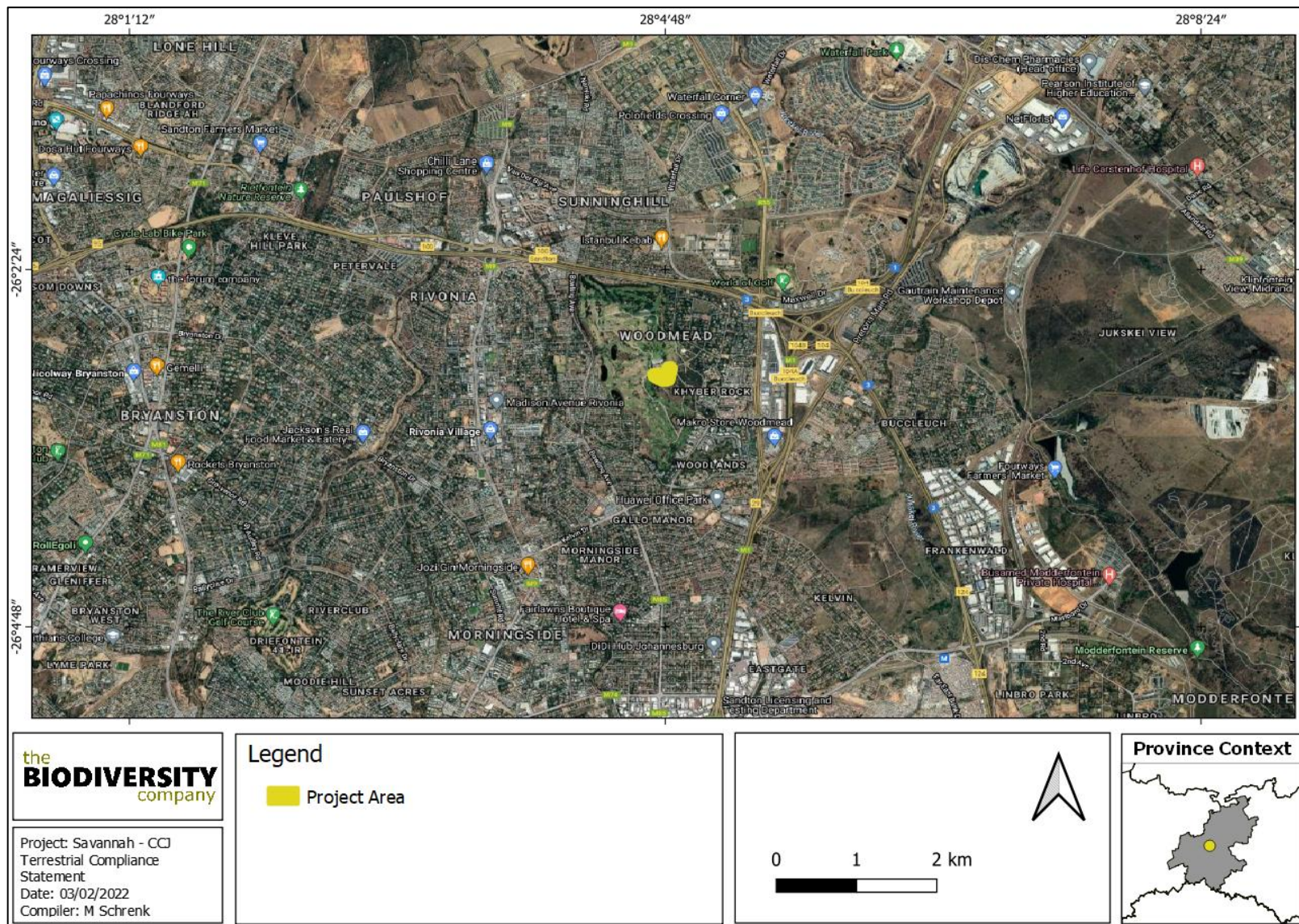


Figure 2-2 Regional overview of the project area

info@thebiodiversitycompany.com

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 activity. The following are the Terms of Reference that guide the project aim:

- Description of the baseline receiving environment specific to the field of expertise (including the general surrounding area as well as the site-specific environment);
- Identification and description of any sensitive receptors in terms of relevant specialist disciplines (i.e., terrestrial 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 Gauteng 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 (UNFCCC, 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)
	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	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	Gauteng Provincial Environmental Management Framework, 2014
	Transvaal Nature Conservation Ordinance No. 12 of 1983
	Gauteng Nature Conservation Bill, 2014 (Draft)

5 Definitions

5.1 Species of Conservation Concern

In accordance with the National Red List of South African Plants website, managed and maintained by the South African National Biodiversity Institute (SANBI), a Species of Conservation Concern (SCC) is a species that has a high conservation importance in terms of preserving South Africa's rich biodiversity. This classification covers a range of red list categories as illustrated in Figure 5-1 below.

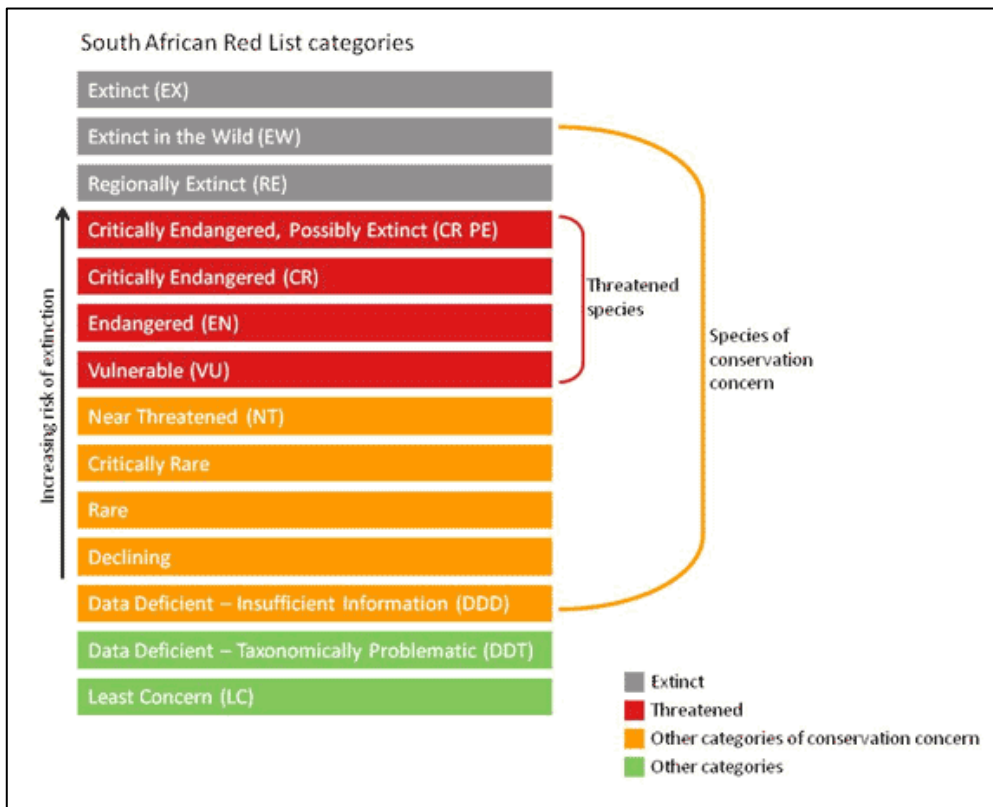


Figure 5-1 Threatened species and Species of Conservation Concern (SANBI, 2016)

South Africa uses the internationally endorsed International Union for Conservation of Nature (IUCN) Red List Categories and Criteria (IUCN, 2012). This scientific system is designed to measure species' risk of extinction and its purpose is to highlight those species that are in need of critical conservation action. As this system has been adopted from the IUCN, the definition of an SCC as described and categorised above is extended to all red list classifications relevant to fauna as well as the IUCN categories, for the purposes of this report.

5.2 Protected Species

Protected species include both floral and faunal species that are protected according to some form of relevant legislation, be it provincial, national, or international. Provincial legislation may include that published in the form of a provincial ordinance or a bill, national legislation includes that which is published in terms of the National Environmental Management: Biodiversity Act (Act No. 10 of 2004) or the National Forest Act (Act No. 84 of 1998). Relevant national legislation includes the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES, 2021).

6 Methods

6.1 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:

- Gauteng Conservation Plan V3.3 of 2014 (GDARD, 2014);
- 2018 National Biodiversity Assessment (NBA, 2018) (Skowno *et al.*, 2019);
- Vegetation Map of South Africa, Lesotho and Swaziland (SANBI, 2018);
- SA Protected and Conservation Areas Databases (DFFE, 2021 & DFFE-2, 2021);
- Important Bird and Biodiversity Areas (Marnewick *et al.*, 2015);
- National Protected Areas Expansion Strategy (DEA, 2016);
- South African Inventory of Inland Aquatic Ecosystems (SAIIAE), NBA 2018 Rivers and Wetlands (Awuah, 2018 & Van Deventer *et al.*, 2018);
- National Freshwater Priority Areas, Rivers and Wetlands (Nel, 2011); and
- Strategic Water Source Areas (Lötter & Le Maitre, 2021).

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

6.2 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 resolution. The Red List of South African Plants website (SANBI, 2016) was used 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 (Transvaal Nature Conservation Ordinance No. 12 of 1983); and
- List of Protected Tree Species (DEFF-2, 2021).

6.3 Floristic Fieldwork Survey and Analysis

The wet season fieldwork (completed during early February 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, rock 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);
- Field Guide to the Wild Flowers of the Highveld (van Wyk & Malan, 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);
- Aquatic and Wetland Plants of Southern Africa (van Ginkel & Cilliers, 2020);
- 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).

6.4 Faunal Assessment

6.4.1 Desktop Assessment

The faunal desktop assessment involved the following:

- Compilation of expected species lists;
- Identification of any red-data/red-listed species or Species of Conservation Concern 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);
- Red Data Book of Birds (Birdlife South Africa, 2015);
- Atlas and Red Data Book of Frogs of South Africa (Mintner *et al.*, 2004);
- South Africa's official site for Species Information and National Red Lists (SANBI, 2022);
- The 2016 Red List of Mammals of South Africa (EWT, 2016); and
- The International Union for Conservation of Nature's Red List of Threatened Species. Version 2021-3 (IUCN, 2021).

6.4.2 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);
- Active hand-searches, used for species that shelter in or under particular micro-habitats (typically rocks, exfoliating rock outcrops, fallen trees, leaf litter, bark etc.);
- Identification of tracks and signs; and
- Utilization of local knowledge.

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).

6.5 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 information from available satellite imagery. These habitat types were assigned Ecological Importance (EI) categories based on their ecological integrity, conservation value, the presence of Species of Conservation Concern (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 6-1 and Table 6-2, respectively.

Table 6-1 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 6-2 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. 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 6-3.

Table 6-3 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 6-4.

Table 6-4 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 6-5.

Table 6-5 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 6-6.

Table 6-6 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.

7 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.

8 Receiving Environment

8.1 Desktop Spatial Assessment

Table 8-1 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 8-1 Desktop spatial features examined

Desktop Information Considered	Relevant/Not relevant	Section
Gauteng Conservation Plan V3.3, 2014	Relevant: The project area overlaps with an Ecological Support Area.	8.1.1
Ecosystem Threat Status (NBA, 2018)	Relevant: The project area falls within a Critically Endangered ecosystem (CR), namely Egoli granite grassland.	8.1.2.1
Ecosystem Protection Level (NBA, 2018)	Relevant: The project area occurs within a Poorly Protected (PP) ecosystem.	8.1.2.2
South African Protected and Conservation Areas Databases, Q3 2021	Irrelevant: The project area is not within 5km of any protected or conservation area.	-
Important Bird and Biodiversity Areas, 2015	Irrelevant: There are no IBAs near the project region.	-
National Protected Areas Expansion Strategy, 2016	Irrelevant: The project area does not overlap with any NPAES focus area.	-
South African Inventory of Inland Aquatic Ecosystems, 2018	Relevant: Several depressions/pans, an Unchanneled Valley-Bottom wetland, and a Channelled Valley-Bottom Wetland (Sandspruit river) all occur within 1 km of the project area. Two wetlands are categorised as Critically Endangered (CR) and Not Protected (NP). The depressions are listed as Least Concern (LC) and Poorly Protected (PP).	8.1.3
National Freshwater Priority Areas, 2011	Relevant: Nine natural systems, as well as the largely modified Sandspruit River, occur within 1 km of the project area.	-
Strategic Water Source Areas, 2021	Irrelevant: There are no Strategic Water Source Areas within the region.	-

8.1.1 Gauteng Conservation Plan

The Gauteng Conservation 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 8-1 and according to the Gauteng Conservation Plan, portions of the project area overlap with an ESA area. The closest CBA area is the Sandspruit river greenbelt, approximately 1 km west of the project area.

According to SANBI (2017), an ESA area is a portion of land currently either in a good or fair ecological condition where the objective is to retain ecological processes and maintain at least a semi-natural ecological condition.

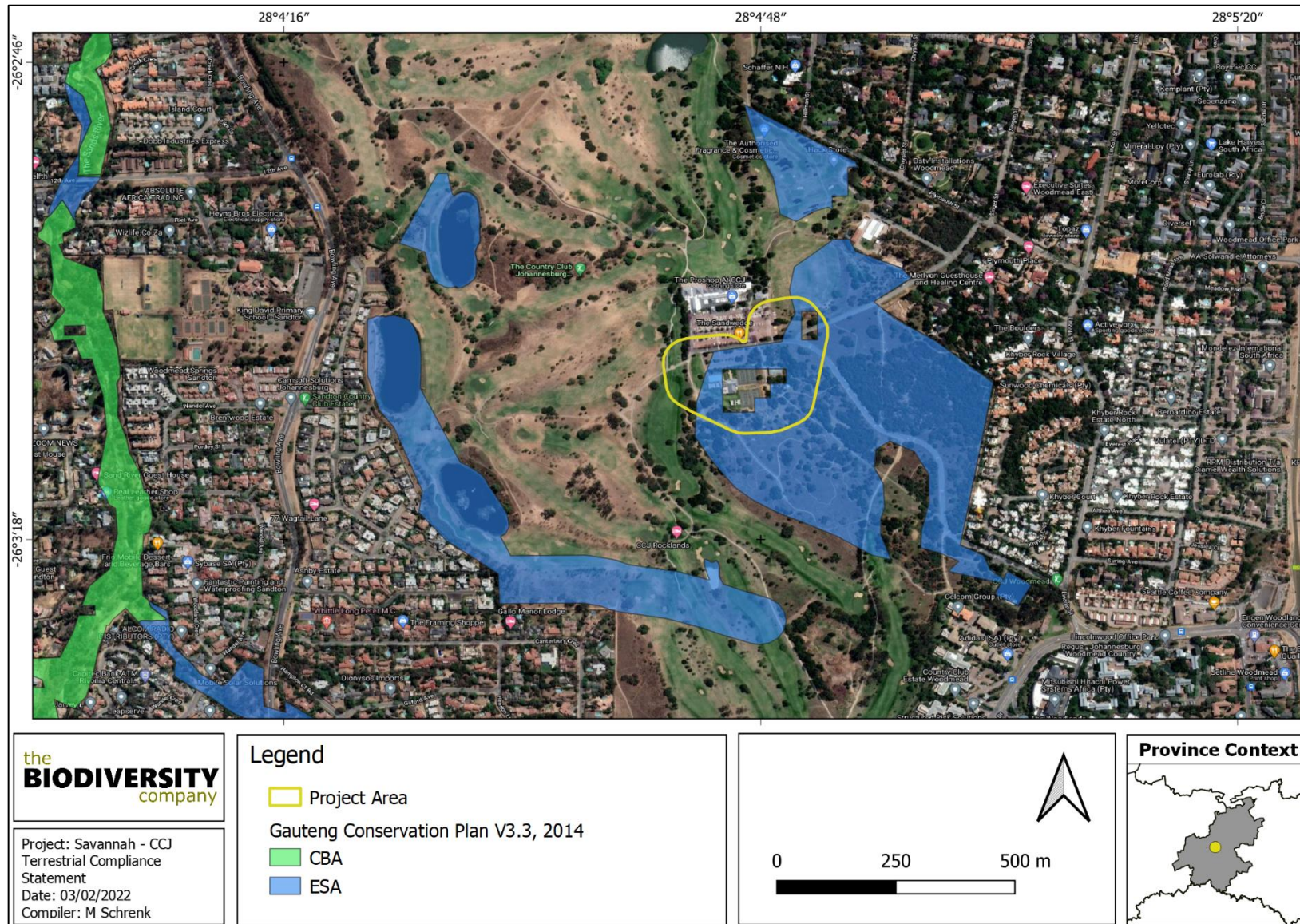


Figure 8-1 The project area superimposed on the Gauteng Conservation Plan (GDARD, 2014)

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

8.1.2.1 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. 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 Critically Endangered ecosystem. This means that most of the ecosystem type associated with the project area (see section 8.2.1) is considered to be at an extremely high risk of collapse. Most of the ecosystem type has been at least moderately modified from its natural state and the system is likely to have lost much of its natural structure and functioning. Species associated with the ecosystem may have been lost (SANBI, 2019).

8.1.2.2 Ecosystem Protection Level

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 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 (between 5% and 50% of its biodiversity target) is protected within the national protected areas network.

8.1.3 The South African Inventory of Inland Aquatic Ecosystems

The South African Inventory of Inland Aquatic Ecosystems (SAIIAE) was released with the National Biodiversity Assessment in 2018. The Ecosystem Threat Status (ETS) of river and wetland ecosystem types are based on the extent to which each ecosystem type has been altered from its natural condition. Ecosystem types and their corresponding protection levels are categorised in the same manner as those described within the NBA, as above.

Figure 8-2 shows that the project area is near numerous wetlands and the Sandspruit River. Two wetlands and the river are categorised as Critically Endangered (CR) and Not Protected (NP), while the pans are categorised as Least Concern (LC) and Poorly Protected (PP).

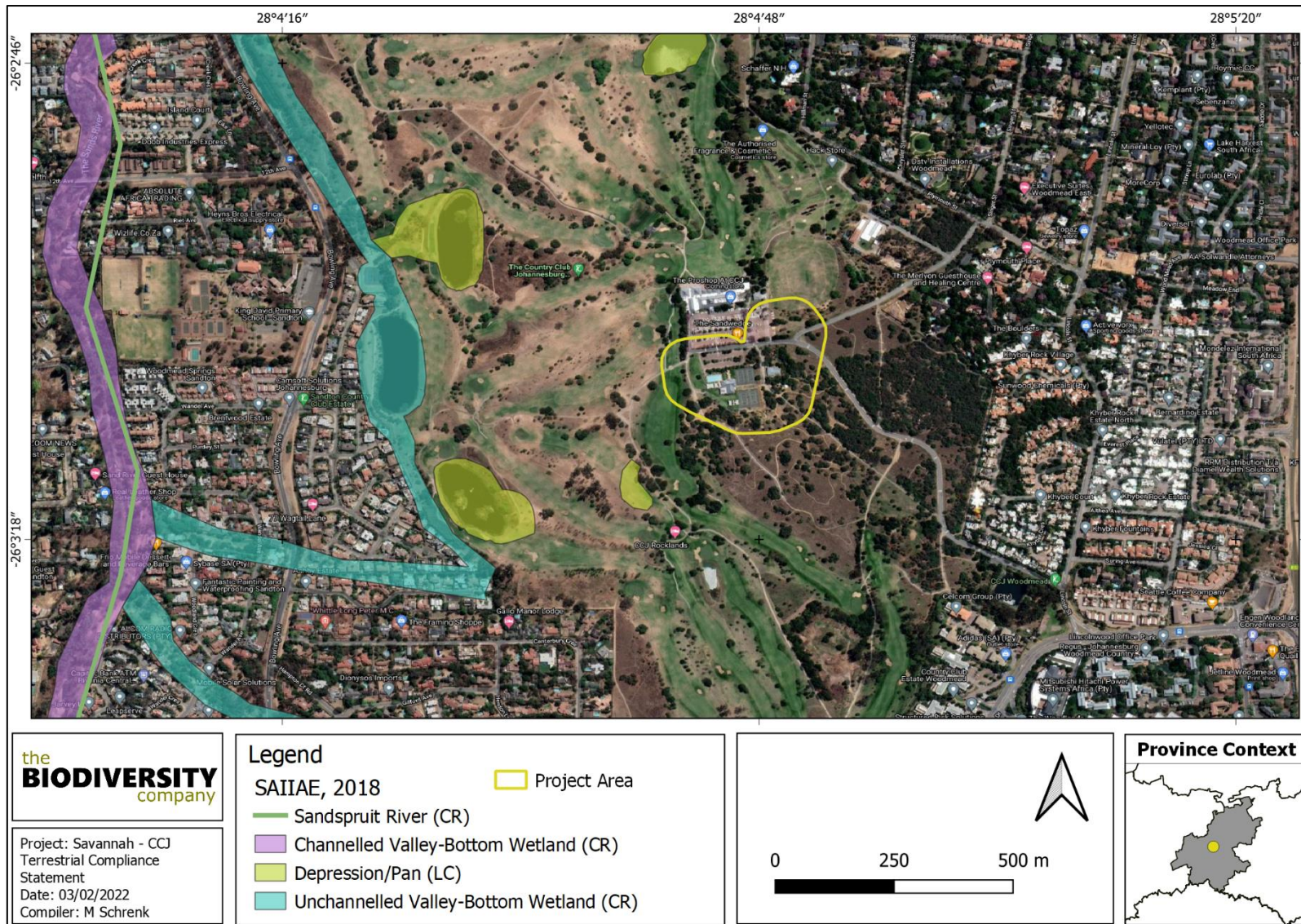


Figure 8-2 The project area overlapped with the SAIIE database (Awuah, 2018 & Van Deventer et al., 2018)

8.2 Ecological Desktop Assessments

8.2.1 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 Egoli Granite Grassland of the Mesic Highveld Grassland Bioregion (Figure 8-3).

8.2.1.1 Egoli Granite Grassland

This vegetation type is characterised by moderately undulating plains and low hills supporting tall, usually *Hyparrhenia hirta* - dominated grassland, with some woody species on rocky outcrops or rock sheets. The rocky habitats show a high diversity of woody species, which occur in the form of scattered shrub groups or solitary small trees (Mucina & Rutherford, 2006).

Some Important Taxa occurring within the Egoli Granite Grassland

Graminoids: *Aristida canescens*, *A. congesta*, *Cynodon dactylon*, *Digitaria monodactyla*, *Eragrostis capensis*, *E. chloromelas*, *Digitaria tricholaenoides*.

Herbs: *Acalypha angustata*, *A. peduncularis*, *Becium obovatum*, *Berkheya insignis*, *Crabbea hirsuta*, *Helichrysum rugulosum*.

Geophytic Herbs: *Cheilanthes deltoidea*, *C. hirta*.

Low Shrubs: *Anthospermum hispidulum*, *A. rigidum subsp. pumilum*, *Gnidia capitata*, *Helichrysum kraussii*, *Ziziphus zeyheriana*.

Conservation Status of the Egoli Granite Grassland

The conservation status of this vegetation community was listed by Mucina and Rutherford (2006) as Endangered and is listed as CR based on the NBA (2018). The national conservation target is 24%, but only approximately 3% of this habitat is protected within public and private Nature Reserves. More than two thirds has already undergone transformation mostly by urbanisation, cultivation or by the building of roads and current rates of transformation threaten most of the remaining unconserved areas.

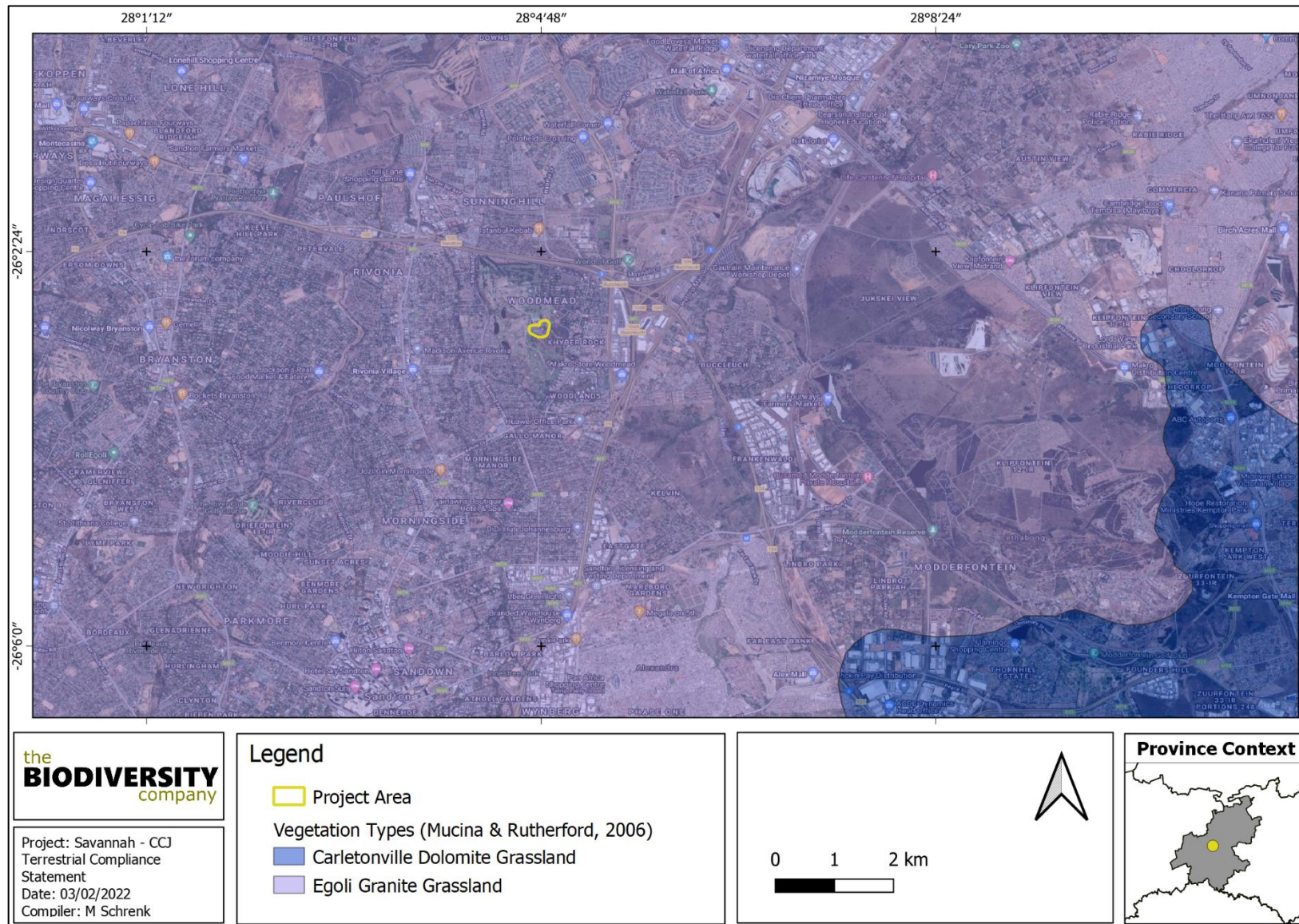


Figure 8-3 The project area showing the regional vegetation types (BGIS, 2018)

info@thebiodiversitycompany.com

8.2.2 Botanical Assessment

Based on the Plants of Southern Africa (BODATSA-POSA, 2019) database, over 1200 plant species have the potential to occur in the project area and its surroundings. Of these plant species, 7 species are listed as being SCC and 58 are listed as provincially protected plants. Table 8-2 below outlines the SCC identified through the desktop assessment.

Table 8-2 Plant Species of Conservation Concern potentially occurring in the project area

Family	Taxon	Author	National Red-List (SANBI, 2016)	Ecology
Apocynaceae	<i>Stenostelma umbelluliferum</i>	(Schltr.) Bester & Nicholas	NT	Indigenous; Endemic
Asteraceae	<i>Cineraria austrotransvaalensis</i>	Cron	NT	Indigenous; Endemic
Crassulaceae	<i>Adromischus umbraticola</i> subsp. <i>umbraticola</i>	C.A.Sm.	NT	Indigenous; Endemic
Fabaceae	<i>Pearsonia bracteata</i>	(Benth.) Polhill	NT	Indigenous; Endemic
Fabaceae	<i>Argyrobium longifolium</i>	(Meisn.) Walp.	VU	Indigenous; Endemic
Orchidaceae	<i>Holothrix randii</i>	Rendle	NT	Indigenous
Proteaceae	<i>Leucospermum saxosum</i>	S.Moore	EN	Indigenous

Provincially protected plants are legally protected by the Transvaal Nature Conservation Ordinance No. 12 of 1983, 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.

8.2.3 Faunal Assessment

Largely based on the South African Bird Atlas Project Version 2 (SABAP2, 2017), IUCN Digital Distribution Maps (IUCN, 2016), and the Animal Demography Unit (ADU, 2020) databases, Table 8-3 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 8-3 Total number of potential fauna species present, and corresponding SCC

Fauna Type	Total Potential No.	Total SCC
Avifauna	341	15
Mammals	58	8
Herpetofauna (Reptiles and Amphibians)	63	3

These numbers exclude any animals that only occur within nature reserves and private reserves. Of the fifteen avifaunal SCC, only one has a moderate likelihood of occurring in the project area, namely, *Coracias garrulus* (European Roller). The other fourteen SCC are unlikely to occur within the project area due to a lack of suitable habitat and the associated disturbed nature of the project area and surrounds.

Of the eight total mammal SCC listed, two have a moderate to high likelihood of occurring in the project area. These are *Atelerix frontalis* (South Africa Hedgehog) and *Chrysospalax villosus* (Rough-haired Golden Mole). None of the listed herpetofaunal SCC are likely to occur within the project region.

8.3 Field Survey

This section details the observations recorded during the 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 February 2022.

8.3.1 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.

8.3.1.1 Flora and Vegetation

The southern and eastern portions of the project area contained a good diversity of indigenous woody flora, dominated by numerous species of mature medium to large shrubs and trees – most commonly *Searsia Leptodictya*, *S. lancea*, *S. pyroides* and *Olea europaea* subsp. *africana* – and a number of grass species such as *Eragrostis trichophora*, *Melinis repens*, *Chloris gayana*, *Hyparrhenia hirta*, and *Digitaria eriantha* (Figure 8-4). Other than *D. eriantha*, these are pioneer grasses which are common in disturbed areas with a low veld condition. Positive habitat features such as rocky mounds and old overturned tree stems were noted throughout this section (Figure 8-5).

Notably, the southern and eastern sections supported four provincially protected plant species (Transvaal Nature Conservation Ordinance No. 12 of 1983): *Eulophia ovalis* var. *bainesii* (Cream courting harlequin orchid, Figure 8-6), *Aloe maculata* (Soap aloe), *Protea caffra* subsp. *caffra* (Common sugarbush), and *Cussonia paniculata* subsp. *sinuata* (Mountain cabbagetree). One flora SCC was recorded, *Hypoxis hemerocallidea* (Star-flower, Figure 8-7), observed within the southwestern portion of the project area. The species is listed as 'Declining' by the national red-list.

Walking paths occur throughout the southern and eastern portions, and large areas of the open grassland are invaded by tall *Erigeron* spp. And *Helichrysum* spp. Weeds (Figure 8-8), with minor sections of dense *Bidens pilosa* recorded. Three common category 1b invasive species were observed across the project area: *Lantana camara*, *Ipomoea purpurea*, and *Verbena bonariensis*. Many of the *Lantana* and *Ipomoea* plants observed were mature individuals that are beginning to impede the relatively healthy state of much of the woody vegetation within the northern portions of the project area (Figure 8-9).

The remaining areas were largely transformed - used as formal parking areas, recreational facilities, and small buildings (Figure 8-10) – all surrounded by manicured lawn. The north-eastern portion was found to be critically modified due to the presence of manicured *Kikuyu* grasses and large exotic *Platanus occidentalis* and *Gleditsia triacanthos* trees (Figure 8-11). Notably, the *Gleditsia triacanthos* (Honey locust) is listed as a category 1b invasive plant.

Refer to Figure 8-12 below for a map of the locations of all recorded SCC and protected flora species occurring within the project area.



Figure 8-4 Small sections contained the climax grass Digitaria eriantha, a common marker grass for good/healthy veld



Figure 8-5 Mature indigenous trees occur throughout certain sections, and some healthy habitat features were noted (rocky outcrops/mounds and old trees)

info@thebiodiversitycompany.com



Figure 8-6 The provincially protected *Eulophia ovalis* var. *bainesii* (orchid) was recorded



Figure 8-7 Over 30 individuals of the red-listed *Hypoxis hemerocallidea* were observed, all within the southwestern boundary of the project area

info@thebiodiversitycompany.com



Figure 8-8 Yellow Helichrysum weeds invade much of the open grassland portions, divided by numerous walking paths



Figure 8-9 The invasive Ipomoea purpurea is overtopping several of the indigenous plants in the area



Figure 8-10 Approximately half of the project area is transformed by development of some form



Figure 8-11 The north-eastern portion contains numerous mature exotic trees

info@thebiodiversitycompany.com

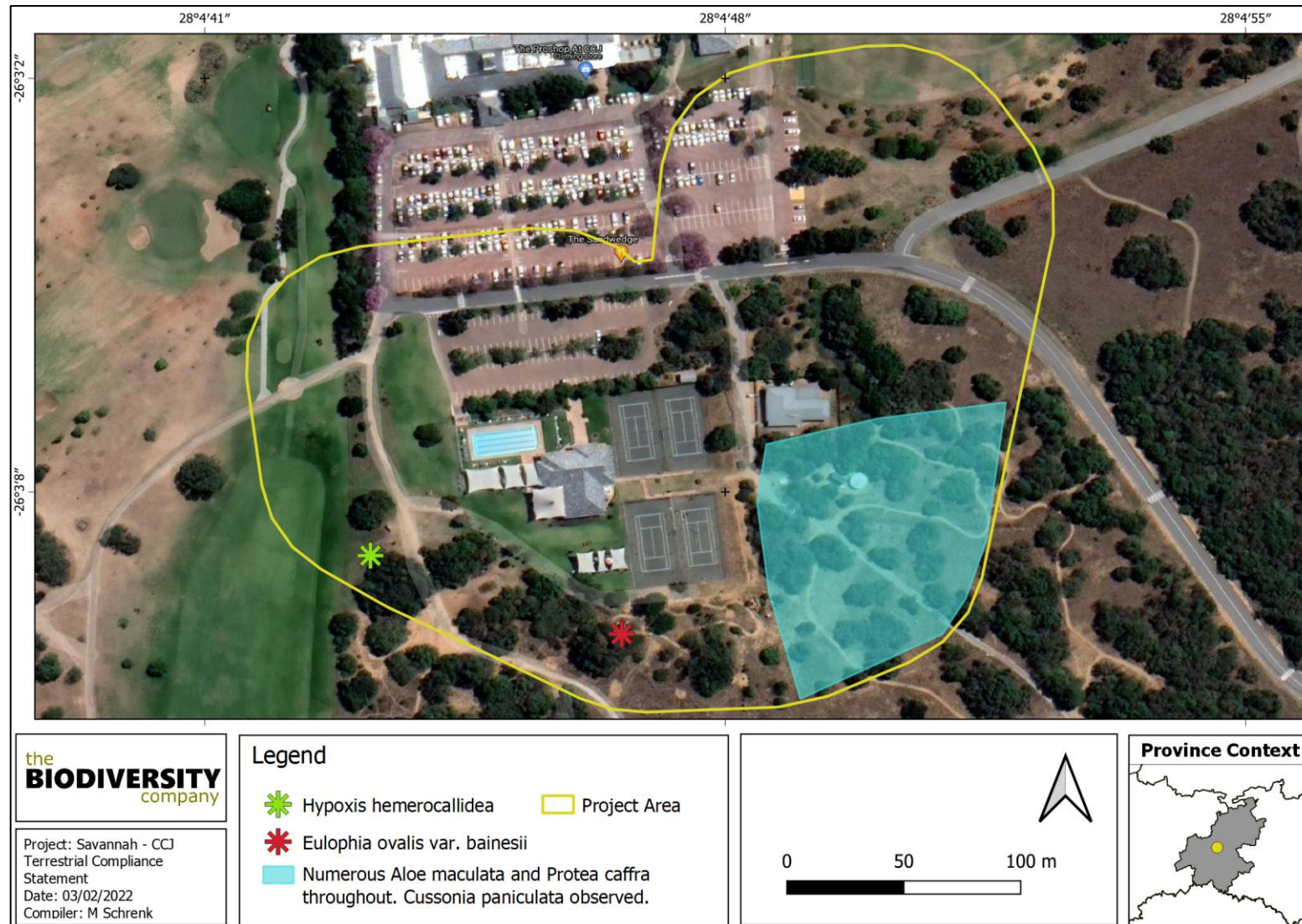


Figure 8-12 A map of the protected flora and floral SCC locations recorded in the project area

8.3.1.2 Fauna

Due to the various indigenous tree species present as well as the close proximity to watercourses, numerous avifaunal species were observed foraging within the southern sections. Over 20 bird species were recorded, mostly consisting of locally common garden species such as the Green wood-hoopoe, Southern fiscal, and most commonly the Cape glossy starling and the Dark-capped bulbul (Figure 8-13). Typical grassland species were also observed, such as Quail and Helmeted guineafowl (Figure 8-14). No avifaunal SCC were observed; however, it is noted that most wild bird species are regarded as protected game according to provincial legislation.

No mammal activity was recorded during the survey. Although signposts and discussions with staff revealed that *Atelerix frontalis* (Hedgehog) have historically been observed in the region. The Hedgehog is listed as 'Near Threatened' (NT) nationally and is considered protected game by both national and provincial legislation. One herpetofaunal species was observed, *Stigmochelys pardalis* (Leopard tortoise, Figure 8-15), which is provincially protected and also listed under appendix II of CITES – affording the species international protection.

Although the local habitat is not conducive to supporting avifaunal SCC, it does contain the necessary ecological resources to support mammal SCC such as the Hedgehog and *Chrysospalax villosus* (Rough-haired golden mole) – which has been recorded in gardens and golf courses adjoining grasslands. The Rough-haired golden mole is listed both nationally and internationally as 'Vulnerable' (VU) and it is considered a 'Critically Endangered' (CR) protected species as per national legislation.

Due to the highly fragmented state of healthy natural land in the region, areas such as the project area concerned should be seen as urban-based sanctuaries for flora and fauna. Additionally, there is a moderate likelihood of faunal SCC occurrence, recommendations are provided with respect to these considerations in section 10.1 below.



Figure 8-13 Dark-capped bulbul foraging within the project area

info@thebiodiversitycompany.com



Figure 8-14 Helmeted guineafowl flocks were recorded in the open grassland portions



Figure 8-15 Three Juvenile Leopard tortoises were observed towards the south of the project area

8.3.2 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 late 2021. These main habitat types were then refined based on the field coverage and data collected during the survey. Three habitat units are delineated for the project area: transformed habitat, critically modified grassland, and modified grassland.

The transformed habitat unit represents approximately half of the project area and is predominantly clear of any healthy natural vegetation. This section includes the buildings, parking areas, recreational spaces, and manicured lawns. Critically modified grassland is the smallest delineated habitat for the project area and encompasses areas of cultivated exotic grasses and trees as well as severely fragmented portions of degraded grassland.

The modified grassland unit occurs throughout the south-eastern quarter of the project area and represents the most in-tact portion of natural vegetation. The land is representative of Ecological Support Area, and the presence of SCC flora and protected plants adds to this area's importance, as does its status as a 'Critically Endangered' (CR) ecosystem. This section does however face disturbance from regular human ingress and alien invasive plants.

Based on the criteria provided in section 6.5 of this report, the three delineated habitat types have each been allocated a sensitivity category, or Site Ecological Importance (SEI), and this breakdown is presented in Table 8-4 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 8-16.

It is important to note that this 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 8-4 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	Very Low	Low	Very Low	High	Very Low
Critically Modified Grassland	Low	Low	Low	Medium	Low
Modified Grassland	Medium	Medium	Medium	Medium	Medium

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

- Very Low: Minimisation mitigation - Development activities of medium to high impact acceptable and restoration activities may not be required.
- Low: Minimisation and restoration mitigation - Development activities of medium to high impact acceptable followed by appropriate restoration activities.
- Medium: Minimisation and restoration mitigation - Development activities of medium impact acceptable followed by appropriate restoration activities.



Figure 8-16 Biodiversity SEI delineation relevant to the project area

info@thebiodiversitycompany.com

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 8-17), mainly due to the ESA status of the area and the fact that it lies within a CR ecosystem.

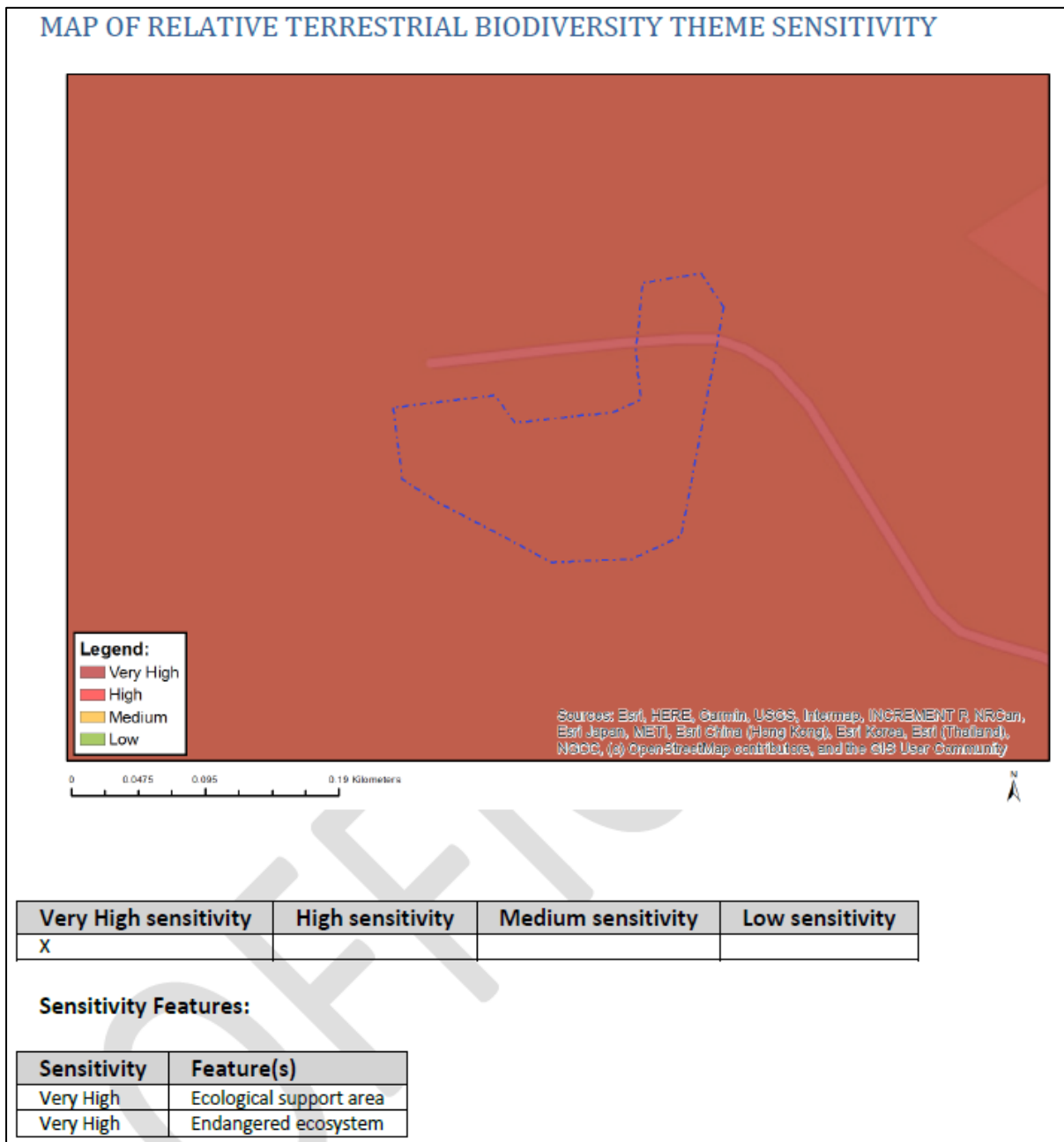


Figure 8-17 Biodiversity Sensitivity of the project area according to the Screening Report

The completion of the terrestrial biodiversity desktop and field assessments disputes the 'Very High' sensitivity presented by the screening report. As discussed above, the project area is largely degraded and as such is assigned a sensitivity rating of 'Very Low' to 'Medium'.

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 classified as having 'Medium' sensitivities. This is due to the presence of protected and SCC flora as well as the possible presence of SCC fauna such as the Hedgehog.

9 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 9-1 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 floral and faunal species and communities (including 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 and SCC flora recorded and the possible mammal SCC, in addition to any further SCC that may occur within the project area.

Table 9-1 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	Responsible Party	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 destruction or relocation is necessary). All red-data plants that will be affected by the development 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-Construction	Project manager, Environmental Officer & Contractor	Environmental Control Officer	Monthly
Any planned activities should be realigned to prioritise development within very low/low sensitivity areas. Any activities or development within medium sensitivity areas must take precautions against disturbing faunal species.	Construction Phase	Project manager, Environmental Officer & Contractor	Environmental Control Officer	Monthly
Any indigenous woody material that is removed during construction can be shredded and used in conjunction with the topsoil to augment soil moisture and prevent erosion. Large wooded stumps or branches may be used to enhance the local habitat features and encourage herpetofauna.	Operational Phase	Environmental Officer & Contractor	Environmental Officer	Annually
Areas of dense and healthy indigenous vegetation, even secondary communities outside of the direct project footprint, should not be fragmented or disturbed further.	Construction, Operational	Project manager, Environmental Officer	Environmental Control Officer for the construction phase and Estate Environmental Representative for the operation phase	Monthly during construction and annually during operation
It is recommended that areas to be developed/disturbed be specifically demarcated so that during the construction/activity phase, only the demarcated areas be impacted upon to prevent the movement of staff or equipment/vehicles into the surrounding environments.	Pre-Construction, Construction Phase	Project manager, Environmental Officer & Contractor	Environmental Control Officer	Monthly
All vehicles and personnel must make use of the existing roads and walking paths, especially construction vehicles/ vehicles used during maintenance activities.	Construction/Operational Phase	Environmental Officer & Contractor	Environmental Control Officer for the construction phase. Estate Environmental	Monthly during construction and as when required during operation

info@thebiodiversitycompany.com

			Representative for the operation phase	
<p>Construction materials may not be stored for extended periods of time and must be removed from the project area once the construction phase has been concluded.</p> <p>Areas that are denuded during construction (laydown areas etc.) need to be re-vegetated with indigenous vegetation to prevent erosion during flood events and strong winds and to support the adjacent habitat. This will also reduce the likelihood of encroachment by alien invasive plant species.</p>	Construction	Environmental Officer & Contractor	Environmental Control Officer	Monthly
<p>All disturbed areas adjacent to the construction footprint are to be rehabilitated and appropriately landscaped. Rehabilitation of the disturbed areas existing in the project area must be made a priority. Topsoil must also be utilised, 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 cleared areas will enable topsoil to be returned more rapidly, thus ensuring more recruitment from the existing seedbank.</p>	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
<p>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:</p> <ul style="list-style-type: none"> 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 necessary. All contaminated soil / yard stone shall be treated in situ or removed and be placed in containers. 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. 	Closure Phase/Rehabilitation phase	Environmental Officer & Contractor	Rehabilitation	Quarterly monitoring
<p>Leaking equipment and vehicles must be repaired immediately or be removed from the project area to facilitate repair.</p>	Construction	Environmental Officer & Contractor	Environmental Control Officer	Monthly

Country Club Johannesburg

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.	Construction and Operation	Environmental Officer & Contractor	Environmental Control Officer during construction and Estate Environmental Representative during operation	Monthly during construction and annually during operation
A fire management plan needs to be compiled and implemented to restrict the impact that fire might have on remaining natural and newly rehabilitated areas. If a plan already exists then it must be made relevant to the new development and its proximity to natural areas.	Closure Phase/Rehabilitation phase	Environmental Officer & Contractor	Fire Management	During Phase
Rocks removed during the construction phase may not be dumped but can be used in areas where erosion control needs to be performed. Alternatively, they may be piled to create useful habitat features for herpetofauna.	Construction Phase	Environmental Officer & Contractor	Environmental Control Officer	Monthly

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 stating that the trapping, killing, or poisoning of any wildlife is not allowed must be put up at the site.	Construction and operation	Environmental Officer & Contractor	Environmental Control Officer during construction and Estate Environmental Representative during operation	Monthly during construction and annually during operation
A qualified environmental control officer must be on site when clearing begins. The area must be walked through prior to construction to ensure that 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.	Pre-Construction, Construction Phase	Environmental Officer, Contractor	Environmental Control Officer	Once-off at the commencement of construction
Any holes/deep excavations must be dug in a progressive manner in order to allow burrowing animals time to move off and to prevent trapping. Should the holes remain open overnight they must be covered temporarily to ensure no fauna species fall in.	Planning and construction	Environmental Officer & Contractor, Engineer	Environmental Control Officer	Monthly
Should any SCC fauna be observed within the project area before or during construction, all activities must cease immediately until the animal moves off. A relevant specialist must be consulted in order to facilitate the capture or removal of any animals that do not move off on their own.	Construction and operation	Environmental Officer, Contractor, and estate manager	Environmental Control Officer during construction and Estate Environmental	Monthly during construction and annually during operation

Country Club Johannesburg

			Representative during operation	
The duration of the construction should be minimized to as short a term as possible, to reduce the period of disturbance on fauna.	Construction/	Project manager, Environmental Officer & Contractor	Environmental Control Officer	Monthly
Outside lighting 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.	Planning, Construction/Operational Phase	Project manager, Environmental Officer, Contractor & Design Engineer	Environmental Control Officer during construction and Estate Environmental Representative during operation	Monthly during construction and annually during operation
All construction and maintenance motor vehicle operators should undergo an environmental induction that includes instruction on the need to comply with speed limits and to respect all forms of wildlife. Speed limits must be enforced to ensure that road killings and erosion is limited. Additional Speed bumps should be built to force slow speeds.	Construction Phase	Health and Safety Officer	Environmental Control Officer	Monthly
Noise must be kept to a minimum during the evenings/ at night to minimize all possible disturbances to amphibian species and nocturnal mammals.	Operational Phase	Environmental Officer	Estate Environmental Representative	Annually
Schedule construction activities during the least sensitive periods, to avoid migration, nesting, and breeding seasons as far as possible.	Construction	Project manager, Environmental Officer & Contractor	Environmental Control Officer	Once-off at the commencement of construction
Any significant heat generated from any source must be monitored to ensure that it does not negatively affect the local fauna.	Life of operation	Environmental Officer & Contractor	Heat generation	Ongoing
Signs must be put up in order to show the importance and sensitivity of the surrounding areas and their functions.	Construction and Operation	Environmental Officer & Contractor	Environmental Control Officer during construction and Estate Environmental Representative during operation	Monthly during construction and annually during operation

Management outcome: Alien Vegetation and fauna

Impact Management Actions

Implementation

Monitoring

info@thebiodiversitycompany.com

Country Club Johannesburg

	Phase	Responsible Party	Aspect	Frequency
The compilation and implementation of an alien vegetation management plan is very important, especially because of the 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.	Life of operation	Environmental Officer & Contractor	Estate Environmental Representative	Quarterly monitoring
The footprint area of the construction should be kept to a minimum.	Construction	Environmental Officer & Contractor	Environmental Control Officer	Monthly
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 frequently to prevent rodents and pests from entering the site and proliferating.	Life of operation	Environmental Officer & Health and Safety Officer	Estate Environmental Representative	Monthly
A pest control plan must be put in place and implemented; it is imperative that poisons not be used.	Life of operation	Environmental Officer & Health and Safety Officer	Evidence or presence of pests	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 dirt roads and any earth dumps. 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 additional speed bumps should also be constructed.	Construction Phase	Contractor	Estate Environmental Representative	Monthly
Management outcome: Waste management				
Impact Management Actions	Implementation		Monitoring	
	Phase	Responsible Party	Aspect	Frequency

Country Club Johannesburg

Refuse bins must be emptied and secured and temporary storage of domestic waste shall be in covered waste skips. Maximum domestic waste storage period must be 10 days.	Life of operation	Environmental Officer & Health and Safety Officer	Estate Environmental Representative	Monthly
Any litter, spills, fuels, chemical and human waste in and around the project area must be removed and disposed of timeously and responsibly.	Construction	Environmental Office, Contractor & Health and Safety Officer	Environmental Control Officer	Monthly
A minimum of one toilet must be provided per 10 persons. Portable toilets must be regularly pumped dry to ensure that the system does not degrade over time and spill into the surrounding area.	Life of operation	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.	Construction and Operation	Environmental Officer & Health and Safety Officer, Contractor	Environmental Control Officer during construction and Estate Environmental Representative during operation	Monthly
Under no circumstances may domestic waste be burned on site. Waste may never be stored in an open pit where it is susceptible to the elements such as wind and rain.	Life of operation	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 are 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 and fauna, their identification, conservation status and importance, biology, habitat requirements and management requirements in line with the Environmental Authorisation and within the EMPr. Contractors and employees must especially be made aware of the potential faunal SCC present and the sensitive flora.	Construction	Health and Safety Officer	Environmental Control Officer	Monthly

info@thebiodiversitycompany.com

Country Club Johannesburg

All staff should 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.

Operation

Environmental Officer and
Estate manager

Estate Environmental
Representative

Annually

10 Conclusion

The project area is generally well classified by the Gauteng Conservation Plan such that the southern and eastern portions are representative of ESAs. Although over half of the project area has been critically modified from its historical, pre-anthropogenic state, there are portions that remain that closely resemble healthy functioning habitat which is likely to contain additional SCC or additional protected flora and fauna. Thus, it is very important that the management outcomes presented above be adhered to, in order to mitigate the negative environmental impacts that will stem from the development activities.

Completion of the terrestrial biodiversity assessment led to a disputing of 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 'Very Low' to 'Low' sensitivity, because of the significant levels of environmental disturbance that have taken place. It is noted that just under half of the project area is however allocated a 'Medium' sensitivity as these areas maintain healthy portions of indigenous vegetation and faunal communities, as well as supporting protected floral and faunal species such as the Cream courting harlequin orchid and Leopard tortoise.

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 critically modified grassland habitats, are likely to face minimal further impacts from any low to high impact development activities, and as such the proposed activities may proceed within these areas. The modified grassland habitat, allocated a 'Medium' sensitivity, represents a relatively healthy portion of 'Critically Endangered' habitat and as such development activities within these areas should only be of a medium impact and must be followed by appropriate restoration and rehabilitation measures.

The project area contains numerous important floral and faunal species and is under threat from several alien invasive plants. Recommendations are provided below which may serve to guide the project progress in this regard.

10.1 Specialist Recommendations

All protected and flora SCC should remain undisturbed as far as possible. If development activities are to take place within any of the areas containing these species, then as many individuals as possible should be translocated to safe areas within the property.

Under no circumstances should protected fauna, such as Hedgehog or Leopard tortoise, be disturbed. Both of these species are protected by the Transvaal Nature Conservation Ordinance No. 12 of 1983. Hedgehog (and the potentially occurring Rough-haired golden mole) are nationally protected according to section 57 of the National Environmental Management: Biodiversity Act (act No. 10 of 2004), in accordance with the 2007 Threatened or Protected Species (TOPS) Regulations and Lists (published in Government Gazettes No. 29657 of 23 February 2007 and No. 30568 of 14 December 2007 respectively).

Several category 1b alien invasive plants were recorded in the project area. Category 1b invasives require compulsory control as part of an invasive species control programme and these plants are deemed to have such a high invasive potential that infestations can qualify to be placed under a government sponsored invasive species management programme. The mature *Gleditsia triacanthos* (Honey locust) trees should be a priority for removal.

10.2 Specialist Opinion

It is the opinion of the specialist that the proposed activities may proceed within the confines of the project area, following accordance with the mitigation measures put forward in Table 9-1 above. Activities that take place within any 'Medium' sensitivity areas (see Figure 8-16) should only be of a medium impact and must be followed by appropriate rehabilitation measures. There are no fatal flaws for this project.

11 References

ADU (Animal Demography Unit). (2020). Virtual Museum: <https://vmus.adu.org.za/> (Accessed: Feb 2022).

Alexander, G. & Marais, J. (2007). A guide to the Reptiles of Southern Africa. Struik, Cape Town.

Alexander, G.J., Tolley, K., Bates, M.F. & Mouton, P.L.F.N. 2018. Smaug giganteus. The IUCN Red List of Threatened Species 2018: e.T5336A115650269. <https://dx.doi.org/10.2305/IUCN.UK.2018-2.RLTS.T5336A115650269.en>. Downloaded on 10 November 2021.

Awuah, A. 2018. NBA 2018 Rivers and NBA 2018 National Wetland Map 5. South African National Biodiversity Institute (SANBI), Newlands, Cape Town.

Barbour, M.T., Gerritsen, J. & White, J.S. 1996. Development of a stream condition index (SCI) for Florida. Prepared for Florida Department of Environmental Protection: Tallahassee, Florida.

Bates, M.F., Branch, W.R., Bauer, A.M., Burger, M., Marais, J., Alexander, G.J & de Villiers, M.S. (Eds). (2014). Atlas and Red List of Reptiles of South Africa, Lesotho and Swaziland. Suricata 1. South African Biodiversity Institute, Pretoria.

BGIS (Biodiversity GIS). (2018). <http://bgis.sanbi.org/> (Accessed: Feb 2022).

Birdlife South Africa. (2015). Taylor MR, Peacock F, Wanless RM (eds). 2015. The Eskom Red Data Book of Birds of South Africa, Lesotho and Swaziland. BirdLife South Africa. Johannesburg, South Africa

BirdLife South Africa. (2017). Important Bird Areas Factsheet. <http://www.birdlife.org> (Accessed: Feb 2022).

BODATSA-POSA. (2019). South African National Biodiversity Institute. 2016. Botanical Database of Southern Africa (BODATSA) [dataset]. <http://newposa.sanbi.org/>. (Accessed: Feb 2022).

Branch, W.R. (1998). Field Guide to Snakes and Other Reptiles of Southern Africa. Struik, Cape Town.

CITES. UNEP-WCMC (Comps.) 2021. Checklist of CITES species. CITES Secretariat, Geneva, Switzerland and UNEP-WCMC, Cambridge, United Kingdom. Accessed: Feb 2022.

Collins, N.B. 2015. Free State Province Biodiversity Plan: CBA map. Free State Department of Economic, Small Business Development, Tourism and Environmental Affairs. Internal Report.

Chittenden, H., Davies, G., and Weiersbye, I. (2016). Roberts Bird Guide. Second Edition. The John Voelcker Bird Book Fund, Cape Town.

Dallas, H.F. 2007. River Health Programme: South African Scoring System (SASS) Data Interpretation Guidelines. Report produced for the Department of Water Affairs and Forestry (Resource Quality Services) and the Institute of Natural Resources.

Department of Environment, Forestry and Fisheries (DEFF), 2021. Screening Report for an Environmental Authorization or for a Part Two Amendment of an Environmental Authorisation as Required by the 2014 EIA Regulations – Proposed Site Environmental Sensitivity.

Department of Environment, Forestry and Fisheries (DEFF-2), 2021. Notice of the list of protected tree species under the National Forests Act, 1998 (Act no. 84 of 1998). National Gazettes, No. 44204 of 01 March 2021.

Department of Environmental Affairs (DEA) (2016) National Protected Areas Expansion Strategy for South Africa 2016. Department of Environmental Affairs, Pretoria, South Africa.

Department of Forestry, Fisheries and the Environment (DFFE), 2021. South Africa Protected Areas Database (SAPAD_OR_2021_Q3). Published 2021/12/17. Available at: <http://egis.environment.gov.za>

Department of Forestry, Fisheries and the Environment (DFFE-2), 2021. South Africa Conservation Areas Database (SACAD_OR_2021_Q3). Published 2021/12/17. Available at: <http://egis.environment.gov.za>

Department of Water and Sanitation (DWS). 2021. A Desktop Assessment of the Present Ecological State, Ecological Importance and Ecological Sensitivity per Sub Quaternary Reaches for Secondary Catchments in South Africa. Draft. Compiled by RQS-RDM.

Del Hoyo, J., Collar, N.J., Christie, D.A., Elliott, A., Fishpool, L.D.C., Boesman, P. & Kirwan, G.M. (1996). HBW and BirdLife International Illustrated Checklist of the Birds of the World. Volume 2: Passerines. Lynx Editions and BirdLife International, Barcelona, Spain and Cambridge, UK.

Du Preez, L. & Carruthers, V. (2009) A Complete Guide to the Frogs of Southern Africa. Struik Nature, Cape Town.

Eskom. (2015). Taylor, M.R., Peacock, F. & Wanless, R.M. (Eds). The 2015 Eskom Red Data Book of birds of South Africa, Lesotho and Swaziland. BirdLife South Africa, Johannesburg.

EWT. (2016). Child MF, Roxburgh L, Do Linh San E, Raimondo D, Davies-Mostert HT, editors. The 2016 Red List of Mammals of South Africa, Swaziland and Lesotho. South African National Biodiversity Institute and Endangered Wildlife Trust, South Africa.

EWT (Endangered Wildlife Trust). (2017). Threatened Amphibian Programme. (2015). The Southern African Frog Atlas Project <https://www.ewt.org.za/TAP/reference.html> (SAFAP, now FrogMAP). <http://vmus.adu.org.za> (Accessed: Feb 2022).

Eyssell, A. (2017). Vegetation Assessment and Management Input Report for G&W Base and Industrial Minerals, Koppies Bentonite Mine. Dimela Eco Consulting, Pretoria.

Fish, L., Mashau, A.C., Moeaha, M.J. & Nembudani, M.T. (2015). Identification Guide to Southern African Grasses: An Identification Manual with Keys, Descriptions, and Distributions. SANBI, Pretoria.

FrogMap. (2017). The Southern African Frog Atlas Project (SAFAP, now FrogMAP). <http://vmus.adu.org.za> (Accessed: Feb 2022).

GDARD (2014): Technical Report for the Gauteng Conservation Plan (Gauteng C-Plan v3.3). Gauteng Department of Agriculture and Rural Development: Nature Conservation Directorate. 60 pages.

Goff, F., Dawson, G., & Rochow, J. (1982). Site examination for threatened and endangered plant species. *Environmental Management*, 6(4), 307-316.

Griffiths, C., Day, J. & Picker, M. (2016). *Freshwater Life: A Field Guide to the Plants and Animals of Southern Africa*. Struik Nature, Cape Town.

Hockey, P.A.R., Dean, W.R.J. & Ryan, P.G. (Eds). (2005). *Roberts – Birds of Southern Africa*, VIIth ed. The Trustees of the John Voelcker Bird Book Fund, Cape Town.

IUCN. (2012). *IUCN Red List Categories and Criteria: Version 3.1. Second edition*. Gland, Switzerland and Cambridge, UK: IUCN. iv + 32pp.

IUCN 2016. *The IUCN Red List of Threatened Species. Version 2016-1*. <http://www.iucnredlist.org>. Downloaded on <Feb 2022>.

International Union for Conservation of Nature (IUCN) 2021. *The IUCN Red List of Threatened Species. Version 2021-3*. <https://www.iucnredlist.org>. Accessed: Feb 2022

Johnson, S. & Bytebier, B. (2015). *Orchids of South Africa: A Field Guide*. Struik publishers, Cape Town.

Kasl, B. (2017). *Assessment of faunal species richness, with focus on vertebrate species, within the mineral boundary of koppies bentonite mine near koppies, free state province, for G&W Base Minerals (Pty) Ltd*. Commissioned by Dimela Eco Consulting, Pretoria.

Lötter, M.C. & Le Maitre, D. (2021) *Fine-scale delineation of Strategic Water Source Areas for surface water in South Africa using Empirical Bayesian Kriging Regression Prediction: Technical report*. Prepared for the South African National Biodiversity Institute (SANBI), Pretoria. 33 pages.

Macfarlane., D and Bredin., I. 2017. *Buffer zone Guidelines for Wetlands, River and Estuaries Part 1: Technical Manual*

Macfarlane, D.M., Dickens J., Von Hase F. 2009. *Development of a methodology to determine the appropriate buffer zone width and type for developments associated with wetlands, watercourses and estuaries. Final literature review. Report produced for the Department of Water Affairs and Forestry. Submitted to: Water Research Commission. INR Report No:400/09*

MammalMap. (2017). <http://mammalmap.adu.org.za/> (Accessed: Feb 2022).

Marnewick MD, Retief EF, Theron NT, Wright DR, Anderson TA. 2015. *Important Bird and Biodiversity Areas of South Africa*. Johannesburg: BirdLife South Africa.

Measey, G.J. (2011). *Ensuring a Future for South Africa's Frogs: A Strategy for Conservation Research*. South African National Biodiversity Institute, Pretoria.

Minter, L., Burger, M., Harrison, J.A. & Kloepfer, D. (2004). *Atlas and Red Data Book of the Frogs of South Africa, Lesotho and Swaziland*. Smithsonian Institute Avian Demography Unit, Washington; Cape Town.

Monadjem, A., Taylor, P.J., Cotterill, F.D.P. & Schoeman, C. (2010). Bats of southern and central Africa: a biogeographic and taxonomic synthesis. Wits University Press, Johannesburg.

Mucina, L. & Rutherford, M.C. (Eds.). (2006). The vegetation of South Africa, Lesotho and Swaziland. Strelitzia 19. South African National Biodiversity Institute, Pretoria, South African.

National Environmental Screening Tool, 2022. Available from the Department of Forestry, Fisheries and the Environment website:

<https://screening.environment.gov.za/screeningtool/index.html#/pages/welcome>

NBA. (2018). Terrestrial Ecosystem Threat Status and Protection Level 2018. <http://bgis.sanbi.org/>. (Accessed: Feb 2022).

Nel, J. L., Driver, A., Strydom, W. F., Maherry, A. M., Petersen, C. P., Hill, L., Roux, D. J., Nienaber, S., van Deventer, H., Swartz, E. R. & Smith-Adao, L. B. (2011). Atlas of Freshwater Ecosystem Priority Areas in South Africa: Maps to support sustainable development of water resources, WRC Report No. TT 500/11. Water Research Commission, Pretoria.

Nel, J.L., Murray, K.M., Maherry, A.M., Petersen, C.P., Roux, D.J., Driver, A., Hill, L., Van Deventer, H., Funke, N., Swartz, E.R., Smith-Adao, L.B., Mbona, N., Downsborough, L. and Nienaber, S. (2011). Technical Report for the National Freshwater Ecosystem Priority Areas project. WRC Report No. K5/1801. Water Research Commission, Pretoria.

NPAES. (2011). National Protected Areas Expansion Strategy. www.environment.gov.za (Accessed: Feb 2022).

Pooley, E. (1998). A Field Guide to Wild Flowers: KwaZulu-Natal and Eastern Region. The Flora Publications Trust; ABC Bookshop, Durban.

Raimondo, Domitilla & von Staden, Lize & Foden, Wendy & Victor, Janine & Helme, N.A. & Turner, R.C. & Kamundi, D.A. & Manyama, P.A.. (2009). Red list of South African plants 2009. Strelitzia. 25.

SABAP2 (South African Bird Atlas Project). (2019). Available at: <https://sabap2.birdmap.africa/coverage>. (Accessed: Feb 2022).

SACAD (South Africa Conservation Areas Database) and SADAP (South Africa Protected Areas Database) (2019). <http://eqis.environment.gov.za>

SANBI. 2013. Grasslands Ecosystem Guidelines: landscape interpretation for planners and managers. Compiled by Cadman, M., de Villiers, C., Lechmere-Oertel, R. and D. McCulloch. South African National Biodiversity Institute, Pretoria. 139 pages.

SANBI. (2016). Red List of South African Plants version 2020. Redlist.sanbi.org (Accessed: Feb 2022).

SANBI. (2017). Technical guidelines for CBA Maps: Guidelines for developing a map of Critical Biodiversity Areas & Ecological Support Areas using systematic biodiversity planning. Driver, A., Holness, S. & Daniels, F. (Eds). 1st Edition. South African National Biodiversity Institute, Pretoria.

South African National Biodiversity Institute (SANBI). 2018. Terrestrial ecosystem threat status and protection level layer [Vector] 2018. Available from the Biodiversity GIS website: <http://bgis.sanbi.org/SpatialDataset/Detail/2675> , downloaded: February 2022.

South African National Biodiversity Institute (SANBI). 2019. National Biodiversity Assessment 2018: The status of South Africa's ecosystems and biodiversity. Synthesis Report. South African National Biodiversity Institute, an entity of the Department of Environment, Forestry and Fisheries, Pretoria. pp. 1–214.

South African National Biodiversity Institute (SANBI). 2022. South Africa's official site for Species Information and National Red Lists. <http://speciesstatus.sanbi.org/> (Accessed: Feb 2022).

Skinner, J.D. & Chimimba, C.T. (2005). The Mammals of the Southern African Subregion (New Edition). Cambridge University Press, South Africa.

Skowno, A.L., Raimondo, D.C., Poole, C.J., Fizzotti, B. & Slingsby, J.A. (eds.). (2019). South African National Biodiversity Assessment 2018 Technical Report Volume 1: Terrestrial Realm. South African National Biodiversity Institute, Pretoria.

Smith, G.F., Chesselet, P., van Jaarsveld, E.J., Hartmann, H., Hammer, S., van Wyk, B., Burgoyne, P., Klak, C. & Kurzweil, H. (1998). Mesembs of the world. Briza Publishers, Pretoria.

Taylor, M.R., Peacock, F. & Wanless, R.M. (Eds). (2015). The 2015 Eskom Red Data Book of birds of South Africa, Lesotho and Swaziland. BirdLife South Africa, Johannesburg.

Van Deventer, H., Smith-Adao, L., Mbona, N., Petersen, C., Skowno, A., Collins, N.B., Grenfell, M., Job, N., Lötter, M., Ollis, D., Scherman, P., Sieben, E. & Snaddon, K. 2018. South African National Biodiversity Assessment 2018: Technical Report. Volume 2a: South African Inventory of Inland Aquatic Ecosystems (SAIIAE). Version 3, final released on 3 October 2019. Council for Scientific and Industrial Research (CSIR) and South African National Biodiversity Institute (SANBI): Pretoria, South Africa. Report Number: CSIR report number CSIR/NRE/ECOS/IR/2018/0001/A; SANBI report number <http://hdl.handle.net/20.500.12143/5847>.

Van Ginkel, CE. & Cilliers, CJ. (2020). Aquatic and Wetland Plants of Southern Africa. First Edition. Briza Publications, Pretoria.

Van Oudtshoorn, F. (2004). Guide to the Grasses of Southern Africa. Second Edition. Briza Publikasies, Pretoria.

Van Wyk, B-E. & Van Wyk, P. (1997). Field guide to trees of Southern Africa. Struik Publishers, Cape Town.

Van Wyk, B-E. & Malan, S. (1998). Field Guide to the Wild Flowers of the Highveld: Also Useful in Adjacent Grassland and Bushveld, Struik Publishers, Cape Town.

Van Wyk, B-E. & Smith, G. (2014). Guide to the Aloes of South Africa. Third Edition. Briza Publications, Pretoria.

Van Wyk, B-E., Van Oudtshoorn, B. & Gericke, N. (2013). Medicinal Plants of South Africa. Briza Publications, Pretoria.

12 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

February 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

February 2022

Appendix B Specialist CVs

Michael Schrenk

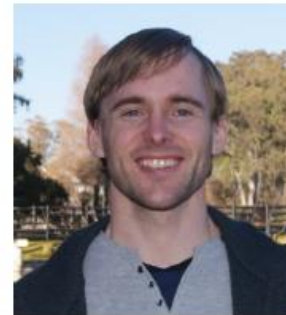
B.Sc Civil and Environmental Engineering

Cell: +27 76 529 2652

Email: mike@thebiodiversitycompany.com

Identity Number: 9204165023085

Date of birth: 16 April 1992



Profile Summary

Project management experience

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

Expertise includes terrestrial biodiversity assessment and ecological restoration

Areas of Interest

Mining, Species specific research and monitoring, Renewable Energy & Bulk Services Infrastructure Development, Farming, Land contamination, Sustainability and Conservation

Key Experience

- Terrestrial biodiversity assessments and surveys
- Environmental Management Programmes (EMPr)
- Ecological assessments
- Rehabilitation Plans
- Invasive species plans
- Search and rescue plans
- Terrestrial biodiversity management

Country Experience

South Africa;
Eswatini

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: Terrestrial Biodiversity Section 24G Assessment for the Explosive Magazine Project

Role on project: Environmental Consultant

Location: Boschhoek, North-West

Main project features: Specialist assessment and report for a NEMA Section 24G application.

Project Name: Specialist Biodiversity Assessment for the Matsopa PRA

Role on project: Terrestrial ecologist

Location: Koppies, Free State

Main project features: Conducting of a specialist field survey and assessment report with sensitivity analyses.

Project Name: Olivedale Retirement Village Erf1250 rehabilitation

Role on project: Project manager and assistant terrestrial ecologist

Location: Olivedale, Gauteng

Main project features: Assist in the securing of environmental authorisation & general authorisation for the rehabilitation of Erf 1250. Manage the terrestrial and ecological assessment and rehabilitation process.

Project Name: Golden Harvest Park ecological assessments

Role on project: Assistant terrestrial ecologist and engineer

Location: Hunters Hill AH, Gauteng

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.

OVERVIEW

An overview of the specialist technical expertise include the following:

- Project management
- Ecological assessments and management plans
- Terrestrial biodiversity surveys and management
- Rehabilitation plans, Invasive species plans, Search and Rescue plans

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

Environmental Consultant at The Biodiversity Company (Present)

Terrestrial biodiversity surveys and assessments, Environmental Management Programmes, Rehabilitation/AIP/Search and Rescue Plans.

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.

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 & 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

- 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, 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: Mondli 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

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

Tate R.B. and Husted, A. 2015. Aquatic Biomonitoring in the upper reaches of the Boesmanspruit, Carolina, Mpumalanga, South Africa. *African Journal of Aquatic Science*.

Tate R.B. and Husted A. 2013. Bioaccumulation of metals in *Tilapia zillii* (Gervai, 1848) from an impoundment on the Badeni River, Cote D'Ivoire. *African Journal of Aquatic Science*.

O'Brien G.C., Bulfin J.B., Husted A. and Smit N.J. 2012. Comparative behavioural assessment of an established and new Tigerfish (*Hydrocynus vittatus*) population in two manmade lakes in the Limpopo catchment, Southern Africa. *African Journal of Aquatic Science*.

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

Husted A. 2009. Aspects of the biology of the Bushveld Smallscale Yellowfish (*Labeobarbus polylepis*): Feeding biology and metal bioaccumulation in five populations. The University of Johannesburg (Thesis).