THE TERRESTRIAL ECOLOGY COMPLIANCE STATEMENT FOR THE SASOL PIGGING STATION PROJECT

Umbogintwini, KwaZulu-Natal

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CLIENT

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Submitted to/Client	
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Declaration	The Biodiversity Company and its associates operate as independent consultants under the auspice of the South African Council for Natural Scientific Professions. We declare that we have no affiliation with or vested financial interests in the proponent, other than for work performed under the Environmental Impact Assessment Regulations, 2017. We have no conflicting interests in the undertaking of this activity and have no interests in secondary developments resulting from the authorisation of this project. We have no vested interest in the project, other than to provide a professional service within the constraints of the project (timing, time and budget) based on the principals of science.

Table of Contents

Tables

Figures

1 Introduction

The Biodiversity Company was appointed to conduct a terrestrial biodiversity assessment for the proposed receiving stations to be established by Sasol South Africa Limited on the existing operating pipeline network in KwaZulu-Natal (further referred to as the Sasol Pigging Station project). The project area is situated in Umbogintwini, 21 km south of Durban, KwaZulu-Natal Province.

The Pigging operations include but are not limited to cleaning and inspecting the pipeline using a cleaning device (“pig”). This is accomplished by inserting the pig into a "pig launcher" (or "launching station") — an oversized section in the pipeline, reducing to the normal diameter. The launching station is then closed and the pressure-driven flow of the product in the pipeline is used to push the pig along the pipe until it reaches the receiving trap — the "pig catcher" (or "receiving station"). Typically, this is done without stopping the flow of the product in the pipeline. The project will entail the installation of pig traps on the existing pipeline to bypass pipelines at the existing stations and allow for inline inspection.

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 May 2022. Furthermore, the assessment and survey both involved the detection, identification and description of any locally relevant sensitive receptors, and the manner in which these sensitive receptors may be affected by the proposed development 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 theme 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.

1.1 Project Area

A generalised Project Area of Interest (PAOI) was established around the proposed footprint, within which the desktop assessments and field survey was carried out (Figure 1-1). The PAOI is located within the farm Umlazi Location 4676 ET in the eThekwini Metropolitan Municipality, within the KwaZulu-Natal Province. Small sections of undeveloped dense natural land surround the PAOI, but the area is largely dominated by compact urban residential, industrial and commercial development. The Mbokodweni River estuary runs north of the PAOI, and the ocean is just over 1 km southeast.

Refer to Figure 1-2 for a regional overview of the PAOI.

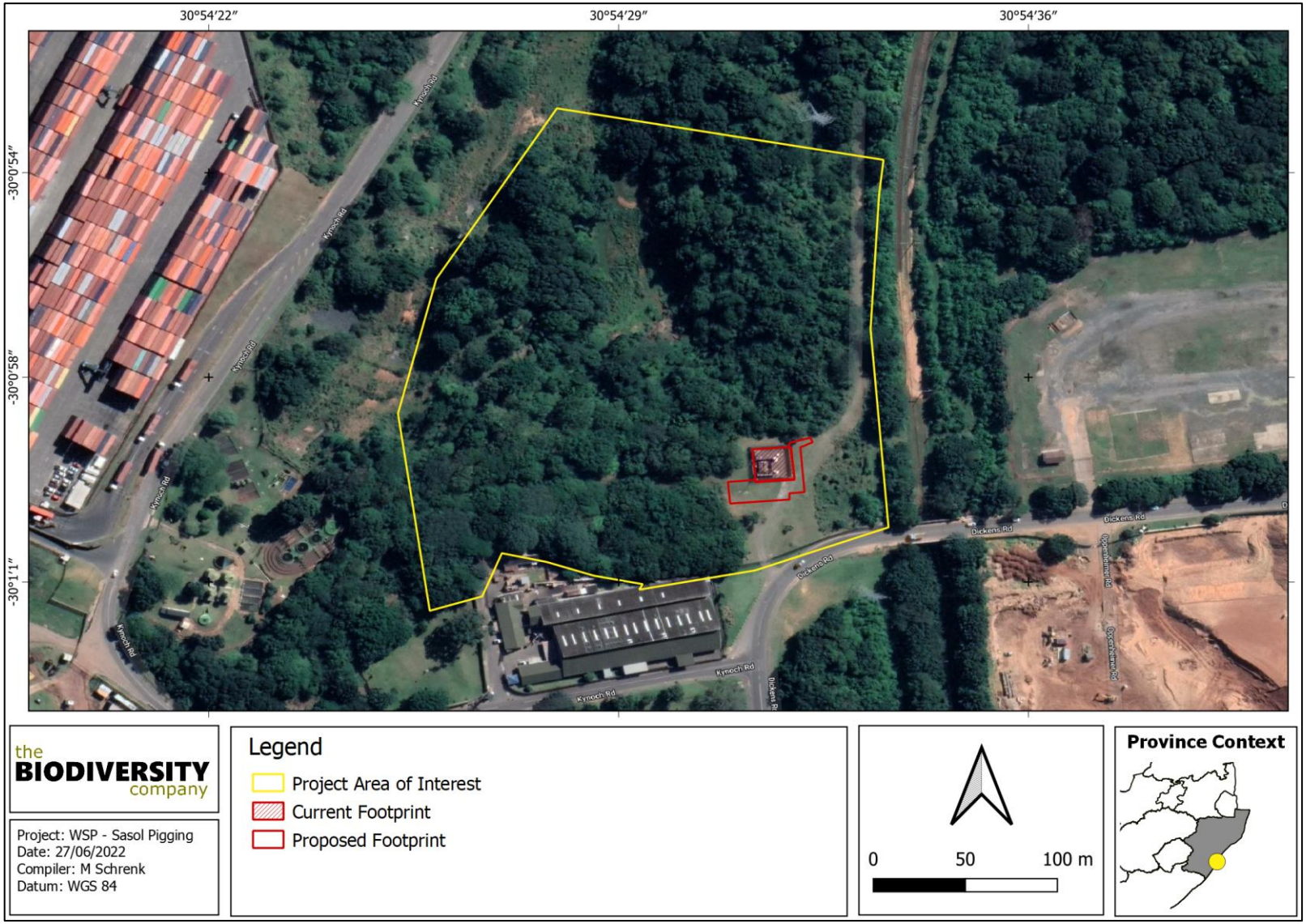


Figure 1-1 Map illustrating the details of Project Area of Interest

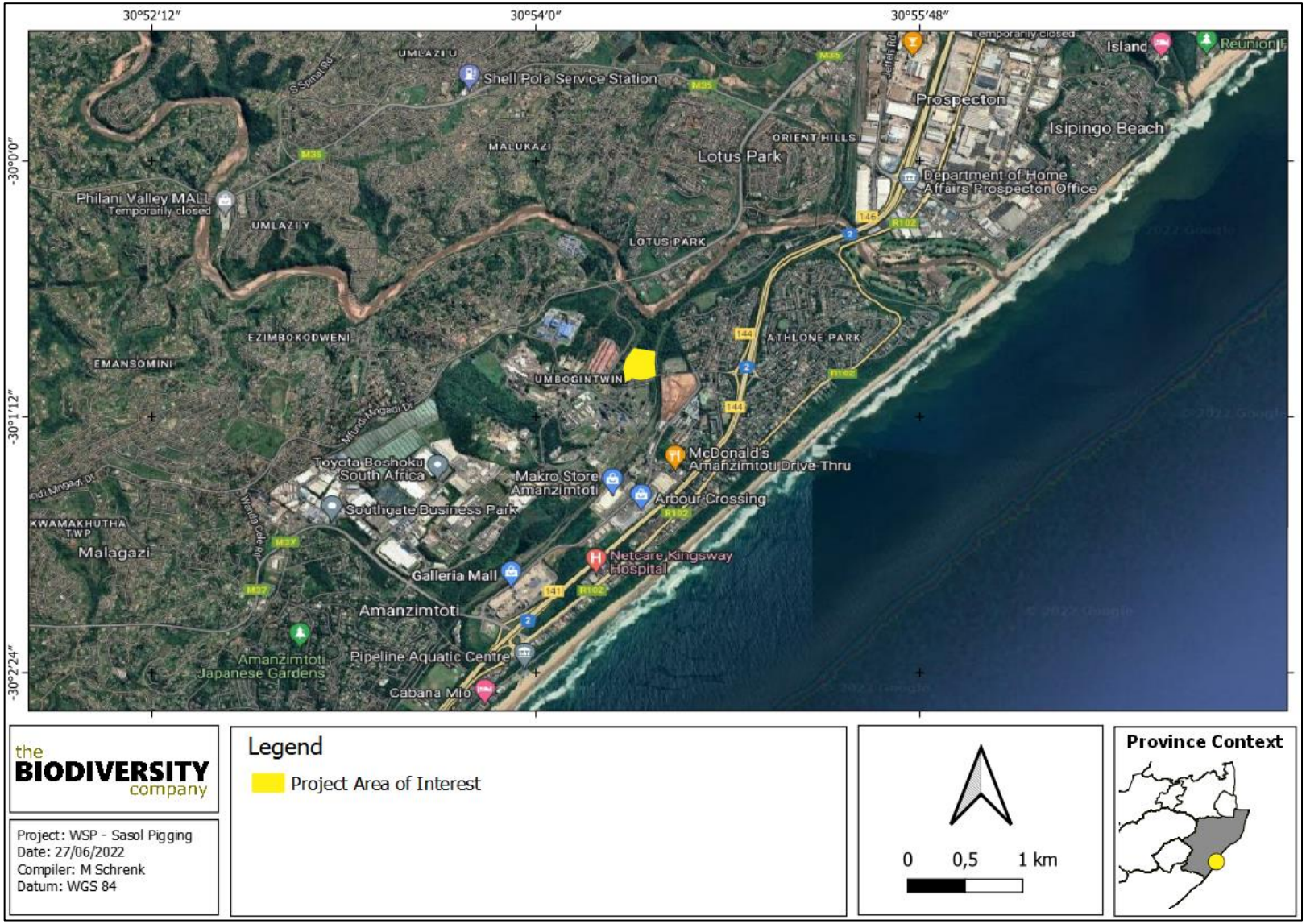


Figure 1-2 Map illustrating a regional overview of the Project Area of Interest

1.2 Terms of Reference

The principal aim of the assessment was to assess the current state of the terrestrial biodiversity of the PAOI 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 PAOI, and the manner in which these sensitive receptors may be affected by the activity;
- Identification of 'significant' ecological, botanical and faunal features within the PAOI;
- Identification of conservation significant habitats around the PAOI 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 PAOI, 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.

2 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 provided is not exhaustive and other legislation, policies and guidelines may apply in addition to those listed below (Table 2-1).

Table 2-1 A list of key legislative requirements relevant to these studies in the KwaZulu-Natal Province

Region	Legislation
National	Constitution of the Republic of South Africa (Act No. 108 of 2006)
	The National Environmental Management Act (NEMA) (Act No. 107 of 1998)
	The National Environmental Management Protected Areas Act (Act No. 57 of 2003)
	The National Environmental Management Biodiversity Act (Act No. 10 of 2004)
	The National Environmental Management Act (NEMA) (Act No. 107 of 1998) Section 24 , No 42946 (January 2020)
	The National Environmental Management Act (NEMA) (Act No. 107 of 1998) Section 24 , No 43110 (March 2020)
	The National Environmental Management: Waste Act, 2008 (Act 59 of 2008);
	The Environment Conservation Act (Act No. 73 of 1989) and associated EIA Regulations
	Natural Scientific Professions Act (Act No. 27 of 2003)
	National Forest Act (Act No. 84 of 1998)
	National Veld and Forest Fire Act (101 of 1998)
	World Heritage Convention Act (Act No. 49 of 1999)
	National Heritage Resources Act, 1999 (Act 25 of 1999)
	Municipal Systems Act (Act No. 32 of 2000)
	Alien and Invasive Species Regulations, 2014
	Conservation of Agricultural Resources Act, 1983 (Act 43 of 1983)
Provincial	KwaZulu-Natal Environmental, Biodiversity and Protected Areas Management Bill, 2014 (Draft)
	KwaZulu-Natal Nature Conservation Management Act no. 9 of 1997
	Natal Nature Conservation Ordinance 15 of 1974 (updated to Provincial Gazette No. 5265 dated 26 March 1998)
	KwaZulu-Nature Conservation Act, 1992
	KwaZulu-Natal Biodiversity Sector Plan, 2016; and the Ugu District Municipality: Biodiversity Sector Plan 2014

2.1 Report Legislative Framework

In line with the protocol for the specialist assessment and minimum report content requirements for environmental impacts on terrestrial biodiversity, as per Government Notice 320 published in terms of NEMA, dated 20 March 2020: “Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of Sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, when applying for Environmental Authorisation” – section 3, subsection 1:

- An applicant intending to undertake an activity identified in the scope of the protocol, on a site identified on the screening tool as being of 'Very High’ sensitivity for terrestrial biodiversity, must submit a Terrestrial Biodiversity Specialist Assessment; however

- Where the information gathered from the site sensitivity verification differs from the designation of 'Very High' terrestrial biodiversity sensitivity on the screening tool and it is found to be of a 'Low' sensitivity, then a Terrestrial Biodiversity Compliance Statement must be submitted.

The information obtained from a site sensitivity verification, which involved both a desktop assessment as well as a field survey, confirmed that the proposed footprint area is of a 'Low' sensitivity. Therefore, a Terrestrial Biodiversity Compliance Statement will be completed and submitted for this project.

As per sections 2 and 3 of the protocol discussed above, a Terrestrial Biodiversity Compliance Statement must contain the information as presented in Table 2-2 below.

Table 2-2 Terrestrial Biodiversity Compliance Statement information requirements as per the relevant protocol, including the location of the information within this report

Information to be Included (as per GN 320, 20 March 2020)	Report Section
Methodology used to undertake the site assessment and survey, and prepare the compliance statement, including relevant equipment and modelling used	4
Description of the assumptions and any uncertainties or gaps in knowledge or data	5
A baseline profile description of biodiversity and ecosystems of the site	6
Site sensitivity verification: Desktop Analysis using satellite imagery and available information	6.1 & 6.2
A statement on the duration, date and season of the site inspection	5 & 6
Site sensitivity verification: Onsite inspection, include a description of current land use and vegetation found on-site	6.3
Site sensitivity verification: Photographs/evidence of environmental sensitivity	6.3
Screening tool confirmation/dispute: The assessment must verify the "low" sensitivity of the site, in terms of plant, animal, and terrestrial biodiversity themes	6.3.2
Proposed impact management outcomes or monitoring requirements for inclusion in the EMPr	7
Indicate whether or not the proposed development will have any impact on the terrestrial environment, animals and/or plants	8.1
A signed statement of independence by the specialist	10
Specialist details, including a CV	11

A signed copy of the compliance statement must be appended to the Basic Assessment Report or Environmental Impact Assessment Report.

3 Definitions

3.1 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 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 3-1 below.

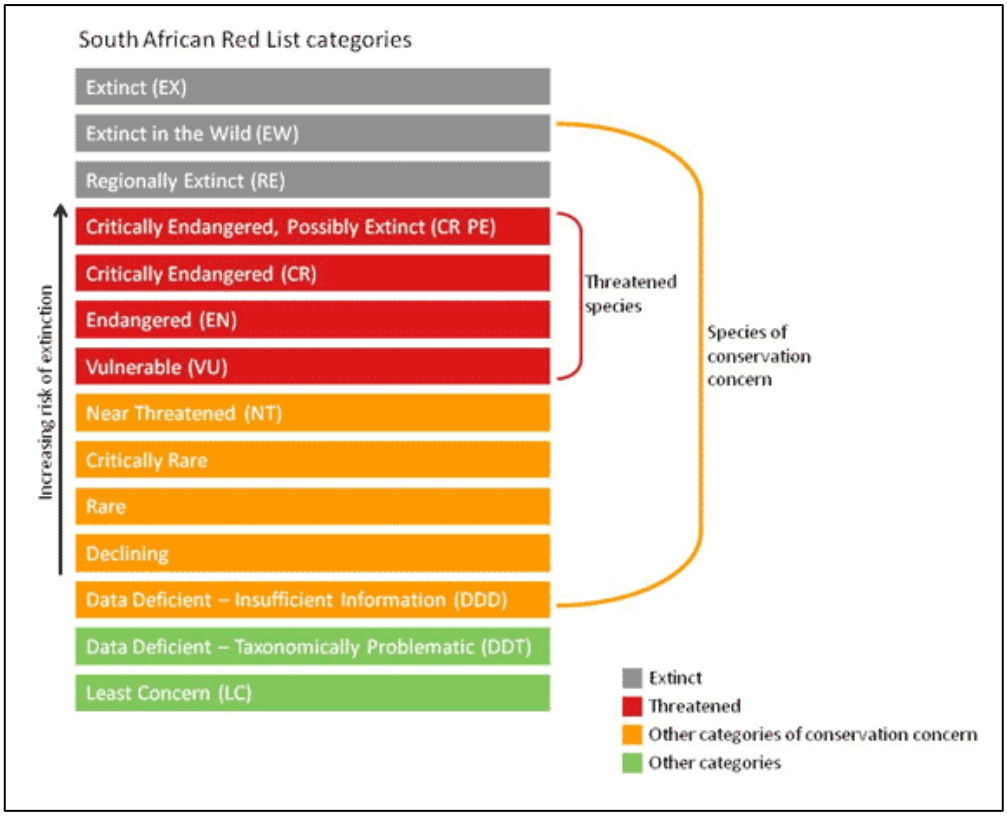


Figure 3-1 Threatened species and Species of Conservation Concern (SANBI, 2016)

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 flora and fauna as well as the IUCN categories, for the purposes of this report.

3.2 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, bill, or an act, 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).

4 Methods

4.1 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:

- The KwaZulu-Natal Biodiversity Plan, 2016 (Ezemvelo, 2016);

- Durban Metropolitan Open Space System (D'MOSS) (EPCPD, 2018);
- 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, 2021 (DFFE, 2021 & DFFE-2, 2021);
- National Protected Areas Expansion Strategy, 2017 (DEA, 2016);
- Important Bird and Biodiversity Areas, 2015 (Marnewick *et al.,* 2015);
- 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, 2011 (Nel, 2011); and
- Strategic Water Source Areas, 2021 (Lötter & Le Maitre, 2021).

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

4.2 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); and
- List of Protected Tree Species (DEFF-2, 2022).

4.3 Floristic Fieldwork Survey and Analysis

The late dry season fieldwork (completed during the 18th of May 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).

4.4 Faunal Assessment

4.4.1 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).

4.4.2 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 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);
- Bats of Southern and Central Africa (Monadjem *et al.,* 2010);
- Spiders of Southern Africa (Leroy & Leroy, 2003); and
- Tortoises, Terrapins, and Turtles of Africa (Branch, 2008).

4.5 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 4-1 and Table 4-2, respectively.

Table 4-1 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 4-2 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 4-3.

Table 4-3 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 4-4.

Table 4-4 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 4-5.

Table 4-5 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 4-6.

Table 4-6 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.

5 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;
- The handheld GPS utilised for the fieldwork had a maximum accuracy of 5 m. As such, any features spatially logged and mapped as part of this report may be offset by approximately 5 m; and
- Only a single season survey was conducted for this assessment, and this constitutes a dry season survey. Temporal trends were therefore not considered.

6 Receiving Environment

6.1 Desktop Spatial Assessment Results

Table 6-1 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. Where a feature is regarded as relevant it is considered an ecologically important landscape feature and discussed further as part of the sub-sections that follow.

Table 6-1 Desktop spatial features examined

Desktop Information Considered	Relevant	Reasoning	Section
KwaZulu-Natal Biodiversity Plan, 2016	Yes	The PAOI overlaps with CBA: Irreplaceable areas	6.1.1
D'MOSS, 2018	Yes	The PAOI overlaps with D'MOSS areas	6.1.2
Ecosystem Threat Status (NBA, 2018)	Yes	The PAOI falls within two ecosystem types, one listed as 'Least Concern' and one listed as 'Endangered'	6.1.3.1
Ecosystem Protection Level (NBA, 2018)	Yes	One ecosystem type is considered 'Well Protected', and the other is considered 'Not Protected'	6.1.3.2
National Protected Areas Expansion Strategy, 2017	Yes	The project area overlaps with an NPAES priority focus area	6.1.4
South African Inventory of Inland Aquatic Ecosystems, 2018	Yes	Numerous river and wetland features occur nearby	6.1.5
National Freshwater Priority Areas, 2011	Yes	Numerous river and wetland features occur nearby, none of which are Freshwater Priority Areas	6.1.5
South African Protected and Conservation Areas Databases, 2021	No	No SAPAD or SACAD areas occur within 5 km or 10 km of the PAOI	-
Important Bird and Biodiversity Areas, 2015	No	No Important Bird and Biodiversity Areas occur nearby	-
Strategic Water Source Areas, 2021	No	There are no Strategic Water Source Areas within the region	-

6.1.1 KwaZulu-Natal Biodiversity Plan

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

Critical Biodiversity Areas (CBAs) are terrestrial areas of the landscape that need to be maintained in a natural or near-natural state to ensure the continued existence and healthy functioning of important species and ecosystems and the delivery of ecosystem services. Thus, if these areas are not maintained in a natural or near natural state then biodiversity targets cannot be met (SANBI, 2017).

Ecological Support Areas (ESAs) are areas that are not essential for meeting biodiversity representation targets but play an important role in supporting the ecological functioning of ecosystems as well as adjacent Critical Biodiversity Areas, and/or in delivering ecosystem services that support socio-economic development (SANBI, 2017).

As shown in Figure 6-1 and according to the KwaZulu-Natal Biodiversity Sector Plan, the PAOI overlaps with CBA: Irreplaceable areas.

These high-level CBA sites represent areas that are irreplaceable, or near irreplaceable, for meeting biodiversity targets. There are no or very few other options for meeting biodiversity targets for the features associated with these areas (SANBI, 2017). Appropriate land-uses for these areas are generally limited to low-impact conservation and game farming activities.

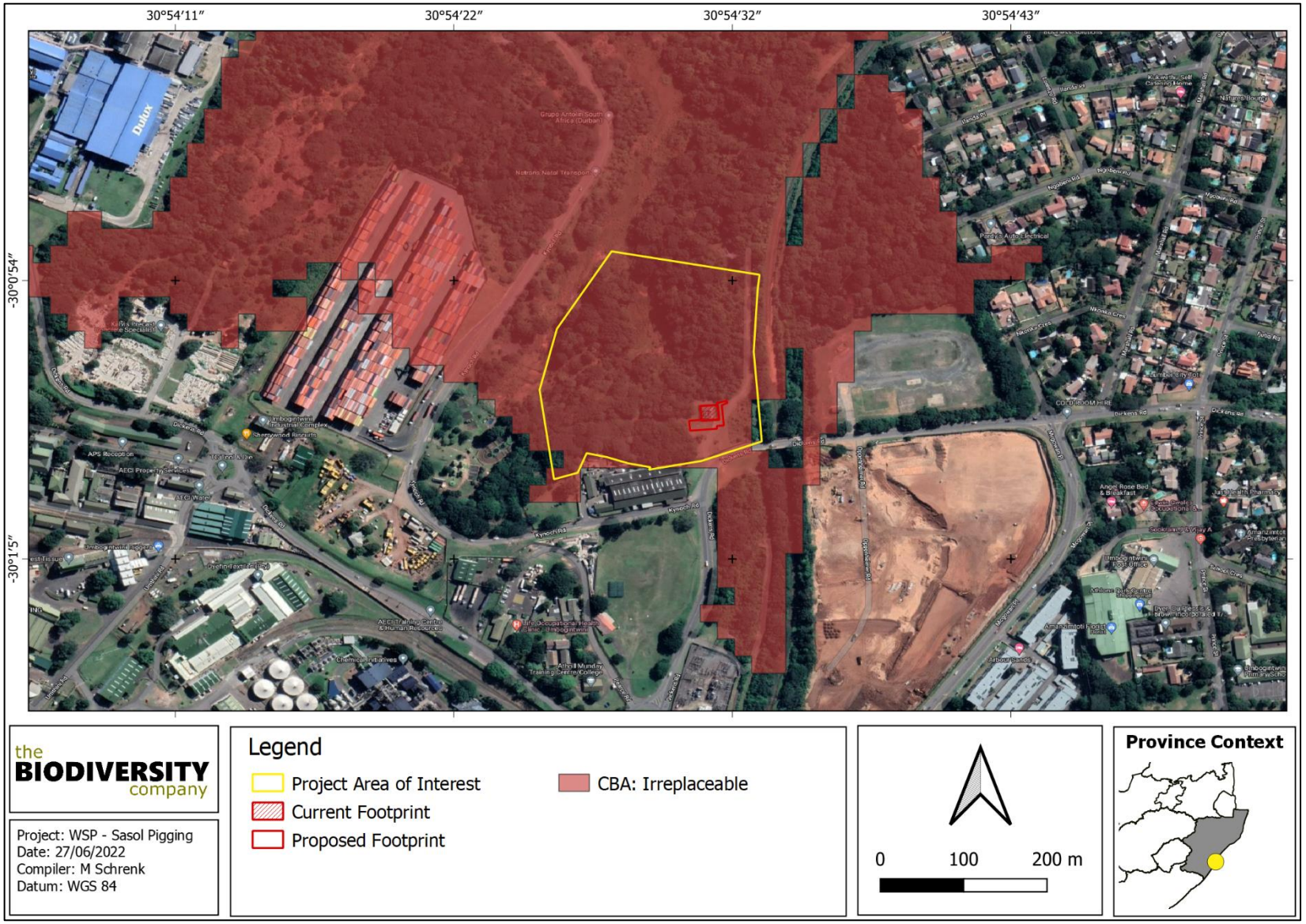


Figure 6-1 Map presenting the Project Area of Interest superimposed on the KwaZulu-Natal Biodiversity Plan dataset

6.1.2 Durban Metropolitan Open Space System

The Durban Metropolitan Open Space System (D'MOSS) is a system of open spaces of land and water that incorporates areas of high biodiversity value linked together in a viable network of open spaces. It is mapped by the Biodiversity Planning Branch of the Environmental Planning and Climate Protection Department (EPCPD) using the nationally approved Systematic Conservation Planning approach. (Ethekwini, 2017)

Apart from contributing to the attainment of provincial and national biodiversity conservation targets, D'MOSS provides a range of ecosystem services to all residents of eThekwini, including the formation of soil, erosion control, water supply and regulation, climate regulation, cultural and recreational opportunities, raw materials for craft and building, food production, pollination, nutrient cycling and waste treatment. (Ethekwini, 2017)

Figure 6-2 shows that the PAOI intercepts with the D'MOSS dataset as the area maintains important functional ecosystems as well as physical links along the coast, connecting river catchments to marine sources of biodiversity.

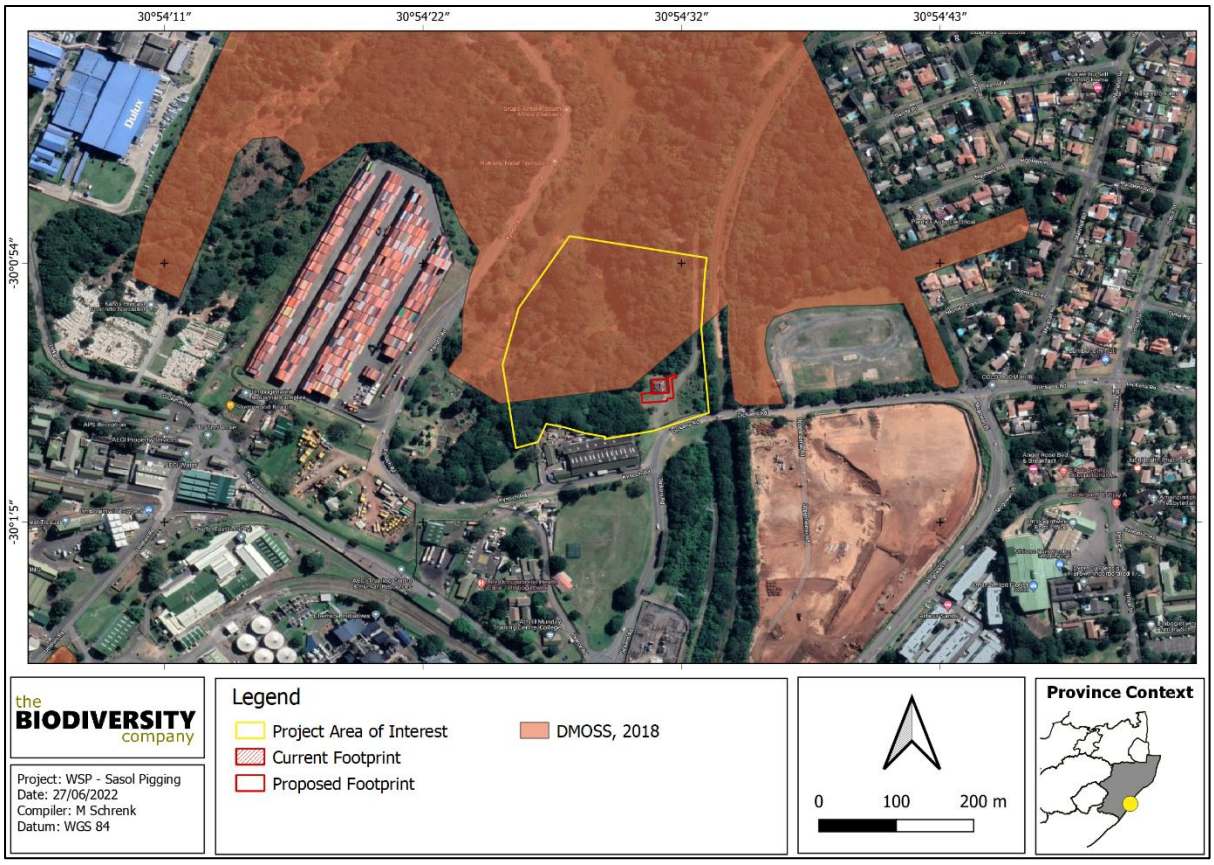


Figure 6-2 Map presenting the Project Area of Interest superimposed on the 2018 D'MOSS dataset

6.1.3 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).

6.1.3.1 Ecosystem Threat Status

Ecosystem Threat Status (ETS) 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 or healthy ecological condition (Skowno *et al*., 2019).

The PAOI was superimposed on the terrestrial ecosystem threat status database, and it falls across two ecosystem types, namely the 'EN' KwaZulu-Natal Coastal Belt Grassland and 'LC' Northern Coastal Forest (see section 6.2.1). 'EN' ecosystems are considered to be at a very high risk of collapse, and 'LC' ecosystem types have experienced little or no loss of natural habitat or deterioration in condition (SANBI, 2019).

6.1.3.2 Ecosystem Protection Level

Protection level (EPL) 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 PAOI was superimposed on the Ecosystem Protection Level map to assess the protection status of the local terrestrial ecosystem. Based on the dataset, the KwaZulu-Natal Coastal Belt Grassland ecosystem is rated as 'NP' and Northern Coastal Forest is rated as 'WP'. 'NP' systems have less than 5% of their biodiversity target included in one or more protected areas, and 'WP' systems have their full target included in one or more protected areas (SANBI, 2019).

6.1.4 National Protected Areas Expansion Strategy

The Department of Environmental Affairs (now the Department of Forestry, Fisheries and the Environment) led the development of the National Protected Areas Expansion Strategy (NPAES) in consultation with the protected area agencies and other key private and public sector stakeholders. The need for the development of the NPAES was established in the National Biodiversity Framework in 2009. (DEA, 2016).

South Africa's protected area network currently falls far short of representing all ecosystems and maintaining healthy functioning ecological processes. In this context, the goal of the NPAES is to achieve cost effective protected area expansion thus enabling better ecosystem representation, ecological sustainability, and resilience to climate change. A comprehensive set of priority areas was compiled based on the priorities identified by provincial and other agencies in their respective protected area expansion strategies. These focus areas are generally large, intact and unfragmented and are therefore of high importance for biodiversity, climate resilience and freshwater protection (DEA, 2016). The PAOI overlaps with priority focus areas for expansion according to the 2017 NPAES dataset (Figure 6-3).

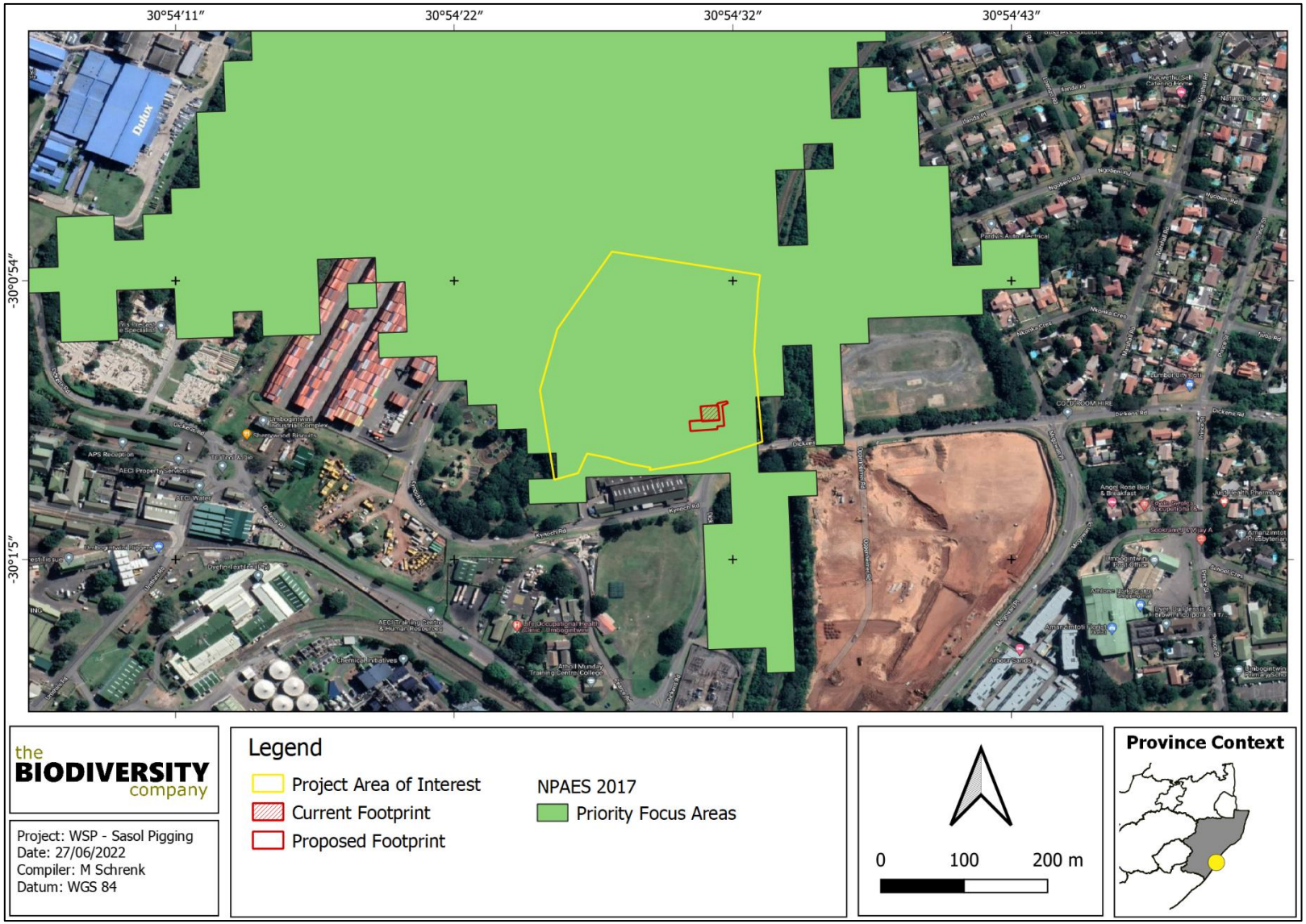


Figure 6-3 Map presenting the PAOI superimposed on the NPAES dataset

6.1.5 Aquatic Habitats

The South African Inventory of Inland Aquatic Ecosystems (SAIIAE) was established during the 2018 NBA. The SAIIAE is a collection of spatial data layers that represent the extent of river and inland wetland ecosystem types as well as the pressures on these systems. The same two headline indicators, and their associated categorisations, are applied as with the terrestrial ecosystem NBA, namely Ecosystem Threat Status and Ecosystem Protection Level. The Ecosystem Threat Status of river and wetland ecosystem types are based on the extent to which each ecosystem type had been altered from its natural condition

Figure 6-4 shows that, according to the SAIIAE database, the PAOI intercepts with a 'Critically Endangered' wetland classified as a 'Poorly protected' channelled valley bottom wetland. Several addition systems occur within 500 m, including the 'Endangered' Mbokodweni River.

National Freshwater Ecosystem Priority Areas (NFEPA) were categorised and spatially delineated in an attempt to better conserve aquatic ecosystems. South Africa has categorised its inland aquatic systems according to set ecological criteria (i.e., ecosystem representation, water yield, connectivity, unique features, and threatened taxa) to identify Freshwater Ecosystem Priority Areas (FEPAs). The FEPAs are intended to be conservation support tools and it is envisioned that they will guide the effective implementation of measures to achieve the National Environment Management: Biodiversity Act's biodiversity conservation goals (Nel et al., 2011).

Figure 6-5 below reveals that, according to the NFEPA database, the PAOI is surrounded by numerous systems - none of which are listed as FEPA systems. The NFEPA database classifies the Mbokodweni River as a permanent to seasonal estuarine system and several natural wetlands occur southwest of the PAOI.

Notably, the fact that the project area is close to a diverse array of aquatic habitats means that it has the potential to support a wide variety of unique flora and fauna species, and potentially certain local SCC

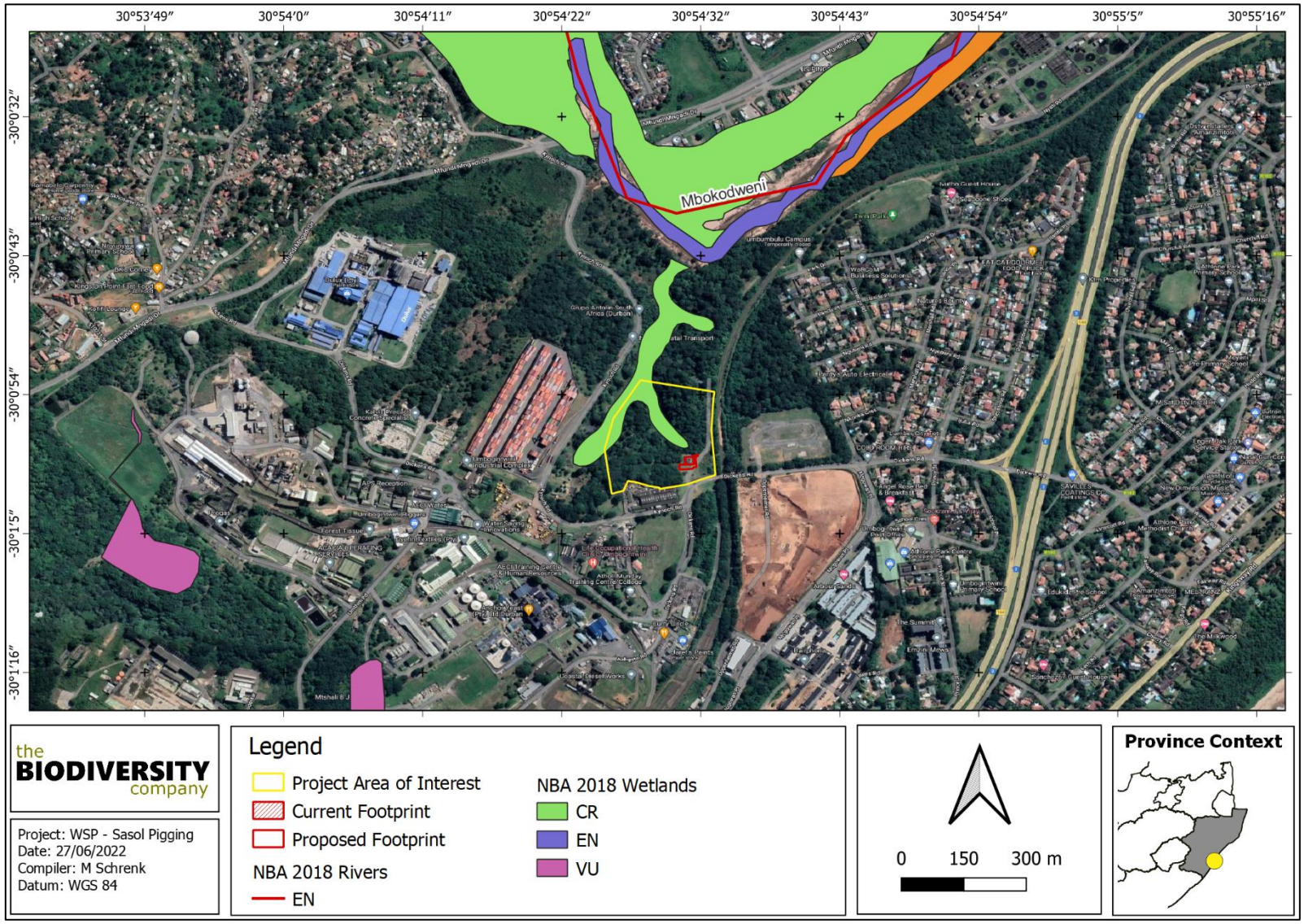


Figure 6-4 Map presenting the PAOI superimposed on the SAIIAE dataset

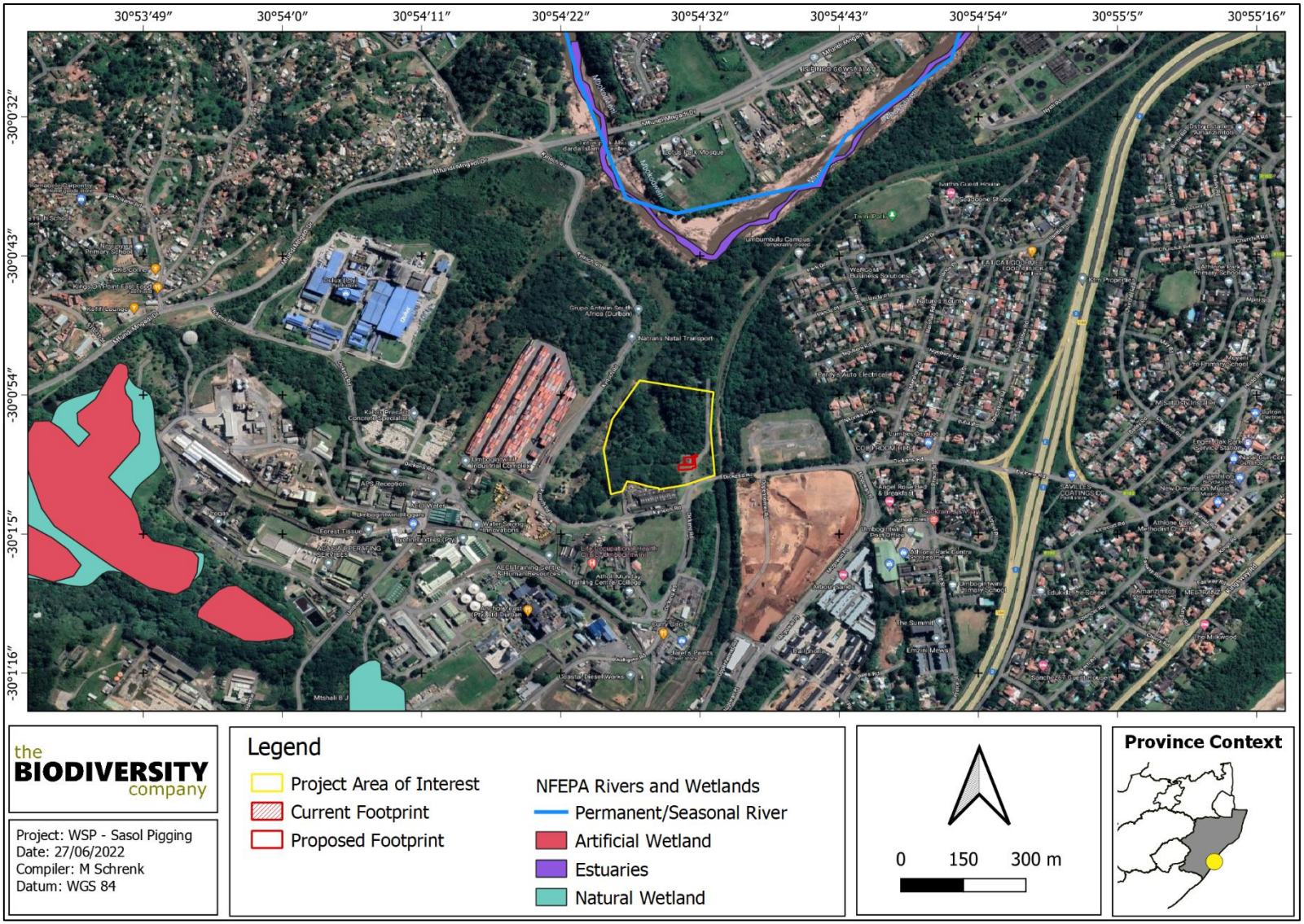


Figure 6-5 Map presenting the PAOI superimposed on the NFEPA dataset

6.2 Ecological Desktop Assessment Results

6.2.1 Vegetation Assessment

The Indian Ocean Coastal Belt is the dominant biome of the region. The biome occurs as an almost 800 km long coastal strip between the South African border with Mozambique as far south as the mouth of the Great Kei River in the Eastern Cape.

This high-level vegetation unit comprises a dominant forest cover interrupted by edaphically or hydrologically controlled areas of grassland, with at least a significant part of the biome being open to dense savanna vegetation, interspersed with many areas of forest and grassland (Mucina & Rutherford, 2006). The overwhelmingly large extent of transformation of the coastal belt outside the existing strips and patches of embedded forest represents a significant loss of evidence of its prior condition.

The Indian Ocean Coastal Belt biome is comprised of 5 different vegetation types. The PAOI intercepts with the KwaZulu-Natal Coastal Belt Grassland, as well as the Northern Coastal Forest of the minor Forests biome (Figure 6-6).

6.2.1.1 KwaZulu-Natal Coastal Belt Grassland

The KwaZulu-Natal Coastal Belt Grassland is a long and, in places, broad coastal strip along the KwaZulu-Natal coast, from near Mtunzini in the north, via Durban to Margate and just short of Port Edward in the south. The habitat is characterised by highly dissected undulating coastal plains which presumably used to be covered to a great extent with various types of subtropical coastal forest. Some primary grassland dominated by Themeda triandra still occurs in hilly, high-rainfall areas where pressure from natural fire and grazing regimes prevailed. At present the KwaZulu-Natal Coastal Belt is affected by an intricate mosaic of very extensive sugarcane fields, timber plantations and coastal holiday resorts, with interspersed secondary Aristida grasslands, thickets and patches of coastal thornveld. (Mucina & Rutherford, 2006).

Important Plant Taxa

Important plant taxa are those species that have a high abundance, a frequent occurrence, or are prominent in the landscape within a particular vegetation type (Mucina & Rutherford, 2006). The following species are considered important in the KwaZulu-Natal Coastal Belt Grassland vegetation type:

Graminoids: *Aristida junciformis subsp. galpinii, Digitaria eriantha, Themeda triandra*.

Herbs: *Berkheya speciosa subsp. speciosa, Cyanotis speciosa, Senecio glaberrimus, Alepidea longifolia, Centella glabrata, Cephalaria oblongifolia.*

Geophytic Herbs: *Bulbine asphodeloides, Disa polygonoides, Hypoxis filiformis, Ledebouria floribunda, Pachycarpus asperifolius, Schizocarphus nervosus, Tritonia disticha.*

Low Shrubs: *Clutia pulchella, Gnidia kraussiana, Phyllanthus glaucophyllus, Tephrosia polystachya.*

Woody Climbers: *Abrus laevigatus, Asparagus racemosus, Smilax anceps.*

Small Trees & Tall Shrubs: *Bridelia micrantha, Phoenix reclinata, Syzygium cordatum, Acacia natalitia, Albizia adianthifolia, Antidesma venosum.*

Biogeographically Important Taxa: Graminoids: *Cyperus natalensis, Eragrostis lappula*. Herbs: *Helichrysum longifolium, Selago tarachodes, Senecio dregeanus, Sphenostylis angustifolia*. Geophytic Herbs: *Kniphofia gracilis, K. littoralis, K. rooperi, Pachystigma venosum, Zeuxine africana.* Low Shrubs: *Helichrysum kraussii, Agathisanthemum bojeri, Desmodium dregeanum.* Megaherb: *Strelitzia nicolai.*

Endemic Taxa: Herb: *Vernonia africana* (extinct). Geophytic Herb: *Kniphofia pauciflora*. Low Shrub: *Barleria natalensis* (extinct).

Conservation Status of the Vegetation Type

According to Mucina and Rutherford (2006) this vegetation type is classified as 'Endangered', with the national target for conservation protection being 25%, only very small parts are statutorily conserved in the Ngoye, Mbumbazi and Vernon Crookes Nature Reserves. About 50% has been transformed for cultivation, by urban sprawl and for roadbuilding. Aliens include *Chromolaena odorata, Lantana camara, Melia azedarach* and *Solanum mauritianum*.

6.2.1.2 Northern Coastal Forest

The vegetation occurs largely within Kwazulu-Natal and is found especially along the seaboards of the Indian Ocean and is particularly well-developed in Maputaland. The Northern Coastal Forest is species-rich, where tall/medium height subtropical coastal forests occur on coastal (rolling) plains and stabilised coastal dunes. Forests of the coastal plains are dominated by *Drypetes natalensis, Englerophytum natalense, Albizia adianthifolia, Diospyros inhacaensis* etc. The low-tree and shrubby understoreys are species-rich and comprise many taxa of (sub)tropical provenience. (Mucina & Rutherford, 2006).

Important Plant Taxa (d = dominant)

Tall Trees: *Albizia adianthifolia (d), Drypetes reticulata (d), Mimusops caffra (d), Psydrax obovata subsp. obovata (d), Sideroxylon inerme (d), Trichilia emetica.*

Small Trees: *Brachylaena discolor subsp. discolor (d), Buxus natalensis (d), Cavacoa aurea (d), Englerophytum natalense (d), Erythroxylum emarginatum (d), Eugenia capensis (d), Gymnosporia nemorosa (d), Kraussia floribunda (d), Peddiea africana (d).*

Woody Climbers: *Acacia kraussiana (d), Rhoicissus tomentosa (d), Dalbergia armata.*

Herbaceous Climber: *Gloriosa superba.*

Tall Shrubs: *Carissa bispinosa subsp. bispinosa, Hyperacanthus amoenus.*

Herbs: *Achyranthes aspera (d), Asystasia gangetica (d), Laportea peduncularis (d)*

Endemic Taxa: Small Tree: *Vachellia kosiensis (d).*

Conservation Status of the Vegetation Type

According to Mucina and Rutherford (2006) this vegetation type is classified as 'Least threatened', but still under threat on the coastal dunes of KwaZulu-Natal (due to mining). Conservation target is 43% and over 65% is statutorily conserved in numerous Nature Reserves, mostly under Ezemvelo KZN Wildlife management. These subtropical forests are sensitive to alien plant invasion, and invaders such as *Chromolaena odorata*, species of *Pereskia* and *Acacia* are posing serious threats.

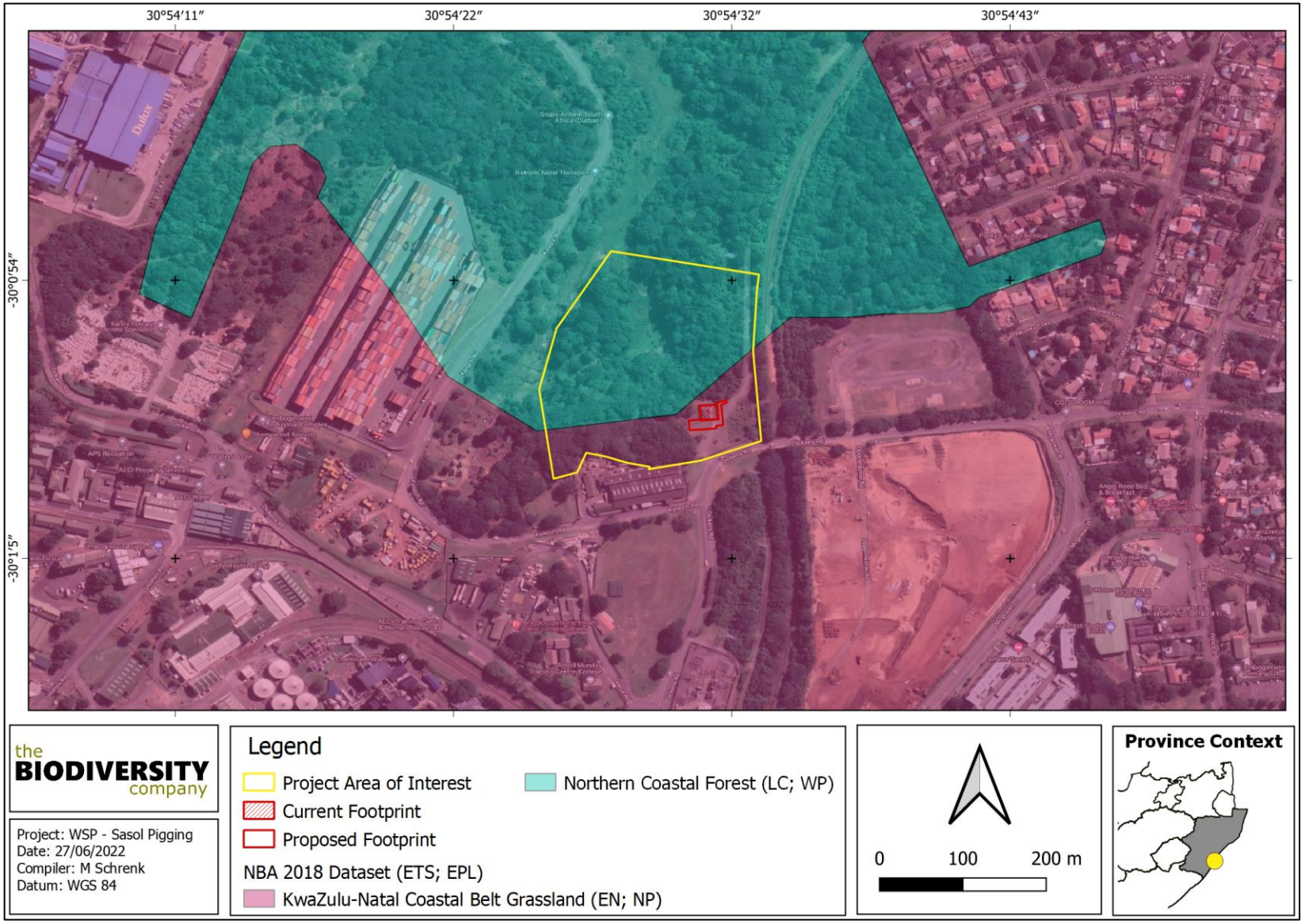


Figure 6-6 Map illustrating the regional vegetation types associated with the PAOI (BGIS, 2018)

6.2.2 Botanical Assessment

Based on the Plants of Southern Africa (BODATSA-POSA, 2019) database, over 250 plant species have the potential to occur within the PAOI and its surroundings. Of these species, 2 are listed as being SCC, and Table 6-2 below outlines these SCC identified through the desktop assessment.

Table 6-2 Plant Species of Conservation Concern potentially occurring in the PAOI

Family	Taxon	Author	National Red-List (SANBI, 2016)	Ecology
Vitaceae	*Cyphostemma flaviflorum*	(Sprague) Desc.	NT	Indigenous; Endemic
Orobanchaceae	*Hyobanche fulleri*	E.Phillips	CR	Indigenous; Endemic

6.2.3 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 6-3 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 6-3 Total number of potential fauna species present, and corresponding SCC

Fauna Type	Total Potential No.	Total SCC
Avifauna	324	20
Mammals	83	9
Herpetofauna (Reptiles and Amphibians)	82	7

These numbers exclude any animals that typically only occur within nature reserves and private reserves. Of the twenty avifaunal SCC, many may be found in the area due to the presence of suitable habitat, including *Circus ranivorus* (African Marsh Harrier) and *Geokichla guttata* (Spotted Ground Thrush).

Of the nine total mammal SCC listed, several are likely to be found in the area, including *Philantomba monticola* (Blue Duiker) and *Myosorex cafer* (Dark-footed Forest Shrew). Of the herpetofauna SCC, *Dendroaspis angusticeps* (Green Mamba) and *Macrelaps microlepidotus* (Natal Black Snake) may be found within the PAOI.

6.3 Field Survey Results

This section details the observations recorded during an on-site field survey conducted to ground truth the floral, faunal, and habitat features of the project area. These observations pertain to the current state of the area as at the 18th of May 2022.

6.3.1 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 the floral and the faunal species recorded are separated below.

6.3.1.1 Flora and Vegetation

The areas immediately adjacent to the current footprint are dominated by common lawn grasses such as *Pennisetum clandestinum* and *Sporobolus africanus,* while the more natural sections of the PAOI are denser and more supportive of numerous indigenous herb and shrub species, including *Celtis africana, Ficus burkei, Hibiscus surattensis* and *Monanthotaxis caffra*. Portions of these areas are however impacted by several invasive species, including the aggressive *Lantana camara* and *Chromolaena odorata*. Overall, 51 flora species were recorded which include 36 indigenous species and 15 exotics (of which 6 are listed Alien Invasive Plant (AIP) Species – highlighted in green in Table 6-4). Note that more flora species are likely to occur, and the list provided should only be considered representative of the most prevalent species within the PAOI.

No protected trees or SCC flora species were observed; however, it is suspected that these species may occur in certain undisturbed sections of the dense indigenous forest areas.

Refer to Figure 6-7 to Figure 6-10 below for photographs of some of the recorded flora.

Table 6-4 Flora species recorded within the Project Area of Interest

Family	Taxon	Author	National Red-List (SANBI, 2016)	Ecology
Amaranthaceae	*Achyranthes aspera var. aspera*	L.		Not indigenous; Naturalised
Acanthaceae	*Asystasia gangetica subsp. micrantha*	(L.) T.Anderson	LC	Indigenous
Fabaceae	*Baphia racemosa*	(Hochst.) Baker	LC	Indigenous; Endemic
Cannabaceae	*Celtis africana*	Burm.f.	LC	Indigenous
Apiaceae	*Centella asiatica*	(L.) Urb.	LC	Indigenous
Cannabaceae	*Chaetachme aristata*	Planch.	LC	Indigenous
Amaranthaceae	*Chenopodium album*	L.		Not indigenous; Naturalised; Invasive
Asteraceae	*Chromolaena odorata*	(L.) R.M.King & H.Rob.		Invasive Category 1b
Sapotaceae	*Chrysophyllum viridifolium*	J.M.Wood & Franks	LC	Indigenous
Commelinaceae	*Commelina benghalensis*	L.	LC	Indigenous
Euphorbiaceae	*Croton sylvaticus*	Hochst.	LC	Indigenous
Poaceae	*Cynodon dactylon*	(L.) Pers.	LC	Indigenous
Cyperaceae	*Cyperus albostriatus*	Schrad.	LC	Indigenous
Sapindaceae	*Deinbollia oblongifolia*	(E.Mey. ex Arn.) Radlk.	LC	Indigenous
Asparagaceae	*Dracaena aletriformis*	(Haw.) Bos	LC	Indigenous
Caryophyllaceae	*Drymaria cordata subsp. diandra*	(L.) Willd. ex Roem. & Schult.	LC	Not indigenous; Naturalised; Invasive
Meliaceae	*Ekebergia capensis*	Sparrm.	LC	Indigenous
Moraceae	*Ficus burkei*	(Miq.) Miq.	LC	Indigenous
Anacardiaceae	*Harpephyllum caffrum*	Bernh. ex Krauss	LC	Indigenous
Convolvulaceae	*Hewittia malabarica*	(L.) Suresh	LC	Indigenous
Malvaceae	*Hibiscus surattensis*	L.	LC	Indigenous
Convolvulaceae	*Ipomoea carnea subsp. fistulosa*	Jacq.		Invasive Category 1b

Acanthaceae	*Isoglossa woodii*	C.B.Clarke	LC	Indigenous; Endemic
Rubiaceae	*Kraussia floribunda*	Harv.	LC	Indigenous
Verbenaceae	*Lantana camara*	L.		Invasive Category 1b
Malvaceae	*Malva parviflora*	L.		Not indigenous; Naturalised
Meliaceae	*Melia azedarach*	L.		Invasive Category 1b
Poaceae	*Melinis repens subsp. repens*	(Willd.) Zizka	LC	Indigenous
Annonaceae	*Monanthotaxis caffra*	(Sond.) Verdc.	LC	Indigenous
Poaceae	*Panicum maximum*	Jacq.	LC	Indigenous
Poaceae	*Paspalum distichum*	L.		Not indigenous; Naturalised; Invasive
Poaceae	*Paspalum notatum*	Flugge		Not indigenous; Naturalised; Invasive
Passifloraceae	*Passiflora ligularis*	Juss.		Exotic, Cultivated
Malvaceae	*Pavonia columella*	Cav.	LC	Indigenous
Poaceae	*Pennisetum clandestinum*	Hochst. ex Chiov.		Not indigenous; Naturalised; Invasive
Acanthaceae	*Phaulopsis imbricata*	(Forssk.) Sweet		Indigenous
Plantaginaceae	*Plantago lanceolata*	L.	LC	Indigenous
Rubiaceae	*Psychotria capensis*	(Eckl.) Vatke		Indigenous
Rubiaceae	*Psydrax obovata*	(Eckl. & Zeyh.) Bridson	LC	Indigenous
Amaranthaceae	*Pupalia lappacea*	(L.) A.Juss.	LC	Indigenous
Vitaceae	*Rhoicissus tomentosa*	(Lam.) Wild & R.B.Drumm.	LC	Indigenous
Euphorbiaceae	*Ricinus communis*	L.		Invasive Category 2
Amaryllidaceae	*Scadoxus puniceus*	(L.) Friis & Nordal	LC	Indigenous
Anacardiaceae	*Schinus terebinthifolius*	Raddi		Invasive Category 1b
Rhamnaceae	*Scutia myrtina*	(Burm.f.) Kurz	LC	Indigenous
Asteraceae	*Senecio tamoides*	DC.	LC	Indigenous
Poaceae	*Setaria megaphylla*	(Steud.) T.Durand & Schinz	LC	Indigenous
Poaceae	*Sporobolus africanus*	(Poir.) Robyns & Tournay	LC	Indigenous
Bignoniaceae	*Tecomaria capensis*	(Thunb.) Spach	LC	Indigenous
Euphorbiaceae	*Tragia cordata*	Michx.		Not Indigenous
Cannabaceae	*Trema orientalis*	(L.) Blume	LC	Indigenous

Figure 6-7 Photograph of the indigenous Asystasia gangetica ssp. micrantha

Figure 6-8 Photograph of the indigenous Tecomaria capensis

Figure 6-9 Photograph of the invasive Ipomoea carnea subsp. fistulosa

Figure 6-10 Photograph of the invasive Ricinus communis

6.3.1.2 Fauna

The presence of dense and functional forest areas, and the close proximity of wetland features, means that numerous fauna species are highly likely to forage and possibly nest within or nearby to the PAOI, including several SCC known to frequent the region.

During the survey numerous indigenous avifauna species were observed such as *Gallirex porphyreolophus* (Purple-crested Turaco), *Andropadus importunus* (Sombre Greenbul) and *Cossypha natalensis* (Red-capped Robin-Chat).

6.3.2 Habitat Survey and Site Ecological Importance

The main habitat types identified across the project area were initially identified largely based on aerial satellite imagery. These 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: coastal forest, wetland, and transformed.

Coastal forest is the most widespread habitat of the PAOI and is characterised by a dense cover of indigenous vegetation which is considered to be highly functional and likely supportive of numerous fauna species, including SCC. The wetland portion is also classified as a uniquely sensitive feature due to the provision of uniquely valuable ecosystem services and the support that this habitat provides to amphibians, mammals and waterfowl in particular. It is characterised by streams of slow flowing water and *Cyperus* spp.

The transformed habitat unit is made up of the areas of existing infrastructure as well as those portions of the PAOI that no longer support functional indigenous vegetation, such as the short lawn and cleared servitude areas.

Refer to Figure 6-11 for a drone photograph of the PAOI, showing all three habitat units.

Figure 6-11 Drone footage of the PAOI, showing wetland features to the left, transformed areas to the right, and coastal forest in between

Based on the criteria provided in section 4.5 of this report, the three delineated habitat types have each been allocated a sensitivity category, or SEI, and this breakdown is presented in Table 6-5 below. In order to identify and spatially present sensitive features in terms of the relevant specialist discipline (terrestrial ecology), the sensitivities of each of the habitat types delineated within the PAOI are mapped in Figure 6-12.

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 6-5 Site Ecological Importance assessment summary of the habitat types delineated within the Project Area of Interest

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

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

- High: Avoidance mitigation wherever possible.
    - Minimisation mitigation – changes must be made to project infrastructure design so as to limit the amount of habitat impacted. Limited development activities of low impact acceptable.
    - Offset mitigation may be required for high impact activities.
- Very Low: Minimisation mitigation - Development activities of medium to high impact acceptable and restoration activities may not be required.

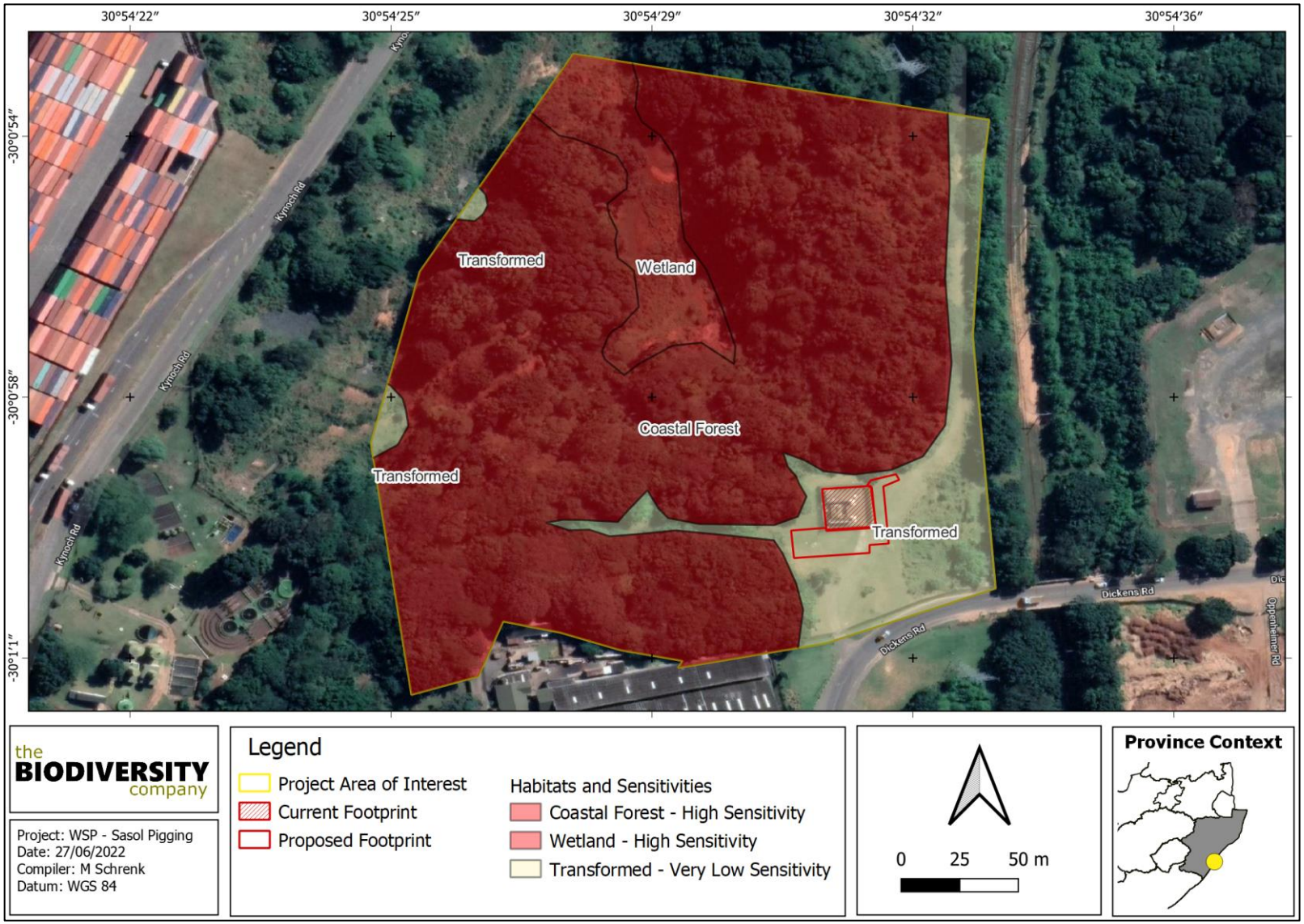
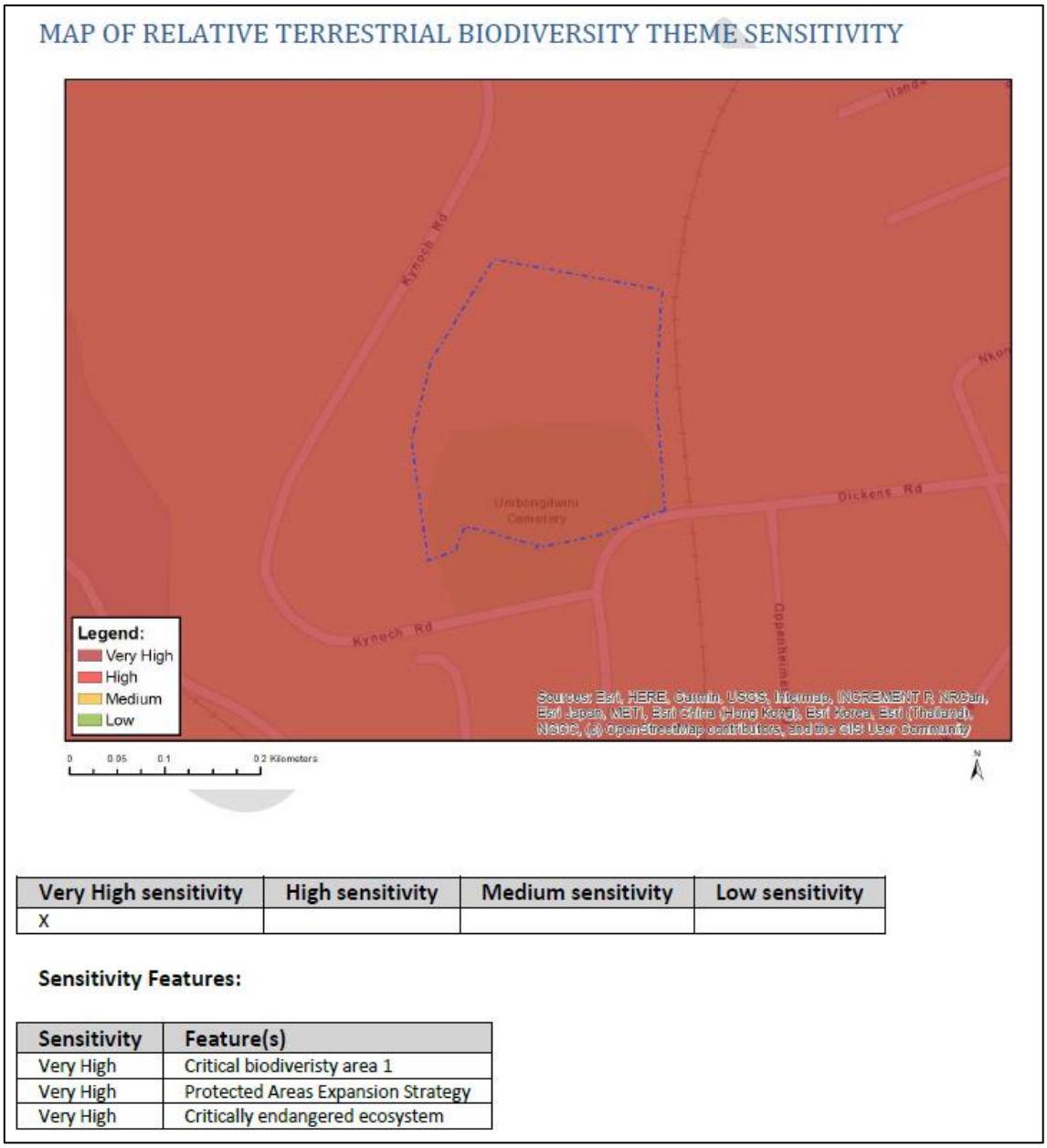


Figure 6-12 Biodiversity SEI delineation relevant to the Project Area of Interest

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 6-13), due to the CBA status of the area, the threatened ecosystem present, and the NPAES.



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Very High	Critical biodiveristy area 1
Very High	Protected Areas Expansion Strategy
Very High	Critically endangered ecosystem

Figure 6-13 Terrestrial Biodiversity Sensitivity of the Project Area of Interest according to the Screening Tool Report

The completion of the terrestrial biodiversity desktop and field studies disputes the 'Very High' sensitivity presented by the screening tool report, as relevant to the proposed footprint areas. As discussed above, the proposed footprint area is largely degraded and as such it is assigned a sensitivity rating of 'Very Low'.

The screening report classified the animal species theme sensitivity as being of a 'High' sensitivity, and the plant species theme as 'Medium'. Following the field survey findings, both the animal and plant species themes should retain their respective ratings for the PAOI. This is due to the fact that the occurrence of sensitive SCC is considered likely within the coastal forest habitat as it may be classified as a functional ecosystem.

7 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 7-1 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 within the CBA areas in the vicinity of the PAOI;
- 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 any potential Species of Conservation Concern nearby).

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 any SCC that may occur nearby to the development footprint.

Table 7-1 Mitigation measures from the terrestrial assessment; including requirements for timeframes, roles, and responsibilities

Management outcome: Vegetation and Habitats				
Impact Management Actions	**Implementation**		**Monitoring**	
	Phase	Responsible Party	Aspect	Frequency
Any individual protected plant that may be 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	Plant species	Ongoing
Development activities may take place only within the 'Very Low' sensitivity areas. This includes laydown, material storage, cement mixing, earth deposition and storage etc. that will result from the construction activities.	Planning Phase, Construction Phase	Project manager, Environmental Officer	Construction footprint	During phase
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 and Decommissioning phase	Environmental Officer & Contractor	Woody material around footprint	During Phase
Areas of dense and healthy indigenous vegetation, even secondary communities outside of the direct project footprint, must not be fragmented or disturbed further. This is particularly relevant to the coastal forest and wetland habitats.	Life of operation	Project manager, Environmental Officer	Areas of indigenous vegetation	Ongoing
Areas to be developed/disturbed must be specifically demarcated so that during the construction/activity phase, only the demarcated areas are to be impacted upon.	Pre-Construction, Construction Phase	Project manager, Environmental Officer	Developing within demarcated areas	During phase
All vehicles and personnel must make use of the existing roads and walking paths, especially construction/operational vehicles.	Construction/Operational Phase	Environmental Officer & Design Engineer	Roads and paths used	During phase
All laydown, chemical toilets etc. must be restricted to 'Very Low' sensitivity areas. Any materials may not be stored for extended periods of time and must be removed from the area once the construction/closure phase has been concluded.	Construction/Operational Phase	Environmental Officer & Design Engineer	Laydown areas and material storage & placement	During phase

Areas that are denuded during construction 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 more alien invasive plant species.	Closure Phase/Rehabilitation phase	Environmental Officer & Contractor	Assess the state of rehabilitation and encroachment of alien vegetation	Quarterly for up to two years after the closure
All disturbed areas are to be rehabilitated and appropriately landscaped. Rehabilitation of the disturbed areas existing in the PAOI 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.	Closure Phase/Rehabilitation phase	Environmental Officer & Contractor	Rehabilitation	Quarterly monitoring
No plant species whether indigenous or exotic may be brought into/taken from the project area, to prevent the spread of exotic or invasive species or the illegal collection of plants.	Life of operation	Project manager, Environmental Officer	Any instances	Ongoing
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.	Operational phase	Environmental Officer & Contractor	Rock piles	During Phase
Leaking equipment and vehicles must be repaired immediately or be removed from project area to facilitate repair.	Life of operation	Environmental Officer & Contractor	Leaks and spills	Ongoing
A hydrocarbon spill management plan must be put in place to ensure that should there be any chemical spill out or over that it does not run into the surrounding areas. • **The Contractor shall be in possession of an emergency spill kit that must always be complete and available on site.** • **Drip trays or any form of oil absorbent material must be placed underneath vehicles/machinery and equipment when not in use.** • **No servicing of equipment is to take place on site unless 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.**	Life of operation	Environmental Officer & Contractor	Spill events, Vehicles dripping	Ongoing

A fire management plan needs to be compiled and implemented to restrict the impact that fire would have on remaining natural and newly rehabilitated areas. Natural areas remaining adjacent to the development footprint should be left to naturally regenerate, fire and cutting control methods are not to be used to clear areas containing natural indigenous vegetation.	Closure Phase/Rehabilitation phase	Environmental Officer & Contractor	Fire Management and Control	During Phase
Precautions must be taken against the erosion damage that would be caused by unplanned pipe leaks. This involves the installation of leak warning and detection systems, as well as the planting of dense indigenous pioneer grass seeds across all bare earth areas.	Closure Phase/Rehabilitation phase	Environmental Officer & Contractor	Erosion Management and Control/ Leaks	During Phase and Ongoing Monitoring
Management outcome: Fauna				
Impact Management Actions	**Implementation**		**Monitoring**	
	Phase	Responsible Party	Aspect	Frequency
No trapping, killing, or poisoning of any wildlife is to be allowed. Signs must be put up to enforce this. These actions are illegal in terms of provincial environmental legislation.	Life of operation	Environmental Officer	Evidence of trapping etc	Ongoing
A qualified environmental control officer must be on site when clearing begins. The area must be walked though 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	Presence of any floral or faunal species	During phase
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	Presence of trapped animals and open holes	Ongoing
Should any SCC fauna be observed nesting within the proposed footprint area before or during construction, all activities must cease immediately. A relevant faunal specialist must be consulted in order to facilitate the capture or removal of any SCC animals	Life of Operation	Environmental Officer, Contractor, and estate manager	SCC fauna	Ongoing
The areas to be developed (or activity areas) must be specifically demarcated to prevent the movement of staff or equipment/vehicles into the surrounding environments. Signs must be put up to enforce this.	Construction/Operational Phase	Project manager, Environmental Officer	Infringement into surrounding areas	During phase
The duration of the construction should be minimized to as short a term as possible, to reduce the period of disturbance on fauna.	Construction/Operational Phase	Project manager, Environmental Officer & Design Engineer	Construction timeframe	During phase

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.	Construction/Operational Phase	Project manager, Environmental Officer & Design Engineer	Light pollution and period of light	During phase
All construction and maintenance motor vehicle operators should undergo an environmental induction that includes instruction on the need to comply with speed limits, to respect all forms of wildlife. Speed limits must be enforced to ensure that road killings and erosion is limited. Speed bumps should be built to force slow speeds.	Construction Phase	Health and Safety Officer	Compliance to the training	During phase
Noise must be kept to a minimum during the evenings/ at night to minimize all possible disturbances to amphibian species and nocturnal mammals and birds.	Construction/Operational Phase	Environmental Officer	Noise levels	Ongoing
Schedule activities and operations during the least sensitive periods, to avoid migration, nesting, and breeding seasons as far as possible.	Life of operation	Project manager, Environmental Officer & Design Engineer	Activities should take place during the day	Ongoing
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 surrounding areas and their functions. This especially pertains to the functional coastal forest and wetland.	Life of operation	Environmental Officer	Presence and condition of signs	Ongoing
Only use environmentally friendly dust suppressant products.	Construction and operation	Environmental Officer & Contractor, Engineer	Presence of chemicals in and around the project area	Ongoing
Management outcome: Alien Vegetation and fauna				
Impact Management Actions	**Implementation**		**Monitoring**	
	Phase	Responsible Party	Aspect	Frequency
The implementation of an Alien Invasive Plant 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 and nearby to the footprint area. The plan must especially pertain to any recently cleared and changed areas.	Life of operation	Project manager, Environmental Officer & Contractor	Assess and control presence and encroachment of alien vegetation	Quarterly monitoring
The footprint area of the construction should be kept to a minimum. The footprint area must be clearly demarcated to avoid unnecessary disturbances to adjacent areas. Road footprints must be kept to prescribed widths.	Construction/Operational Phase	Project manager, Environmental Officer & Contractor	Footprint Area	During phase

It is recommended that all waste be removed from site on a weekly basis to prevent rodents and pests from entering the site and proliferating.	Life of operation	Environmental Officer & Health and Safety Officer	Presence of waste	Life of operation
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 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 speed bumps should also be constructed.	Construction Phase and Life of operation	Contractor	Dustfall	Ongoing, as per a dust monitoring program
Management outcome: Waste management				
Impact Management Actions	**Implementation**		**Monitoring**	
	Phase	Responsible Party	Aspect	Frequency
Waste management must be a priority and all waste must be collected and stored adequately. It is recommended that all waste be removed from site on a weekly basis to prevent rodents and pests entering the site. • **Refuse bins must be emptied and secured;** • **Temporary storage of domestic waste shall be in covered waste skips; and** • **Maximum domestic waste storage period must be 10 days.**	Life of operation	Environmental Officer & Health and Safety Officer	Presence of waste	Life of operation
Any litter, spills, fuels, chemical and human waste in and around the project area must be removed and disposed of timeously and responsibly.	Construction/Closure Phase	Environmental Officer & Health and Safety Officer	Presence of Waste	Daily
It must be made an offence to litter or dump any material outside of specially demarcated and managed zones. Signs and protocols must be established to explain and enforce this.	Life of operation	Contractor, Environmental Officer & Health and Safety Officer	Presence of Waste and Dumping	Daily, Ongoing
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.	Life of operation	Environmental Officer & Health and Safety Officer, Contractor	Availability of bins and the collection of waste	Ongoing
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 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 sensitive habitat features, such as natural forest, and management requirements in line with the Environmental Authorisation and within the EMPr.	Life of operation	Environmental Officer, Health and Safety Officer	Compliance to the training	Ongoing
Contractors and employees must all undergo a strict environmental induction and be made aware of the sensitive habitats within and nearby to the project area.	Life of operation	Environmental Officer, Health and Safety Officer	Compliance to the training	Ongoing
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.	Life of operation	Environmental Officer	Environmental Awareness	Ongoing

8 Conclusion

The extent of the PAOI that exists beyond the proposed footprint boundary represents functional indigenous coastal forest and wetland habitat, which is accurately listed as an Irreplaceable Critical Biodiversity and D'MOSS Area by the provincial conservation plan. However, the portions of land within the proposed development footprint area are considered to be historically transformed and may therefore no longer be classified as functional CBA.

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, as relevant to the proposed footprint area. This proposed footprint area has instead been assigned a 'Very Low' sensitivity, because of the significant levels of environmental disturbance that have taken place within and immediately adjacent to the footprint area. It is noted that the remaining portions of the PAOI are assigned a 'High' sensitivity due to the presence of functional CBA vegetation and the likely occurrence of several SCC.

8.1 Specialist Recommendations

The 'High' sensitivity areas delineated by the specialists must be treated as 'no-go' areas for the proposed project, and the project may only be favourably considered should the development be fully contained within the 'Very Low' sensitivity areas – including all associated construction phase activities such as laydown, concrete mixing, and the placement of temporary toilet facilities. Due to the close proximity of 'High' sensitivity areas to the proposed footprint, all mitigation measures presented above must be strictly adhered to. Should these restrictions be met, then the proposed project activities are likely to have only a minimal negative impact on any indigenous terrestrial biodiversity.

The PAOI is under threat from numerous populations of category 1b AIP species, which are degrading the forest landscape and competing with the many indigenous trees, shrubs and herbs which are a valuable resource to the local region. According to the latest NEMBA legislation, category 1b AIPs must be controlled according to an Invasive Alien Plant Management Plan. It is recommended that this plan be developed and implemented on a priority basis in conjunction with the development activities, as the extensive AIP invasion is likely to be aggravated by the project activities and further spread across the coastal forest and wetland habitats – which are expected to support SCC communities.

9 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 International. 2022. Important Bird Areas factsheets. Downloaded from http://www.birdlife.org. 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.

Branch, B. (2008). Tortoises, Terrapins, and Turtles of 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). 2022. Declaration of four tree species as protected and the publication of the annual list of all tree species which are protected under section 12 of the National Forests Act, 1998 (Act no. 84 of 1998). No. 1935, National Gazettes No. 46094 of 25 March 2022.

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_Q4). 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_Q4). 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.

Environmental Planning and Climate Protection Department (EPCPD). (2018). Durban Metropolitan Open Space System. Available at: https://gis.durban.gov.za/

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.

Ethekwini. (2017). D'MOSS Background Info Document. EThekwini Municipality. Available at: https://www.durban.gov.za/

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/refrence.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.

Ezemvelo. 2016. Ezemvelo KZN Wildlife. KZN CBA Irreplaceable version 2016 [Vector] 2016. Available from the Biodiversity GIS website, downloaded: February 2022.

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.

GDARD. (2019). The Ridges Guideline. GDARD Biodiversity. Gauteng Department of Agriculture and Rural Development, Johannesburg.

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.

Leroy, A. & Leroy, J. (2003). Spiders of Southern Africa. Struik publishers, Cape Town.

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., Coterrill, 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. Strelizia 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.

READ. (2015). North West Department of Rural, Environment and Agricultural Development (READ). 2015 North West Biodiversity Sector Plan. North West Provincial Government, Mahikeng. December 2015.

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://egis.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.

Scholes, R.J. & Walker, B.H. (1993). An African savanna: synthesis of the Nylsvley study. Cambridge Univ. Press, Cambridge.

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.

10 Appendix A: Specialist Declarations

DECLARATION

I, Leigh-Ann de Wet, 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.

Leigh-Ann de Wet

Terrestrial Ecologist

The Biodiversity Company

June 2022

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

June 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

June 2022

11 Appendix B: Specialist CVs

Leigh-Ann de Wet

M.Sc Botany (*Pr Sci Nat*)

Cell: +27 83 352 1936
Email: leigh-ann@thebiodiversitycompany.com
Identity Number: 8209010127081
Date of birth: 1 September 1982

Profile Summary

Working experience throughout South Africa, Southern Africa West and Central Africa and also Madagascar.

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

Experience with project management for national and international biodiversity projects.

Experience with IFC Performance Standards, Critical Habitat and High Conservation Value Assessments. Experience in numerous vegetation and habitat types throughout Africa,

Specialist expertise includes botany, forest ecology, avifauna and terrestrial fauna. Methodology development, conservation management and terrestrial monitoring.

Areas of Interest

Forest ecology and ecosystem functionality.

Ecology and plant identification.

Field methodology.

Publication of scientific journals and articles.

Key Experience

- Familiar with World Bank, Equator Principles and the International Finance Corporation requirements.
- Familiar with High Conservation Value assessments as per ProForest guidelines.
- Conservation Management Plans.
- Flora assessments.
- Avifauna assessments.
- Terrestrial fauna assessments.
- Monitoring.
- Ecosystem services
- Rehabilitation Plans.
- Alien Invasive Plant Management Plans.
- Permitting.

Country Experience

Mozambique,

Malawi,

Zambia,

Madagascar,

Liberia,

Guinea'

Democratic Republic of the Congo,

South Africa

Nationality

South African

Languages

English – Proficient

Afrikaans – Conversational

Zulu - Basic

Qualifications

- MSc (Rhodes University) – Botany.
- BSc Honours (Rhodes University) – Botany
- BSc Natural Science (Botany and Entomology)
- Pr Sci Nat (400233/12)
- Certificate of Competence: UFS Introduction to wetland delineation.
- Certificate of Competence: UFS Introduction to wetland law
- Certificate of competence: Africa Land Use Training Grass Identification (long and short course)
- Certificate of Competence: ASI Snake Awareness, first aid for snake bite and venomous snake handling.

SELECTED PROJECT EXPERIENCE

Project Name: The Environmental Impact Assessment for the Karpowership Project including ships, and associated terrestrial infrastructure in Richards Bay, Coega and Saldanha Bay, South Africa.

Personal position / role on project: Specialist Terrestrial Ecologist and Avifauna specialist.

Location: South Africa (including KZN, Eastern and Western Cape) (2021).

Main project features: To determine the current status of the avifauna and terrestrial biodiversity.

Project Name: A biodiversity baseline and impact assessment for the proposed Siguiri Gold Mine Project, in Kankan Province, Guinea.

Personal position / role on project: Botanist

Location: Guinea

Main project features: To conduct a dual season ecological baseline assessment for the expected impact footprint area. The study was required to meet national and IFC requirements, including a Critical Habitat assessment.

Project Name: The Environmental Impact Assessment for the proposed Sibaya Node 6 development, Umdloti, South Africa.

Personal position / role on project: Terrestrial Ecologist

Location: South Africa

Main project features: To conduct a flora and fauna specialist assessment of the proposed mixed use development location and determine the impacts associated with the proposed development in relation to terrestrial fauna and flora.

Project Name: Terrestrial Biodiversity Monitoring (including rehabilitation, alien vegetation and indigenous ecology) for the Sibaya Node 6 development, Umdloti, South Africa.

Personal position / role on project: Terrestrial Ecologist

Location: South Africa

Main project features: To conduct monthly monitoring for the Sibaya Node 6 development (Salta) for 6 months including completing a detailed Vegetation Assessment, Rehabilitation Plan, Plant Rescue Plan, Conservation Management Plan and Biodiversity Action Plan.

Project Name: The Environmental Impact Assessment for the proposed Roodeplaatwind energy facility, Eastern Cape, South Africa.

Personal position / role on project: Terrestrial Ecologist

Location: South Africa

Main project features: To conduct a flora and fauna specialist assessment of the proposed wind farm location and determine the impacts associated with the proposed development in relation to terrestrial fauna and flora. This included An Ecological Assessment, Rehabilitation Plan, Plant Rescue and Protection Plan, Open Space Management Plan and Alien Vegetation Management Plan.

Project Name: The Environmental Impact Assessment for the proposed Roodeplaatwind energy facility, Eastern Cape, South Africa.

Personal position / role on project: Terrestrial Ecologist

Location: South Africa

Main project features: To conduct a flora and fauna specialist assessment of the proposed wind farm location and determine the impacts associated with the proposed development in relation to terrestrial fauna and flora.

Project Name: Conservation Value Assessment for the City of Johannesburg (Little Falls Nature Reserve, Melville Koppies Nature Reserve, Ruimsig Butterfly Reserve and Rietfontein Nature Reserve)

Personal position / role on project: Terrestrial Ecologist

Location: Gauteng, South Africa

Main project features: Determination of the conservation potential and connectivity of four nature reserves within the City of Johannesburg including both fauna and flora.

Project Name: Feronia Palm Oil Projects, Including Boteka, Lokutu and Yaligimba, Democratic Republic of the Congo.

Personal position / role on project: Terrestrial Ecologist and HCV Specialist

Location: Democratic Republic of the Congo

Main project features: Determination and mapping of High Conservation Value areas within three oil palm plantations in the DRC to meet international best practice. Components including flora and fauna assessments as well as the integration of social aspects into the HCV assessment.

OVERVIEW

An overview of the specialist technical expertise includes the following:

- Terrestrial Ecological baseline assessments and categorization of the current condition of the environment.
- Ecosystem services for biodiversity, and the ecological and social interactions.
- Integration of specialist reports into IFC standard or HCV reporting.
- Design and adaptation of field methodology for assessment.
- Terrestrial Biodiversity offset strategy designs.
- Terrestrial rehabilitation plans.
- Monitoring plans for terrestrial systems.
- Faunal surveys which include mammals, birds, amphibians and reptiles.
- The design, compilation and implementation of Biodiversity and Land Management Plans and strategies.

EMPLOYMENT EXPERIENCE

The Biodiversity Company (March 2022 – Present)

Terrestrial Ecologist.

LD Biodiversity (August 2014 – March 2022)

Director and Terrestrial Ecologist

Digby Wells Environmental (July 2012 – September 2014)

Terrestrial Ecologist

Coastal and Environmental Services (March 2009 – June 2012)

Terrestrial Ecologist

PREVIOUS EMPLOYMENT: Rhodes University Department of Botany

Research Assistant

ACADEMIC QUALIFICATIONS

Rhodes University, Grahamstown, South Africa (2007): MAGISTER SCIENTIAE (MSc) - Botany:

Title: *Pollinator mediated selection in Pelargonium reniforme Curtis (Geraniaceae): Patterns and Process.*

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

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

PUBLICATIONS

Taylor, S, Ripley, B, Martin, T, **de Wet, L,** Woodward, I and Osborne, C (2014.) Physiological advantages of C4 grasses in the field: a comparative experiment demonstrating the importance of drought. Global Change Biology – in Press.

Ripley BS, **de Wet, L** and Hill MP (2008). Herbivory-induced reduction in photosynthetic productivity of water hyacinth, *Eichhornia crassipes* (Martius) Solms-Laubach (Pontederiaceae), is not directly related to reduction in photosynthetic leaf area. African Entomology 16(1): 140-142.

de Wet LR, Barker NP and Peter CI (2008). The long and the short of gene flow and reproductive isolation: Inter-Simple Sequence Repeat (ISSR) markers support the recognition of two floral forms in *Pelargonium reniforme* (Geraniaceae). Biochemical Systematics and Ecology 36: 684-690.

de Wet L, NP Barker and CI Peter (2006). Beetles and Bobartia: an interesting herbivore-plant relationship. Veld & flora. September: 150 – 151.

de Wet LR and Botha CEJ (2007). Resistance or tolerance: An examination of aphid (*Sitobion yakini*) phloem feeding on Betta and Betta-Dn wheat (*Triticum aestivum* L.). South African Journal of Botany 73(1): 35-39.

de Wet L (2005). Is *Pelargonium reniforme* in danger? The effects of harvesting on *Pelargonium reniforme*. Veld & Flora. December: 182-184.

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: Mondi Wetland Assessments
- Certificate of Competence: Wetland WET-Management
- SASS 5 (Expired) – Department of Water Affairs and Forestry for the River Health Programme
- EcoStatus application for rivers and streams

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'Iviore. 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).