

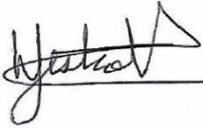
TERRESTRIAL ASSESSMENT



TERRESTRIAL IMPACT ASSESSMENT OF THE PROPOSED REHABILITATION OF THE EXISTING BENMORE DAM WITHIN BENMORE GARDENS, GAUTENG PROVINCE



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I, **Wietsche Roets**, in my capacity as a specialist consultant, hereby declare that I:

- Act as an independent consultant;
- Do not have any financial interest in the undertaking of this project, other than remuneration for the work performed in terms of the National Environmental Management Act 107 of 1998;
- Have and will not have vested interest in the proposed activity nor will I engage myself in any conflicting interest associated with this project
- I undertake to disclose and provide to the competent authority any material or information at my disposal regarding this project as required in terms of National Environmental Management Act 107 of 1998;
- Based on the information provided to me by the client and in addition to information obtained during the course of this study, I have presented the results and conclusion with regard to this project to the best of my professional ability;
- I reserve the right to modify aspects pertaining to this study should additional information become available through ongoing research and further work on this field;
- I undertake to have my work peer reviewed on a regular basis by a competent specialist in the field of study;
- I am duly qualified and experienced to undertake the work at hand;
- I am registered as a Natural Scientist with the South African Council for Natural Scientific Professions (SACNASP), registration number 119357.



Wietsche Roets, SACNASP Reg no.: *Cand.Sci.Nat.* 119357

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GLOSSARY

TERMS	DEFINITION
Alien species	(a) A species that is not indigenous; or (b) an indigenous species translocated outside of its normal distribution range in nature, but not an indigenous species that has extended its natural distribution range by natural means of migration or dispersal without human intervention.
Alien Invasive Species	Plants or animals that are introduced by man, accidentally or intentionally, outside of their natural geographic range into an area where they are not naturally present. They are often introduced as a result of the globalisation of economies, for instance by ships, shipment of wood products infested with insects, or the transport of ornamental plants that then establish themselves into the wild and spread in a manner that modifies ecosystems, habitats or species and is difficult to control e.g. <i>Lantana camara</i> . Not all introduced alien species are invasive and not all invasive species are necessarily alien.
Emerging weed	Plants with invasive tendencies already present outside of their natural distribution range, but not yet widely so. They often have horticultural value, but can impact negatively on natural ecosystems, biodiversity, livelihoods or human health if allowed to continue to expand to outside of their natural range and become naturalised.
Indigenous Species	A species that occurs, or has historically occurred, naturally in a free state in nature within the borders of the Republic, but exclude a species that has been introduced in the Republic as a result of human activity. e.g. the bontebok <i>Damaliscus pyragus pygargus</i> is indigenous to only South Africa, but according to previous definition would only be indigenous to the Western Cape.
Weed	Any plant, indigenous or alien, invasive or otherwise, which is growing where it is not desired.

LIST OF ABBREVIATIONS

TERM	EXPANSION
ARC	Agricultural Research Council
ARC-PPRI	Agricultural Research Council – Plant Protection Research Institute
BA	Basic Assessment
BMPs	Biodiversity Management Plans
CARA	Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983)
CEBA	Community-based Ecosystem Adaptation Programme (under EPCPD)
CR	Critically Endangered
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EIA	Environmental Impact Assessment
EIS	Ecological Importance and Sensitivity
EN	Endangered
ENVASS	Environmental Assurance (Pty) Ltd
ESA	Ecological Support Area
GIS	Geographic Information System
GPS	Global Positioning System
HACA	High Alien Concentration Area
IAPS	Invasive Alien Plant Species
IAP	Invasive Alien Plant
IAP EDRR	Invasive Alien Plant Early Detection and Rapid Response
LT	Least Threatened
NBA	National Biodiversity Assessment
NBSAPs	National Biodiversity Strategy and Action Plans
NEMA	National Environmental Management Act, 1998 (Act No. 107 of 1998) [as amended]
NEMBA	National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) [as amended]
NWA	National Water Act, 1998 (Act No. 36 of 1998) [as amended]
SANBI	South African National Biodiversity Institute
SANS	South African National Standards
StatsSA	Statistics South Africa



1 INTRODUCTION

1.1 Background

Environmental Assurance (Pty) Ltd. (hereafter referred to as ENVASS), as an independent environmental specialist firm, was appointed by GA Environment (Pty) Ltd. (hereafter referred to as “the client”), on behalf of the Johannesburg Road Agency, to undertake several specialist studies with the primary objective of providing specialist input into the Environmental Impact Assessment (EIA) and Water Use License Application (WULA) processes. These processes will be applicable to the proposed rehabilitation of the Benmore Dam, located within the City of Johannesburg District and Local Municipality of the Gauteng Province, South Africa.

This report will constitute as the Terrestrial ecological (fauna and flora) impact assessment of the Benmore Dam rehabilitation site, which will hereafter be referred to as the proposed development. The proposed development will be situated within Benmore Gardens Extension 3, as part of Sandton. The site falls within the City of Johannesburg District Municipality (JHB) and City of Johannesburg Metropolitan Municipality, within the Gauteng Province of South Africa (**Figure 1**). Benmore Dam is characterised by surrounding urban development inclusive of homes and Estates, roads, Schools, Colleges and more. The study area for the floral and faunal components of this impact assessment were a 25 Metre (m) and 500 m assessment radius around the proposed development site, respectively, which was provided to ENVASS by the design engineer.

According to the Mallard Meadow Bird Sanctuary (2005), the initiative was known as the relevant donga area on the portion of Park erf 220 of the then developing township. The area historically had frequent inflows from the catchment area and the water spread across to the Western donga on Portion 286, Zandfontein No. 42-IR. The water was carried further north to pans that formed due to old collapsed farm dams.

The inflow of water from the southern end resulted in heavy pollution from urban activities and erosion, where after the water was then successfully redirected to preserve the vegetation and reduce erosion and the area was closed off and cleaned. The area, which was cleared of pollution, was used as a small “bird sanctuary” initiative that also raised and domesticated Mute (white) Swans for distribution once the offspring become independent. The area had concrete structures to control overflow, with small sand traps. The old dam was privately restored and deepened as well. Since then, the site has been degraded further and is currently not fit for purpose as a stormwater control mechanism. The proposed development aims to refurbish the site to ensure that it may once again add value to as a stormwater control facility, as well as an open space initiative. A once-off field survey of the floral and faunal species within the above area, was undertaken during the SANBI prescribed dry season for the region in June 2020.

The results of which are presented and discussed in the following sections of this report, which is structured as follows:

- Legislative overview applicable to this study;
- Desktop study and mapping of the abiotic and biotic environment within the study area;
- Overview of the floral aspects of the study area;
- Overview of the faunal aspects of the study area;
- Sensitivity assessment; and
- Appendices contains species lists of the respective habitats observed within the study area.

1.2 Terms of Reference

The Terms of Reference (ToR) for this terrestrial impact assessment were formulated using the “Guidelines for Implementation of the Terrestrial Flora and Fauna Species Protocols for Environmental Impact Assessments in South Africa” as a guideline.

The ToRs were thus as follows:

1. Desktop study and mapping of the ecological components within the study area;
2. Once-off field survey of the study area to delineate habitat units, as well as to identify any Species of Conservation Concern (SCC), Threatened or Protected Species (TOPS) and the dominant floral and faunal species;
3. Describe the general condition in terms of biodiversity of each of the delineated habitat units;
4. Provide a species list for each of the delineated habitat units;
5. Determine the sensitivity of each habitat unit;
6. Provide an overview of the current ecological condition of the study area;
7. Conduct an impact assessment of the proposed development on the receiving terrestrial environment; and
8. Provide a reasonable opinion as to whether the proposed development should continue and what (if any) condition may need to apply with the relevant Environmental Authorisation (EA) and Water Use License (WUL).

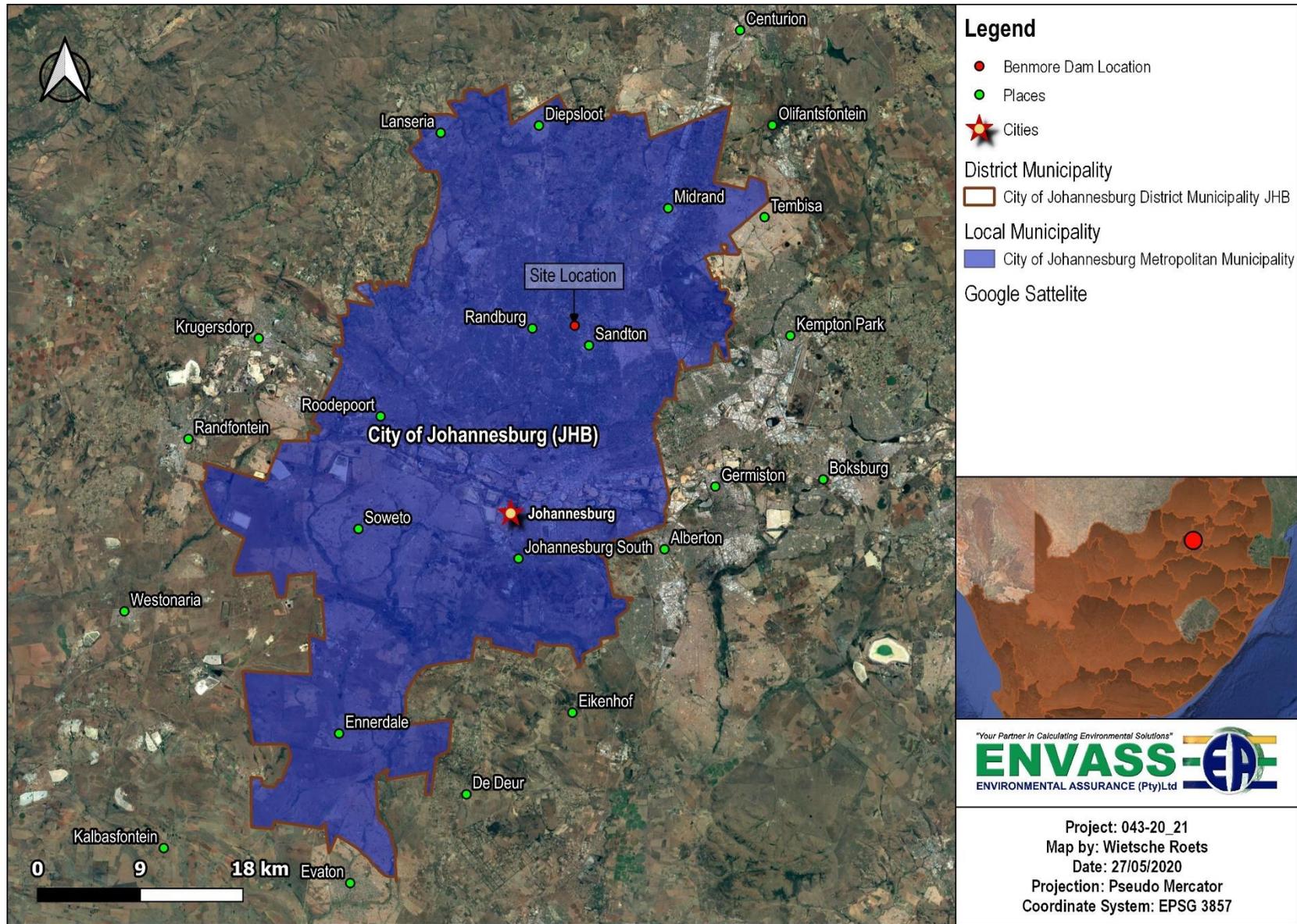


Figure 1: Location of the study area in relation to the relevant municipalities and the surrounding towns.

1.3 Reference Documents

The following list of documentation was reviewed prior to the site visit, and was used to guide the implementation of this updated biodiversity assessment:

- i. Gauteng Provincial Environmental Management Framework (GPEMF) Standard Gazette 41473 (Notice. 164 of 2018);
- ii. City of Johannesburg Metropolitan Municipality By-Laws for the Protection of Wild Animals and Birds, Section 13(a) of the Local Government: Municipal Systems Act, 2000 (Act No. 32 of 2000).
- iii. National Environmental Management Act, 1998 (Act No. 107 of 1998) [as amended] (NEMA);
- iv. National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) [as amended] (NEMBA);
- v. National Water Act, 1998 (Act No. 36 of 1998) [as amended] (NWA);
- vi. Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983) [as amended] (CARA);
- vii. General Notice (GN) 864: NEMBA: Alien and Invasive Species Regulations, 2016;
- viii. Gauteng Nature Conservation Bill of 2014; and
- ix. Species Environmental Assessment Guideline: Terrestrial Flora and Fauna Assessment (SANBI, 2020).

2 METHODOLOGY

In order to determine the baseline condition of the habitat units within the relevant study area and capture comprehensive data, the following methodology was implemented:

2.1 Literature review

- a. All information relevant to the study area that was made available to ENVASS was reviewed and documented to ascertain the previous and reference conditions within the study;
- b. All legislation that may have been applicable to this study were reviewed to ensure that the contents of this study were legally compliant; and
- c. Local, regional and national ecological literature relevant to the study area was reviewed.

2.2 Desktop study and mapping

- a. Aerial imagery in conjunction with available Geographic Information System (GIS) datasets were reviewed and the applicable ecological information mapped and discussed to gain an understanding of the broader ecological importance and sensitivity of the study area;
- b. Land cover data, aerial imagery and contour line data was utilised to map potential habitat units within the study area, which were ground-truthed on-site and later refined;
- c. Potential sensitive areas were identified at a desktop level and marked for ground-truthing; and
- d. A review of the relevant Atlas data was conducted and used to compose the broad scale lists of species that have the potential to occur within the study area.

2.3 Once-off Field Survey

A once-off field survey of the relevant study area was conducted to determine the baseline condition of the site in comparison to the perceived natural state that may have been evident in an undisturbed environment. Ground-truthing of the desktop information was also conducted to ensure accurate up-to-date information relevant to the site was provided to the reader, allowing for more informed decision making.

2.3.1 Vegetation Analysis

Due to the relatively small extent of the study area within an urban environment, the specialist was capable of conducting a thorough walk through of the site during a full day's field survey. During this endeavour, all floral species that were identifiable were recorded and any disturbances that were evident noted to ensure that the pre-development state of the site was well documented. As previously noted, the study area associated with the floral assessment was a 25 m assessment radius around the proposed development site.

2.3.2 Faunal Survey

A desktop faunal study was conducted to determine the dominant composition and conservation status of the potential faunal species that could occur within study area. The following databases and documents were utilised during this process:

- The potential (expected) occurrence and conservation status of mammal taxa were based on the IUCN Red List (2019) and the revised national Red Data Book by Child et al. (2016), while mammalian nomenclature was informed by Stuart and Stuart (2015) along with MammalMap, unless otherwise indicated.
- The historical and extant (contemporary) distribution ranges of mammal taxa sympatric to the study area were sourced from MammalMap (c. 2628AA) along with applicable field guides, in particular Stuart & Stuart (2015), Skinner & Chimimba (2005) and Friedmann & Daly (2004).
- Telephonic interviews with the landowner and short discussions will be held with community members onsite.
- Previous biodiversity assessments will also be consulted if available.

The once-off field survey of the study area was conducted as follows:

- *Ad hoc* observations of all faunal species, and evident thereof (e.g. spoor, dug, niche habitats etc.), were recorded by means of a walkthrough of the site.
- The availability of potential faunal habitat was also noted during the walkthrough of the site, which informed the 'likelihood of occurrence' of the faunal species that were identified during the desktop study.

3 LEGAL FRAMEWORK

3.1 National Legislation

3.1.1 The Constitution of the Republic of South Africa Act (Act No. 108 of 1996) [as amended] (CSA)

Section 24

The Constitution is South Africa's overarching law. It prescribes minimum standards with which existing and new laws must comply. Chapter 2 of the Constitution contains the Bill of Rights in which basic human rights are enshrined. Section 24 of this chapter states that "Everyone has the right to an environment that is not harmful to their health or well-being and to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that prevent pollution and ecological degradation; promote conservation; and secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development." Government's commitment to give effect to the environmental rights enshrined in the Constitution is evident from the enactment of various pieces of environmental legislation since 1996, including the National Water Act, the National Environmental Management Act, etc.

3.1.2 National Environmental Management Act (Act No. 107 Of 1998) [as amended] (NEMA)

NEMA provides for cooperative environmental governance by establishing principles for decision-making on matters affecting the environment, institutions that will promote cooperative governance and procedures for coordinating environmental functions. The principles enshrined in NEMA guide the interpretation, administration and implementation of the Act with regards to the protection and / or management of the environment. These principles serve as a framework within which environmental management must be formulated. Section 2(4) specifies that "sustainable development requires the consideration of all relevant factors including the following aspects specifically relevant to biodiversity":

- The disturbance of ecosystems and loss of biological diversity are avoided, or, where they cannot be altogether avoided, are minimised and remedied;
- The development, use and exploitation of renewable resources and the ecosystems of which they are part do not exceed the level beyond which their integrity is jeopardised;
- A risk-averse and cautious approach is applied, which takes into account the limits of current knowledge about the consequences of decisions and actions; and
- Negative impacts on the environment and on people's environmental rights be anticipated and prevented, and where they cannot be altogether prevented, are minimised and remedied.

The costs of remedying pollution, environmental degradation and consequent adverse health effects and of preventing, controlling or minimising further pollution, environmental damage or adverse health effects must be paid for by those responsible for harming the environment. Otherwise known as the 'polluter pays' principle. Sensitive, vulnerable, highly

dynamic or stressed ecosystems, such as coastal shores, estuaries, wetlands, and similar systems require specific attention in management and planning procedures, especially where they are subject to significant human resource usage and development pressure.

Of particular importance are the Environmental Impact Assessment (EIA) regulations, 2014 of the Act [as amended], which identify activities that may have a substantial detrimental effect on the environment. The identification of these activities results in the activity being prohibited unless the competent authority has granted a written authorisation after the consideration of an environmental impact assessment or basic assessment.

Section 28 (1) also places a “Duty of Care” and responsibilities to minimise and remediate environmental degradation on every person.

3.1.3 National Environmental Management: Biodiversity Act (Act No. 10 of 2004) [as amended] (NEMBA)

NEMBA provides for the management and conservation of biological diversity and components thereof; the use of indigenous biological resources in a sustainable manner; the fair and equitable sharing of benefits arising from bioprospecting of biological resources; and cooperative governance in biodiversity management and conservation within the framework of NEMA. The Act states that the Minister of Environmental Affairs, may identify any process or activity in a listed ecosystem as a threatening process and will, thereafter, be regarded as an activity contemplated in Section 24(2)(b) of NEMA which states that:

- a) Specified activities may not be commenced without prior authorisation from the Minister or MEC. This Act allows for any person, organisation or organ of state to contribute to biodiversity management. Such a party may submit to the Minister a draft management plan for an ecosystem or species. Should the Minister approve the management plan, an agreement can be entered into regarding the implementation of the plan.
- b) NEMBA established the South African National Biodiversity Institute (SANBI) and gave it a mandate regarding monitoring, advising and co-coordinating biodiversity issues in South Africa.

Furthermore, Alien and Invasive Species Regulations, as well as new lists of invasive species under NEMBA, came into effect in August 2014 [**LISTS UPDATED in 2016**], further assigning new categories for species designated under section 70 of the Act that cannot be propagated, grown, bought or sold by any industry without a permit. NEMBA categories of invasive alien plant species are as follows:

Regulation 2: Category 1a Listed Invasive Species:

- 1) Category 1a Listed Invasive Species are those species listed as such by notice in terms of section 70(1)(a) of the Act as species which must be combatted or eradicated.
- 2) A person in control of a Category 1a Listed Invasive Species must –
 - a. comply with section 73(2) of the Act;
 - b. immediately take steps to combat or eradicate listed invasive species in compliance with sections 75(1), (2) and (3) of the Act; and
 - c. allow an authorised official from the Department to enter onto land to monitor, assist with or implement the combatting or eradication of the listed invasive species.
- 3) If an Invasive Species Management Programme has been developed in terms of section 75(4) of the Act, a person must combat or eradicate the listed invasive species in accordance with such programme.

Regulation 3: Category 1b Listed Invasive Species:

- 1) Category 1b Listed Invasive Species are those species listed as such by notice in terms of section 70(1)(a) of the Act as species which must be controlled.
- 2) A person in control of a Category 1 b Listed Invasive Species must control the listed invasive species in compliance with sections 75(1), (2) and (3) of the Act.
- 3) If an Invasive Species Management Programme has been developed in terms of section 75(4) of the Act, a person must control the listed invasive species in accordance with such programme.
- 4) A person contemplated in sub-regulation (2) must allow an authorised official from the Department to enter onto the land to monitor, assist with or implement the control of the listed invasive species, or compliance with the Invasive Species Management Programme contemplated in section 75(4) of the Act.

Regulation 4: Category 2 Listed Invasive Species:

1. Category 2 Listed Invasive Species are those species listed as such by notice in terms of section 70(1)(a) of the Act as species which require a permit to carry out a restricted activity within an area specified in the Notice or an area specified in the permit, as the case may be.
2. Unless otherwise indicated in the Notice, no person may carry out a restricted activity in respect of a Category 2 Listed Invasive Species without a permit.
3. A landowner on whose land a category 2 Listed Invasive Species occurs or person in possession of a permit, must ensure that the specimens of the species do not spread outside of the land or the area specified in the Notice or permit.
4. If an Invasive Species Management Programme has been developed in terms of section 75(4) of the Act, a person must control the listed invasive species in accordance with such programme.
5. Unless otherwise specified in the Notice, any species listed as a Category 2 Listed Invasive Species that occurs outside the specified area contemplated in sub-regulation (1), must, for purposes of these regulations, be considered to be a Category 1b Listed Invasive Species and must be managed according to Regulation 3.

6. Notwithstanding the specific exemptions relating to existing plantations in respect of Listed Invasive Plant Species published in Government Gazette No. 37886, Notice 599 of 1 August 2014 (as amended), any person or organ of state must ensure that the specimens of such Listed Invasive Plant Species do not spread outside of the land over which they have control.

Regulation 4: Category 3 Listed Invasive Species:

- 1) Category 3 Listed Invasive Species are species that are listed by notice in terms of section 70(1)(a) of the Act as species which are subject to exemptions in terms of section 71(3) and prohibitions in terms of section 71A of the Act, as specified in the Notice.
- 2) Any plant species identified as a Category 3 Listed Invasive Species that occurs in riparian areas, must, for the purposes of these regulations, be considered to be a Category 1b Listed Invasive Species and must be managed according to regulation 3.
- 3) If an Invasive Species Management Programme has been developed in terms of section 75(4) of the Act, a person must control the listed invasive species in accordance with such programme.

In summary:

- 1) Category 1a: Invasive species requiring compulsory control. Any specimens of Category 1a listed species need, by law, to be eradicated from the environment. No permits will be issued.
- 2) Category 1b: Invasive species requiring compulsory control as part of an invasive species control programme. Remove and destroy. These plants are deemed to have a high invasive potential. No permits will be issued.
- 3) Category 2: Invasive species regulated by area. A demarcation permit is required to import, possess, grow, breed, move, sell, buy or accept as a gift any plants listed as Category 2 plants. No permits will be issued for Category 2 plants to exist in riparian zones.
- 4) Category 3: Invasive species regulated by activity. An individual plant permit is required to undertake any of the following restricted activities (import, possess, grow, breed, move, sell, buy or accept as a gift) involving a Category 3 species. No permits will be issued for Category 3 plants to exist in riparian zones.

3.1.4 National Water Act (Act No. 36 of 1998) [as amended] (NWA)

The National Water Act (NWA) is a legal framework for the effective and sustainable management of water resources in South Africa. Central to the NWA is recognition that water is a scarce resource in the country which belongs to all the people of South Africa and needs to be managed in a sustainable manner to benefit all members of society. The NWA places a strong emphasis on the protection of water resources in South Africa, especially against its exploitation, and the insurance that there is water for social and economic development in the country for present and future generations.

3.2 Provincial Acts, Plans, Policy and Environmental guidelines

3.2.1 Bioregional plans

The Bioregional plans aim to provide maps of biodiversity priorities with accompanying land-use planning and decision-making guidelines in order to inform decisions associated with land-use planning, environmental assessment, natural resource management and authorisation.

3.2.2 Biodiversity Management Plans (BMPs)

BMPs ensure the long-term survival in nature of species; to provide the responsible person or organ of state effective monitoring and reporting on species progress and to be consistent with acts, frameworks and applicable bioregional plans or any plans issued in terms of Chapter 3 of the NEMA or any municipal integrated development plans etc.

3.2.3 National Biodiversity Strategy and Action Plans (NBSAPs)

The goal of the NBSAPs, is to conserve and managed terrestrial and aquatic biodiversity to ensure a sustainable and equitable benefits.

3.2.4 National Biodiversity Assessment (NBA)

NBA, formerly known as National Spatial Biodiversity Assessment (NSBA), is a systematic biodiversity planning approach that aims to provide a comprehensive biodiversity assessment (previously it focused on spatial only), throughout the country. Its focus is to mainstream biodiversity priorities throughout the economy and making links between biodiversity and socio-economic development.

3.3 Applicable By-laws

3.3.1 By-Laws for the Protection of Wild Animals and Birds

Prohibition against hunting wild animals and birds

2. No person may, without lawful cause or without the permission in writing of the Council and subject to such conditions as the Council may impose –

- (a) hunt any wild animal or bird by any means whatsoever;
- (b) remove, disturb or destroy any nests of birds, their eggs or their young.

4 DESKTOP STUDY

The following sections consist of information obtained during the desktop study of with the study area and the surrounding terrestrial and aquatic environment.

4.1 Hydrological Setting

The study area was observed to fall within the quaternary catchment area A21C, that is within the Crocodile (West) and Marico Water Management Area (WMA) (**Figure 2**). The proposed development was recorded to traverse the Sub-Quaternary Reach (SQR) A21C-1262 (Braamfonteinspruit), which was calculated to have a Present Ecological State (PES) score falling within Class E (Seriously modified) and be of a low Ecological Importance and moderate Ecological Sensitivity within the broader catchment area (DWS, 2012).

4.2 Ecoregion

According to the delineation provided by Dallas (2005), the level 1 ecoregion in which the study area is recorded was the Highveld ecoregion (**Figure 3**). **Table 3** below presents the primary characteristics and data that have been collected for the relevant ecoregion.

Table 1: Highveld Ecoregion attributes (Kleynhans, 2005) (Bold indicates the most dominant attribute/s).

MAIN ATTRIBUTES	HIGHVELD
Terrain Morphology: Broad division (dominant types in bold) (Primary)	Plains; Low Relief; Plains; Moderate Relief; Lowlands; Hills and Mountains; Moderate and High Relief; Open Hills; Lowlands; Mountains; Moderate to high Relief Closed Hills. Mountains; Moderate and High Relief
Vegetation types (dominant types in bold) (Primary)	Mixed Bushveld (limited); Rocky Highveld Grassland; Dry Sandy Highveld Grassland; Dry Clay Highveld Grassland; Moist Cool Highveld Grassland; Moist Cold Highveld Grassland; North Eastern Mountain Grassland; Moist Sandy Highveld Grassland; Wet Cold Highveld Grassland (limited); Moist Clay Highveld Grassland; Patches Afromontane Forest (very limited)
Altitude (m a.m.s.l) (secondary)	1100-2100, 2100-2300 (very limited)
MAP (mm) (modifying)	400 to 1000

MAIN ATTRIBUTES	HIGHVELD
Coefficient of Variation (% of annual precipitation)	<20 to 35
Rainfall concentration index	45 to 65
Rainfall seasonality	Early to late summer
Mean annual temp. (°C)	12 to 20
Mean daily max. temp. (°C): February	20 to 32
Mean daily max. temp. (°C): July	14 to 22
Mean daily min. temp. (°C): February	10 to 18
Mean daily min temp. (°C): July	-2 to 4
Median annual simulated runoff (mm) for quaternary catchment	5 to >250

4.3 Land Use

The dominant land cover associated with the study area were recorded to be; 1) Urban residential buildings, 2) Urban school and sports ground, 3) Urban commercial buildings that is surrounded by thicket or dense bush (**Figure 4**). Subsequent to conducting a field survey it was recorded that the majority of the desktop modelled land cover classes were correct, however the extent of historic Thicket area within the Assessment radius of the study area was over presented. The remaining land cover classes delineated within SANBI (2013/14) were observed to have been an accurate representation of the broad land cover within the study area. These classes were used to guide the development of habitat classes within this study.

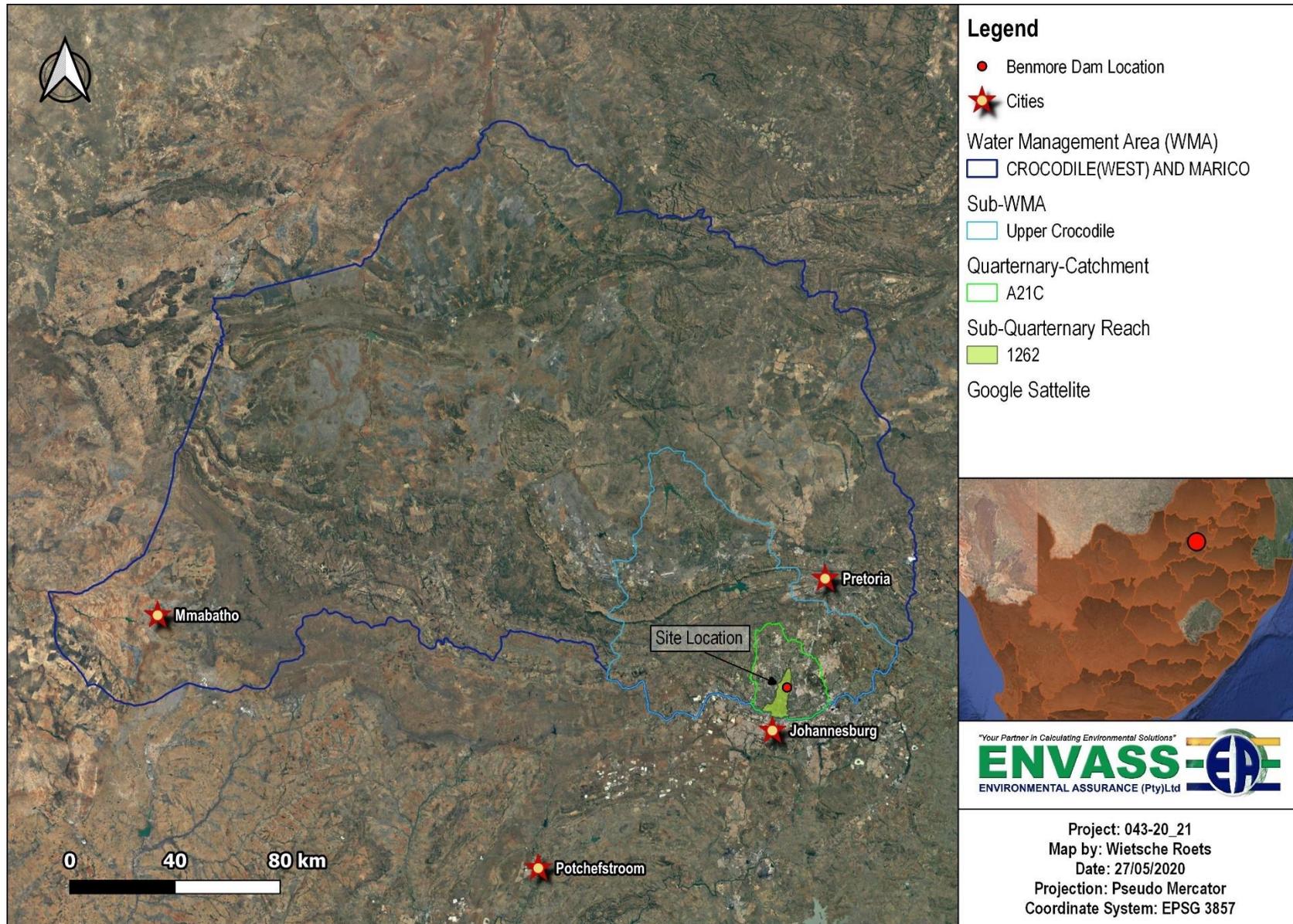


Figure 2: Illustration of the study area in relation to the relevant SQRs, quaternary catchment areas and Water Management Areas (DWS, 2012).

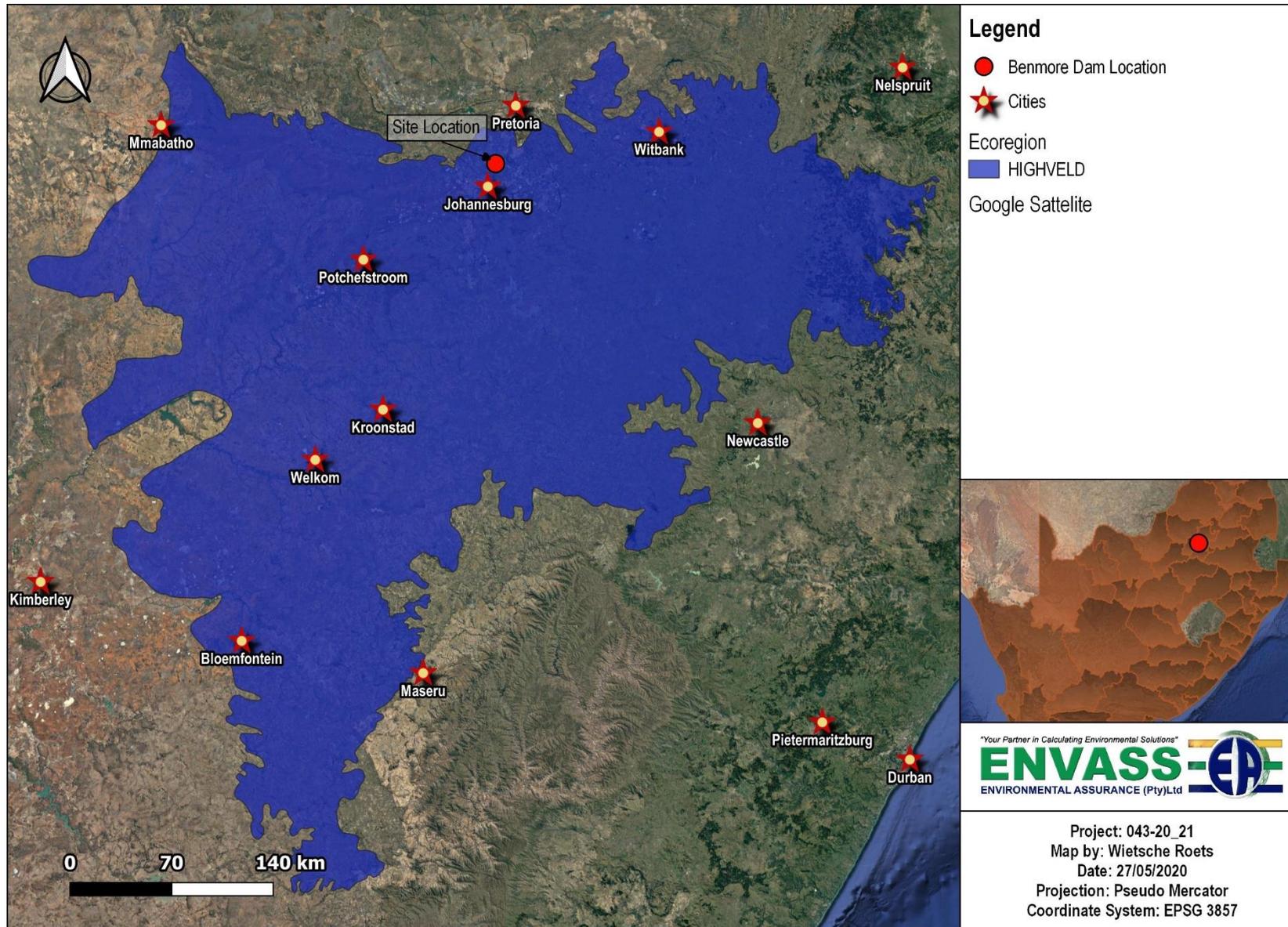


Figure 3: Illustration of the study area within the Highveld Ecoregion (Dallas, 2005).

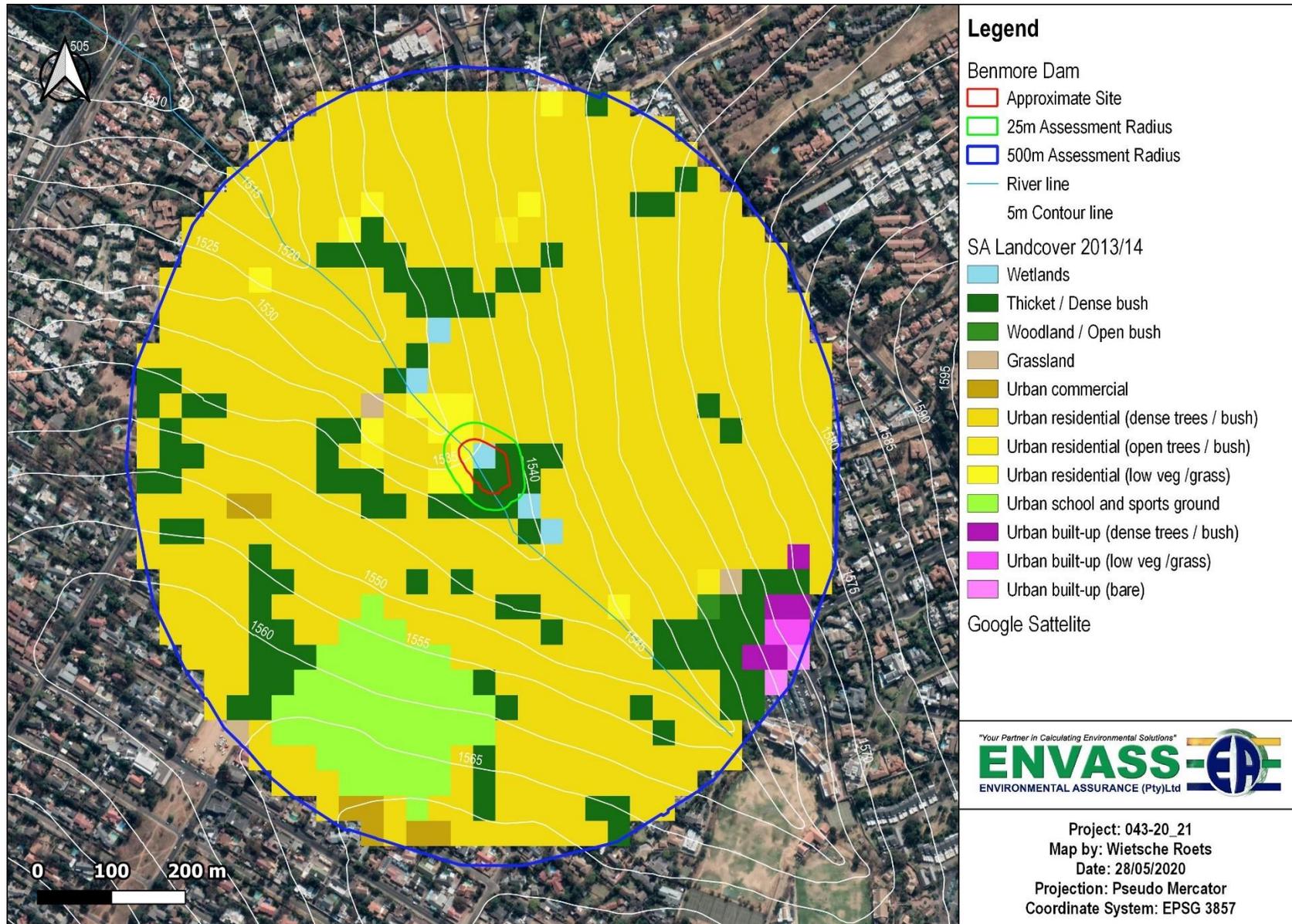


Figure 4: Illustration of the land cover recorded within the study area at a desktop level (SANBI, 2013/14).

4.4 Vegetation

Vegetation types were identified and delineated on a national scale by Mucina and Rutherford (2006), and this terrestrial vegetation delineation has since been continually modified at five (5) year intervals to account for changes in land cover. The most recent version of the dataset at the time of this study was from 2018. As this delineation was at a national scale, the vegetation dataset was used as a broad baseline against which the on-site land-cover and vegetation condition was compared to in order to determine whether changes had occurred on-site.

According to the most recent SANBI (2006-2018) delineation, the study area was recorded to extend into the Egoli Granite Grassland vegetation type (Gm10) (**Figure 5**). This vegetation type forms part of the Grassland Biome within the Mesic Highveld Grassland Bioregion and is considered to be hardly protected. The vegetation has a conservation status of endangered with only 3 % already protected on a national scale and an estimated 31.8 % of its natural extent is still remaining within SA (SANBI, 2006-18). It must however be noted that the condition of the aforementioned vegetation type was highly impacted on and degraded as the developments surrounding the study area had encroached on the overall delineated habitat boundaries, and thus this has altered the desktop delineated vegetation units. This will however be discussed in more detailed within the sections to follow.

Figure 6 below also presents the wetland vegetation (WetVeg) types that were delineated within the study area, at a national scale (Driver *et al.*, 2011). The WetVeg type that was observed in the study area was the Mesic Highveld Grassland (Group 3) unit, which was categorised as critically endangered at a national scale (Driver *et al.*, 2011). Remnant of this WetVeg unit was recorded on-site, however the majority of the watercourses had been invaded by Invasive and Alien Plant Species (IAPS) and pioneer species within disturbance footprints.

4.5 Conservation Plan: Gauteng Biodiversity Sector

The component of Gauteng Department of Agriculture and Rural Development (GDARD), namely Gauteng Nature Conservation produced the Gauteng Conservation Plan Version 3 that was released in 2012 (hereafter referred to as the "C-Plan"). The C-Plan was developed to provide spatial planners with knowledge of an area through a simplified guide to systematic conservation assessments. Critical Biodiversity Areas (CBA) and Ecological Support Areas (ESA) buffers have been developed to outline areas of conservation concern. CBAs are areas which are irreplaceable often providing essential habitat for particular species (GDARD, 2014). A buffer of 100 m is recommended for any proposed activities in relation to CBA. ESAs are areas which provide ecological support to CBA, offering forage or often act as movement corridors for sensitive species, these include fish sanctuaries and registered freshwater and Wetland National Freshwater Ecosystem Priority Areas (NFEPAs) (GDARD, 2014; Driver *et al.*, 2011). A buffer of 30 m is often recommended for ESAs (GDARD, 2014).

The site was observed to be situated in Important Areas and Ecological Support areas (**Figure 7**). The highlighted sections that were delineated as Important Areas have been deemed as important for climate change; whereas the Ecological Support Areas are imperative for long term sustainability in terms of maintenance and generation of biodiversity in sensitive areas. These areas were observed to have been degraded and encroached upon by numerous IAPS, as well as urbanisation. However, there was sufficient natural vegetation with potential to be rehabilitated to near natural condition, and thus the site was considered of ecological importance and to maintain its classification as ESA and IAs.

4.6 Geology and Soils

Figure 8 below illustrates the geological units that were recorded to be underlying the study area, and consequently providing the parent material from which the overlying soils were created. It was evident that the study area was underlain by the Halfway House Granite lithostratigraphic unit (Council for Geoscience, 2008). The Halfway House Granite is indicated to contain granodiorite that can potentially be porphyritic, gneiss and migmatite (Council for Geoscience, 2008).

The abovementioned lithostratigraphic unit hydrological soil properties have been classified as Class B soil and can be described as having a moderately low runoff potential (**Figure 9**). The runoff potential is due to slow infiltration or infiltration that deteriorates rapidly that has restricted permeability. During the site assessment the eroded areas revealed the underlying impermeable layer to be sandstone in the area.

4.7 National Wetland Inventory Version 5 & National Freshwater Ecosystem Priority Areas (NFEPA)

The NFEPA database provides strategic spatial priorities for conserving South Africa's freshwater ecosystems and supporting sustainable use of water resources. NFEPA were identified based on a range of criteria dealing with the maintenance of key ecological processes and the conservation of ecosystem types and species associated with rivers, wetlands and estuaries (Driver *et al.*, 2011). The National Wetland Inventory (NWI) map 5 was developed to provide input into the 2018 National Biodiversity Assessment, as well as to improve the overall land-use planning and decision mapping surrounding wetland ecosystems at a national scale. Subsequent to an analysis of the NFEPA river and wetland datasets, as well as the NWI, at a desktop level and during a field assessment, it was determined that one (1) artificial NFEPA wetland was delineated within the site area, namely the Benmore Dam (**Figure 10**). According to the NWI map, a Channelled Valley-bottom (CVB) wetland and Hillslope Seep (HS) wetland were delineated within the 500 m assessment radius around the proposed development (**Figure 10**). The CVB wetland was however determined to have been a riparian environment with additional HS wetlands flowing into the primary channel. These systems are considered of high conservation importance and ecosystem service supply to the region at a national scale.

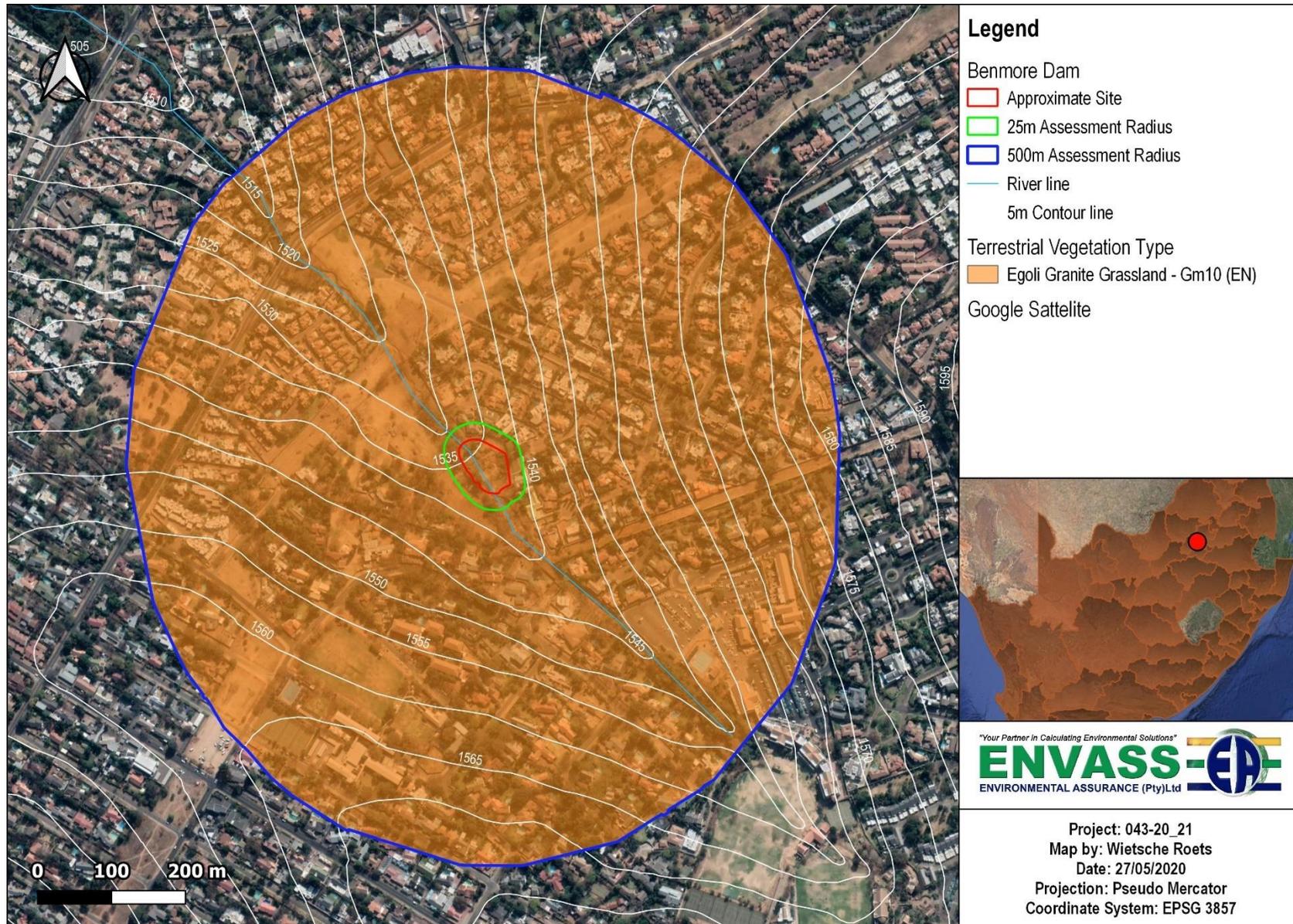


Figure 5: Illustration of the terrestrial vegetation types applicable to the study area (SANBI, 2006-2018).

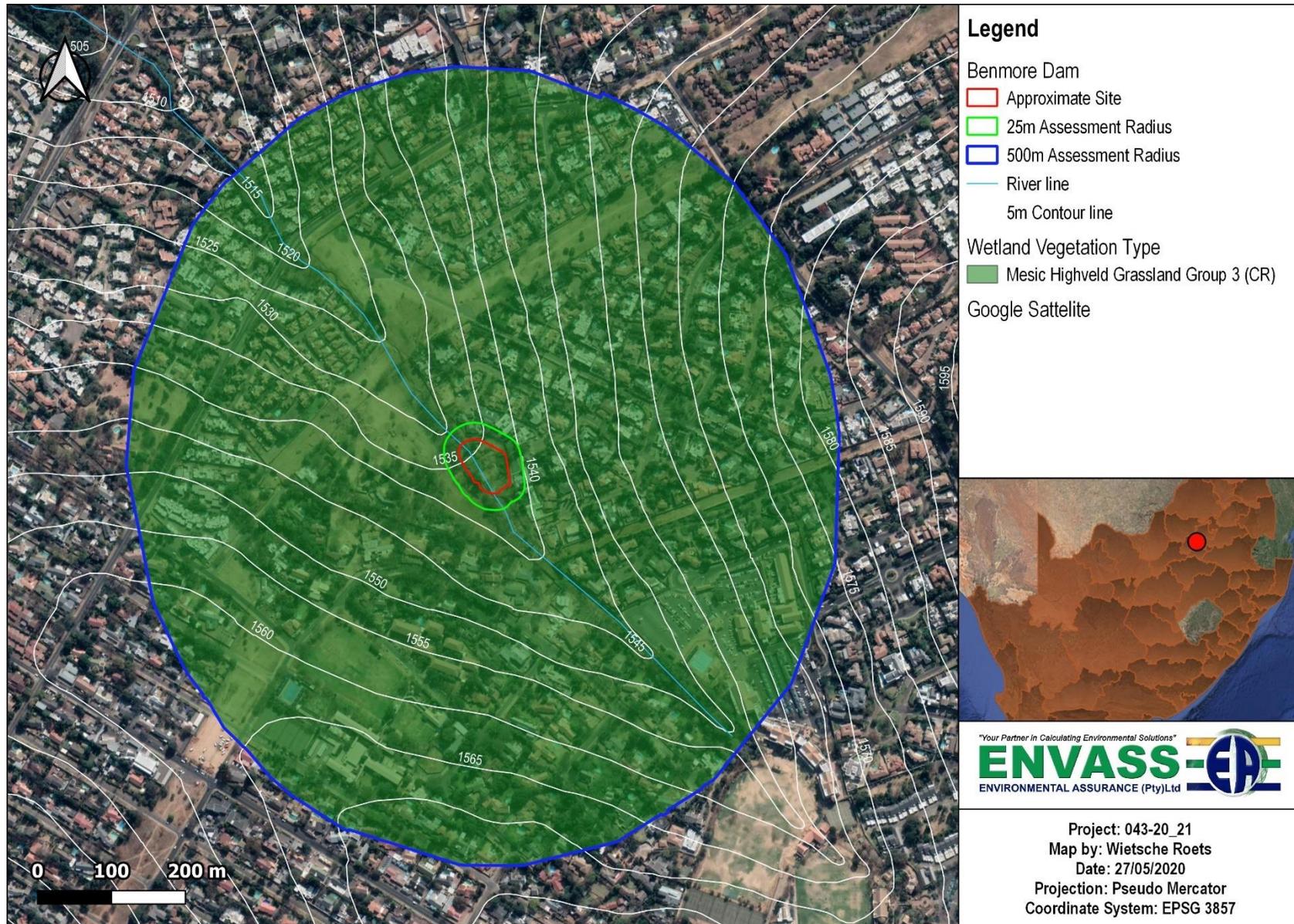


Figure 6: Illustration of the wetland vegetation types delineated within the study area (Driver et al., 2011).

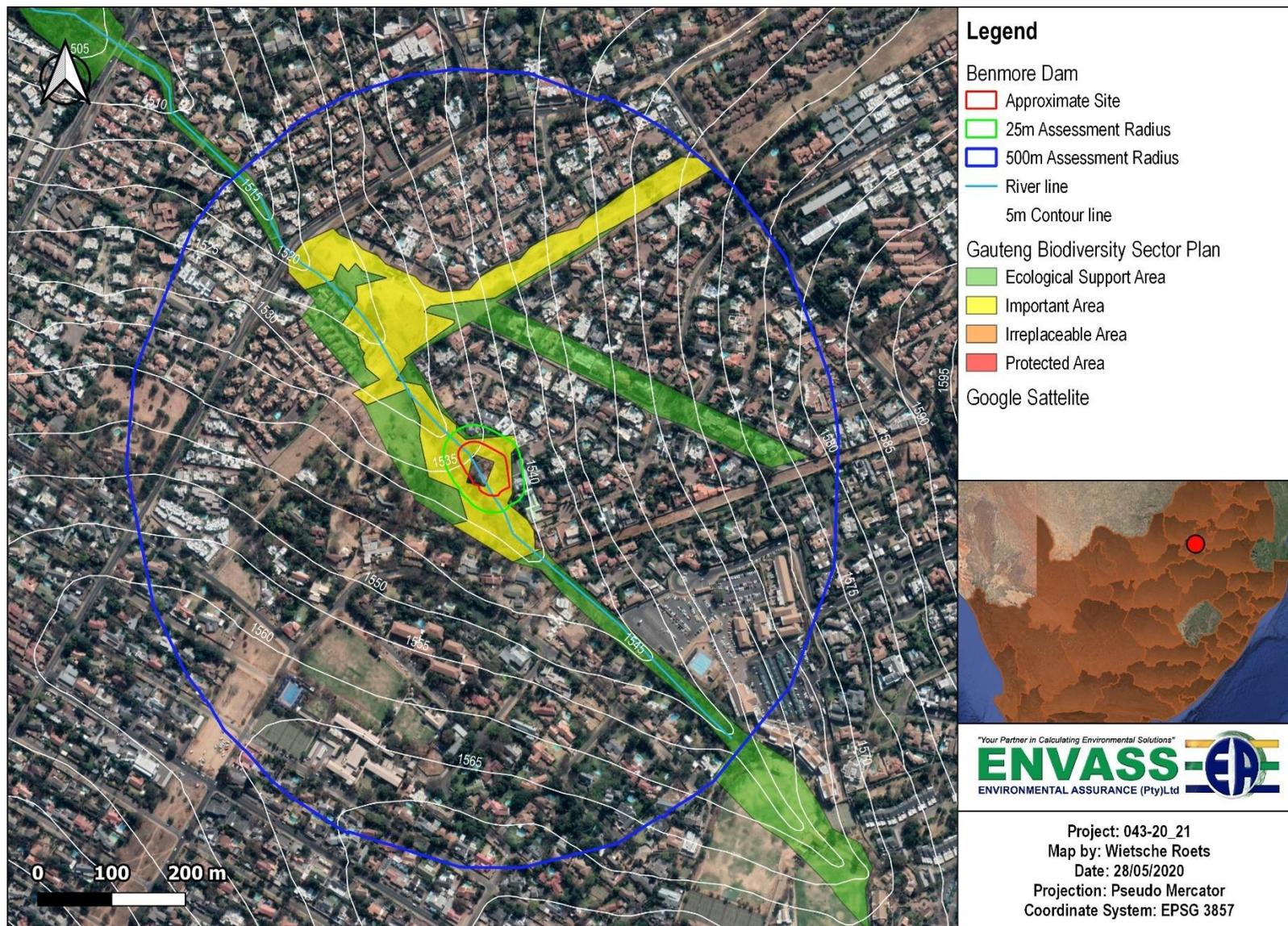


Figure 7: Illustration of the Gauteng Biodiversity Sector Plan for conservation units relevant to the study area (GDARD, 2011).

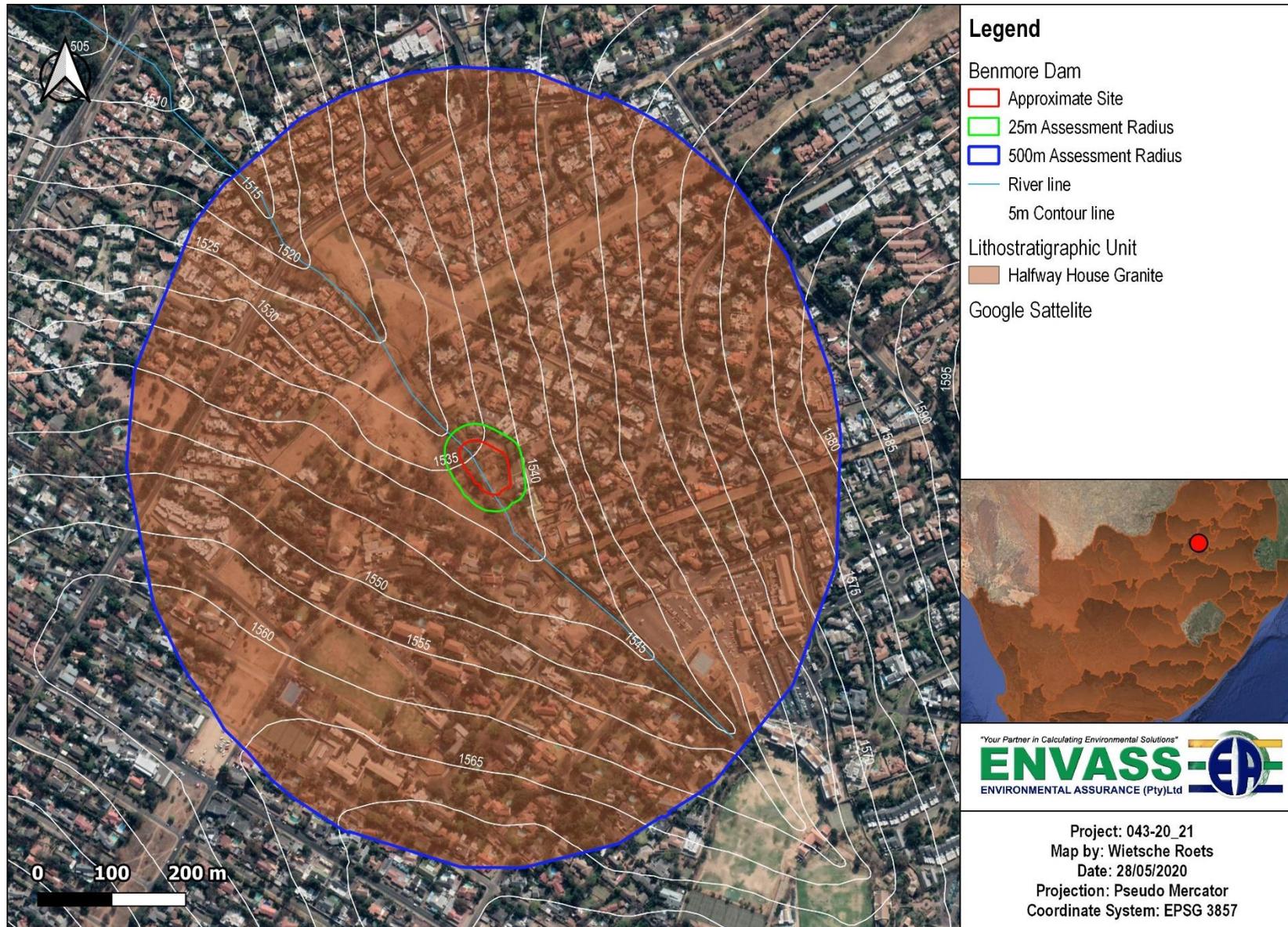


Figure 8: Illustration of the lithostratigraphic units relevant to the study area (Council for Geoscience, 2008).

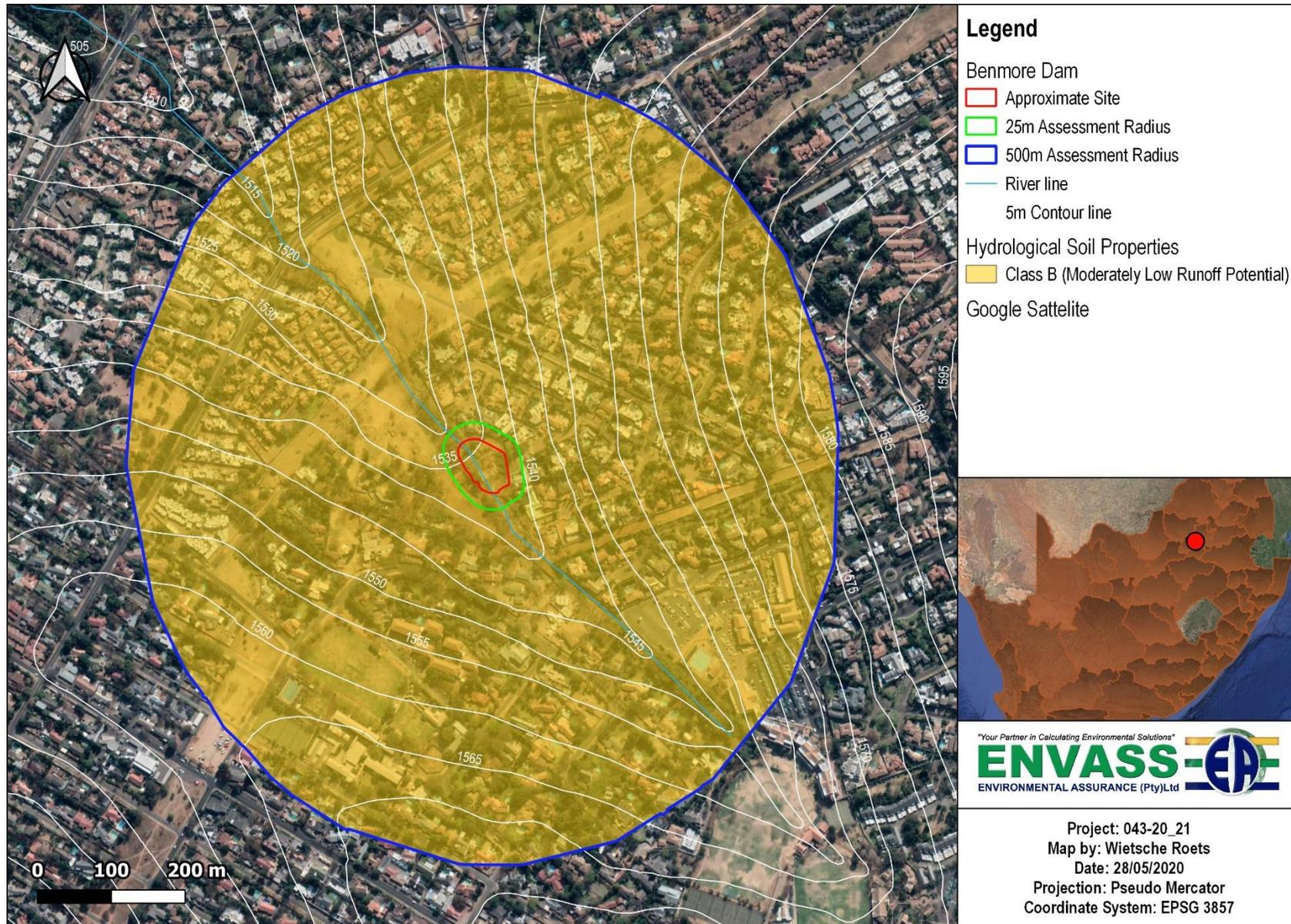


Figure 9: Illustration of the hydrological properties of the soils within the study area.

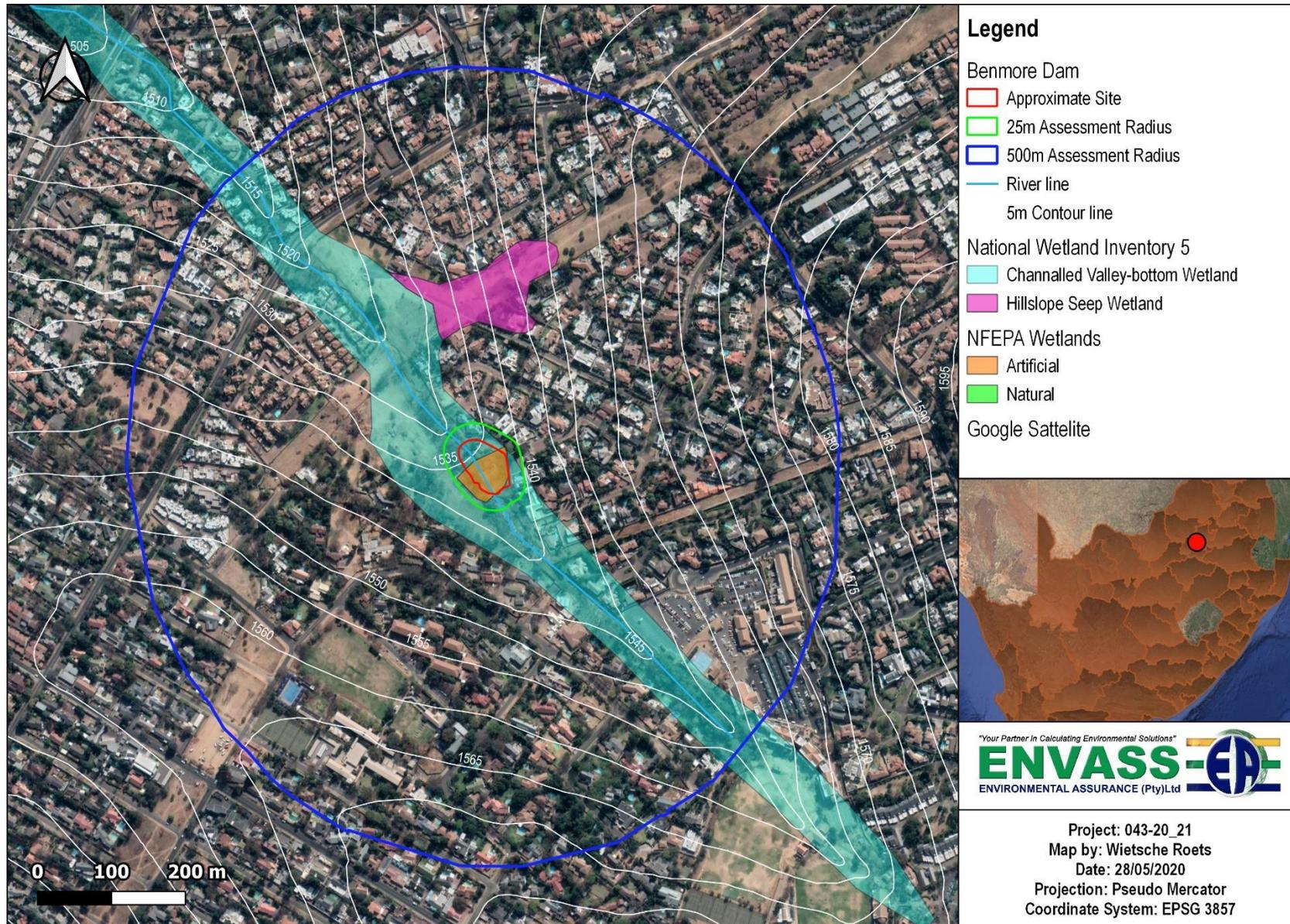


Figure 10: National Wetland Inventory and National Freshwater Ecosystem Priority Areas (NFEPA) applicable to the study area.

5 RESULTS

The following sections will present the results that were obtained subsequent to conducting the field survey of the study area.

5.1 FLORAL INVESTIGATION

The entire study area was recorded to fall within the Egoli Granite Grassland type vegetation unit, which according to Mucina and Rutherford (2006/12) usually contains *Hyparrhenia hirta* dominated grassland, with some woody species. The vegetation unit is characterised by scattered shrub groups and/or small trees (Mucina & Rutherford, 2006). The soils within the study area were recorded to be shallow and coarsely grained, sandy soils on top of the Halfway House Granite dome. Remanence of the desktop delineated vegetation type were recorded within the 25 m assessment radius; however, the perceived natural state had been moderately-to-highly degraded as a result of landscaping of the area and planting IAPS presumably for aesthetic purposes. The degradation had been further exasperated by the livestock grazing that was taking place throughout the study area, as a result of the property on the western bank of the site being occupied by a subsistence farmer. The excessive grazing in parts of the site had resulted in the majority of the decreaser grass and invader species having been removed and consequent proliferation of increaser species.

The dominant floral species of the Egoli Granite Grassland vegetation type are presented in **Table 4** below (Mucina & Rutherford, 2006). Some of these species were recorded to have been scattered throughout the study area, however the exact composition of each habitat unit will be described in the section to follow.

Table 2: According to Mucina & Rutherford (2006), the following are the dominant floral species of the Egoli Granite Grassland vegetation type.

SCIENTIFIC NAME	COMMON NAME	HABITAT NOTES	SANBI CONSERVATION STATUS
GERMANOIDS			
<i>Andropogon eucomus</i>	Silver-Thread Grass	Moist areas and disturbed sandy soils	Least Concern
<i>Aristida aequiglumis</i>	Krulgras	Grassland	Least Concern
<i>Aristida canescens</i>		Dry grassland and woodland areas, disturbed land	Least Concern

SCIENTIFIC NAME	COMMON NAME	HABITAT NOTES	SANBI CONSERVATION STATUS
<i>Aristida congesta subsp. congesta</i>	Tassel Three-awn	Disturbed, overgrazed areas	Least Concern
<i>Aristida diffusa</i>		Grassland and bushveld regions in a variety of soil types	Least Concern
<i>Aristida scabrivalvis subsp. Borumensis</i>	Assegaaisteeckgras	Disturbed areas, grassland	Least Concern
<i>Bewsia biflora</i>	Blousaadgras	Open grassland	Least Concern
<i>Brachiaria serrata</i>	Red-Topped Signal Grass, Velvet Grass	Rocky grassland areas	Least Concern
<i>Bulbostylis burchellii</i>	Joang-ba-nokana	Grassland, rocky ridges	Least Concern
<i>Cymbopogon caesius</i>	Common turpentine grass	Forest margins, grassland, as well as disturbed areas such as pastures, cultivated fields and roadsides.	Least Concern
<i>Cynodon dactylon</i>	Fingergrass	All soil types, and wetlands	Least Concern
<i>Digitaria monodactyla</i>	One-finger-grass	Open grassland and bushveld areas	Least Concern
<i>Digitaria tricholaenoides</i>	Purple Finger Grass	Open grassland and sometimes in open bushveld	Least Concern
<i>Diheteropogon amplexans</i>	Broad-leaved Bluestem	Open grassland, poor gravelly soil	Least Concern
<i>Eragrostis capensis</i>	Cape Love Grass	Terrestrial	Least Concern
<i>Eragrostis chloromelas</i>	Blue Love Grass	Terrestrial	Least Concern
<i>Eragrostis curvula</i>	Weeping Love Grass	Terrestrial	Least Concern
<i>Eragrostis gummiflora</i>	Gum Grass	Terrestrial	Least Concern
<i>Eragrostis racemosa</i>	arrow Heart Love Grass	Terrestrial	Least Concern

SCIENTIFIC NAME	COMMON NAME	HABITAT NOTES	SANBI CONSERVATION STATUS
<i>Eragrostis sclerantha</i>	Kanariegras	Savanna habitat	Least Concern
<i>Heteropogon contortus</i>	Common Spear Grass	Albany Thicket, Fynbos, Grassland, Nama Karoo, Savanna, Succulent Karoo habitats	Least Concern
<i>Hyparrhenia hirta</i>	Blue Grass	Well-drained soils in open grassland and disturbed areas	Least Concern
<i>Melinis repens subsp. repens</i>	Natal Red-top	Terrestrial, disturbed areas	Least Concern
<i>Monocymbium cerasiiforme</i>	Boat Grass	Slopes in high altitudes, leached acidic soils	Least Concern
<i>Panicum natalense</i>	Natal Buffalo Grass	Open mountainous grassland and sandy bushveld	Least Concern
<i>Schizachyrium sanguineum</i>	Red Autumn Grass	Grassland and bushveld, often in vleis	Least Concern
<i>Setaria nigrirostris</i>	Large Seed Setaria	Bushveld and grassland turf soils	Least Concern
<i>Setaria sphacelate subsp. sphacelata</i>	Common Bristle Grass	Open grassland and bushveld areas	Least Concern
<i>Themeda triandra</i>	Red Grass	Undisturbed open grassland	Least Concern
<i>Tristachya leucothrix</i>	Hairy Trident Grass	Rocky, open grassland	Least Concern
<i>Tristachya rehmannii</i>		Bushveld and open grassland	Least Concern

SCIENTIFIC NAME	COMMON NAME	HABITAT NOTES	SANBI CONSERVATION STATUS
<i>Urelytrum agropyroides</i>	Quinine Grass	Sandy soil in open grassland and bushveld	Least Concern
HERBS			
<i>Acalypha angustata</i>		Terrestrial	Least Concern
<i>Alepidea peduncularis</i>	Ikhothe	Terrestrial	Least Concern
<i>Becium (Ocimum) obovatum</i>	Cat's Whiskers	Grassland or open woodland, 100-2100 m.	Least Concern
<i>Berkheya insignis</i>		Terrestrial	Least Concern
<i>Crabbea hirsuta</i>	Prickle Head	Terrestrial	Least Concern
<i>Cyanotis speciosa</i>	Doll's Powderpuff	Terrestrial	Least Concern
<i>Dicoma anomala</i>	Aambeibos	Terrestrial	Least Concern
<i>Helichrysum rugulosum</i>	Marotole	Stony or sandy grassland, and readily invades disturbed and overgrazed places	Least Concern
<i>Justicia anagalloides</i>		Open grassland, often in overgrazed or disturbed places such as roadsides.	Least Concern
<i>Kohautia amatymbica</i>	Tremble Tops	Terrestrial	Least Concern
<i>Nidorella hottentotica</i>		Terrestrial	Least Concern
<i>Pentansia prunelloides subsp. Latifolia</i>	Wild Verbena	Terrestrial	Least Concern
<i>Pseudognaphalium luteo-album</i>	Jersey Cudweed	Sandy or clay soils near streams and marshes, often in disturbed places such as irrigation canals and also a weed in gardens.	Least Concern

SCIENTIFIC NAME	COMMON NAME	HABITAT NOTES	SANBI CONSERVATION STATUS
<i>Senecio venosus</i>	Besembos	Terrestrial	Least Concern
GEOPHYTIC HERBS			
<i>Cheilanthes deltoidea</i> (subsp. <i>Silicicola</i> & <i>deltoida</i>)		Southwest-facing soil pockets and rock crevices in chert rock.	subsp. <i>deltoida</i> =Least Concern subsp. <i>silicicola</i> = Vulnerable
<i>Cheilanthes hirta</i> Sw.	Parsley Fern	Terrestrial;	Least Concern
SMALL TREE			
<i>Vangueria infausta</i>	Velvet Wild-medlar	Terrestrial	Least Concern
TALL SHRUB			
<i>Rhus (Searsia) pyroides</i> (Burch.)	Currant	Terrestrial	Least Concern
LOW SHRUBS			
<i>Anthospermum hispidulum</i>		Terrestrial	Least Concern
<i>Anthospermum rigidum</i> subsp. <i>pumilum</i>	Umlomomnandomncane	Terrestrial	Least Concern
<i>Gnidia capitata</i>	Gifbos		Not Listed
<i>Helichrysum kraussii</i>	Straw Everlastin	Terrestrial	Least Concern
<i>Ziziphus zeyheriana</i>	Wag-'n-bietjie	Terrestrial	Least Concern
SUCCULENT SHRUB			
<i>Lopholaena coriifolia</i>	Leather-leaved Fluff-bush	Terrestrial	Least Concern

5.1.1 Habitat Units Delineated within the Study Area

Two (2) broad habitat units were delineated within the study area based on the similarity of the floral species and the general land cover class within each area. These habitat units included; 1) Disturbed Area and 2) Watercourse (**Figures 11 to 12**). A distinct difference in dominant plant species was recorded between the two sections was observed, with the disturbed area being highly invaded with several species planted and in pots along the boundary. The watercourse indicated woody species and ferns along the riparian area with the left portion of the wetland being dominated by poaceae species such as *Pennisetum clandestinum*. The centre of the watercourse indicated wetland vegetation dominated by *Cyperus papyrus*, *Typha capensis*, *Zantedeschia aethiopica* (L.) Spreng, and *Pontederia cordata* species. The sections to follow will focus on the dominant floral species within each community, a full list of the floral species recorded during the site assessment can be found under Appendix A. These floral habitat units were used to describe the faunal niche habitats that may be evident within the study area, and were linked to the in-field faunal sighting in the section to follow.

5.1.1.1 Watercourse

As a result of the proposed development being a dam rehabilitation, the entire footprint of the proposed development fell within this habitat unit. The remaining extent of the watercourse habitat unit consisted of hillslope seepage wetlands and a central riparian area associated with the stream that flowed into the proposed development from the south east and continued downstream in a north western direction. The entire extent of this habitat unit within the study area covered an extent of approximately 1.24 Hectares (ha), out of a total 2.1 ha, which equated to approximately 59 %. Although portions of the riparian area were observed to have been artificially concreted to create a more stable stormwater channel, the woody species recorded to have been proliferating directly adjacent to, and parallel to, it formed a defined riparian environment, which was distinguishable from the disturbed areas habitat unit.

The floral composition of this habitat unit could be differentiated from the surrounding environment. It must be noted that the assessment was conducted in the dry season and it is to be considered that a similar assessment be conducted in the wet season for a thorough review of the habitat. As a result of these systems providing good connectivity within the landscape, a good diversity of floral species in comparison to the surrounding urban environment, and unique faunal habitats within this disturbed environment, the ecological sensitivity and importance was determined to have been high.

It became evident that extensive historical anthropogenic activities had greatly impacted the watercourse itself and around the site. **Table 5** below presented the dominant floral species identified in the Watercourse habitat unit such as *Typha capensis* (Bulrush), *Cyperus longus* (Sweet Cyperus) and *Cyperus papyrus* (Papyrus sedge), that were identified within this habitat unit, with a more detailed species list presented in the Appendices. **Figure 11** illustrates the general condition of the habitat unit that was observed during the field survey.

Table 3: Dominant floral Species that were identified within the Watercourse areas habitat unit.

SCIENTIFIC NAME	ENGLISH NAME	SANBI CONSERVATION STATUS
		OR NEMBA IAPS CATEGORY
<i>Acacia mearnsii</i>	Black Wattle	2
<i>Achyranthes aspera</i>	Devil's Horsewhip	Unlisted Invasive Species
<i>Amaranthus cruentus</i>	Red Amaranth	Unlisted Invasive Species
<i>Argemone ochroleuca</i>	Prickly poppy	1b
<i>Bidens pilosa</i>	Blackjacks	Unlisted Invasive Species
<i>Bulbinella cauda-felis</i>	Cat's Tail Bulbinella	Least Concern
<i>Bulbostylis burchellii</i>	Sedge Grass	Least Concern (Not endemic to SA)
<i>Canna indica</i>	Indian-shot	1b
<i>Celtis africana</i>	African Elm	Least Concern (Not endemic to SA)
<i>Chloris virgata</i>	Feather Finger Grass	Least Concern (Not endemic to SA)
<i>Cirsium vulgare</i>	Spear Thistle	1b
<i>Colocasia esculenta</i>	Elephant Ears	Unlisted Invasive Species
<i>Combretum erythrophyllum</i>	River bushwillow	Least Concern (Not endemic to SA)
<i>Cynodon dactylon</i>	Finger grass	Least Concern (Not endemic to SA)
<i>Cynoglossum officinale</i>	Hound's tongue	Unlisted Invasive Species
<i>Cyperus papyrus</i>	Papyrus Sedge	Least Concern (Not endemic to SA)
<i>Cyperus longus</i>	Sweet Cyperus	Least Concern (Not endemic to SA)
<i>Datura stramonium</i>	Jimsonweed	1b
<i>Delairea odorata</i>	Cape-ivy	Least Concern (Not endemic to SA)
<i>Dietes grandiflora</i> (Presumed)	Fortnight lily	Least Concern
<i>Ehrharta erecta</i>	Panic veldtgrass	Least Concern (Not endemic to SA)
<i>Euphorbia oblongata</i>	Eggleaf spurge	Unlisted Invasive Species
<i>Euphorbia peplus</i>	Petty Spurge	Unlisted Invasive Species
<i>Ipomoea indica</i>	Blue dawn flower	1b
<i>Ipomoea purpurea</i>	Common morning glory	1b
<i>Laburnum anagyroides</i>	Common Laburnum	Unlisted Invasive Species
<i>Lantana camera</i>	West Indian Lantana	1b
<i>Lepidium didymium</i>	Lesser Swine-cress	Unlisted Invasive Species
<i>Lepidium draba</i>	Hoary cardaria	1b
<i>Malva parviflora</i>	Cheeseweed Mallow	Unlisted Invasive Species

SCIENTIFIC NAME	ENGLISH NAME	SANBI CONSERVATION STATUS OR NEMBA IAPS CATEGORY
<i>Melia azedarach</i>	Chinaberry	Unlisted Invasive Species
<i>Mikania micrantha</i>	Mile-a-minute	Unlisted Invasive Species
<i>Oxalis corniculata</i>	Creeping Woodsorrel	Unlisted Invasive Species
<i>Pelargonium inquinans</i>	Scarlet Geranium	Least Concern
<i>Pennisetum clandestinum</i>	Kikuyu Grass	Least Concern (Not endemic to SA)
<i>Persicaria lapathifolia</i>	Smartweed	Unlisted Invasive Species
<i>Phytolacca dioica</i>	Belhambra tree	Unlisted Invasive Species
<i>Plantago major</i>	Greater Plantain	Unlisted Invasive Species
<i>Podranea ricasoliana</i>	Pink Trumpet Vine	Vulnerable
<i>Polygala virgate</i>	Purple broom	Least Concern (Not endemic to SA)
<i>Polypogon viridis</i>	Water Beard Grass	Least Concern (Not endemic to SA)
<i>Pontederia cordata</i>	Pickereelweed	1b
<i>Populus deltoides (Presumed)</i>	Eastern cottonwood	Unlisted Invasive Species
<i>Pteridium aquilinum</i>	Fern	Least Concern (Not endemic to SA)
<i>Quercus suber</i>	Cork Oak	Unlisted Invasive Species
<i>Rinicus communis</i>	Castor Bean	1b
<i>Salix babylonica</i>	Weeping willow	Unlisted Invasive Species
<i>Solanum lycopersicum</i>	Tomato plant	Unlisted Invasive Species
<i>Solanum mauritianum</i>	Bugweed	1b
<i>Sonchus asper</i>	Prickly Sowthistle	Unlisted Invasive Species
<i>Tagetes lunulate</i>	Red-crescent Marigold	Unlisted Invasive Species
<i>Taraxacum officinale</i>	Common Dandelion	Unlisted Invasive Species
<i>Taxodium distichum</i>	Bald Cypress	Unlisted Invasive Species
<i>Typha capensis</i>	Bullrush	Least Concern (Not endemic to SA)
<i>Ulmus parvifolia</i>	Chinese Elm	Unlisted Invasive Species
<i>Vachellia karroo</i>	Cape thorn-tree	Least Concern (Not endemic to SA)
<i>Veronica polita</i>	Grey Field-speedwell	Unlisted Invasive Species
<i>Washingtonia robusta</i>	Mexican Fan Palm	Least Concern (Not endemic to SA)
<i>Zamia integrifolia</i>	Coontie	Unlisted Invasive Species
<i>Zantedeschia aethiopica (L.) Spreng.</i>	White arum lily	Least Concern (Not endemic to SA)

KEY: Not Listed = "-", IAPS = Invasive and/or Alien Plant Species.



Figure 11: Illustration of the Watercourse habitat unit.

5.1.1.2 Disturbed Area

The disturbed area habitat unit constituted as areas that were built-up, cleared, urban lawns, with associated pot plants and aesthetic species, and other infrastructural developments. The total extent of this habitat unit was calculated to have been 0.86 ha out of a total 2.1 ha, equating to a total of approximately 41 % within the study area. As a result of the highly infilled and disturbed natural of this habitat unit, which had resulted in numerous IAPS encroaching into its boundary, the EIS of this unit was considered low.

It was evident from the presence of Poaceae species, such as *Pennisetum clandestinum* and *Cynodon dactylon*, and the abundance of ruderal weeds within these such as *Bidens pilosa* (Common Blackjack), that these areas were not in a natural state. Various species of exotic and indigenous vegetation, some of which are provincially protected, were noted to be plated in gardens and pots along the disturbed area, such as species of *Aloe marlothii*, *Agapanthus praecox*, *Crassula ovata*, *Duranta erecta*, *Pelagonium inquinans*, *Schefflera arboricola*, *Washingtonia robusta* and the nationally protected *Clivia miniate* (Natal Lily) species. **Figure 12** indicates the illustration of the Disturbed area, whereas **Table 6** presented the species identified within the area unit.

Table 4: Dominant floral Species that were identified within the Disturbed Area habitat unit.

SCIENTIFIC NAME	ENGLISH NAME	SANBI CONSERVATION STATUS OR NEMBA CATEGORY
<i>Agapanthus praecox</i>	Blue Lily	Least Concern
<i>Aloe marlothii (fero)</i>	Cape Aloe	Least Concern
<i>Amaranthus cruentus</i>	Red Amaranth	Unlisted Invasive Species
<i>Argemone ochroleuca</i>	Prickly poppy	1b
<i>Bidens pilosa</i>	Blackjacks	Unlisted Invasive Species
<i>Bulbinella cauda-felis</i>	Cat's Tail Bulbinella	Least Concern
<i>Bulbostylis burchellii</i>	Sedge Grass	Least Concern (Not endemic to SA)
<i>Callistemon speciosus</i>	Bottlebrush	Unlisted Invasive Species
<i>Canna indica</i>	Indian-shot	1b
<i>Celtis africana</i>	African Elm	Least Concern (Not endemic to SA)
<i>Chloris virgata</i>	Feather Fingergrass	Least Concern (Not endemic to SA)
<i>Chlorophytum comosum</i>	Spider plant	Least Concern (Not endemic to SA)
<i>Citrus x sinensis</i>	Orange tree	Unlisted Invasive Species
<i>Clivia miniate</i>	Natal Lily	Vulnerable (Not endemic to SA)
<i>Colocasia esculenta</i>	Elephant Ears	Unlisted Invasive Species
<i>Combretum erythrophyllum</i>	River bushwillow	Least Concern (Not endemic to SA)
<i>Crassula ovata</i>	Jade Plant	Least Concern (Not endemic to SA)
<i>Cycas revoluta</i>	Sago Cycad	Unlisted Invasive Species
<i>Cynodon dactylon</i>	Finger grass	Unlisted Invasive Species
<i>Cynoglossum officinale</i>	Hound's tongue	Unlisted Invasive Species

SCIENTIFIC NAME	ENGLISH NAME	SANBI CONSERVATION STATUS OR NEMBA CATEGORY
<i>Duranta erecta</i>	Skyflower	3
<i>Ehrharta erecta</i>	Panic veldtgrass	Least Concern (Not endemic to SA)
<i>Euonymus japonicus</i>	Evergreen Euonymus	Unlisted Invasive Species
<i>Euphorbia cooperi</i> var. <i>graniticola</i>	bushveld candelabra tree	Least Concern (Not endemic to SA)
<i>Flaveria Bidentis</i>	Smelter's bush	1b
<i>Lavandula x intermedia</i> var. <i>Margaret Roberts</i>	Margaret Roberts Lavender	Unlisted Invasive Species
<i>Magnolia grandiflora</i>	Southern Magnolia	Unlisted Invasive Species
<i>Opuntia ficus-indica</i>	Cochineal Nopal Cactus	1b
<i>Pelargonium inquinans</i>	Scarlet Geranium	Least Concern
<i>Pennisetum clandestinum</i>	Kikuyu Grass	Least Concern (Not endemic to SA)
<i>Populus deltoides</i>	Eastern cottonwood	Unlisted Invasive Species
<i>Portulacaria afra</i>	Elephant Bush	Least Concern (Not endemic to SA)
<i>Schefflera arboricola</i>	Dwarf umbrella tree	Unlisted Invasive Species
<i>Solanum lycopersicum</i>	Tomato plant	Unlisted Invasive Species
<i>Vitex trifolia</i>	Arabian Lilac	1b
<i>Vachellia karroo</i>	Cape thorn-tree	Least Concern (Not endemic to SA)
<i>Washingtonia robusta</i>	Mexican Fan Palm	Least Concern (Not endemic to SA)
<i>Weigela decora</i> (Presumed)	Japanese Weigela	Unlisted Invasive Species
<i>Yucca gigantea</i>	Spineless Yucca	Unlisted Invasive Species



Figure 12: Illustration of the general make-up of the Disturbed unit.

5.1.2 Species of Conservation Concern (SCC)

The following section will present the Species of Conservation Concern (SCC) and any Threatened and/or Protected (TOPS) that were identified on site, as well as those that may have the potential to be recorded within the project region. In addition to the SCC and TOPS identified during the field survey, a precautionary approach was adopted in implementing a desktop study of the study area to ensure that all conservation aspects of the study area have been reviewed and the DEA requirements for terrestrial floral assessments addressed (SANBI & BLSA, 2020). The Plants of Southern Africa (POSA) webpage was utilised to outline a regional search area for any potential SCC and TOPS that may occur in and/or around the study area. SCC include all species that are assessed according the IUCN Red List Criteria as Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Data Deficient (DD) or Near Threatened (NT) as well as range-restricted species which are not declining and are Nationally Listed as Rare or Extremely Rare [also referred to in some Red Lists as Critically Rare] (SANBI & BLS, 2020) (**Figure 13**).

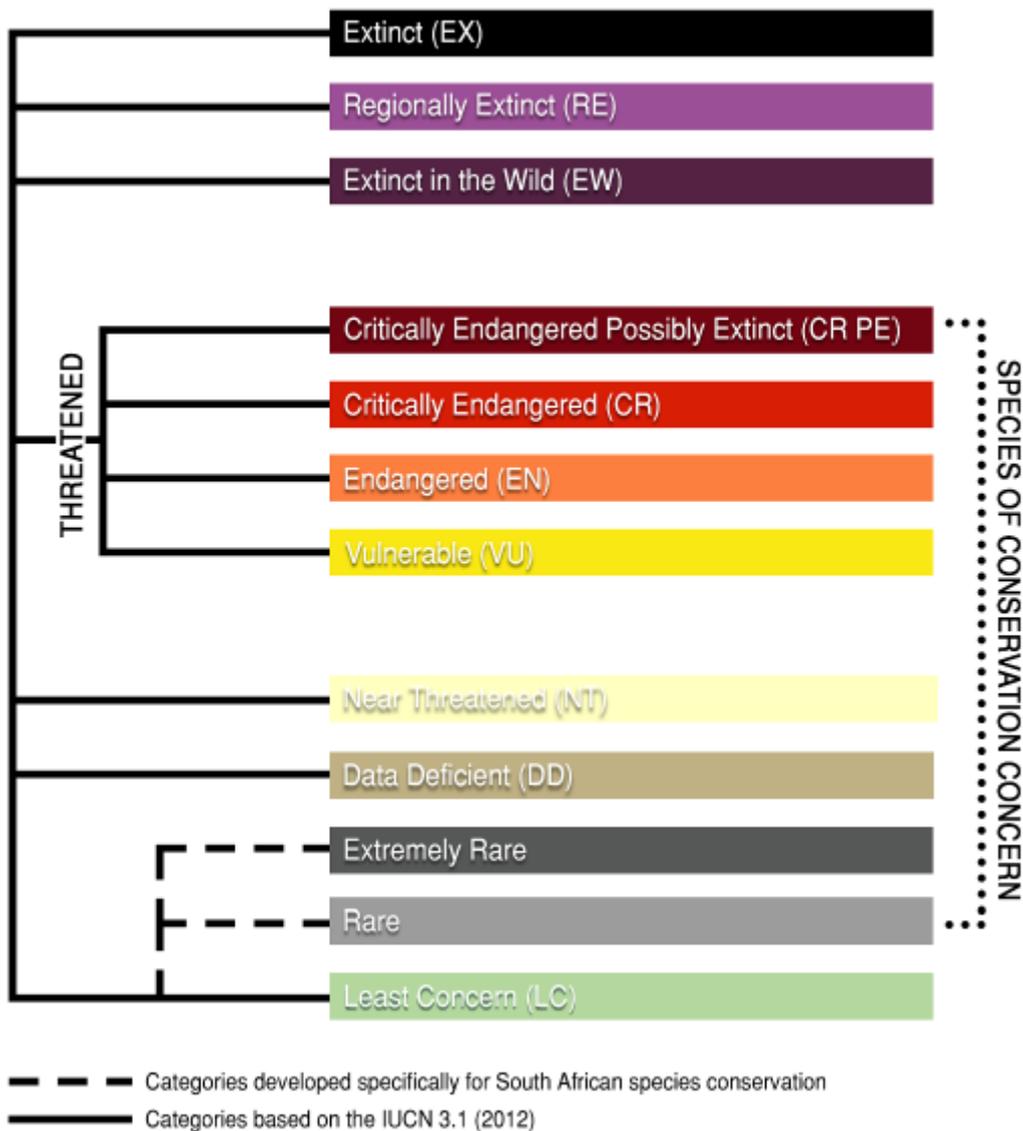


Figure 13: The different categories of Species of Conservation Concern (SCC) modified from the IUCN extinction risk categories (SANBI & BLSA, 2020; IUCN, 2012).

Subsequent to a review of the SANBI Plants of Southern Africa (POSA) database and the IUCN Red List of Threatened Species a list of SCC that have the potential to establish within the study area was determined and is presented in **Table 7** for the QDS 2628AA. None of the below species were recorded within the study area during the field survey relevant to this study, however cognisance of the potential of their occurrence must be had during all activities within the study area.

Table 5: Species of Conservation Concern (SCC) that have the potential to establish within the study area provided no further disturbance occurs.

SCIENTIFIC NAME	COMMON NAME	SUITABLE HABITAT	LIKELIHOOD OF OCCURRENCE	SANBI CONSERVATION STATUS
<i>Adromischus umbraticola</i> subsp. <i>umbraticola</i>	Cliff adromischus	South-facing rock crevices on ridges, restricted to Gold Reef Mountain Bushveld in the northern parts of its range, and Andesite Mountain Bushveld in the south.	Unlikely	Near threatened
<i>Cheilanthes deltoidea</i> subsp. <i>silicicola</i>		Southwest-facing soil pockets and rock crevices in chert rock.	Unlikely	Vulnerable
<i>Cineraria austrotransvaalensis</i>		Amongst rocks on steep hills and ridges, at the edge of thick bush or under trees on a range of rock types: quartzite, dolomite and shale, 1400-1700 m.	Unlikely	Near Threatened
<i>Cineraria longipes</i>	Wild cineraria	Grassland, amongst rocks and along seepage lines, exclusively on basalt koppies on south-facing slopes.	Unlikely	Vulnerable
<i>Clivia miniata</i>	Natal Lily	Within the Disturbed habitat area- Urban garden	SITED	Vulnerable
<i>Delosperma purpureum</i>		South-facing slopes, in shallow soils among crystalline or conglomerate quartzitic rocks, in sun or in partial shade, rarely in shade, in grassland with some trees.	Unlikely	Endangered
<i>Habenaria bicolor</i>	Bog orchids	Well-drained grasslands at around 1600 m in South Africa	Unlikely	Near Threatened
<i>Habenaria mossii</i>	Wild orchids	Open grassland on dolomite or in black, sandy soil.	Unlikely	Endangered
<i>Holothrix micrantha</i>		Grassy cliffs, 1500-1800 m.	Unlikely	Critically Endangered (Possibly Extinct)
<i>Holothrix randii</i>	Tassel Orchid	Grassy slopes and rock ledges, usually southern aspects.	Unlikely	Near Threatened
<i>Khadia beswickii</i>		Open shallow soil over rocks in grassland.	Unlikely	Vulnerable
<i>Pearsonia bracteata</i>		Plateau grassland.	Unlikely	Near Threatened
<i>Podranea ricasoliana</i>	Pink Trumpet Vine	Within the Watercourse habitat area	SITED	Vulnerable

SCIENTIFIC NAME	COMMON NAME	SUITABLE HABITAT	LIKELIHOOD OF OCCURRENCE	SANBI CONSERVATION STATUS
<i>Stenostelma umbelliferum</i>		Deep black turf in open woodland mainly in the vicinity of drainage lines.	Unlikely	Near Threatened

5.1.3 Protected Species

The relevant Gauteng Conservation Plan (GDARD, 2014) and the Transvaal Nature Ordinance (No. 12 of 1983) (TNO), as well as the amended listed of protected species promulgated under the National Forest Act (Act no. 84 of 1998) (NFA) were reviewed to ascertain which protected species were identified within the study area. The tampering with, or removal of, protected species will require a permit to do so from the Department of Fisheries and Forestry (DAFF), as well as consultation with the provincial environmental departments.

It must be noted from the onset that the majority of the protected species that were identified within the study area were situated within urban gardens, pot plants or were planted within the respective habitat units. However, although this is the case their presence must be noted and for those species that have been physically planted within the study, the relevant permits will need to be obtained from DAFF for the relocation of the protected species. This will not be required for the pot plants, which can be relocated without the use of intrusive means and thus will not be disturbed.

During the field survey, of the eighty-one (81) species recorded, only six (6) species were endemic and of these total species found there were four (4) provincially protected species within the study area. These protected species include: *Agapanthus praecox* (Blue Lily), *Aloe marlothii* (Cape Aloe), *Dietes grandiflora* (Fortnight Lily) and *Zantedeschia aethiopica* (L.) Spreng. (White arum Lily), each at and around the respective coordinates (**Table 8**). This can be attributed to the abundance of gardens and pot plants in the site.

In addition, two (2) SANBI vulnerable species sited and four (4) provincially protected species as listed in the Transvaal Nature Ordinance (No. 12 of 1983) were recorded within the study area. However, these species are noted as species that are commonly occurring garden species that have been used for landscaping purposes, and thus do not represent the natural condition of the habitat units. For this reason, these species, which were artificially transplanted, were not considered in the EIS calculations as they are representative of the perceived natural condition of the habitat unit.

Table 6: Presentation of the nationally and provincially protected floral species recorded within the study area.

SCIENTIFIC NAME	COMMON NAME	LOCALITY	General Coordinates
PROVINCIALY PROTECTED SPECIES			
<i>Agapanthus praecox</i>	Blue Lily	Within the Disturbed habitat area- Urban garden	26° 5'31.88" S 28° 2'39.44" E

<i>Aloe marlothii</i>	Cape Aloe	Within the Disturbed habitat area- Pot plant	26° 5'31.86" S 28° 2'39.43" E
<i>Dietes grandiflora</i>	Fortnight Lily	Within the Watercourse habitat area	26° 5'31.94" S 28° 2'39.12" E
<i>Zantedeschia aethiopica (L.) Spreng</i>	White Arum Lily	Within the Watercourse habitat area	26° 5'32.17" S 28° 2'39.45" E

5.2 FAUNAL INVESTIGATION

To ensure consistency, the habitat units that were described under the floral investigation section, namely: 1) Watercourse and 2) Disturbed Area, were used as potential faunal habitats. It must be noted that as a result of the study area being situated within an urban area, trapping was not possible with fear of capturing urban pets. Thus, in adopting a precautionary approach to this faunal assessment, a detailed desktop study of the avifaunal, mammalia and herpetofaunal species was conducted to ascertain what species have the potential to be sited within the study area. Although no faunal species were identified onsite during the once-off field survey, cognisance of these species identified at a desktop level must be had within the study area. The sections to follow will describe the faunal environment within the study area in terms of species occurrence and potential for SCC to be found within the area. Detailed species lists and their respective conservation statuses are presented under the appendices.

5.2.1 Avifauna

During the field survey a total of nineteen (19) avifaunal species were recorded in and directly surrounding the study area. According to the Southern Africa Bird Atlas Project 2 (SABAP2), approximately 270 species have been sited within Quarter Degree Square (QDS) 2628 AA as presented within the Gauteng Pentad 2605_2800 (SABAP2, 2020). These species thus have the potential to occur within the study area in the near future. The full list of species is presented under the Appendices.

Out of the 270 avifaunal species that have the potential to be recorded within the study area (SABAP2, 2020), one (1) was recorded to be Endangered, namely *Gyps coprotheres* (Cape Vulture), and six (6) Vulnerable and two (2) Near Threatened species. A review of the species list obtained from the SABAP2 (2020) in terms of the SANBI red list categorised resulted in the SABAP2 (2020) list containing three (3) Vulnerable species and six (6) Near Threatened species. Five (5) of the avifaunal species that have been identified within the Gauteng Pentad 2605_2800 are listed as provincially protected within the Gauteng Conservation Plan (GDARD, 2014). However, none of these species were recorded onsite during the site assessment.

5.2.2 Mammals

Subsequent to conducting a literature review and desktop study of the study area, it was observed that sixteen (16) mammal species have the potential to occur within QDS 2628AA, but none of these species were observed within the study area during the site assessment. From the desktop list of species that could occur within the study area, one (1) species was noted as Near Threatened, the *Hydricotis maculicollis* and was also considered a SCC under the IUCN Red List (IUCN, 2020; Reed-Smith, 2015) and in terms of the SANBI red list this species was also classified as Vulnerable (EWT, 2020).

5.2.3 Herpetofauna

Using the FitzPatrick Institute of African Ornithology Reptile Database in combination with the South African Reptile Conservation Assessment (SARCA) it was determined that a total of twenty (22) reptile species have the potential to occur within the QDS 2628AA. However, none of these species were observed during the site assessment.

Subsequent to a review of the Frog Atlas of Southern Africa in combination with information sources obtained during a detailed literature and desktop study, it was evident that a total of thirteen (13) amphibious species had the potential to occur within QDS 2628AA. However, none of these species were identified within the study area during the site assessment. The provincially Near Threatened *Pyxicephalus adsperus* or Giant Bullfrog (FrogMap, 2020), was the only SCC that has the potential to be sighted within the study area with all of the species within the QDS 2628AA being globally categorised as Least Threatened (IUCN Red List, 2020). The Giant Bullfrog is a rare find within the field, as it typically remains covered under moist soil until the heavy storms arrive in the rainy season when they emerge. Although not sighted, cognisance of this species within the study area must be had, specifically within shallow pools.

5.3 ECOLOGICAL SENSITIVITY ASSESSMENT

The following section describes the criteria that were used to determine the sensitivity of the various sections within the study area, which are presented in **Table 10** and **Figure 14**.

5.3.1 Ecological Importance and Sensitivity

The study area was assessed in terms of Ecological Importance and Sensitivity (EIS) at a regional and local scale. The following section presents an amalgamation of the site-specific sensitive areas that were observed and recorded during the field survey, as well as the sensitivity data (e.g. CBAs, NFEPAs, vegetation unit threatened status) that was analysed during the desktop assessment. Importance of the various ecosystems and the sensitivity of said ecosystems to the study area was categorised as follows (**Table 7**). This assessment considered the current state of the habitat unit and the potential to rehabilitate it to near natural condition.

Table 7: Presentation of the categorises of Ecological Sensitivity and Importance, as well as a description of each.

EIS CATEGORY	DESCRIPTION
High	Areas within the study area that were recorded to be dominated by natural vegetation and thus habitats, which are regarded as important to maintain the biodiversity at a regional scale. Planning units that were recorded to be CBAs and are still considered natural and thus have the potential to supply valuable ecosystem services to the surrounding biological environment, or systems of high importance and functionality which are essential to maintain the integrity of downstream habitats and providing conservation corridors within the region. Destruction of these habitats may result in the regional loss of biodiversity.
Medium	Areas that were observed to be, or have the potential to supply ecosystem services to a moderate degree and be of medium ecological importance. These habitats contain secondary vegetation and are considered to be semi-natural, and thus may contain several alien plants species within them. The area may have a low ecological conservation importance, however if relevant mitigation and rehabilitation measures are implemented these areas have the potential to be improved to a condition that may be able provide ecosystem functionality to a moderate degree. Destruction of these habitats may lead to a loss of biodiversity at a regional scale.
Low	These areas were recorded to be of low ecological function and/or conservation importance as a result of the high level of transformation and/or degradation from the surrounding anthropogenic and/or environmental pressures.

5.3.2 Ecological Functionality and Conservation Importance

The following will explain the difference between ecological functionality and conservation importance.

Ecological Functionality

Definition: The intactness of the structure and the overall functionality of the vegetation community, which has the ability to support faunal communities. This includes the level of ecological connectivity of the habitat or system to the surrounding ecosystems, or the ability of the habitat/system to provide a conservation corridor. The ecological functionality of each of the identified ecosystems, which fed into the overall determination of the ecological sensitivity mapping illustrated in the following section, was categorised as follows (**Table 8**).

Table 8: Presentation of the categories of ecological functionality, as well as a description of each.

FUNCTIONALITY CATEGORY	DESCRIPTION
High	Predominantly natural areas that are observed to have undergone little to no disturbance by the surrounding land-use practices are assumed to have intact ecosystem functions, which have the potential to maintain the condition of the ecosystem. These areas generally provide good connectivity to the surrounding ecosystems and contain unique niche habitats for faunal species. Therefore, are considered to supply a high level of ecosystem services.
Medium	Areas that contain moderately disturbed, or degraded habitats that are considered to offer ecological connectivity to a moderate degree. Although moderately disturbed, these habitats generally provide refugia to faunal species.
Low	Very disturbed or degraded area that contain habitats with little or no ecological functionality.

Conservation Importance

Definition: The overall importance of an area is determined by analysing its importance on a national, regional and provincial scale to give an indication of the necessity to conserve the area. Although the conservation importance is largely based on the presence of rare, threatened or endemic species, SCC, protected species and threatened ecosystems the present ecological state of the area (i.e. pristine or degraded) will also influence the overall conservation importance. The conservation importance of each ecosystem, which fed into the overall determination of the ecological sensitivity mapping illustrated in the following section, was categorised as follows (Table 9).

Table 9: Presentation of the conservation importance categorise, as well as a general description of each.

IMPORTANCE CATEGORY	DESCRIPTION
High	Habitats with high species diversity which are generally recorded to provide suitable refugia for SCC or may contain habitats that are representative of a threatened ecosystem. These areas should be avoided by development, maintained and if possible rehabilitated to maintain or improve the biodiversity within the region.
Medium	Habitats that exhibit a moderate species diversity with no SCC identified within them, however have the potential to provide some degree of refugia to SCC.
Low	Habitats with little or no conservation potential which generally exhibit a low species diversity as a result of the high level of disturbance or degradation that has occurred within it.

5.3.3 Sensitivity Statement

Utilising the results of the desktop study and in-field floral and faunal surveys and implementing the criteria presented within **Tables 7 to 9**, the overall ecological sensitivity of the habitat units delineated within the study were determined. **Table 10** below presents the relevant scores allocated to each category (i.e. Ecological Importance and Sensitivity (EIS), Ecological Functionality (EF) and Ecological Conservation Importance (ECI)) for each habitat unit and **Figure 14** illustrates the results visually. It is evident that the Watercourse habitat unit was determined to be of a high sensitivity in the broader environment with the surrounding Disturbed Area habitat being of low sensitivity.

Table 10: Presentation of the overall sensitivity of the relevant habitat units within the study area.

HABITAT UNITS	DISTURBED AREA	WATERCOURSE
EIS	LOW	MOD
EF	LOW	HIGH
ECI	LOW	MOD
OVERALL	LOW	HIGH

KEY: EIS- Ecological Importance and Sensitivity, EF- Ecological Functionality and ESI- Ecological Conservation Importance.

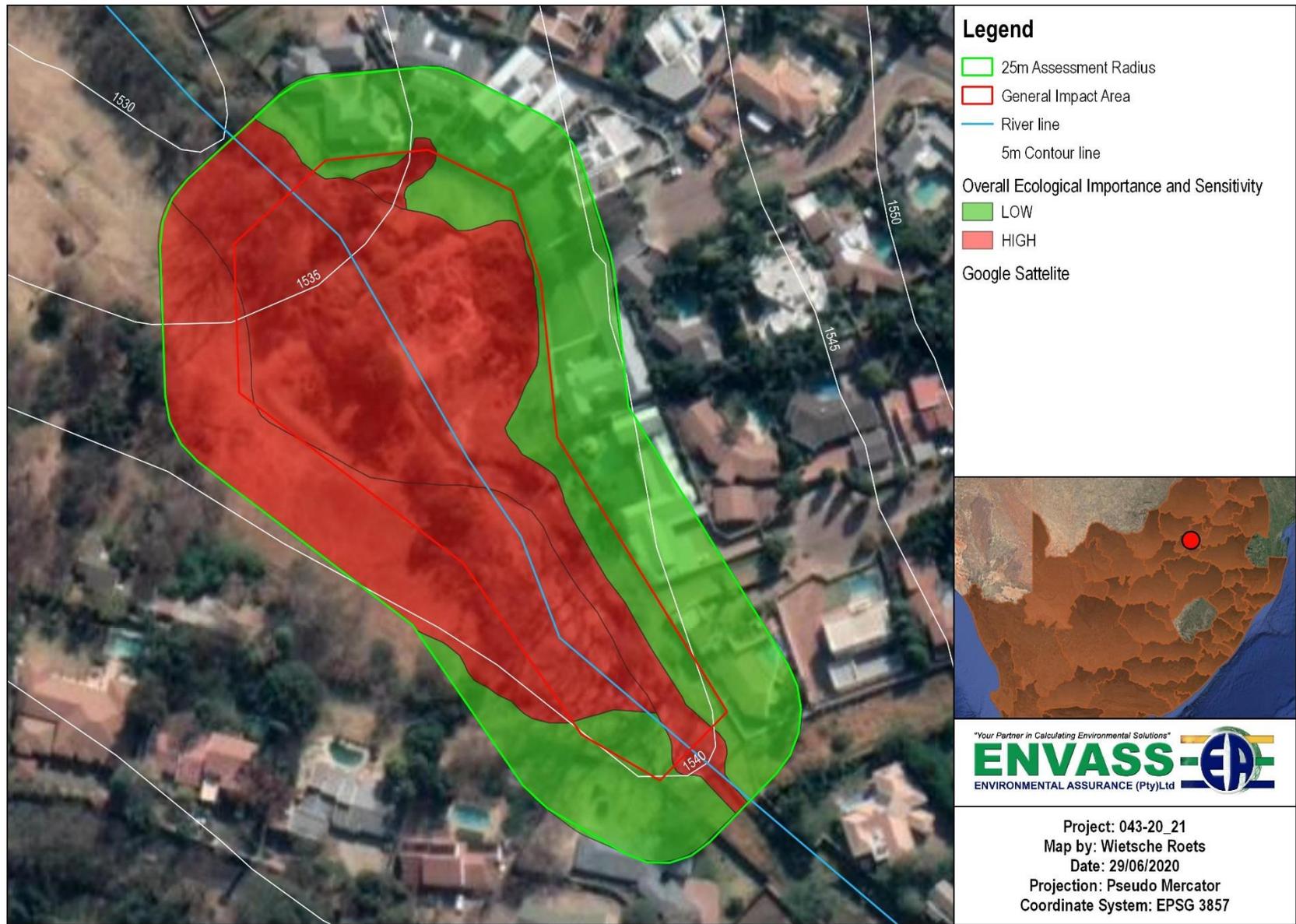


Figure 14: Illustration of the overall ecological sensitivity and importance of the study area.

5.3.4 Impact Assessment

The perceived impacts associated with the proposed development were assessed using a quantitative impact assessment methodology, which was formalised to comply with Regulation 31(2)(l) of the NEMA (Act no. 107 of 1998). The aim of this assessment was to identify and assess the significance of all the perceived impacts, which may arise as a result of the proposed development. The methodology employed makes use of the following procedure:

1. Identification and assessment of potential impacts;
2. Prediction of the nature, duration, extent, likelihood and significance;
3. Identification of mitigation measures that could be implemented to reduce the significance of the potential impact;
and
4. Evaluation of the significance of the potential impacts following the implementation of mitigation measures.

Potential impacts will be assessed using the following factors and associated score ratings (**Table 11**).

Table 11: Table outlining the various factors considered when determining the significance of each potential impact associated with the proposed development.

CRITERIA	INDICATOR
The nature	A description of what causes the effect, what will be affected and how it will be affected.
The physical extent (spatial scale)	Wherein it is indicated whether:
	1 The impact will be limited to the site
	2 The impact will be limited to the local area
	3 The impact will be limited to the region
	4 The impact will be national
	5 The impact will be international
The duration (temporal scale)	Wherein it is indicated whether the lifetime of the impact will be of:
	1 A very short duration (0–1 years)
	2 A short duration (2-5 years)
	3 Medium-term (5–15 years)
	4 Long term (> 15 years)
	5 Permanent

CRITERIA	INDICATOR												
<p>The intensity/magnitude of the impact on ecological processes (severity)</p>	<p>Impacts quantified on a scale from 0-10, where a score is assigned:</p> <table border="1" data-bbox="751 353 1434 813"> <tr> <td>0</td> <td>Small and will have no effect on the environment</td> </tr> <tr> <td>2</td> <td>Minor and will not result in an impact on processes</td> </tr> <tr> <td>4</td> <td>Low and will cause a slight impact on processes</td> </tr> <tr> <td>6</td> <td>Moderate and will result in processes continuing but in a modified way</td> </tr> <tr> <td>8</td> <td>High (processes are altered to the extent that they temporarily cease)</td> </tr> <tr> <td>10</td> <td>Very high and results in complete destruction of patterns and permanent cessation of processes</td> </tr> </table>	0	Small and will have no effect on the environment	2	Minor and will not result in an impact on processes	4	Low and will cause a slight impact on processes	6	Moderate and will result in processes continuing but in a modified way	8	High (processes are altered to the extent that they temporarily cease)	10	Very high and results in complete destruction of patterns and permanent cessation of processes
0	Small and will have no effect on the environment												
2	Minor and will not result in an impact on processes												
4	Low and will cause a slight impact on processes												
6	Moderate and will result in processes continuing but in a modified way												
8	High (processes are altered to the extent that they temporarily cease)												
10	Very high and results in complete destruction of patterns and permanent cessation of processes												
<p>The probability of occurrence/likelihood of the impact (Likelihood of occurring)</p>	<p>Probability is estimated on a scale where:</p> <table border="1" data-bbox="751 893 1434 1128"> <tr> <td>1</td> <td>Very improbable (probably will not happen)</td> </tr> <tr> <td>2</td> <td>Improbable (some possibility, but low likelihood)</td> </tr> <tr> <td>3</td> <td>Probable (distinct possibility)</td> </tr> <tr> <td>4</td> <td>Highly probable (most likely)</td> </tr> <tr> <td>5</td> <td>Definite (impact will occur regardless of any prevention measures)</td> </tr> </table>	1	Very improbable (probably will not happen)	2	Improbable (some possibility, but low likelihood)	3	Probable (distinct possibility)	4	Highly probable (most likely)	5	Definite (impact will occur regardless of any prevention measures)		
1	Very improbable (probably will not happen)												
2	Improbable (some possibility, but low likelihood)												
3	Probable (distinct possibility)												
4	Highly probable (most likely)												
5	Definite (impact will occur regardless of any prevention measures)												

Subsequent to the abovementioned factors being ranked for each potential impact, the ecological significance of each impact was calculated utilising the following formulae:

Significance = (Intensity + Duration + Extent) x Probability. The maximum value is 100 Significance Points.

- The significance, which is determined through a synthesis of the characteristics described above and can be assessed as low, medium or high;
- The status, which is described as either positive, negative or neutral;
- The degree to which the impact can be reversed;
- The degree to which the impact may cause irreplaceable loss of resources;
- The degree to which the impact can be mitigated;

The significance weightings for each potential impact are outlined in **Table 12**.

Table 12: Table illustrating the significance weighting that can be allocated to each impact significance score.

SIGNIFICANCE VALUE	SIGNIFICANCE WEIGHTING	DESCRIPTION
< 30	Low	This impact has a Low ecological significance, and does not impact on the decision to develop within the area
31-60	Medium	Where the impact could influence the decision to develop in the area unless it is effectively mitigated
> 60	High	Where the impact must have an influence on the decision process to develop in the area

Table 13 below presents the perceived impacts associated with the proposed development, as well as the mitigation measures that must be implemented to reduce their impact significance on the receiving terrestrial environment.

Table 13: Impact assessment of the proposed development on the receiving terrestrial floral and faunal environment.

POTENTIAL IMPACT	SIGNIFICANCE RATING OF IMPACTS PRIOR TO MITIGATION		PROPOSED MITIGATION	SIGNIFICANCE RATING OF IMPACTS AFTER MITIGATION	
<p>Direct construction phase impact: Loss of approximately 9 843 m² of vegetation and faunal habitats (e.g. nests) within the direct footprint of the proposed development.</p>	Duration	1	<ul style="list-style-type: none"> - A preconstruction walk-through of the proposed development site should be conducted by a suitably qualified botanist to identify any SCC and TOPS that may have established on-site. These species should be rescued and relocated to suitable undisturbed habitats directly adjacent to the rescue site. - All protected lily species situated within the disturbance footprint should be relocated to the instream environment further downstream until construction is completed. These species should then be relocated to their original positions (if possible) to encourage the proliferation of aquatic plant species and to attract faunal species back to the site. - Investigation into a floating reed bed within the dam post-construction should be done. This will encourage recolonization of aquatic avian species and provide ESS to the environment. - To compensate for the direct loss of vegetation in the footprint of the proposed development, IAPS control and management should be conducted on the remaining extent of the site. An IAPS control and management plan should be drafted by a suitably qualified botanist to guide the control and maintenance of the IAPS species within these property boundaries. This will improve the biodiversity and species composition within the study area. - All disturbed areas surrounding the direct footprint of the proposed development should be landscaped, tilled and revegetated with a mixture of indigenous grass species specific to the Egoli Granite Grassland unit post-construction. It will be the responsibility of the property manager to manage these rehabilitated areas until successful establishment is evident. This is to be determined by a suitably qualified botanist or horticulturalist. - The landscaping of the post-development environment should involve the planting of indigenous woody tree species along the perimeter of the proposed development boundary to replace the large woody tree species that may be lost. These species should include species representative of the perceived natural vegetation type such 	Duration	1
	Extent	1		Extent	1
	Probability	5		Probability	4
	Intensity	8		Intensity	4
	Significance rating	<p>50 (Medium)</p>		Significance rating	<p>24 (Low)</p>

POTENTIAL IMPACT	SIGNIFICANCE RATING OF IMPACTS PRIOR TO MITIGATION		PROPOSED MITIGATION	SIGNIFICANCE RATING OF IMPACTS AFTER MITIGATION	
			<p>as <i>Senegalia caffra</i> and <i>Rhus pyrioides</i> or alternatively <i>Albizia sp.</i> that provide good shade.</p> <ul style="list-style-type: none"> - Plugs of hydrophilic plant species should be relocated to the area surrounding the dam site to encourage the regrowth and establishment of the aquatic vegetation species. - Infill with a fertile topsoil layer around the disturbed areas will be essential for the success of post-construction landscaping efforts. - Artificial bird houses positioned within the study area should be placed there post-construction to encourage the recolonization of the area. 		
Direct construction phase impact: Construction within a conservation planning unit classified as an Important Area	Duration	1	<ul style="list-style-type: none"> - The construction of the proposed development within an Important Area must be discussed with the City of Johannesburg Municipality and DEA prior to the EIA process continuing to avoid unnecessary cost to client. - If approval to constructed within the conservation planning unit is granted from the relevant authority, adequate remediation of the area lost in the form of rehabilitation must be conducted concurrently with the construction phase activities. - Rehabilitation should be commenced with local indigenous species and the IAPS control and management should be conducted during construction as to remove pioneer species and IAPS. 	Duration	1
	Extent	1		Extent	1
	Probability	5		Probability	2
	Intensity	8		Intensity	4
	Significance rating	50 (Medium)		Significance rating	12 (Low)
Direct construction and operational phase impact: Fragmentation of the ecosystems and faunal habitats.	Duration	5	<ul style="list-style-type: none"> - The surrounding area should be landscaped and revegetated to increase the surface area of natural habitat available for fauna and flora to inhabit post-construction. - The ecological importance provided by the current connectivity to downstream systems should be reinstated and improved on post-construction by planting a mosaic of indigenous woody and herbaceous species around the perimeter of the disturbed area. - Erosion control should be implemented and managed to ensure that the current erosional features do not proliferate downstream as a result of altered base levels. - Where possible, unnecessary paving of terrestrial land should be avoided. 	Duration	1
	Extent	1		Extent	1
	Probability	4		Probability	3
	Intensity	8		Intensity	4
	Significance rating	56 (Medium)		Significance rating	18 (Low)

POTENTIAL IMPACT	SIGNIFICANCE RATING OF IMPACTS PRIOR TO MITIGATION		PROPOSED MITIGATION	SIGNIFICANCE RATING OF IMPACTS AFTER MITIGATION	
Indirect construction phase impact: Encroachment of IAPS into disturbed areas (clearing and excavation points) will result in changes to the vegetation composition and loss of natural biodiversity.	Duration	2	- An IAPS control and management plan should be developed for the site in accordance with the Alien and Invasive Lists (DEA, 2016). This should be implemented during and post-construction until the site is clear of all IAPS. Thereafter, the site should be monitored for presence of IAPS. - Control methods may include the removal and control of IAPS using the following: <ul style="list-style-type: none"> • Mechanical: Physical removal through various means (i.e. uprooting, felling, slashing, mowing, ring barking or bark stripping). • Chemical: The use of registered herbicides, only as a last resort and must be approved by the site ECO in consultation with a suitably qualified botanist. • Biological: The introduction of natural enemies to reduce the potential reproductive rate- not recommended. - IAPS must be regularly monitored (1-month, 2-month, 3-month, 6-month, 1-year and 2-year intervals) as they propagate quickly. - Should IAPS be found, this needs to either be removed physically or reported to the site manager or ECO as soon as it is found. - The proliferation of invasive tree species i.e. <i>Acacia mearnsii</i> (Black Wattle) must be clear-felled and the stumps treated to inhibit growth. - Following construction of the proposed development, approved indigenous vegetation must be planted in disturbed areas.	Duration	1
	Extent	2		Extent	1
	Probability	4		Probability	2
	Intensity	6		Intensity	2
	Significance rating	40 (Medium)		Significance rating	8 (Low)
Direct construction phase impact: Loss of SCC, TOPS and culturally/medical significant plant species.	Duration	1	- A thorough walkthrough of the study area must be conducted by a suitably qualified botanist whom must be accompanied by the site ECO prior to the construction phase commencing. All TOPS, SCC and/or medically significant floral species must be identified, marked and rescue and relocation planned. - If protected species are found within the disturbance footprint directly prior to construction taking place, the relevant permits for the disturbance and relocation of these species must be obtained from DAFF prior to relocation. - No plant species must be removed or cut unless certain they are not SCC, or TOPS.	Duration	1
	Extent	1		Extent	1
	Probability	4		Probability	2
	Intensity	6		Intensity	2
	Significance rating	32 (Medium)		Significance rating	8 (Low)

POTENTIAL IMPACT	SIGNIFICANCE RATING OF IMPACTS PRIOR TO MITIGATION		PROPOSED MITIGATION	SIGNIFICANCE RATING OF IMPACTS AFTER MITIGATION	
			<ul style="list-style-type: none"> - Potted plants in the disturbed area should be moved prior to commencement of activities. - Plant species that are SCC or TOPS must be reported to an ECO as soon as they are identified. - Possibly translocate plant species that are of economic or cultural value to the local community. - Vegetation clearing may only take place within the development footprint. Where possible, limited clearing must take place within the medium and high sensitivity vegetation units. - If any SCC or TOPS are identified within the proposed footprint, effective transplantation of them must be undertaken by a qualified botanist and ECO. 		
<p>Indirect operational phase impact: Pollution of the surrounding environment and unauthorised harvesting of floral species by personnel associated with the proposed development.</p>	Duration	2	<ul style="list-style-type: none"> - Security guards should be post at the proposed development site to protect the infrastructure, as well as to ward off unauthorised personnel from the surrounding environment and enforce the prohibition of litter and harvesting of floral species. - All waste skips on-site must be covered to avoid littering entering the surrounding environment through wind dispersion. - Municipal waste collection from the site must be conducted weekly to reduce the risk of litter travelling from site into the surrounding environment. 	Duration	1
Extent	2	Extent		1	
Probability	3	Probability		2	
Intensity	4	Intensity		2	
Significance rating	24 (Low)	Significance rating		8 (Low)	

5.3.4.1 Terrestrial Impact Statement

Based on the overall estimated disturbance footprint provided to ENVASS by the design engineer, the proposed development may result in the direct disturbance of approximately 0.98 ha of terrestrial habitat, including the Watercourse and the Disturbed Area habitat units, which considered the landscaping of gardens and fencing. The proposed development will involve *inter alia* the clearing of terrestrial vegetation within the footprint and an estimated 15 m working corridor around it, cut and fill of an unexcavated slope, construction of hardened surfaces and subsequent use of infrastructure by new purpose-driven human personnel. Based on the above, the following activities were determined to have the highest impact significance; 1) Direct loss of floral and faunal ecological value within a biodiversity conservation planning unit classified as an Important Area and Ecological Support Area, 2) Ecosystem fragmentation and 3) the indirect encroachment by opportunistic weeds, pioneer species and IAPS.

All of the abovementioned impacts can be mitigated to a Low impact significance rating by strictly implementing and subsequently monitoring the mitigation and/or rehabilitation measures presented in **Table 13** above and **Section 6** below. As the proposed development footprint is in an already severely altered environment, and the proposed development will in essence improve the overall ecological functionality and thus value of the at-risk terrestrial environment, the proposed development can be considered a positive alteration to a largely urban environment. This is however on the condition that all mitigation and concurrent rehabilitation of the disturbed area takes place. This rehabilitation process should be guided by the Environmental Management Programme (EMPr) and detailed Rehabilitation and Landscaping Plan, which should be drafted on the Final Design and associated Construction Method Statement document.

It will also be imperative that a detailed IAPS Control and Management Programme be drafted by a suitably qualified botanist for the relevant properties. This programme must be approved by the relevant authorities associated with the City of Johannesburg Municipality, as the unattended proliferation of IAPS within the Gauteng C-Plan has the potential to impact on the biodiversity value of the open space. Subsequent implementation of the aforementioned programme must be conducted by an IAPS/Weed Control contractor, whom should have a minimum of two years' experience in clearing IAPS from grassland and watercourse habitat types. The contractor should be registered as a pest control operator in terms of Section 10 of the Fertilizers, Farm Feeds, Agricultural Remedies and Stock Remedies Act (Act no. 36 of 1947), as amended in GN no. R1449 of 1 July 1983.

6 MITIGATION AND/OR REHABILITATION STRATEGY

The NEMA (Act no 107 of 1998), specifies the following under Chapter 1, Section 2(4) regarding sustainable development and the management of sensitive ecosystems:

(a), "Sustainable development requires the consideration of all relevant factors including the following:

- (i) That the disturbance of ecosystems and loss of biological diversity are avoided, or, where they cannot be altogether avoided, are minimised and remedied;
- (ii) that pollution and degradation of the environment are avoided, or, where they cannot be altogether avoided, are minimised and remedied;
- (vi) that the development, use and exploitation of renewable resources and the ecosystems of which they are part do not exceed the level beyond which their integrity is jeopardised;
- (vii) that a risk-averse and cautious approach is applied, which takes into account the limits of current knowledge about the consequences of decisions and actions; and
- (viii) That negative impacts on the environment and on people's environmental rights be anticipated and prevented, and where they cannot be altogether prevented, are minimised and remedied."

(r) Sensitive, vulnerable, highly dynamic or stressed ecosystems, such as coastal shores, estuaries, wetlands, and similar systems require specific attention in management and planning procedures, especially where they are subject to significant human resource usage and development pressure.

Therefore, to encourage the above to become a reality the precautionary principle was applied within this study to ensure that cost-effective measures are implemented to proactively prevent degradation of the region's water resources and terrestrial biodiversity and the social systems that depend on these ecosystems and habitats. To further guide the preservation of the terrestrial habitats within the study area, the mitigation hierarchy was applied (**Figure 15**). Its application is intended to strive to first avoid disturbance of ecosystems and loss of biodiversity, and where this cannot be avoided altogether, to minimise, rehabilitate, and then finally offset any remaining significant residual negative impacts on biodiversity (DEA, 2013). **With regard to the proposed development, all disturbance must be rehabilitated and stringent IAPS control and maintenance conducted on the impacted land habitat units. The IAPS control efforts must be monitored by a suitably qualified botanist and progress reported to the competent authority on a quarterly basis.**

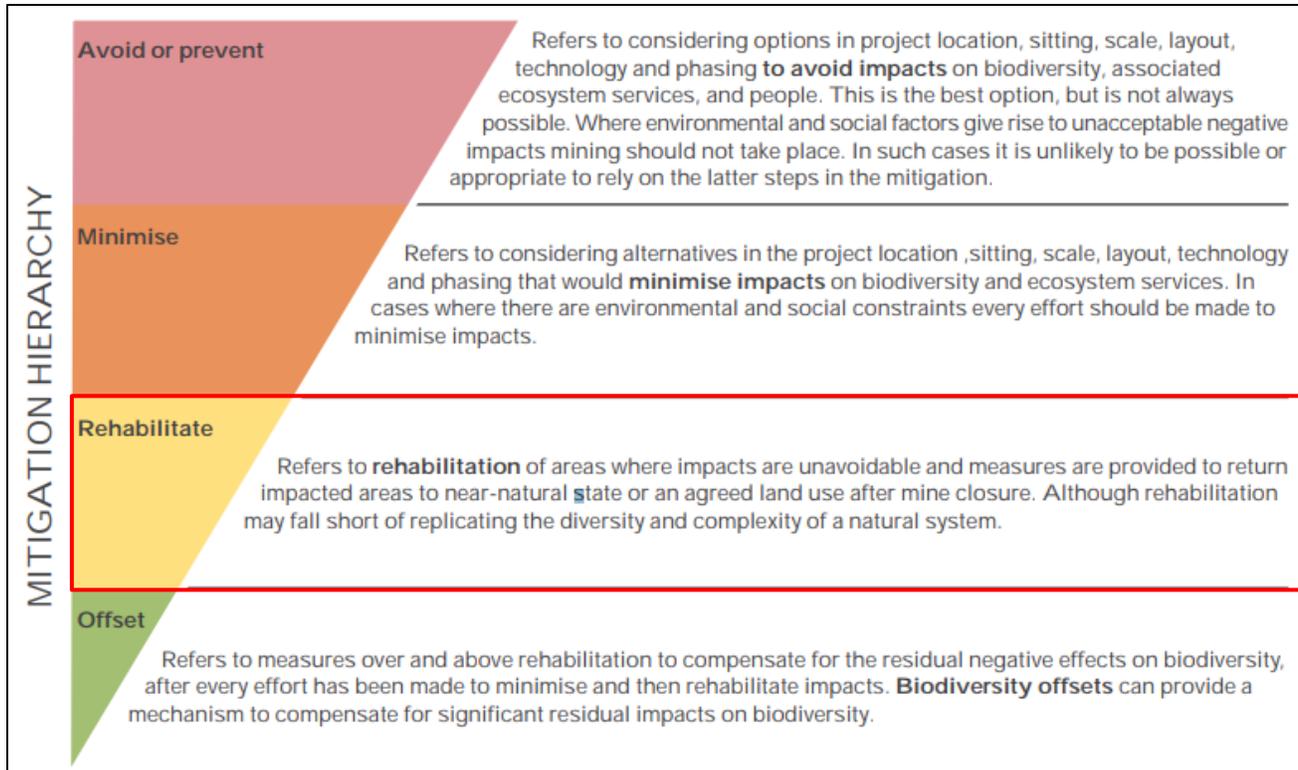


Figure 15: The mitigation hierarchy for dealing with negative impacts on biodiversity (DEA, 2013).

The following sections will present the recommended mitigation and/or rehabilitation measures that must be included in the project-specific EMP document and may be considered by the DWS and GDARD case officers for inclusion in the project WULA and EA.

6.1 Design Phase

Development Layout

- Grassland and woody floral species that are characteristic of the Egoli Granite Grassland vegetation unit should be incorporated into the landscaping of the site. Poaceae species such as *Themeda triandra*, *Eragrostis curvula*, *Aristida canescens* and *Aristida congesta* are preferred. Woody species such as *Albizia adianthifolia*, *Senegalia caffra* and *Rhus pyroides* are preferred in the full sun grassland environment.
- A floating march within the final proposed development landscape should be investigated. This will provide valuable ESSs to the surrounding environment and encourage faunal species to recolonize the site.
- The site camp must be positioned within a bunded concreted, or previously disturbed area to avoid further disturbance to the receiving environment.

- The site access road must, as far as reasonably possible, avoid all floral species and watercourses. It is advised that access off Muscovy Road be investigated, as this will be the most direct and least invasive route into the site.

6.2 Construction Phase

General

- Construction must take place within the dry season (i.e. April to mid-September) to reduce the risk of erosion and sedimentation of the downstream systems during construction.
- A chronological plan of construction must be developed:
 - Construction must be immediately followed by rehabilitation;
 - Excavation of any soils in the watercourses must be done to allow the storage of soil in sequence;
 - Soil replacement must be conducted in same sequence as excavated;
 - Soil surfaces must not be left open for lengthy periods to prevent erosion;
 - Affected surface vegetation must be removed, appropriately stored then reinstated, concurrently with construction, as close to their original position as possible, to reduce the possibility of longer-term change to the vegetation community. The vegetation must be removed keeping the root systems intact as far as possible;
 - If required vegetation plugs can be sorted from areas adjacent to the construction site, under the supervision of a suitably qualified ECO.
- Environmental inductions and training must include the contents of the above construction method statement.
- In area where vegetation clearing may take place, any SCC and TOPS, which are recorded during a preconstruction walkthrough must be safely transplanted, and maintained unto establishment, to an undisturbed area directly adjacent to the rescue site concurrently with construction. An independent botanist must be consulted during this process.
- Excess dust observed in the vicinity of the proposed development must be noted and the appropriate dust suppression techniques implemented to ensure no excess sediment input into the surrounding freshwater resources.
- Cut and fill must be avoided where possible during the set-up of the construction site camp. The utilisation of already heavily disturbed areas should be encouraged.
- Removal of vegetation must only be done when essential for the construction of the proposed development. Do not allow any disturbance to the adjoining natural vegetation cover or soils. All disturbed areas must be prepared and then revegetated to the satisfaction of the ECO as per the relevant EMPr to be composed.
- All potential contaminants / hazardous materials must be bunded in the site camp to prevent runoff into the surrounding environment. A drainage system must be established for the construction camp. The drainage system must be regularly checked to ensure an unobstructed water flow. Establish cut-off drains and berms to reduce stormwater flow through the construction site. The contractor must prepare a SWMP (which may form part of the construction method statement)

to ensure that all construction activities do not cause, or precipitate, soil erosion sediment which may result in sediment input into the surrounding environment. The designated responsible person on site, as indicated in the SWMP (usually the contractor/ECO) must ensure that no construction work takes place before the stormwater control measures are in place and must include post-construction/operational/rehabilitation phase stormwater requirements.

- No contaminated runoff or grey water is allowed to be discharged from the construction site camp.
- All exposed surfaces within the construction site camp must be checked for IAPS monthly and any identified IAPS must be removed by hand pulling/uprooting and appropriately disposed of. Herbicides should **only** be utilised where manually removing is not possible. Herbicides utilised are restricted to products which have been certified safe for use in watercourse areas by an independent testing authority. The ECO must be consulted before the purchase of any herbicide.
- None of the open areas or the surrounding environment may be used as ablution facilities.

Site-specific

- The indigenous woody species present on site that can be avoided and incorporated into the final landscape should be preserved during the construction phase.
- All woody trees species that are not IAPS (i.e. the *Celtis africana* spp.) should (as far as mechanically possible) be uprooted and utilised during the landscaping of the site, or transplanted into an undisturbed area directly adjacent to the proposed development. The uprooted trees should be immediately transplanted into the relevant areas on-site to improve the chances of successful transplantation.
- The SCC such as the Pink Trumpet Vine (*Podranea ricasoliana*) is to be relocated as it is classified as a Vulnerable species.
- The topsoil inclusive of the grassland plant species should be stripped and stored in a bunded area directly adjacent to the construction site prior to excavation taking place. This material may then be utilised during the rehabilitation phase applicable to the project, however all IAPS should be removed from the topsoil prior to reuse to avoid reestablishment of IAPS.
- No access to the delineated watercourses and their associated buffer zones must be permitted (ENVAS, 2020).
- During the construction phase, sand bags or sediment traps must be placed at 5m intervals downslope of excavations to reduce the risk of erosion sediment being transported in solution downgradient and into the downstream watercourses.
- All disturbed areas, specifically slopes, must be landscaped to near-nature profile, tilled and revegetation with a mixture of indigenous grassland species concurrently with construction activities. Indigenous woody species must then be planted to form a mosaic of woody vegetation.

6.3 Rehabilitation Phase

- Rehabilitation is not the static endpoint of a recipe-like process (Kusler & Kentula, 1990). Rather, it is a process in its own right, whereby the system is given an opportunity for a new beginning (Grenfell *et al.*, 2007).
- Rehabilitation requires that there is an attempt to imitate natural processes and reinstate natural ecological driving forces in such a way that it aids the recovery (or maintenance) of dynamic systems so that, although they are unlikely to be identical to their natural counterparts, they will be comparable in critical ways so as to function similarly (Jordan *et al.*, 1987).
- It must be recognised that rehabilitation interventions may have different ecological starting points (ranging from totally degraded to slightly degraded) and different goal endpoints (ranging from a state that is close to the pristine to one which is still far from pristine, but nonetheless an improvement on the state of the system without any rehabilitation intervention). The chosen goal endpoint depends on what is achievable, given the site conditions, and those ecosystem attributes and services that are considered most important. Any rehabilitation project should therefore be based on an understanding of both the ecological starting point and on a defined goal endpoint, and should accept that it is not possible to predict exactly how the system is likely to respond to the rehabilitation interventions.
- It is the responsibility of the developer to appoint a suitably experienced rehabilitation specialist to implement an approved Rehabilitation Plan. The specialist must have a sound knowledge of the vegetation types and communities of the site and his/her appointment must be approved by the ECO. The plan shall include (but not limited to):
 - Detailed rehabilitation methodology;
 - Details for potential structures proposed within existing systems to assist with the prevention of further erosion and improve flooding of watercourses;
 - Methods for the removal and control of IAPS within the proposed development footprint and adjacent corridor;
 - Assessment of current vegetation species within the study area;
 - Proposed plant species to be replanted in and around the disturbed development footprint; and
 - Monitoring requirements to assess how successful the rehabilitation techniques are.
- All post-construction building material and waste must be cleared in accordance with the abovementioned rehabilitation plan or EMP, before revegetation takes place.
- Erosion features that have developed as a result of construction/operation related disturbances are required to be stabilised. This may also include the need to deactivate any erosion head cuts/rills/gullies that may have developed by either compacted soil infill, rock plugs, gabions or any other suitable measures.
- Slopes that have been altered due to construction/operation must be reshaped to replicate the original condition and contours.

- If the gradient of the banks is greater than 1:1.75, the banks must be stabilised with a biodegradable cover such as Geojute which must be secured to the steep slope with wooden (biodegradable) pegs. This will reduce soil erosion potential.
- Any areas, which fall outside of the site, that have been compacted are required to be ripped to allow for the establishment of vegetation. This ripping must not result in the mixing of sub- and topsoil.
- No imported soil material may be utilised for rehabilitation, unless it can be ensured that it is free of any IAPS seeds.
- Before adding the topsoil, all weeds and IAPS must be removed.
- Additional stabilisation of cleared areas to prevent and control erosion must be actively managed. The method of stabilisation should be determined in consultation with the ECO and engineer. The following methods (or a combination) may be considered, depending on the specific conditions of the site:
 - Brush packing;
 - Mulch or chip cover;
 - Terracing;
 - Straw stabilising (at the rate of one bale/m² and rotated into the top 100mm of the completed earthworks);
 - Watering;
 - Planting / sodding;
 - Hand-seeding / Hydro-seeding; and/or
 - Mechanical cover or packing structures (Geofabric, Hessian cover, Armourflex, Log / pole fencing).
- A suitably qualified ECO/botanist/horticulturist must supervise the handling, maintenance and planting of the plant/trees. No IAPS may be utilised during the rehabilitation process.
- Rapidly germinating indigenous species (e.g. fast growing, deep rooting, rhizomatous, stoloniferous) known to bind soils in terrestrial, riparian and/or wetland areas must be utilised where there is a strong motivation for stabilisation over reinstating similar plant communities to that being disturbed. This should be informed by a suitably qualified specialist.
- Exposure of plant root systems to drying winds, high temperatures or water logging must be avoided.
- Where possible, revegetation must take place at the start of the spring rains to maximise water availability and minimise the need for irrigation. This will ensure optimal conditions for germination and rapid vegetation establishment.
- It is the property owner's responsibility to continuously monitor the area for alien species during the contract and establishment period, and any alien species encountered must be removed.
- Removal of these species shall be undertaken in a way which prevents any damage to the remaining indigenous species and inhibits the re-infestation of the cleaned areas.
- All alternative tracks and footpaths created during the operational phase should be appropriately rehabilitated (e.g. tillage and revegetation of the affected areas). This rehabilitation should result in improved surface roughness and increased infiltration along with reduced stormwater flow and consequently reduced rill erosion.

- Any haulage or access roads (legal or illegal) which were created must be decommissioned and rehabilitation to reinstate the natural vegetation, increase the surface roughness and resultantly increase infiltration (e.g. tillage and revegetation) post-construction.
- All construction waste materials must be removed, and temporary structures (e.g. offices, workshops, storage containers, ablution facilities) dismantled, from site and the surrounding environment, this will need to be checked by the ECO and the various contractors.
- All banks where there is exposed soil, with the potential for rill/gully erosion to take place, must be stabilised. Gabion structures or geotextiles must be implemented upslope of the proposed development in areas of steep gradient.
- The reinstatement of the longitudinal slope profiles, which have been altered, must be rehabilitated if possible. The soil horizons must be reinstated on the correct structural order and the vegetation groundcover over the disturbed area revegetated according to the site-specific rehabilitation plan.
- IAPS must be removed manually without further disturbance to the surrounding ecosystems. If manual removal is not possible, seek guidance from a local cooperative extension service or Working for Water. Dispose of the removed IAS at a registered dumping site or burn the material on a bunded surface.
- Rehabilitation of the sections where IAPS are removed must take place. The appropriate indigenous grass and woody vegetation species seeds must be attained from a registered nursery with the guidance of a botanist who is familiar to the region.

6.4 Operational Phase

- Maintenance of all disturbed areas must be implemented continuously as is the responsibility of the proposed development owner within the working corridor.
- Regular monitoring and maintenance of the infrastructure must take place to ensure that no leakages of water and/or erosion occur.
- The establishment and infestation of IAPS must be prevented, managed and eradicated in the areas impacted upon by the proposed operational activities. The type of species and location of said species will determine the type of methodology required for its management and eradication. This methodology should target all lifecycle phases and propagules of the specific species (e.g. seedlings/saplings, seeds, roots, etc.).
- Indigenous vegetation within the site must not be removed or damaged, where possible, during the alien plant control, increasing the probability of indigenous species propagating and preventing the reestablishment of IAPS.
- IAPS control must be implemented within the site area on the alien plant species that were listed under the Alien and Invasive Species Lists (2016 or as amended) amalgamated under NEM:BA (Act no. 10 of 2004). The obligation is on the landowner to identify, control and management the IAPS on his/her property.

- Any use of herbicides in removing alien plant species is required to be investigated by the ECO before use, for the necessity, type proposed to be used, effectiveness and impacts of the product on aquatic and terrestrial biota.
- A mechanical maintenance plan must be drafted for all plant on-site to reduce the risk of leakages and spillages of potentially harmful hydrocarbons and pathogens into the receiving terrestrial and aquatic environment. The frequency of maintenance must be determined by a suitably qualified professional with knowhow of the specific plant.

7 MONITORING REQUIREMENTS

The monitoring of the rehabilitated site will be essential for the maintenance and/or improvement of the ecological value within the study area. The mitigative recommendations stated above must be incorporated into the project-specific EMPr and compliance with the requirements/recommendations must be audited by a suitability qualified independent, or site ECO. The key to a successful EMPr is appropriate monitoring and review to ensure effective functioning of the EMPr and to identify and implement corrective measures in a timely manner. Monitoring for non-compliance must be undertaken on a daily basis during the construction phase by the contractors under the guidance of the Project Manager / ECO / Engineer. An appropriately timed audit report should be compiled by the independent ECO. Paramount to the reporting of non-conformance and incidents is that appropriate corrective and preventative action plans are developed and adhered to. Photographic records of all incidents and non-conformances must be retained. This is to ensure that the key impacts on the receiving aquatic and terrestrial habitats are adequately managed and mitigated against and that the rehabilitation of any disturbed areas within any system is successful.

A monitoring programme must be in place not only to ensure compliance with the EMPr throughout the construction and operational phases, but also to monitor any environmental issues and impacts during the vegetation establishment phase during rehabilitation. Compliance against the EMPr must be monitored during the construction/operational phase monthly by an ECO. The period and frequency of monitoring required post-construction must be determined by a suitably qualified botanist and approved by the ECO. Once the initial transplants / plugs are planted during the rehabilitation phase, a suitably qualified professional must conduct weekly site visits to remove IAPS (in accordance with the latest revised NEM:BA requirements) and address any revegetation concerns until revegetation is considered successful (i.e. >80% indigenous cover). A generally accepted monitoring period of revegetated areas after this initial period is monitoring every 3 months for the first 12 months and every 6 months thereafter until the vegetation has successfully been established. If the revegetated areas have inadequate surface coverage (less than 30% within 9 months after re-vegetation) the disturbed areas should be prepared and re-vegetated again.

- The cost-effective qualitative monitoring of the rehabilitation area may be time based through the use of periodic photographs taken from permanent photo viewpoints. These points are required to be established during site inception. The timeline created between the pre- and post-rehabilitation photos will provide an invaluable visual representation of the progress that is conveyed in a straightforward manner. The photographer should be an environmental scientist (may be the site ECO), therefore allowing an expert assessment of the site adding to the qualitative information gathered from the photographs.

The below mentioned criteria must be adhered to, ensuring the quality of the information collected:

- Establishment of the photo points must be completed during site inception/establishment. This will allow for pre-rehabilitation imagery spanning more than a once off photograph.
- These points should be permanently marked and assigned a unique identify number to ensure continual relocation and accuracy of the photographs. GPS coordinates should be recorded of each site. This is to ensure if any markers are removed or vandalised then they can be replaced.
- Photo point locations should be easily relocated and accessible and must not be obscured by future vegetation growth.
- The level of detail captured must be appropriate to the area that has undergone rehabilitation.
- Photo record forms must be development and utilised for every photo taken. The information required will be project name, location, unique identity number, directional point (e.g. North, South), date, time, photographers name and additional comments.
- Qualitative ecological information that must be visually interpreted and recorded at the same time as taking the photograph include:
 - Extent of the site vegetation ground cover.
 - General level of plant growth, substrate levels, and water levels.
 - General observations of water quality such as clarity and presence of litter.
 - Evidence of anthropogenic presence and bird species.
 - Vegetation condition, extent of alien invasive plants; and
 - Evidence of erosion and close monitoring of the post-construction erosion-control measures which must be implemented.

This is to ensure that the key impacts on the aquatic and terrestrial habitats are adequately managed and mitigated against and that rehabilitation of any disturbed areas within the study area is successful.

8 CONCLUSION

ENVASS was appointed by the client, on behalf of the Johannesburg Road Agency, to undertake a terrestrial impact assessment with the primary objective of providing specialist input into the EIA and WULA processes applicable to the proposed development. The study area for this study constituted as a 25 m assessment radius around the proposed development site, as provided by the design engineer.

It was evident that the study area fell within single terrestrial and wetland vegetation types, namely: Egoli Granite Grassland and the Mesic Highveld Grassland (Group 3), which were classified as Endangered and Critically Endangered, respectively (SANBI, 2006/18; Driver *et al.*, 2011). These vegetation units were however recorded to have been moderately to largely disturbed as a result of current and historic infrastructural and urban landscaping development, and thus contained only remnants of the perceived natural composition, dominated by IAPS and pioneer species. Utilising these broad vegetation types as a guide, as well as the land cover classes delineated within the study area, habitat units were delineated at a desktop scale and later ground-truthed onsite for refinement. It was determined that two (2) habitat units were applicable to the study area, namely: 1) Watercourse and 2) Disturbed Area. A once-off field survey of these habitat units was conducted to determine the overall floral composition and structure, as well as to identify faunal species and ascertain the potential refugia present within each habitat unit. The floral and faunal species identified onsite were then cross-referenced to the relevant conservation databases and legislation to determine whether SCC and/or TOPS were present within each of the habitat units.

It was determined that the Wetland habitat unit within the project area had the highest species diversity and conservation importance, which was elevated by the presence of two (2) vulnerable and four (4) provincially protected floral species, namely: *Podranea ricasoliana* (Pink Trumpet Vine) and *Clivia miniata* (Natal Lily) in terms of SANBI; and *Agapanthus praecox* (Blue Lily), *Aloe marlothii* (Cape Aloe), *Dietes grandiflora* (Fortnight Lily) and *Zantedeschia aethiopica* (L.) Spreng (White arum Lily) species that were growing at the old dam weir and within the eroded areas. The good groundcover and moderately dense *Cyprus papyrus*, *Typha capensis* and *Pontederia cordata* species in the watercourse and woody species within the riparian area associated with the habitat unit was also determined to provide good refugia for avifaunal species. Although no faunal SCC were identified onsite, these niche riparian and wetland areas within the study area were determined to have a high potential to provide refuge for other faunal species. The ecological connectivity and ESSs provided by the watercourse habitat unit was determined to be invaluable within the urbanised area, and as such was recorded to be of high Ecological Functionality and Conservation Importance. This resulted in the overall EIS of the watercourse habitat unit being high in the broader urbanised environment.

The Disturbed Area habitat unit constituted as areas of infrastructural development, urban gardens and other areas that were recorded to have been highly disturbed as a result of urbanisation. The only indigenous species within these areas were those presumably planted by landowners in an effort to landscape the area. These species included pot plants containing indigenous and provincially protected species, which although are protected as a regional scale are considered common garden species within the region. These species included *Agapanthus praecox* and *Aloe marlothii*. As these species were situated within gardens and along the fence line, they did not provide natural ecological value to the habitat unit. This was exasperated as the majority of these species were situated in pot plants. These potted plants should therefore be moved prior to the initial activities taking place. The severe disturbance and consequent fragmentation created by the man-made infrastructure within the study area results in low ecological functionality and conservation importance being determined for the Disturbed Area habitat unit. Although the use of IAPS for ornamental purposes was observed to have been very common within these areas, it is recommended that alien and invasive control and maintenance be implemented in areas associated with the rehabilitation and the larger woody species replaced with indigenous trees that provide valuable ecosystem services to the anthropogenic and natural environments. The presence/identification of eighty-one (81) floral species (of which only 6 were indigenous) and a total of nineteen (19) faunal species within the study area resulted in the overall biodiversity of the site being classified as moderate.

Based on the results presented within this study, it is the substantive opinion that the proposed development continue, provided that all mitigation and rehabilitation measures presented within this report and the project-specific EMP be strictly implemented and subsequently monitored.

It is however recommended that the following be implemented prior to the construction phase beginning:

- A walk-through of the study area should be conducted by a suitably botanist, accompanied by the site ECO, prior to the start of the construction phase. Any additional SCC and TOPS identified within the study area, that are not pot plants, should be recorded and the relevant permits applied for from DAFF to relocate or disturb these species.
- A detailed Rehabilitation and Landscaping Plan should be developed prior to the construction phase initiating. This plan must guide the concurrent rehabilitation of the study area based on the final design and construction method statement.
- An Alien and Invasive Plant Species Management Programme should be drafted for the entire study area. This recommendation is in line with the requirements stipulated within the NEM:BA (Act no. 10 of 2004) and its Alien and Invasive Species Lists (2016) Regulations, which put the responsibility of the control and maintenance of alien and invasive species on the designated land proponent/owner. Fixed-point photographic monitoring sited should be setup around the proposed development site, at which monthly photographs should be taken to document the changes occurring onsite and the overall condition of the rehabilitated land in a post-construction state.

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10 APPENDIX A: FLORAL SPECIES WITHIN VEGETATION TYPE

The following floral species list includes all floral species noted on site during the field survey with their respective SANBI Red List status, or whether the species is protected at a provincial or national scale.

KEY:

Red: Protected Species

SCIENTIFIC NAME	ENGLISH NAME	SANBI CONSERVATION STATUS	TNO Protected
<i>Acacia mearnsii</i>	Black Wattle	Not Evaluated	
<i>Achyranthes aspera</i>	Devil's Horsewhip	Least Concern (Not endemic to SA)	
<i>Agapanthus praecox</i>	Blue Lily	Least Concern	Protected in Gauteng
<i>Aloe marlothii (ferox)</i>	Cape Aloe	Least Concern	Protected in Gauteng
<i>Amaranthus cruentus</i>	Red Amaranth	-	
<i>Argemone ochroleuca</i>	Prickly poppy	Not Evaluated	
<i>Bidens pilosa</i>	Blackjacks	-	
<i>Bulbinella cauda-felis</i>	Cat's Tail Bulbinella	Least Concern	
<i>Bulbostylis burchellii</i>	Sedge Grass	Least Concern (Not endemic to SA)	
<i>Callistemon speciosus</i>	Bottlebrush	Not Evaluated	
<i>Canna indica</i>	Indian-shot	Not Evaluated	
<i>Celtis africana</i>	African Elm	Least Concern	
<i>Chloris virgata</i>	Feather Fingergrass	Least Concern (Not endemic to SA)	
<i>Chlorophytum comosum</i>	Spider plant	Least Concern (Not endemic to SA)	
<i>Cirsium vulgare</i>	Spear Thistle	Not Evaluated	
<i>Citrus x sinensis</i>	Orange tree	-	
<i>Clivia miniata</i>	Natal Lily	Vulnerable (Not endemic to SA)	
<i>Colocasia esculenta</i>	Elephant Ears	-	
<i>Combretum erythrophyllum</i>	River bushwillow	Least Concern (Not endemic to SA)	
<i>Crassula ovata</i>	Jade Plant	Least Concern (Not endemic to SA)	
<i>Cycas revoluta</i>	Sago Cycad	Least Concern	
<i>Cynodon dactylon</i>	Finger grass	Least Concern	
<i>Cynoglossum officinale</i>	Hound's tongue	-	
<i>Cyperus papyrus</i>	Papyrus Sedge	Least Concern (Not endemic to SA)	
<i>Cyperus longus</i>	Sweet Cyperus	Least Concern	
<i>Datura stramonium</i>	Jimsonweed	Not Evaluated	
<i>Delairea odorata</i>	Cape-ivy	Least Concern (Not endemic to SA)	
<i>Dietses grandiflora (Presumed)</i>	Fortnight Lily	Least Concern	Protected in Gauteng
<i>Duranta erecta</i>	Skyflower	Not Evaluated	
<i>Ehrharta erecta</i>	Panic veldtgrass	Least Concern (Not endemic to SA)	
<i>Erigeron karvinskianus</i>	Santa Barbara Daisy	Not Evaluated	
<i>Euonymus japonicus</i>	Evergreen Euonymus	-	
<i>Euphorbia cooperi var. graniticola</i>	bushveld candelabra tree	Least Concern (Not endemic to SA)	
<i>Euphorbia oblongata</i>	Eggleaf spurge	-	
<i>Euphorbia peplus</i>	Petty Spurge	Not Evaluated	
<i>Flaveria Bidentis</i>	Smelter's bush	Not Evaluated	
<i>Ipomoea indica</i>	Blue dawn flower	Not Evaluated	
<i>Ipomoea purpurea</i>	Common morning glory	Not Evaluated	
<i>Laburnum anagyroides</i>	Common Laburnum	-	
<i>Lantana camera</i>	West Indian Lantana	Not Evaluated	
<i>Lavandula x intermedia var. Margaret Roberts</i>	Margaret Roberts Lavender	-	
<i>Lepidium didymium</i>	Lesser Swine-cress	-	
<i>Lepidium draba</i>	Hoary cardaria	Not Evaluated	
<i>Magnolia grandiflora</i>	Southern Magnolia	-	
<i>Malva parviflora</i>	Cheeseweed Mallow	Not Evaluated	
<i>Melia azedarach</i>	Chinaberry	-	
<i>Mikania micrantha</i>	Mile-a-minute	Unlisted invasive species	
<i>Opuntia ficus-indica</i>	Cochineal Nopal Cactus	Not Evaluated	
<i>Oxalis corniculata</i>	Creeping Woodsorrel	(Introduced)	
<i>Pelargonium inquinans</i>	Scarlet Geranium	Least Concern	
<i>Pennisetum clandestinum</i>	Kikuyu Grass	Least Concern (Not endemic to SA)	
<i>Persicaria lapathifolia</i>	Smartweed	Not Evaluated	
<i>Phytolacca dioica</i>	belhambra tree	Not Evaluated	

SCIENTIFIC NAME	ENGLISH NAME	SANBI CONSERVATION STATUS	TNO Protected
<i>Plantago major</i>	Greater Plantain	-	
<i>Podranea ricasoliana</i>	Pink Trumpet Vine	Vulnerable	
<i>Polygala virgate</i>	Purple broom	Least Concern (Not endemic to SA)	
<i>Polypogon viridis</i>	Water Beard Grass	Least Concern (Not endemic to SA)	
<i>Pontederia cordata</i>	Pickerelweed	Not Evaluated	
<i>Populus deltooides</i> (Presumed)	Eastern cottonwood	Not Evaluated	
<i>Portulacaria afra</i>	Elephant Bush	Least Concern (Not endemic to SA)	
<i>Pteridium aquilinum</i>	Fern	Least Concern (Not endemic to SA)	
<i>Quercus suber</i>	Cork Oak	-	
<i>Rinicus communis</i>	Castor Bean	Not Evaluated	
<i>Salix babylonica</i>	Weeping willow	Not Evaluated	
<i>Schefflera arboricola</i>	Dwarf umbrella tree	Not Evaluated	
<i>Solanum lycopersicum</i>	Tomato plant	-	
<i>Solanum mauritianum</i>	Bugweed	Not Evaluated	
<i>Sonchus asper</i>	Prickly Sowthistle	Not Evaluated	
<i>Tagetes lunulate</i>	Red-crescent Marigold	-	
<i>Taraxacum officinale</i>	Common Dandelion	Not Evaluated	
<i>Taxodium distichum</i>	Bald Cypress	Not Evaluated	
<i>Typha capensis</i>	Bullrush	Least Concern	
<i>Ulmus parvifolia</i>	Chinese Elm	Not Evaluated	
<i>Vachellia karroo</i>	Cape thorn-tree	Least Concern	
<i>Veronica polita</i>	Grey Field-speedwell	-	
<i>Vitex trifolia</i>	Arabian Lilac	-	
<i>Washingtonia robusta</i>	Mexican Fan Palm	Least Concern (Not endemic to SA)	
<i>Weigela decora</i> (Presumed)	Japanese Weigela	-	
<i>Yucca gigantea</i>	Spineless Yucca	-	
<i>Zamia integrifolia</i>	Coontie	-	
<i>Zantedeschia aethiopica</i> (L.) Spreng.	White Arum Lily	Least Concern (Not endemic to SA)	Protected in Gauteng

11 APPENDIX B: INVASIVE ALIEN PLANT SPECIES IDENTIFIED WITHIN THE STUDY AREA

The following is a list of IAPS that were identified within the study area as part of this study. There NEMBA (2016) categories are presented to ensure compliance with the National List of Invasive Species in terms of Sections 70(1), 71(3) and 71A of NEMBA (Act no. 10 of 2004).

SCIENTIFIC NAME	ENGLISH NAME	NEMBA CATEGORY (2016)
Listed		
<i>Acacia mearnsii</i>	Black Wattle	2
<i>Argemone ochroleuca</i>	Prickly poppy	1b
<i>Canna indica</i>	Indian-shot	1b
<i>Cirsium vulgare</i>	Spear Thistle	1b
<i>Datura stramonium</i>	Jimsonweed	1b
<i>Duranta erecta</i>	Skyflower	3
<i>Flaveria Bidentis</i>	Smelter's bush	1b
<i>Ipomoea indica</i>	Blue dawn flower	1b
<i>Ipomoea purpurea</i>	Common morning glory	1b
<i>Lantana camera</i>	West Indian Lantana	1b
<i>Lepidium draba</i>	Hoary cardaria	1b
<i>Opuntia ficus-indica</i>	Sweet prickly pear	1b
<i>Pennisetum clandestinum</i>	Kikuyu Grass	1b in wetlands and protected areas
<i>Pontederia cordata</i>	Pickerelweed	1b
<i>Rinicus communis</i>	Castor Bean	1b
<i>Solanum mauritianum</i>	Bugweed	1b
<i>Vitex trifolia</i>	Arabian Lilac	1b
Unlisted		
<i>Achyranthes aspera</i>	Devil's Horsewhip	-
<i>Amaranthus cruentus</i>	Red Amaranth	-
<i>Bidens pilosa</i>	Blackjacks	-
<i>Bulbostylis burchellii</i>	Sedge Grass	-
<i>Callistemon speciosus</i>	Bottlebrush	-
<i>Celtis africana</i>	African Elm	-

SCIENTIFIC NAME	ENGLISH NAME	NEMBA CATEGORY (2016)
<i>Chloris virgata</i>	Feather Fingergrass	-
<i>Chlorophytum comosum</i>	Spider plant	-
<i>Citrus x sinensis</i>	Orange tree	-
<i>Clivia miniate</i>	Natal Lily	-
<i>Colocasia esculenta</i>	Elephant Ears	-
<i>Combretum erythrophyllum</i>	River bushwillow	-
<i>Crassula ovata</i>	Jade Plant	-
<i>Cycas revoluta</i>	Sago Cycad	-
<i>Cynodon dactylon</i>	Finger grass	-
<i>Cynoglossum officinale</i>	Hound's tongue	-
<i>Cyperus papyrus</i>	Papyrus Sedge	-
<i>Cyperus longus</i>	Sweet Cyperus	-
<i>Delairea odorata</i>	Cape-ivy	-
<i>Ehrharta erecta</i>	Panic veldtgrass	-
<i>Erigeron karvinskianus</i>	Santa Barbara Daisy	-
<i>Euonymus japonicus</i>	Evergreen Euonymus	-
<i>Euphorbia cooperi var. graniticola</i>	Bushveld candelabra tree	-
<i>Euphorbia oblongata</i>	Eggleaf spurge	-
<i>Euphorbia peplus</i>	Petty Spurge	-
<i>Laburnum anagyroides</i>	Common Laburnum	-
<i>Lavandula x intermedia var. Margaret Roberts</i>	Margaret Roberts Lavender	-
<i>Lepidium didymium</i>	Lesser Swine-cress	-
<i>Magnolia grandiflora</i>	Southern Magnolia	-
<i>Malva parviflora</i>	Cheeseweed Mallow	-
<i>Melia azedarach</i>	Chinaberry	-
<i>Mikania micrantha</i>	Mile-a-minute	-
<i>Oxalis corniculata</i>	Creeping Woodsorrel	-
<i>Persicaria lapathifolia</i>	Smartweed	-
<i>Phytolacca dioica</i>	belhambra tree	-
<i>Plantago major</i>	Greater Plantain	-
<i>Polygala virgate</i>	Purple broom	-
<i>Polypogon viridis</i>	Water Beard Grass	-
<i>Populus deltoides</i> (Presumed)	Eastern cottonwood	-
<i>Portulacaria afra</i>	Elephant Bush	-
<i>Pteridium aquilinum</i>	Fern	-
<i>Quercus suber</i>	Cork Oak	-
<i>Salix babylonica</i>	Weeping willow	-
<i>Schefflera arboricola</i>	Dwarf umbrella tree	-
<i>Solanum lycopersicum</i>	Tomato plant	-
<i>Sonchus asper</i>	Prickly Sowthistle	-
<i>Tagetes lunulate</i>	Red-crescent Marigold	-
<i>Taraxacum officinale</i>	Common Dandelion	-
<i>Taxodium distichum</i>	Bald Cypress	-
<i>Typha capensis</i>	Bullrush	-
<i>Ulmus parvifolia</i>	Chinese Elm	-
<i>Vachellia karroo</i>	Cape thorn-tree	-
<i>Veronica polita</i>	Grey Field-speedwell	-
<i>Washingtonia robusta</i>	Mexican Fan Palm	-
<i>Weigela decora</i> (Presumed)	Japanese Weigela	-
<i>Yucca gigantea</i>	Spineless Yucca	-
<i>Zamia integrifolia</i>	Coontie	-
<i>Zantedeschia aethiopica</i> (L.) Spreng.	White Arum Lily	-

12 APPENDIX C: AVIFAUNAL SPECIES IDENTIFIED WITHIN THE STUDY AREA

The following table presents an avifaunal species list of the species that were identified onsite during the field survey.

SCIENTIFIC NAME	COMMON NAME	IUCN CONSERVATION STATUS	PROVINCIAL CONSERVATION STATUS
<i>Anas sparsa</i>	African black duck	Least Concern	
<i>Anser anser</i>	Emden goose	Least Concern	
<i>Bostrychia hagedash</i>	Hadada ibis	Least Concern	
<i>Cercomela familiaris</i>	Familiar chat	Least Concern	
<i>Colius striatus</i>	Speckled mousebird	Least Concern	
<i>Corythaoides concolor</i>	Grey Lourie	Least Concern	
<i>Euplectes afer</i>	Yellow-crowned bishop	Least Concern	
<i>Muscicapa striata</i>	Spotted flycatcher	Least Concern	
<i>Numida meleagris</i>	Guineafowls (feathers found)	Least Concern	
<i>Passer melanurus</i>	Cape sparrow	Least Concern	
<i>Ploceus velatus</i>	Southern masked weaver	Least Concern	
<i>Psittacula krameri</i>	Rose-ringed parakeet	Least Concern	
<i>Pycnonotus capensis</i>	Cape bulbul	Least Concern	
<i>Quelea quelea</i>	Red-billed quelea	Least Concern	
<i>Serinus mozambicus</i>	Yellow-fronted canary	Least Concern	
<i>Spilopelia senegalensis</i>	Laughing Dove	Least Concern	
<i>Streptopelia capicola</i>	Ring-necked Dove	Least Concern	
<i>Threskiornis aethiopicus</i>	African sacred ibis	Least Concern	
<i>Turdoides jardineii</i>	Arrow-marked babbler	Least Concern	

13 APPENDIX D: ADDITIONAL AVIFAUNAL SPECIES OF CONSERVATION CONCERN IN PENTAB 2605_2800

The following table presents SCCs that have the potential to occur within the study area, which were extracted from the SABAP2 (2020).

KEY: Red = SCC

SCIENTIFIC NAME	COMMON NAME	IUCN CONSERVATION STATUS	SANBI CONSERVATION STATUS	GBSP CONSERVATION STATUS
<i>Alcedo semitorquata</i>	Half-collared kingfisher	Least Concern	Near Threatened	Near Threatened
<i>Anthropoides paradiseus</i>	Blue crane	Vulnerable	Vulnerable	Vulnerable
<i>Aquila rapax</i>	Tawny eagle	Vulnerable		
<i>Ciconia nigra</i>	Black stork	Least Concern	Near Threatened	
<i>Falco biarmicus</i>	Lanner Falcon	Least Concern	Near Threatened	
<i>Falco concolor</i>	Sooty falcon	Vulnerable		
<i>Falco naumanni</i>	Lesser kestrel	Least Concern	Vulnerable	
<i>Falco peregrinus</i>	Peregrine falcon	Least Concern	Near Threatened	
<i>Gyps coprotheres</i>	Cape vulture	Endangered	Vulnerable	Vulnerable
<i>Limosa lapponica</i>	Bar-tailed godwit	Near Threatened		
<i>Macheiramphus alcinus</i>	Bat hawk	Least Concern	Near Threatened	
<i>Oxyura maccoa</i>	Maccoa duck	Vulnerable		
<i>Phoenicopterus minor</i>	Lesser flamingo	Near Threatened		
<i>Polemaetus bellicosus</i>	Martial eagle	Vulnerable	Vulnerable	
<i>Sagittarius serpentarius</i>	Secretarybird	Vulnerable	Near Threatened	Near Threatened
<i>Tyto capensis</i>	African grass owl	Least Concern		Vulnerable

14 APPENDIX E: ADDITIONAL AVIFAUNAL SPECIES RECORDED IN PENTAB 2605_2800

KEY: Red = SCC

SCIENTIFIC NAME	COMMON NAME	IUCN CONSERVATION STATUS	SANBI CONSERVATION STATUS	GBSP CONSERVATION STATUS
<i>Accipiter badius</i>	Shikra	Least Concern		
<i>Accipiter melanoleucus</i>	Black sparrowhawk	Least Concern		
<i>Accipiter minullus</i>	Little sparrowhawk	Least Concern		
<i>Accipiter ovampensis</i>	Ovambo sparrowhawk	Least Concern		
<i>Accipiter tachiro</i>	African goshawk	Least Concern		
<i>Acridotheres tristis</i>	Common myna	Least Concern		
<i>Acrocephalus arundinaceus</i>	Great reed warbler	Least Concern		
<i>Acrocephalus baeticatus</i>	African reed warbler	-		

SCIENTIFIC NAME	COMMON NAME	IUCN CONSERVATION STATUS	SANBI CONSERVATION STATUS	GBSP CONSERVATION STATUS
<i>Acrocephalus gracilirostris</i>	Lesser swamp warbler	Least Concern		
<i>Acrocephalus palustris</i>	Marsh warbler	Least Concern		
<i>Acrocephalus schoenobaenus</i>	Sedge warbler	Least Concern		
<i>Afrotis afroides</i>	Northern black korhaan	Least Concern		
<i>Agapornis roseicollis</i>	Rosy-faced lovebird	Least Concern		
<i>Aix galericulata</i>	Mandarin duck	Least Concern		
<i>Alcedo cristata</i>	Malachite kingfisher	Least Concern		
<i>Alopochen aegyptiacus</i>	Egyptian goose	Least Concern		
<i>Amadina erythrocephala</i>	Red-headed finch	Least Concern		
<i>Amandava subflava</i>	Orange-breasted waxbill	Least Concern		
<i>Amauornis flavirostris</i>	Black crane	Least Concern		
<i>Amblyospiza albifrons</i>	Thick-billed weaver	Least Concern		
<i>Anas erythrorhyncha</i>	Red-billed teal	Least Concern		
<i>Anas hottentota</i>	Hottentot teal	Least Concern		
<i>Anas hybrid</i>	Hybrid Mallard	-		
<i>Anas platyrhynchos</i>	Mallard	Least Concern		
<i>Anas smithii</i>	Cape shoveler	Least Concern		
<i>Anas sparsa</i>	African black duck	Least Concern		
<i>Anas undulata</i>	Yellow-billed duck	Least Concern		
<i>Anastomus lamelligerus</i>	African openbill	Least Concern		
<i>Anhinga rufa</i>	African darter	Least Concern		
<i>Anomalospiza imberbis</i>	Cuckoo-finch	Least Concern		
<i>Anser anser</i>	Greylag goose	Least Concern		
<i>Anthus cinnamomeus</i>	African pipit	Least Concern		
<i>Apalis thoracica</i>	Bar-throated apalis	Least Concern		
<i>Apus affinis</i>	Little swift	Least Concern		
<i>Apus apus</i>	Common swift	Least Concern		
<i>Apus barbatus</i>	African black swift	Least Concern		
<i>Apus caffer</i>	White-rumped swift	Least Concern		
<i>Apus horus</i>	Horus swift	Least Concern		
<i>Aquila (Hieraetus) ayresii</i>	Ayres's hawk-eagle	Least Concern		
<i>Aquila (Hieraetus) pennatus</i>	Booted eagle	Least Concern		
<i>Aquila verreauxii</i>	Verreaux's eagle	Least Concern		
<i>Ardea cinerea</i>	Grey heron	Least Concern		
<i>Ardea goliath</i>	Goliath heron	Least Concern		
<i>Ardea melanocephala</i>	Black-headed heron	Least Concern		
<i>Ardea purpurea</i>	Purple heron	Least Concern		
<i>Ardeola ralloides</i>	Squacco heron	Least Concern		
<i>Asio capensis</i>	Marsh owl	Least Concern		
<i>Aviceda cuculoides</i>	African cuckoo-hawk	Least Concern		
<i>Batis molitor</i>	Chin-spot batis	Least Concern		
<i>Bostrychia hagedash</i>	Hadada ibis	Least Concern		
<i>Bradypterus baboecala</i>	Little rush warbler	Least Concern		
<i>Bubo africanus</i>	Spotted eagle-owl	Least Concern		
<i>Bubulcus ibis</i>	Cattle egret	Least Concern		
<i>Burhinus capensis</i>	Spotted thick-knee	Least Concern		
<i>Buteo vulpinus</i>	Common buzzard	Least Concern		
<i>Butorides striata</i>	Striated heron	Least Concern		
<i>Cairina moschata</i>	Muscovy duck	Least Concern		
<i>Calandrella cinerea</i>	Red-capped lark	Least Concern		
<i>Campephaga flava</i>	Black cuckooshrike	Least Concern		
<i>Campethera abingoni</i>	Golden-tailed woodpecker	Least Concern		
<i>Caprimulgus europaeus</i>	European nightjar	Least Concern		
<i>Caprimulgus pectoralis</i>	Fiery-necked nightjar	Least Concern		
<i>Caprimulgus rufigena</i>	Rufous-cheeked nightjar	Least Concern		
<i>Caprimulgus tristigma</i>	Freckled nightjar	Least Concern		
<i>Centropus burchellii</i>	Burchell's coucal	-		
<i>Ceryle rudis</i>	Pied kingfisher	Least Concern		
<i>Chalcomitra amethystina</i>	Amethyst sunbird	Least Concern		
<i>Charadrius tricollaris</i>	Three-banded plover	Least Concern		

SCIENTIFIC NAME	COMMON NAME	IUCN CONSERVATION STATUS	SANBI CONSERVATION STATUS	GBSP CONSERVATION STATUS
<i>Chlidonias hybrida</i>	Whiskered tern	Least Concern		
<i>Chlidonias leucopterus</i>	White-winged tern	Least Concern		
<i>Chloropeta natalensis</i>	African yellow warbler	Least Concern		
<i>Chrysococcyx caprius</i>	Diederik cuckoo	Least Concern		
<i>Chrysococcyx klaas</i>	Klaas's cuckoo	Least Concern		
<i>Ciconia abdimii</i>	Abdim's stork	Least Concern		
<i>Ciconia ciconia</i>	White stork	Least Concern		
<i>Cinnyris mariquensis</i>	Marico sunbird	Least Concern		
<i>Cinnyris talatala</i>	White-bellied sunbird	Least Concern		
<i>Circaetus cinereus</i>	Brown snake eagle	Least Concern		
<i>Circaetus pectoralis</i>	Black-chested snake eagle	Least Concern		
<i>Cisticola fulvicapilla</i>	Neddicky	Least Concern		
<i>Cisticola juncidis</i>	Zitting cisticola	Least Concern		
<i>Cisticola tinniens</i>	Levaillant's cisticola	Least Concern		
<i>Colius striatus</i>	Speckled mousebird	Least Concern		
<i>Columba arquatrix</i>	African olive pigeon	Least Concern		
<i>Columba guinea</i>	Speckled pigeon	Least Concern		
<i>Columba livia</i>	Rock dove	Least Concern		
<i>Coracias caudatus</i>	Lilac-breasted roller	Least Concern		
<i>Coracias garrulus</i>	European roller	Least Concern		
<i>Corvus albus</i>	Pied crow	Least Concern		
<i>Corvus capensis</i>	Cape crow	Least Concern		
<i>Corythaixoides concolor</i>	Grey go-away-bird	Least Concern		
<i>Cossypha caffra</i>	Cape robin-chat	Least Concern		
<i>Coturnix coturnix</i>	Common quail	Least Concern		
<i>Coturnix delegorguei</i>	Harlequin quail	Least Concern		
<i>Creatophora cinerea</i>	Wattled starling	Least Concern		
<i>Crecoptis egregia</i>	African crane	Least Concern		
<i>Crex crex</i>	Corn crane	Least Concern		
<i>Crithagra atrogularis</i>	Black-throated canary	Least Concern		
<i>Crithagra flaviventris</i>	Yellow canary	Least Concern		
<i>Crithagra gularis</i>	Streaky-headed seedeater	Least Concern		
<i>Crithagra mozambicus</i>	Yellow-fronted canary	Least Concern		
<i>Cuculus canorus</i>	Common cuckoo	Least Concern		
<i>Cuculus clamosus</i>	Black cuckoo	Least Concern		
<i>Cuculus gularis</i>	African cuckoo	Least Concern		
<i>Cuculus solitarius</i>	Red-chested cuckoo	Least Concern		
<i>Cygnus atratus</i>	Black swan	Least Concern		
<i>Cygnus olor</i>	Mute swan	Least Concern		
<i>Cypsiurus parvus</i>	African palm swift	Least Concern		
<i>Delichon urbicum</i>	Common house martin	Least Concern		
<i>Dendrocygna bicolor</i>	Fulvous whistling duck	Least Concern		
<i>Dendrocygna viduata</i>	White-faced whistling duck	Least Concern		
<i>Dendropicos fuscescens</i>	Cardinal woodpecker	Least Concern		
<i>Dendropicos namaquus</i>	Bearded woodpecker	Least Concern		
<i>Dicrurus adsimilis</i>	Fork-tailed drongo	Least Concern		
<i>Dryoscopus cubla</i>	Black-backed puffback	Least Concern		
<i>Egretta alba</i>	Great egret	Least Concern		
<i>Egretta ardesiaca</i>	Black heron	Least Concern		
<i>Egretta garzetta</i>	Little egret	Least Concern		
<i>Egretta (Ardea) intermedia</i>	Intermediate egret	Least Concern		
<i>Elanus caeruleus</i>	Black-winged kite	Least Concern		
<i>Emberiza tahapisi</i>	Cinnamon-breasted bunting	Least Concern		
<i>Estrilda astrild</i>	Estrilda	Least Concern		
<i>Euplectes afer</i>	Yellow-crowned bishop	Least Concern		
<i>Euplectes albonotatus</i>	White-winged widowbird	Least Concern		
<i>Euplectes ardens</i>	Red-collared widowbird	Least Concern		
<i>Euplectes orix</i>	Southern Red Bishop	Least Concern		
<i>Euplectes progne</i>	Long-tailed widowbird	Least Concern		
<i>Eurystomus glaucurus</i>	Broad-billed roller	Least Concern		

SCIENTIFIC NAME	COMMON NAME	IUCN CONSERVATION STATUS	SANBI CONSERVATION STATUS	GBSP CONSERVATION STATUS
<i>Falco amurensis</i>	Amur Falcon	Least Concern		
<i>Falco rupicolus</i>	Rock kestrel	Least Concern		
<i>Falco subbuteo</i>	Eurasian hobby	Least Concern		
<i>Fulica cristata</i>	Red-knobbed coot	Least Concern		
<i>Gallinula chloropus</i>	Common moorhen	Least Concern		
<i>Halcyon albiventris</i>	Brown-hooded kingfisher	Least Concern		
<i>Halcyon senegalensis</i>	Woodland kingfisher	Least Concern		
<i>Haliaeetus vocifer</i>	African fish eagle	Least Concern		
<i>Hirundo abyssinica</i>	Lesser striped swallow	Least Concern		
<i>Hirundo albigularis</i>	White-throated swallow	Least Concern		
<i>Hirundo cucullata</i>	Greater striped swallow	Least Concern		
<i>Hirundo dimidiata</i>	Pearl-breasted swallow	Least Concern		
<i>Hirundo (Ptyonoprogne) fuligula</i>	Rock martin	Least Concern		
<i>Hirundo rustica</i>	Barn swallow	Least Concern		
<i>Hirundo spilodera</i>	South African cliff swallow	Least Concern		
<i>Indicator indicator</i>	Greater honeyguide	Least Concern		
<i>Indicator minor</i>	Lesser honeyguide	Least Concern		
<i>Ixobrychus minutus</i>	Little bittern	Least Concern		
<i>Ixobrychus sturmii</i>	Dwarf bittern	Least Concern		
<i>Jynx ruficollis</i>	Red-throated wryneck	Least Concern		
<i>Kaupifalco monogrammicus</i>	Lizard buzzard	Least Concern		
<i>Lagonosticta rhodopareia</i>	Jameson's firefinch	Least Concern		
<i>Lamprotornis nitens</i>	Cape starling	Least Concern		
<i>Laniarius atrococcineus</i>	Crimson-breasted shrike	Least Concern		
<i>Laniarius ferrugineus</i>	Southern boubou	Least Concern		
<i>Lanius collaris</i>	Southern fiscal	Least Concern		
<i>Lanius collurio</i>	Red-backed shrike	Least Concern		
<i>Lanius minor</i>	Lesser grey shrike	Least Concern		
<i>Larus cirrocephalus</i>	Grey-headed gull	Least Concern		
<i>Lophaetus occipitalis</i>	Long-crested eagle	Least Concern		
<i>Lybius torquatus</i>	Black-collared barbet	Least Concern		
<i>Macronyx capensis</i>	Cape longclaw	Least Concern		
<i>Malaconotus blanchoti</i>	Grey-headed bushshrike	Least Concern		
<i>Megaceryle maxima</i>	Giant kingfisher	Least Concern		
<i>Melaenornis pammelaina</i>	Southern black flycatcher	Least Concern		
<i>Melierax gabar</i>	Gabar goshawk	Least Concern		
<i>Merops apiaster</i>	European bee-eater	Least Concern		
<i>Merops bullockoides</i>	White-fronted bee-eater	Least Concern		
<i>Merops hirundineus</i>	Swallow-tailed bee-eater	Least Concern		
<i>Milvus aegyptius</i>	Yellow-billed kite	-		
<i>Mirafra africana</i>	Rufous-naped lark	Least Concern		
<i>Motacilla aguimp</i>	African pied wagtail	Least Concern		
<i>Motacilla capensis</i>	Cape wagtail	Least Concern		
<i>Muscicapa striata</i>	Spotted flycatcher	Least Concern		
<i>Nectarinia famosa</i>	Malachite sunbird	Least Concern		
<i>Netta erythrophthalma</i>	Southern pochard	Least Concern		
<i>Nilus afer</i>	Brubru	Least Concern		
<i>Numida meleagris</i>	Helmeted guineafowl	Least Concern		
<i>Nycticorax nycticorax</i>	Black-crowned night heron	Least Concern		
<i>Oena capensis</i>	Namaqua dove	Least Concern		
<i>Oenanthe pileata</i>	Capped wheatear	Least Concern		
<i>Onychognathus morio</i>	Red-winged starling	Least Concern		
<i>Oriolus larvatus</i>	Black-headed oriole	Least Concern		
<i>Oriolus oriolus</i>	Eurasian golden oriole	Least Concern		
<i>Ortygospiza atricollis</i>	African quailfinch	Least Concern		
<i>Parisoma subcaeruleum</i>	Chestnut-vented warbler	Least Concern		
<i>Passer diffusus</i>	Southern grey-headed sparrow	Least Concern		
<i>Passer domesticus</i>	House sparrow	Least Concern		
<i>Passer melanurus</i>	Cape sparrow	Least Concern		
<i>Pavo cristatus</i>	Indian peafowl	Least Concern		

SCIENTIFIC NAME	COMMON NAME	IUCN CONSERVATION STATUS	SANBI CONSERVATION STATUS	GBSP CONSERVATION STATUS
<i>Pernis apivorus</i>	European honey buzzard	Least Concern		
<i>Phalacrocorax africanus</i>	Reed cormorant	Least Concern		
<i>Phalacrocorax carbo</i>	Great cormorant	Least Concern		
<i>Phoenicopterus ruber</i>	American flamingo	Least Concern		
<i>Phoeniculus purpureus</i>	Green wood hoopoe	Least Concern		
<i>Phylloscopus trochilus</i>	Willow warbler	Least Concern		
<i>Platalea alba</i>	African spoonbill	Least Concern		
<i>Plectropterus gambensis</i>	Spur-winged goose	Least Concern		
<i>Plegadis falcinellus</i>	Glossy ibis	Least Concern		
<i>Plocepasser mahali</i>	White-browed sparrow-weaver	Least Concern		
<i>Ploceus capensis</i>	Cape weaver	Least Concern		
<i>Ploceus cucullatus</i>	Village weaver	Least Concern		
<i>Ploceus intermedius</i>	Lesser masked weaver	Least Concern		
<i>Ploceus velatus</i>	Southern masked weaver	Least Concern		
<i>Polyboroides typus</i>	African harrier-hawk	Least Concern		
<i>Porphyrio madagascariensis</i>	African swamphen	-		
<i>Prinia flavicans</i>	Black-chested prinia	Least Concern		
<i>Prinia subflava</i>	Tawny-flanked prinia	Least Concern		
<i>Prodotiscus regulus</i>	Brown-backed honeybird	Least Concern		
<i>Psittacula krameri</i>	Rose-ringed parakeet	Least Concern		
<i>Psophocichla litsipsirupa</i>	Groundscraper thrush	Least Concern		
<i>Pternistis swainsonii</i>	Swainson's spurfowl	Least Concern		
<i>Ptilopsis granti</i>	Southern white-faced owl	Least Concern		
<i>Pycnonotus nigricans</i>	African red-eyed bulbul	Least Concern		
<i>Pycnonotus tricolor</i>	Dark-capped bulbul	-		
<i>Quelea quelea</i>	Quelea	Least Concern		
<i>Rallus caerulescens</i>	African rail	Least Concern		
<i>Rhinopomastus cyanomelas</i>	Common scimitarbill	Least Concern		
<i>Riparia cincta</i>	Banded martin	Least Concern		
<i>Riparia paludicola</i>	Brown-throated martin	Least Concern		
<i>Riparia riparia</i>	Sand martin	Least Concern		
<i>Sarothrura rufa</i>	Red-chested flufftail	Least Concern		
<i>Saxicola torquatus</i>	African stonechat	Least Concern		
<i>Scopus umbretta</i>	Hamerkop	Least Concern		
<i>Sigelus silens</i>	Fiscal flycatcher	Least Concern		
<i>Spermestes cucullatus(Lonchura curullata)</i>	Bronze mannikin	Least Concern		
<i>Spreo bicolor</i>	Pied starling	Least Concern		
<i>Stenostira scita</i>	Fairy flycatcher	Least Concern		
<i>Sterna caspia</i>	Caspian tern	Least Concern		
<i>Streptopelia capicola</i>	Ring-necked dove	Least Concern		
<i>Streptopelia semitorquata</i>	Red-eyed dove	Least Concern		
<i>Streptopelia senegalensis</i>	Laughing dove	Least Concern		
<i>Sturnus vulgaris</i>	Common starling	Least Concern		
<i>Sylvia borin</i>	Garden warbler	Least Concern		
<i>Tachybaptus ruficollis</i>	Little grebe	Least Concern		
<i>Tadorna cana</i>	South African shelduck	Least Concern		
<i>Telophorus zeylonus</i>	Bokmakierie	Least Concern		
<i>Terpsiphone viridis</i>	African paradise flycatcher	Least Concern		
<i>Threskiornis aethiopicus</i>	African sacred ibis	Least Concern		
<i>Tockus nasutus</i>	African grey hornbill	Least Concern		
<i>Trachyphonus vaillantii</i>	Crested barbet	Least Concern		
<i>Treron calvus</i>	African green pigeon	Least Concern		
<i>Tricholaema leucomelas</i>	Acacia pied barbet	Least Concern		
<i>Tringa nebularia</i>	Common greenshank	Least Concern		
<i>Turdoides jardineii</i>	Arrow-marked babbler	Least Concern		
<i>Turdus libonyanus (liboyana)</i>	Kurrichane thrush	Least Concern		
<i>Turdus smithi</i>	Karoo thrush	Least Concern		
<i>Turnix sylvaticus</i>	Common buttonquail	Least Concern		
<i>Tyto alba</i>	Barn owl	Least Concern		
<i>Upupa africana</i>	African hoopoe	-		

SCIENTIFIC NAME	COMMON NAME	IUCN CONSERVATION STATUS	SANBI CONSERVATION STATUS	GBSP CONSERVATION STATUS
<i>Urocolius indicus</i>	Red-faced mousebird	Least Concern		
<i>Vanellus armatus</i>	Blacksmith lapwing	Least Concern		
<i>Vanellus coronatus</i>	Crowned lapwing	Least Concern		
<i>Vanellus senegallus</i>	African wattled lapwing	Least Concern		
<i>Vidua macroura</i>	Pin-tailed whydah	Least Concern		
<i>Zosterops virens</i>	Cape white-eye	Least Concern		

15 APPENDIX F: POTENTIAL MAMMAL SPECIES OCCURRING WITHIN QDS 2628AA

KEY: NA- Not Applicable, Red= SCC

SCIENTIFIC NAME	COMMON NAME	GLOBAL LIST STATUS (IUCN)	SANBI REGIONAL CONSERVATION STATUS
<i>Atilax paludinosus</i>	Water Mongoose	Least Concern	Least Concern
<i>Canis mesomelas</i>	Black-backed Jackal	Least Concern	Least Concern
<i>Damaliscus pygargus phillipsi</i>	Blesbok	Least Concern	Least Concern
FAMILY Soricidae	Unidentified Shrew	NA	NA
<i>Genetta maculata</i>	Rusty-spotted Genet	Least Concern	Least Concern
<i>Herpestes sanguineus</i>	Slender Mongoose	Least Concern	Least Concern
<i>Hydrictis maculicollis</i>	Spotted-necked Otter	Neat Threatened	Vulnerable
<i>Hystrix africaeaustralis</i>	Cape Porcupine	Least Concern	Least Concern
ORDER Chiroptera	Unidentified bat	NA	NA
ORDER Rodentia	Unidentified rat	NA	NA
<i>Oreotragus oreotragus</i>	Klipspringer	Least Concern	Least Concern
<i>Otomys sp.</i>	Vlei Rats	-	-
<i>Procavia capensis</i>	Rock Hyrax	Least Concern	Least Concern
<i>Sylvicapra grimmia</i>	Common Duiker	Least Concern	Least Concern
<i>Thryonomys swinderianus</i>	Greater Cane Rat	Least Concern	Least Concern
<i>Xerus inauris</i>	South African Ground Squirrel	Least Concern	Least Concern

16 APPENDIX G: REPTILE SPECIES OCCURING WITHIN THE STUDY AREA AND QDS 2628AA

SCIENTIFIC NAME	COMMON NAME	IUCN RED LIST STATUS	SANBI NATIONAL STATUS
<i>Agama aculeata distanti</i>	Distant's Ground Agama	Least Concern	Least Concern
<i>Agama atra</i>	Southern Rock Agama	Least Concern	Least Concern
<i>Aparallactus capensis</i>	Black-headed Centipede-eater	Least Concern	Least Concern
<i>Boaedon capensis</i>	Brown House Snake		Least Concern
<i>Bradypodion ventrale</i>	Eastern Cape Dwarf Chameleon	Least Concern	Least Concern
<i>Crotaphopeltis hotamboeia</i>	Red-lipped Snake		Least Concern
<i>Dasypeltis scabra</i>	Rhombic Egg-eater	Least Concern	Least Concern
<i>Dendroaspis polylepis</i>	Black Mamba	Least Concern	Least Concern
<i>Gerrhosaurus flavigularis</i>	Yellow-throated Plated Lizard		Least Concern
<i>Hemachatus haemachatus</i>	Rinkhals	Least Concern	Least Concern
<i>Hemidactylus mabouia</i>	Common Tropical House Gecko		Least Concern
<i>Lycodonomorphus inornatus</i>	Olive House Snake	Least Concern	Least Concern
<i>Lygodactylus capensis</i>	Common Dwarf Gecko		Least Concern
<i>Naja mossambica</i>	Mozambique Spitting Cobra		Least Concern
<i>Pachydactylus affinis</i>	Transvaal Gecko	Least Concern	Least Concern
<i>Pachydactylus capensis</i>	Cape Gecko	Least Concern	Least Concern
<i>Panaspis wahlbergi</i>	Wahlberg's Snake-eyed Skink		Least Concern
<i>Pelomedusa galeata</i>	South African Marsh Terrapin	Least Concern	Least Concern
<i>Pseudaspis cana</i>	Mole Snake		Least Concern
<i>Stigmochelys pardalis</i>	Leopard Tortoise	Least Concern	Least Concern
<i>Trachylepis punctatissima</i>	Speckled Rock Skink	Least Concern	Least Concern
<i>Trachylepis varia sensu lato</i>	Trachylepis damarana - Common Variable Skink (Species)		Least Concern

17 APPENDIX H: AMPHIBIAN SPECIES OCCURING WITHIN THE STUDY AREA AND QDS 2628AA

KEY: Red = SCC

SCIENTIFIC NAME	COMMON NAME	IUCN RED LIST STATUS	SA RED LIST STATUS
<i>Afrana angolensis</i>	Angola river frog	Least Concern	Least Concern
<i>Afrana fuscigula</i>	Cape river frog	Least Concern	Least Concern
<i>Bufo (Amietophrynus) gutturalis</i>	Guttural toad	Least Concern	Least Concern
<i>Bufo (Amietophrynus) rangeri</i>	Ranger's toad	Least Concern	Least Concern
<i>Cacosternum boettgeri</i>	Boettger's dainty frog	Least Concern	Least Concern
<i>Kassina senegalensis</i>	Kassina senegalensis	Least Concern	Least Concern
<i>Phrynobatrachus natalensis</i>	Natal dwarf puddle frog	Least Concern	Least Concern
<i>Pyxicephalus adspersus</i>	Giant bullfrog	Least Concern	Near Threatened
<i>Schismaderma carens</i>	African red toad	Least Concern	Least Concern
<i>Strongylopus fasciatus</i>	Striped Stream Frog	Least Concern	Least Concern
<i>Tomopterna cryptotis</i>	Common sand frog	Least Concern	Least Concern
<i>Tomopterna natalensis</i>	Natal sand frog	Least Concern	Least Concern
<i>Xenopus laevis</i>	African clawed frog	Least Concern	Least Concern