Terrestrial Ecology Baseline and Impact Assessment for the proposed van Stadens Pipeline Project

Charl Cillier, Mpumalanga Province

January 2021

CLIENT

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Declaration

I, Martinus Erasmus declare that:

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing any decision to be taken with respect to the application by the competent authority; and the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- all the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of Regulation 71 and is punishable in terms of Section 24F of the Act.

Martinus Erasmus

Terrestrial Ecologist

The Biodiversity Company

January 2021

Declaration

I, Mahomed Desai declare that:

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
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- all the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of Regulation 71 and is punishable in terms of Section 24F of the Act.

Mahomed Desai

Terrestrial Ecologist

The Biodiversity Company

January 2021

1 Introduction

1.1 Background

The Biodiversity Company was commissioned to undertake an ecological impact assessment for a proposed pipeline from Bosjesspruit Irenedale Colliery in order to supply service water to Van Staden Dam for North Sections and Main Belts from S100 to S913. The pipeline will be constructed on existing servitude as illustrated in Figure 1-1.

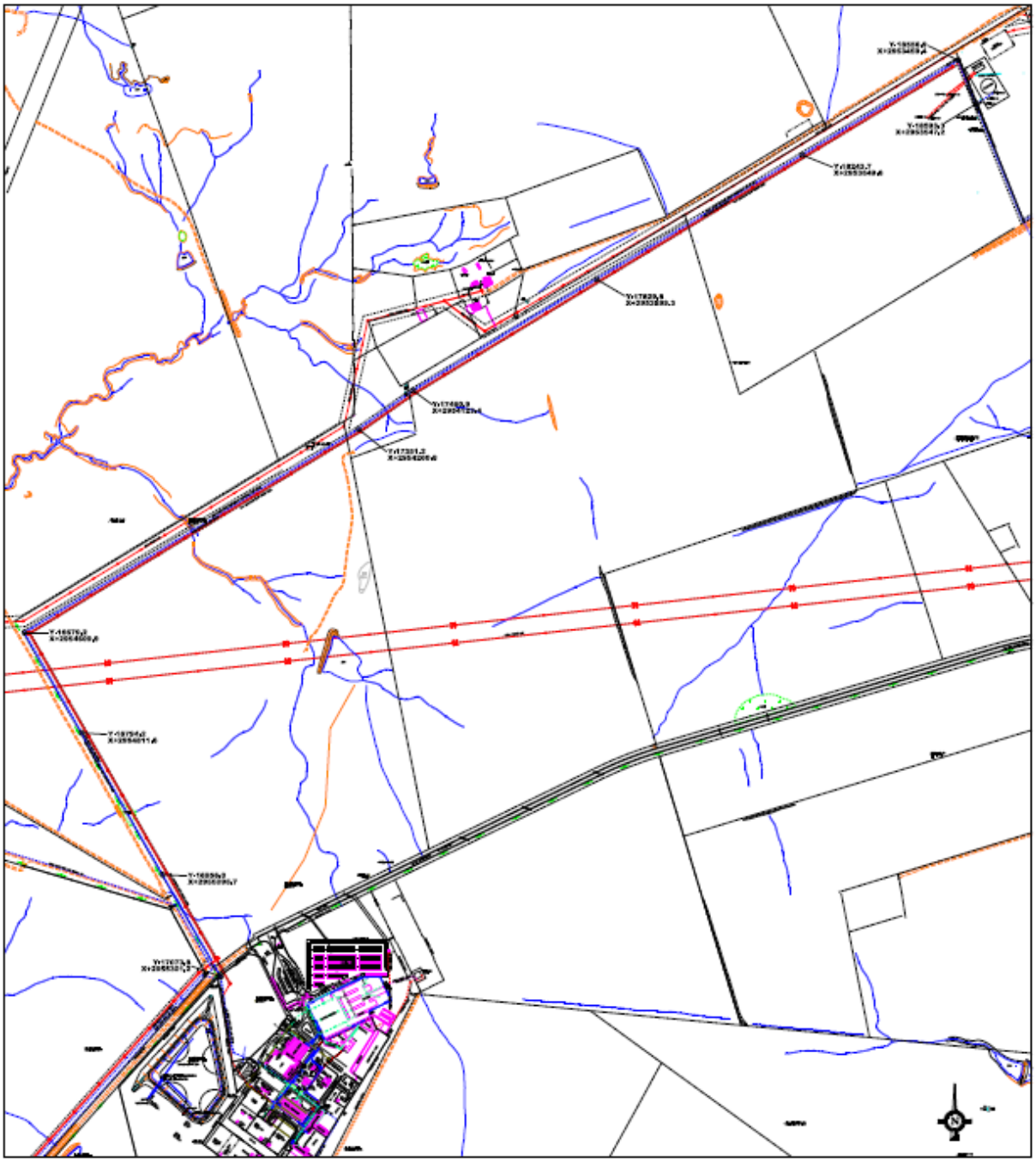

Figure 1-1 Drawing to illustrate the pipeline design

1.2 Specialist Details

Report Name	**Terrestrial Ecology Baseline and Impact Assessment for the proposed van Stadens Pipeline Project**
Submitted to	sasol
Report Writer (Desktop Report)	Mahomed Desai Mahomed Desai has extensive experience in assessing estuarine, freshwater and terrestrial biodiversity. He obtained his M.Sc. in Environmental Engineering and Ph.D. in Ecological Sciences, and is an accredited SASS5 practitioner. Mahomed has over 10 years of experience working with African fauna and flora as a researcher and consultant, through various national and international projects, including those requiring IFC standards. Mahomed has also completed training courses in GIS, stable-isotope analysis, micro-PIXE analysis and deriving energy from waste.
Report Writer (Terrestrial Biodiversity)	Martinus Erasmus Martinus Erasmus obtained his B-Tech degree in Nature Conservation in 2016 at the Tshwane University of Technology. Martinus has been conducting EIAs, basic assessments and assisting specialists in field during his studies since 2015.
Report Reviewer	Andrew Husted Andrew Husted is Pr Sci Nat registered (400213/11) in the following fields of practice: Ecological Science, Environmental Science and Aquatic Science. Andrew is an Aquatic, Wetland and Biodiversity Specialist with more than 12 years' experience in the environmental consulting field. Andrew has completed numerous wetland training courses, and is an accredited wetland practitioner, recognised by the DWS, and also the Mondi Wetlands programme as a competent wetland consultant.
Declaration	The Biodiversity Company and its associates operate as independent consultants under the auspice of the South African Council for Natural Scientific Professions. We declare that we have no affiliation with or vested financial interests in the proponent, other than for work performed under the Environmental Impact Assessment Regulations, 2017. We have no conflicting interests in the undertaking of this activity and have no interests in secondary developments resulting from the authorisation of this project. We have no vested interest in the project, other than to provide a professional service within the constraints of the project (timing, time and budget) based on the principals of science.

1.3 Terms of Reference

The assessment comprised of a Biodiversity assessment. The Terms of Reference (ToR) included the following:

- Description of the baseline receiving environment specific to the field of expertise (general surrounding area as well as site specific environment);
- Identification and description of any sensitive receptors in terms of relevant specialist disciplines (biodiversity and wetland) that occur in the project area, and the manner in which these sensitive receptors may be affected by the activity;
- Identify 'significant' ecological, botanical and faunal features within the proposed project areas;
- Identification of conservation significant habitats around the project area which might be impacted;
- Screening to identify any critical issues (potential fatal flaws) that may result in project delays or rejection of the application;
- Provide a map to identify sensitive receptors in the project area, based on available maps and database information;
- Impact assessment, mitigation and rehabilitation measures to prevent or reduce the possible impacts.

1.4 Key Legislative Requirements

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

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

Region	Legislation
International	Convention on Biological Diversity (CBD, 1993)
	The Convention on Wetlands (RAMSAR Convention, 1971)
	The United Nations Framework Convention on Climate Change (UNFCC,1994)
	The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES 1973)
	The Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention, 1979)
National	Constitution of the Republic of South Africa (Act No. 108 of 2006)
	The National Environmental Management Act (NEMA) (Act No. 107 of 1998)
	The National Environmental Management Act (NEMA) (Act No. 107 of 1998) Section 24 , No 42946 (January 2020)
	The National Environmental Management Act (NEMA) (Act No. 107 of 1998) Section 24 , No 43110 (March 2020)
	The National Environmental Management Protected Areas Act (Act No. 57 of 2003)
	The National Environmental Management Biodiversity Act (Act No. 10 of 2004)
	The National Environmental Management: Waste Act, 2008 (Act 59 of 2008);
	The Environment Conservation Act (Act No. 73 of 1989) and associated EIA Regulations
	National Environmental Management Air Quality Act (No. 39 of 2004)
	National Protected Areas Expansion Strategy (NPAES)
	Environmental Conservation Act (Act No. 73 of 1983)
	Natural Scientific Professions Act (Act No. 27 of 2003)
	National Biodiversity Framework (NBF, 2009)
	National Forest Act (Act No. 84 of 1998)
	National Veld and Forest Fire Act (101 of 1998)
	National Spatial Biodiversity Assessment (NSBA)
	World Heritage Convention Act (Act No. 49 of 1999)
	National Heritage Resources Act, 1999 (Act 25 of 1999)
	Municipal Systems Act (Act No. 32 of 2000)
	Alien and Invasive Species Regulations, 2014
	South Africa's National Biodiversity Strategy and Action Plan (NBSAP)
	Conservation of Agricultural Resources Act, 1983 (Act 43 of 1983)
	Sustainable Utilisation of Agricultural Resources (Draft Legislation).
	White Paper on Biodiversity
	National Water Act (NWA, 1998)
Provincial	Mpumalanga Parks Board Act 6 of 1995
	Mpumalanga Conservation Act, 1998 (Act 10 of 1998)
	Mpumalanga Tourism and Parks Agency Act, No 5 of 2005
	Mpumalanga Conservation Plan (C-plan 2)
	Mpumalanga Biodiversity Sector Plan

1.5 Assumptions and Limitations

The following limitations should be noted for the assessment:

- Only a single season survey was conducted for the respective studies, this would constitute a wet season survey;
- This assessment has not assessed any temporal trends for the project; and
- The GPSs used for delineations is accurate to within five meters. Therefore, the wetland and habitat delineation plotted digitally may be offset by at least five meters to either side.

2 Methods

2.1 Project Location

The location of the proposed pipeline is approximately 3.5 km south of Charl Cilliers and 27 km north of Standerton, Gert Sibande District Municipality. The predominant land uses surrounding the area of the proposed activity includes mining, agriculture and wetlands surrounded by grassland. The location of the proposed activity and the associated 500 m regulated area is illustrated in Figure 2-1.

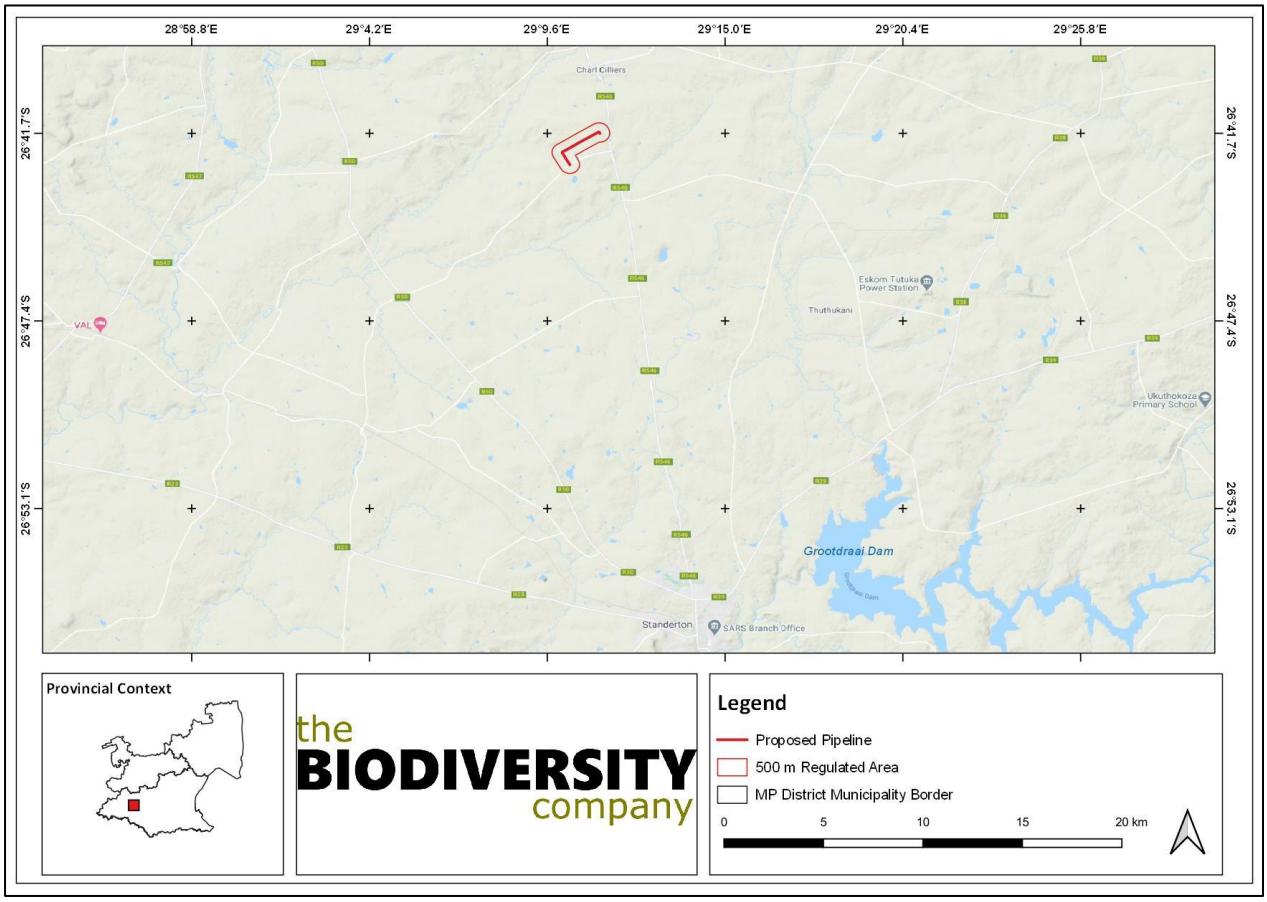

Figure 2-1 Map illustrating the location of the proposed Van Staden pipeline

2.2 Biodiversity Assessment

2.2.1 Desktop Assessment

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

2.2.1.1 Ecologically Important Landscape Features

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

- National Biodiversity Assessment 2018 (Skowno *et al*, 2019) - The purpose of the National Biodiversity Assessment (NBA) is to assess the state of South Africa's biodiversity based on best available science, with a view to understanding trends over time and informing policy and decision-making across a range of sectors. The NBA deals with all three components of biodiversity: genes, species and ecosystems; and assesses biodiversity and ecosystems across terrestrial, freshwater, estuarine and marine environments. The two headline indicators assessed in the NBA are:
    - Ecosystem Threat Status – indicator of an ecosystem's wellbeing, based on the level of change in structure, function or composition. Ecosystem types are categorised as Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Near Threatened (NT) or Least Concern (LC), based on the proportion of the original extent of each ecosystem type that remains in good ecological condition.
    - Ecosystem Protection Level – indicator of the extent to which ecosystems are adequately protected or under-protected. Ecosystem types are categorised as Well Protected (WP), Moderately Protected (MP), Poorly Protected (PP), or Not Protected (NP), based on the proportion of the biodiversity target for each ecosystem type that is included within one or more protected areas. Not Protected, Poorly Protected or Moderately Protected ecosystem types are collectively referred to as under-protected ecosystems.
- Protected areas:
    - South Africa Protected Areas Database (SAPAD) (DEA, 2020) – The South African Protected Areas Database (SAPAD) contains spatial data for the conservation of South Africa. It includes spatial and attribute information for both formally protected areas and areas that have less formal protection. SAPAD is updated on a continuous basis and forms the basis for the Register of Protected Areas which is a legislative requirement under the National Environmental Management: Protected Areas Act, Act 57 of 2003.
- The Mpumalanga Protected Area Expansion Strategy (MPAES, 2013), commissioned by the MTPA, serves to function as a provincial framework for an integrated, co-ordinated and uniform approach in the expansion and consolidation of the Provincial Protected Areas (PAs), in line with the requirements of the NPAES.

- The Mpumalanga Biodiversity Sector Plan (MBSP) systematic biodiversity plan includes a map of biodiversity priority areas (MTPA, 2014). The MBSP CBA map delineates Critical Biodiversity Areas, Ecological Support Areas, Other Natural Areas, Protected Areas, and areas that have been irreversibly modified from their natural state (MTPA, 2014):

- **CBAs** are terrestrial and aquatic areas of the landscape that need to be maintained in a natural or near-natural state to ensure the continued existence and functioning of species and ecosystems and the delivery of ecosystem services. CBAs are areas of high biodiversity value and need to be kept in a natural state, with no further loss of habitat or species (MTPA, 2014). Thus, if these areas are not maintained in a natural or near natural state then biodiversity targets cannot be met. Maintaining an area in a natural state can include a variety of biodiversity compatible land uses and resource uses (SANBI-BGIS, 2017). Two different CBAs are defined, **Irreplaceable CBA's and Optimal CBA's**. Irreplaceable CBA's include; (1) areas required to meet targets and with irreplaceability biodiversity values of more than 80%; (2) critical linkages or pinch-points in the landscape that must remain natural; or (3) critically Endangered ecosystems (MTPA, 2014).

    - **ESAs** are not essential for meeting biodiversity targets but play an important role in supporting the ecological functioning of Critical Biodiversity Areas and/or in delivering ecosystem services. Critical Biodiversity Areas and Ecological Support Areas may be terrestrial or aquatic (SANBI-BGIS, 2017).
    - **ONAs** consist of all those areas in good or fair ecological condition that fall outside the protected area network and have not been identified as CBAs or ESAs. A biodiversity sector plan or bioregional plan must not specify the desired state/management objectives for ONAs or provide land-use guidelines for ONAs (SANBI-BGIS, 2017).

    - **Moderately or Heavily Modified Areas** (sometimes called 'transformed' areas) are areas that have been heavily modified by human activity so that they are by-and-large no longer natural, and do not contribute to biodiversity targets (MTPA, 2014). Some of these areas may still provide limited biodiversity and ecological infrastructural functions but, their biodiversity value has been significantly, and in many cases irreversibly, compromised.

- Important Bird and Biodiversity Areas (BirdLife South Africa, 2015) – Important Bird and Biodiversity Areas (IBAs) constitute a global network of over 13 500 sites, of which 112 sites are found in South Africa. IBAs are sites of global significance for bird conservation, identified through multi-stakeholder processes using globally standardised, quantitative and scientifically agreed criteria; and

- South African Inventory of Inland Aquatic Ecosystems (SAIIAE) (Van Deventer *et al.,* 2018) – A South African Inventory of Inland Aquatic Ecosystems (SAIIAE) was established during the National Biodiversity Assessment of 2018. It is a collection of data layers that represent the extent of river and inland wetland ecosystem types as well as pressures on these systems.

2.2.1.2 Desktop Flora Assessment

The Vegetation of South Africa, Lesotho and Swaziland (Mucina & Rutherford, 2006) was used in order to identify the vegetation type that would have occurred under natural or pre-anthropogenically altered conditions. Furthermore, the Plants of Southern Africa (POSA) database was accessed to compile a list of expected flora species within the proposed development area and surrounding landscape (Figure 2-2). The Red List of South African Plants (Raimondo *et al.,* 2009; SANBI, 2020) was utilized to provide the most current national conservation status of flora species, accessed.

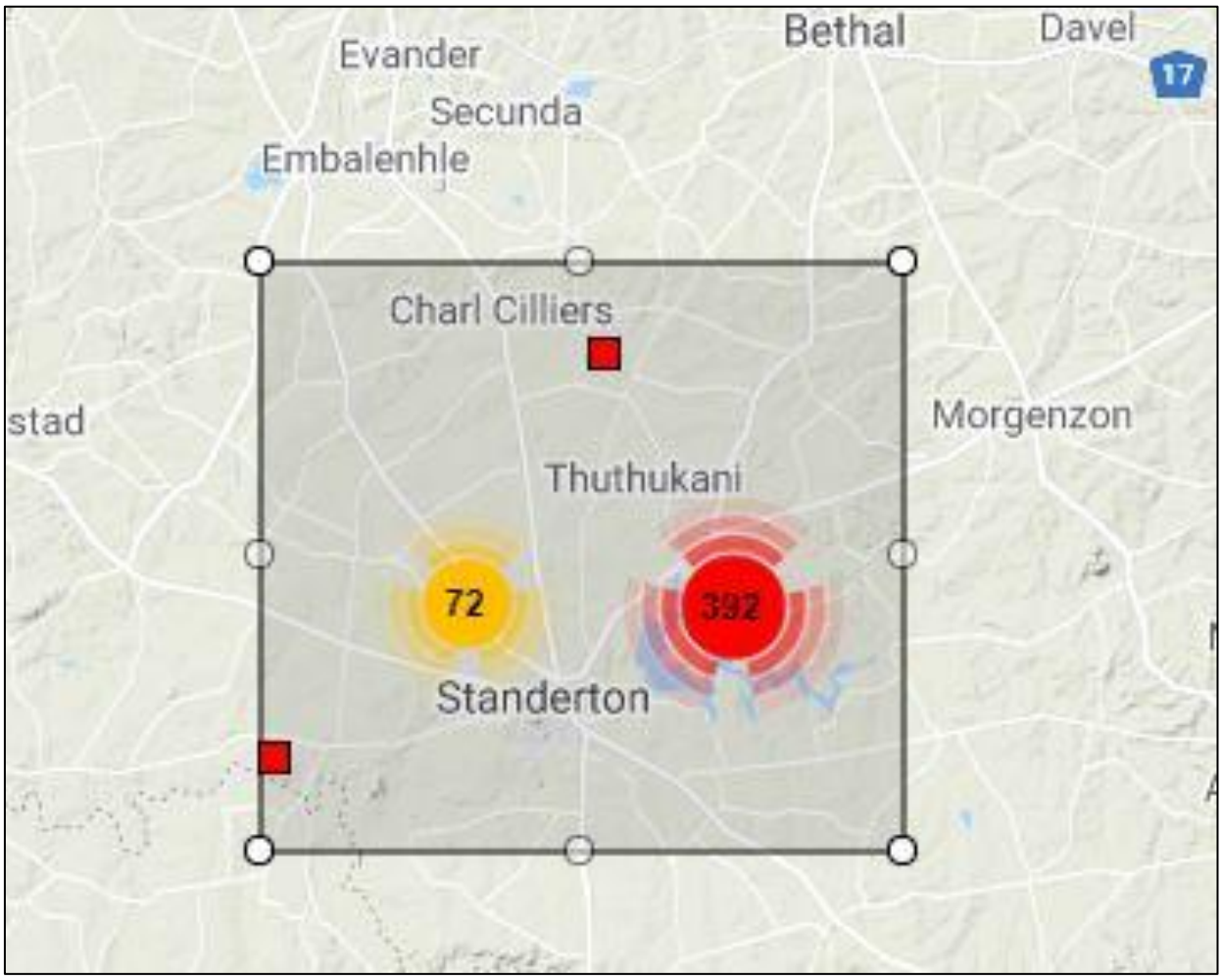

Figure 2-2 Map illustrating extent of area used to obtain the expected flora species list from the Plants of South Africa (POSA) database

2.2.1.3 Desktop Faunal Assessment

The faunal desktop assessment comprised of the following:

- Compiling an expected amphibian list generated from the IUCN spatial dataset (2017);
- Compiling an expected reptile list generated from the IUCN spatial dataset (2017);
- Compiling an expected avifauna list using the South African Bird Atlas Project 2 (SABAP2) using the 2645_2905, 2645_2910, 2645_2915, 2640_2915, 2640_2910 and 2640_2905 pentads (2020); and

- Compiling an expected mammal list from the IUCN spatial dataset (2017).

2.2.2 Field Assessment

The field survey for the project area was conducted on the 8th of January 2021. During the survey the floral and faunal communities within the 100-meter survey corridor were assessed. The corridor was ground-truthed on foot, which included spot checks in pre-selected areas to validate desktop data. Photographs were recorded during the site visit and some are provided in this section of the report. All site photographs are available on request.

2.2.2.1 Flora Assessment

2.2.3 Floristic Analysis

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

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

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

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

2.2.3.1 Faunal Assessment

The faunal field survey comprised the following techniques:

- Visual searches - This typically comprised of meandering or using binoculars to view species from a distance without them being disturbed; and
- Active hand-searches - are used for species that shelter in or under particular micro-habitats (typically rocks, exfoliating rock outcrops, fallen trees, leaf litter, bark etc.).

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

- Field Guide to Snakes and other Reptiles of Southern Africa (Branch, 1998);
- A Complete Guide to the Snakes of Southern Africa (Marais, 2004);

- Atlas and Red List of the Reptiles of South Africa, Lesotho and Swaziland (Bates et al, 2014);
- A Complete Guide to the Frogs of Southern Africa (du Preez and Carruthers, 2009);
- SASOL Birds of Southern Africa 3rd Edition (Sinclair et al, 2002);
- Roberts Birds of Southern Africa mobile app;
- Smithers' Mammals of Southern Africa (Apps, 2000); and
- A Field Guide to the Tracks and Signs of Southern and East African Wildlife (Stuart and Stuart, 2000).

2.2.4 Habitat Types and Sensitivity

The different habitat types within the assessment area were delineated and identified based on observations made during the field assessment as well as available satellite imagery. These habitat types were assigned sensitivity values based on their ecological integrity, conservation value, the presence of species of conservation concern and their ecosystem processes. The basis for the assigned sensitivity value is summarised in Table 2-1.

Table 2-1 Summary of criteria used for habitat sensitivity ratings.

Sensitivity	Criteria
Very High	• Habitat is occupied by a red-listed species. • Red-listed vegetation type exhibiting natural integrity. • Provides critical ecosystem services. • Protected by national or provincial legislation. • Low resilience to disturbance
High	• Possesses a high diversity of protected species but does not possess red-listed species • Habitats that provide important ecosystem services but not necessarily possess high species richness. • Corridors and wetland buffer zones. • Natural habitats that are unique within the landscape • Natural habitats that possess a relatively high species richness in comparison to the rest of the landscape.
Moderate	• Natural areas that although listed as not threatened, are regarded as Not Protected or Poorly Protected. • Degraded areas that provide some ecosystem services.
Low	• Transformed areas. • Natural or degraded areas that are not red-listed vegetation types and Moderately Protected or Well Protected.

3 Results

3.1 Desktop Assessment

3.1.1 Ecologically Important Landscape Features

The following features describes the general area and habitat, this assessment is based on spatial data that are provided by various sources such as the provincial environmental authority and SANBI. The desktop analysis and their relevance to this project are listed in Table 3-1.

Table 3-1 Desktop spatial features examined.

Desktop Information Considered	Relevant/Irrelevant	Section
Conservation Plan Terrestrial	Relevant – The assessment area overlaps with a CBA: Optimal and HMA	3.1.1.1
Conservation Plan Aquatic	Relevant – The assessment area overlaps with Other Natural Area and HMA	3.1.1.1

Ecosystem Threat Status	Relevant – The assessment area is situated within an ecosystem that is listed as VU	3.1.1.2
Ecosystem Protection Level	Relevant – The terrestrial ecosystem associated with the assessment area is rated as Not Protected	3.1.1.2
Mpumalanga Protected Areas Expansion Strategies (MPEAS)	Relevant – The assessment area overlaps with a Provincial Protected Area Expansion Priority Area	3.1.1.3
Strategic Water Source Areas (SWSA)	Irrelevant – The closest SWSA area is 16 km from the assessment area	3.1.1.4
South African Inventory of Inland Aquatic Ecosystems (SAIIAE)	Relevant – The assessment area overlaps with CR wetlands that are regarded as NP or PP	3.1.1.5
Mpumalanga Highveld Wetlands	Relevant – The assessment area overlaps with wetlands classified as Class AB and C wetlands	3.1.1.6
Important Bird and Biodiversity Areas	Irrelevant – The nearest IBA is 32 km away	3.1.1.7
Protected Areas (SAPAD & SACAD)	Irrelevant – The nearest SAPAD is 45 km away	-
NFEPA Rivers and Wetlands	No natural FEPA wetland or rivers within the assessment area	-

3.1.1.1 Mpumalanga Biodiversity Sector Plan

The key output of this systematic biodiversity plan is a map of biodiversity priority areas (MTPA, 2014). The MBSP CBA map delineates Critical Biodiversity Areas, Ecological Support Areas, Other Natural Areas, Protected Areas, and areas that have been irreversibly modified from their natural state (MTPA, 2014).

CBAs are terrestrial and aquatic areas of the landscape that need to be maintained in a natural or near-natural state to ensure the continued existence and functioning of species and ecosystems and the delivery of ecosystem services. CBAs are areas of high biodiversity value and need to be kept in a natural state, with no further loss of habitat or species (MTPA, 2014). Thus, if these areas are not maintained in a natural or near natural state then biodiversity targets cannot be met. Maintaining an area in a natural state can include a variety of biodiversity compatible land uses and resource uses (SANBI-BGIS, 2017).

The Mpumalanga Biodiversity Sector Plan (MBSP) specifies two different CBA areas, **Irreplaceable CBA's and Optimal CBA's**. Irreplaceable CBA's include: (1) areas required to meet targets and with irreplaceability biodiversity values of more than 80%; (2) critical linkages or pinch-points in the landscape that must remain natural; or (3) critically Endangered ecosystems (MTPA, 2014).

ESAs are not essential for meeting biodiversity targets but play an important role in supporting the ecological functioning of Critical Biodiversity Areas and/or in delivering ecosystem services. Critical Biodiversity Areas and Ecological Support Areas may be terrestrial or aquatic (SANBI-BGIS, 2017).

ONAs consist of all those areas in good or fair ecological condition that fall outside the protected area network and have not been identified as CBAs or ESAs. A biodiversity sector plan or bioregional plan must not specify the desired state/management objectives for ONAs or provide land-use guidelines for ONAs (SANBI-BGIS, 2017).

Heavily or Moderately Modified Areas (sometimes called 'transformed' areas) are areas that have been heavily modified by human activity so that they are by-and-large no longer natural, and do not contribute to biodiversity targets (MTPA, 2014). Some of these areas may still provide limited biodiversity and ecological infrastructural functions but, their biodiversity value has been significantly, and in many cases irreversibly, compromised.

Figure 3-1 illustrates that the assessment area overlaps with terrestrial features classified as:

- CBA: Optimal; and
- Heavily or Moderately Modified Areas.

Figure 3-2 illustrates that the assessment area overlaps with aquatic features classified as:

- Other Natural Areas; and
- Heavily or Moderately Modified Areas.

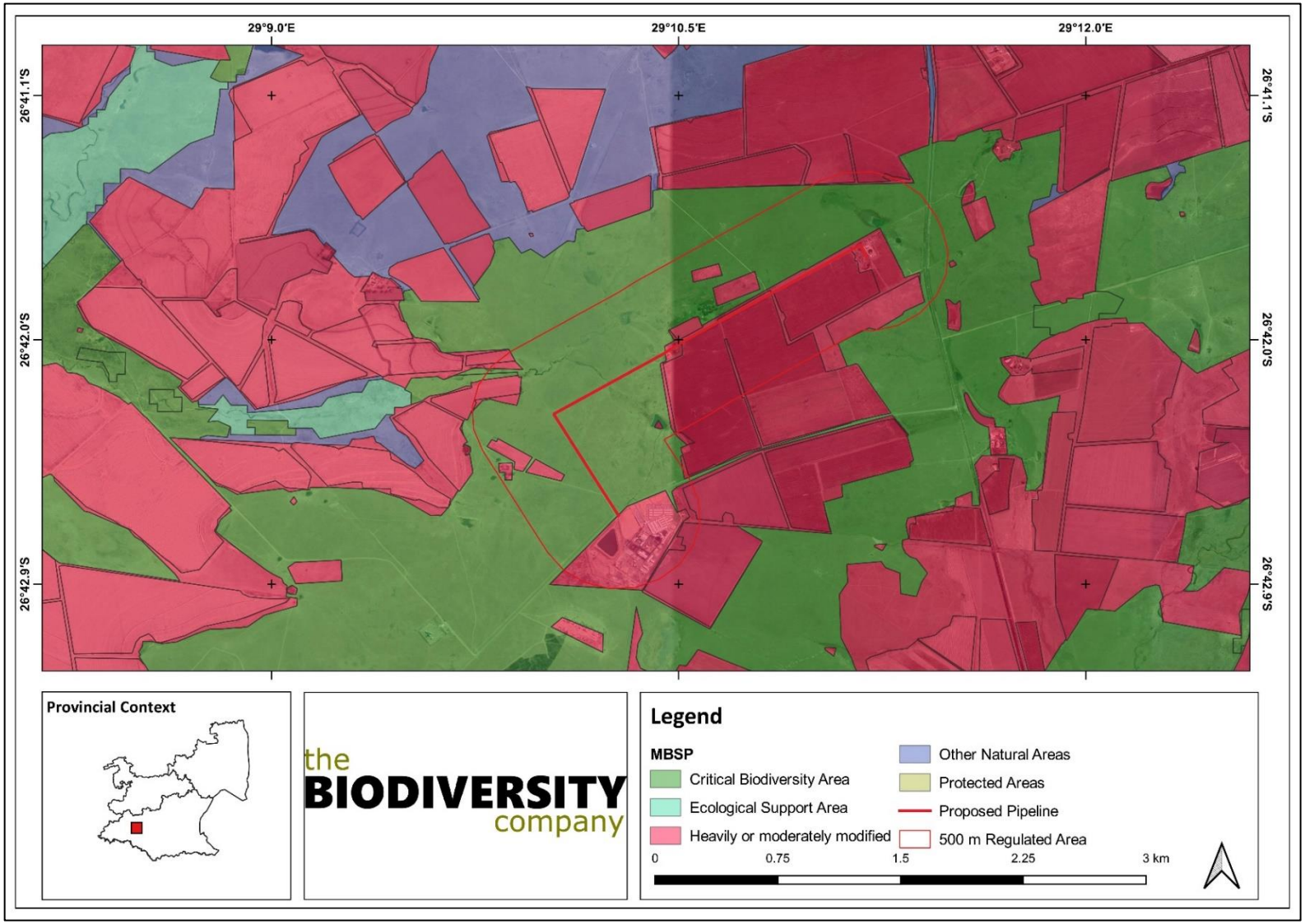

Figure 3-1 Map illustrating the proposed assessment area superimposed on the Terrestrial Mpumalanga Biodiversity Sector Plan (MBSP, 2014)

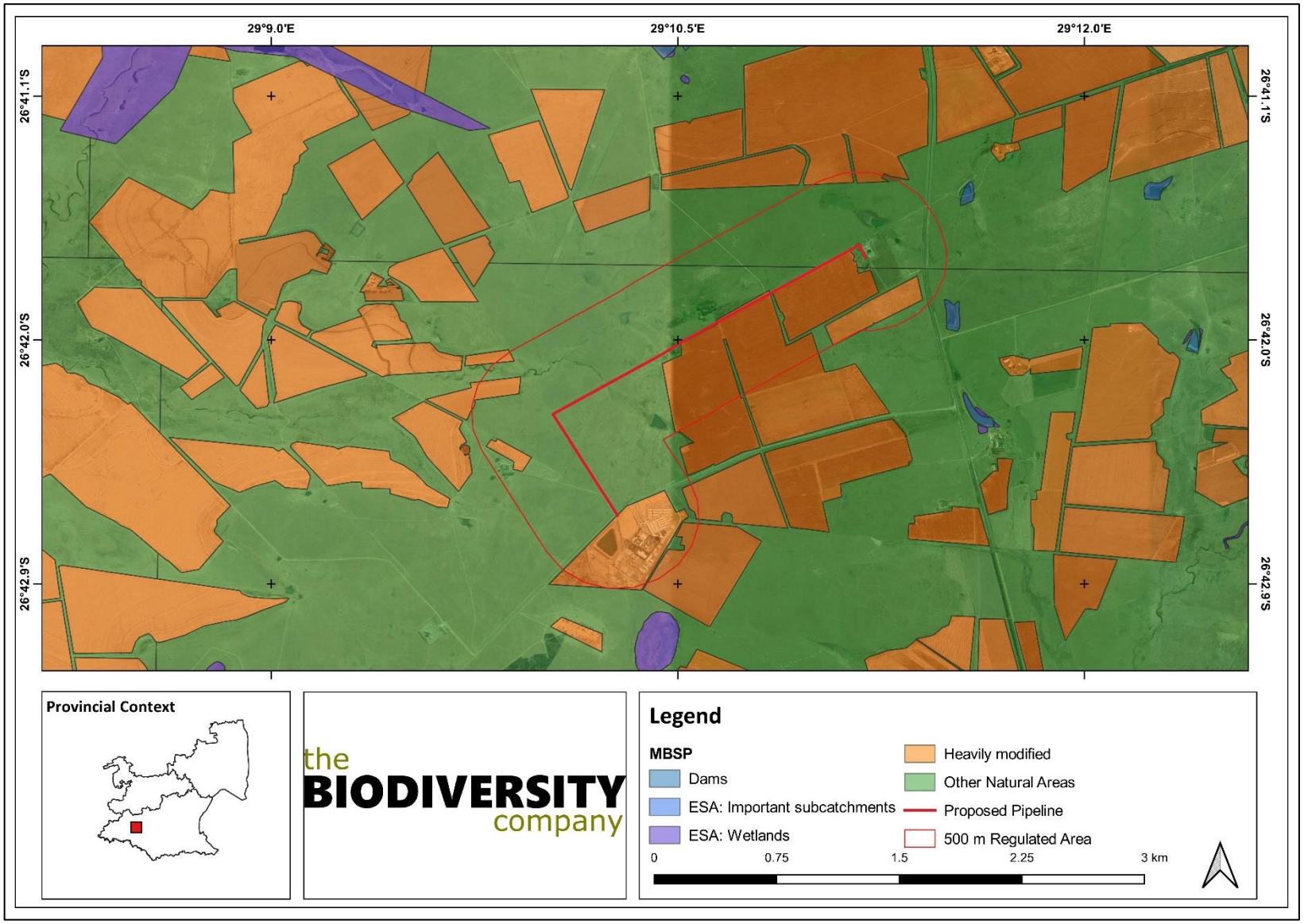

Figure 3-2 Map illustrating the proposed assessment area superimposed on the Aquatic Mpumalanga Biodiversity Sector Plan

3.1.1.2 National Biodiversity Assessment – Terrestrial Ecosystems

The National Biodiversity Assessment (NBA) was completed as a collaboration between the SANBI, the DEA and other stakeholders, including scientists and biodiversity management experts throughout the country over a three-year period (Skowno *et al*., 2019). The purpose of the NBA is to assess the state of South Africa's biodiversity with a view to understanding trends over time and informing policy and decision-making across a range of sectors (Skowno *et al*., 2019).

Ecosystem threat status outlines the degree to which ecosystems are still intact or alternatively losing vital aspects of their structure, function and composition, on which their ability to provide ecosystem services ultimately depends (Skowno *et al*., 2019). Ecosystem types are categorised as Critically Endangered (CR), Endangered (EN), Vulnerable (VU) or Least Threatened (LT), based on the proportion of each ecosystem type that remains in good ecological condition (Skowno *et al*., 2019). The project area was superimposed on the terrestrial ecosystem threat status (Figure 3-3). As seen in this figure, the project area is situated within an ecosystem that is listed as VU.

Ecosystem protection level tells us whether ecosystems are adequately protected or under-protected. Ecosystem types are categorised as not protected, poorly protected, moderately protected or well protected, based on the proportion of each ecosystem type that occurs within a protected area recognised in the Protected Areas Act (Skowno *et al*., 2019).

The project area was superimposed on the ecosystem protection level map to assess the protection status of terrestrial ecosystems associated with the development (Figure 3-4). Based on Figure 3-4, the terrestrial ecosystem associated within the assessment area is rated as 'Not Protected'. This means that this ecosystem is not protected in areas such as national parks or other formally protected areas.

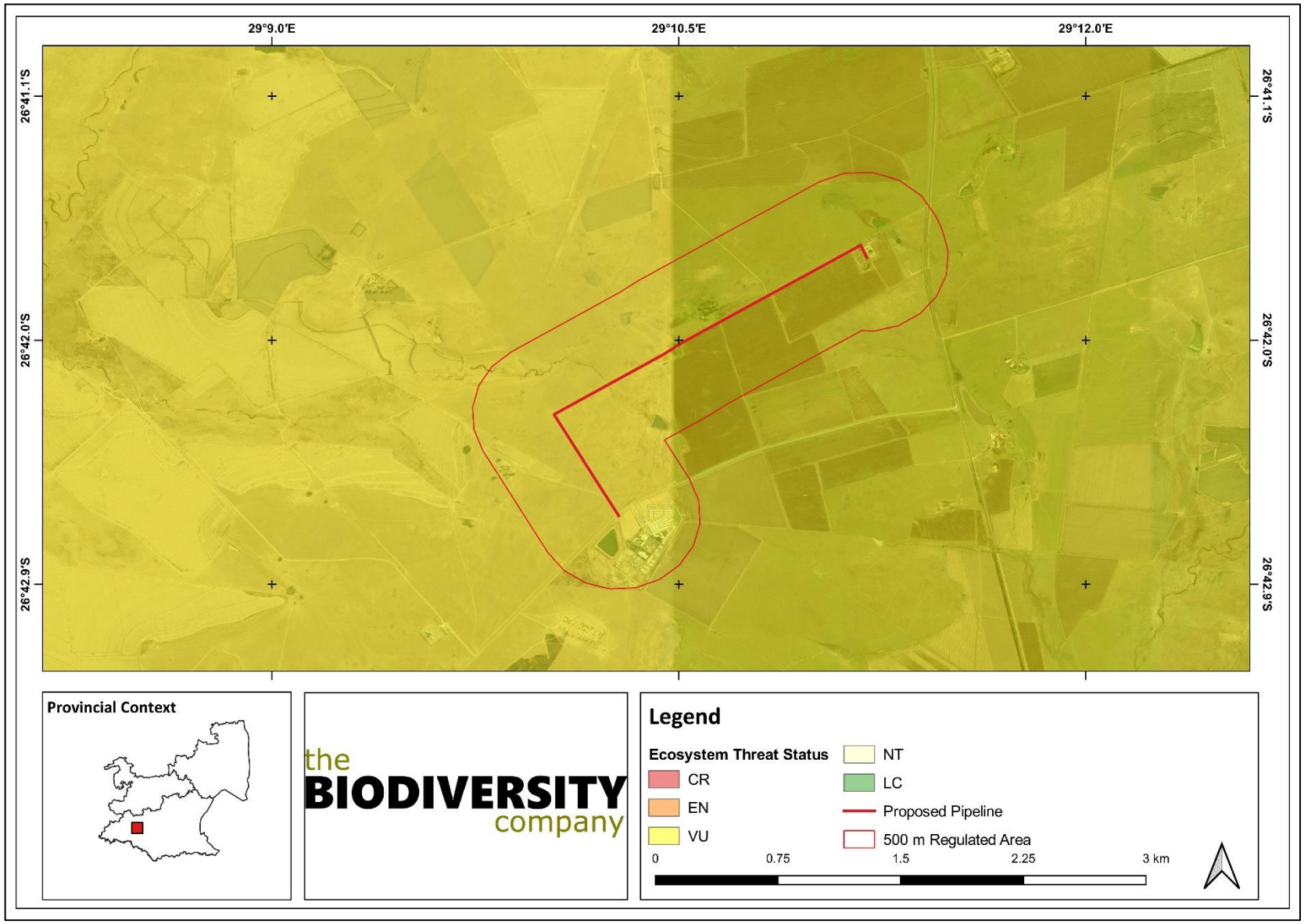

Figure 3-3 Map illustrating the Ecosystem Threat Status of the terrestrial ecosystem within the assessment area.

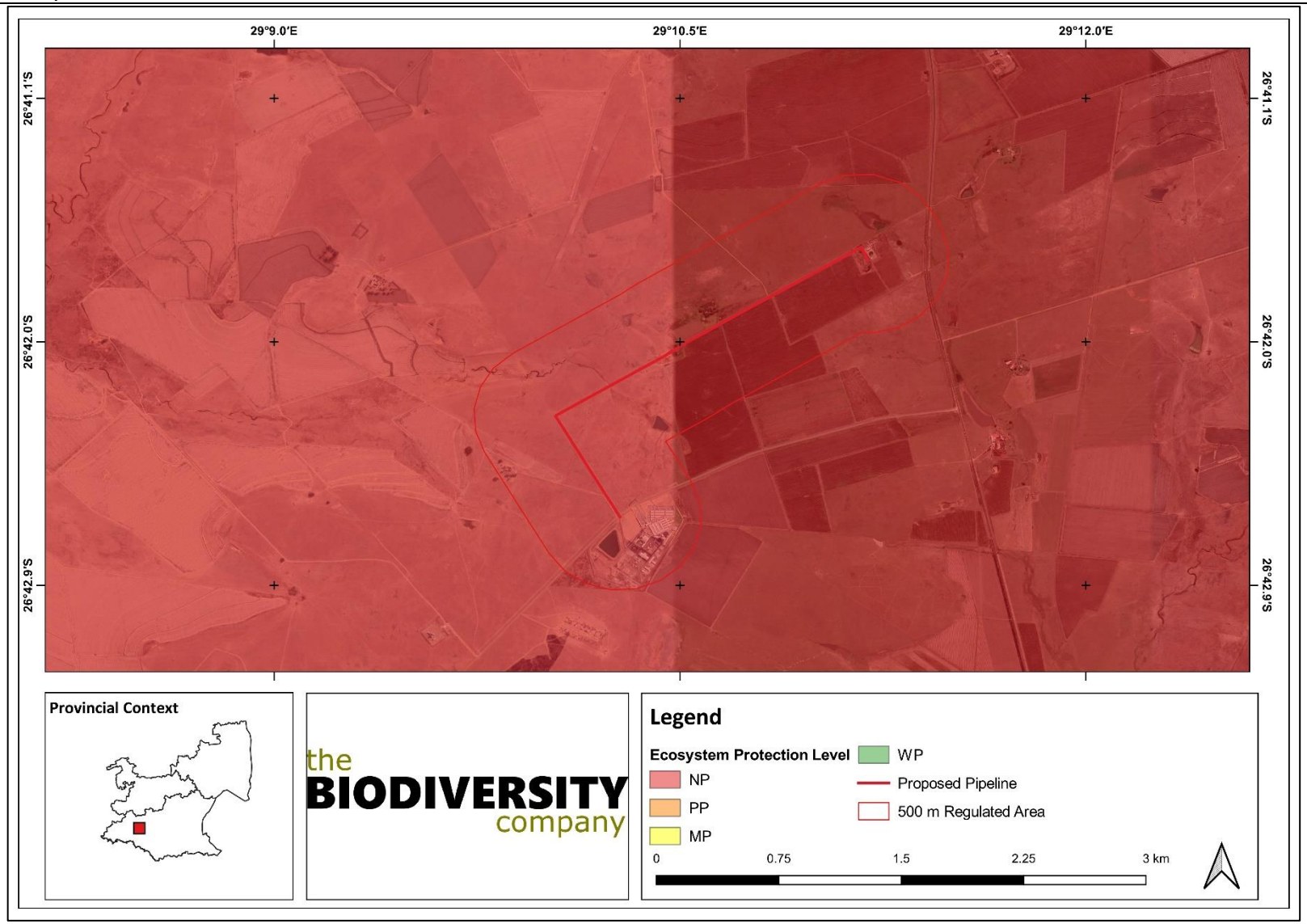

Figure 3-4 Map illustrating the Ecosystem Protection Level of the terrestrial ecosystem within the assessment area

3.1.1.3 Mpumalanga Protected Areas Expansion Strategy

The priority areas for PA Expansion within Mpumalanga were spatially established based on the premise that the primary goal of these areas is to protect biodiversity targets. Several biodiversity data sources were used for the assessment, namely the: Threatened Ecosystems, MBCP Terrestrial Assessment, MBCP Aquatic Assessment, MBCP Irreplaceability, C-plan Irreplaceability, and the National Spatial Biodiversity Assessment Priority areas. A combination of all these were used, together with the spatial priorities established within the NPAES, to establish the spatial priority areas that will guide the NPAES over the next 20 years. Figure 3-5 illustrates that the assessment area overlaps with a Provincial Protected Area Expansion (PPAE) Priority area.

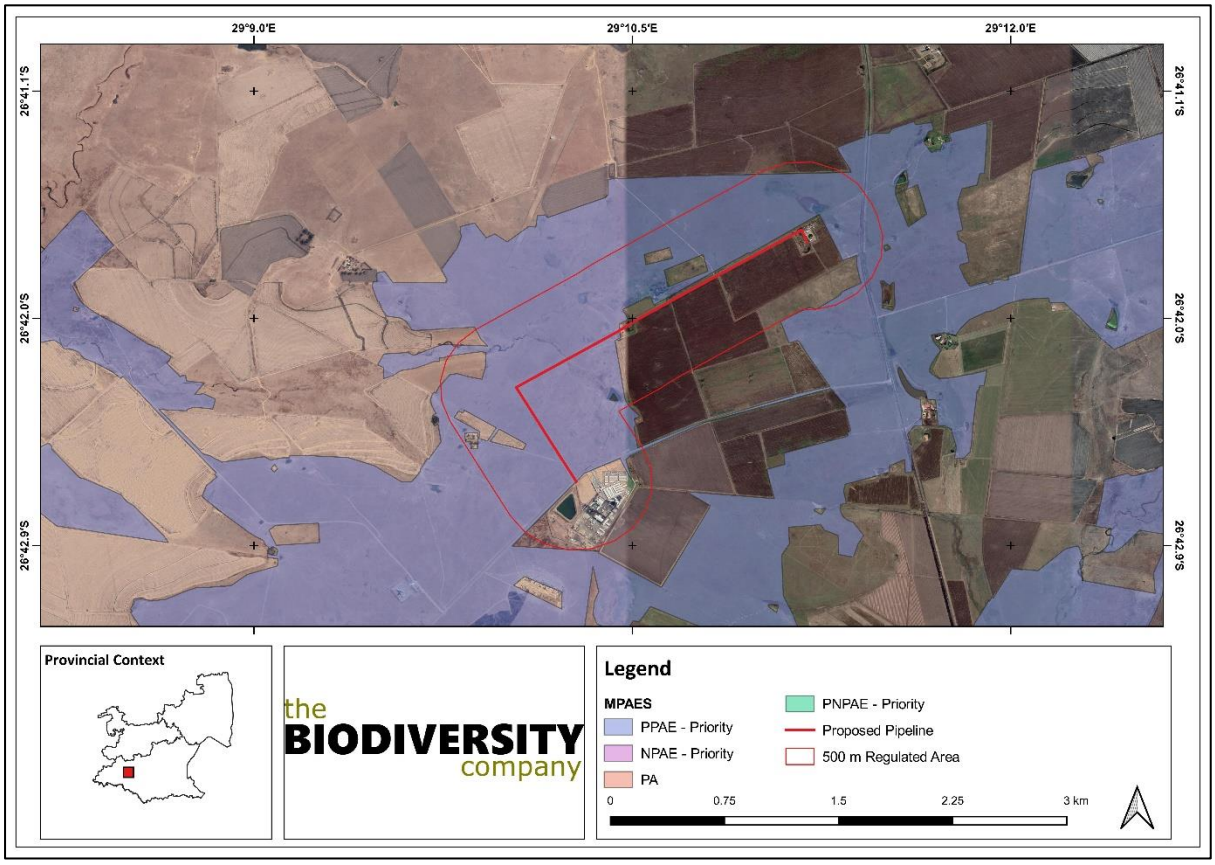

Figure 3-5 Map illustrating the assessment area in relation to the Mpumalanga Protected Areas Expansion Strategy areas

3.1.1.4 Hydrological Setting

The proposed activity is not located in a Strategic Water Source Area (SWSA) and is located within the Vaal C12E quaternary catchment. The assessment area does not overlap with any major river systems but overlaps with systems draining into the Boesmanspruit (reach code C12E-01712) and the Rietspruit (reach code C12E-01753) (Figure 3-6).

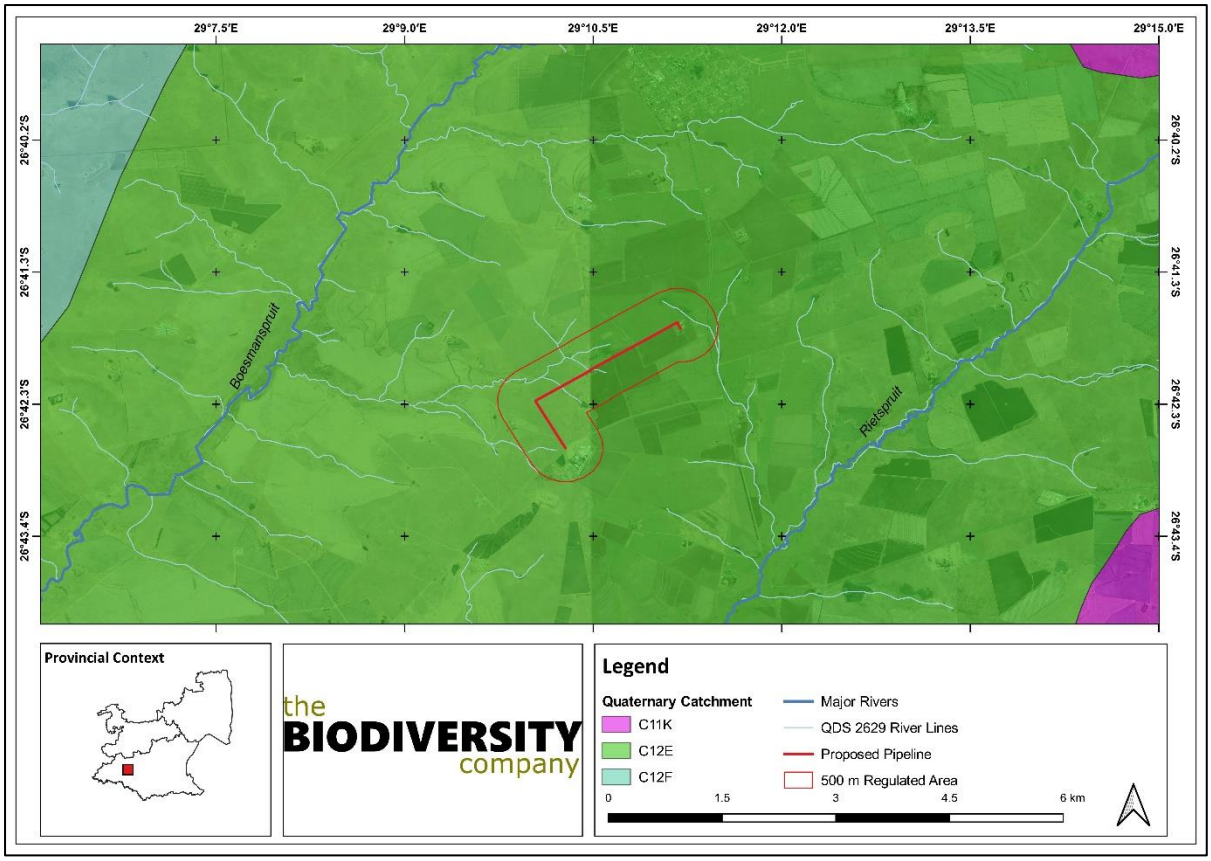

Figure 3-6 Map illustrating the hydrological setting of the assessment area

The ecological conditions of the Boesmanspruit and Rietspruit reaches are summarised in Table 3-2.

Table 3-2 Desktop data pertaining to the ecological condition of the Boesmanspruit (reach code C12E-01712) and Rietspruit (reach code C12E-01753) (DWS, 2020)

Descriptor	Boesmanspruit (reach code C12E-01712)	Rietspruit (reach code C12E-01753)
Present Ecological Status	Moderately Modified (Class C)	Largely Natural (Class B)
Ecological Importance	High	High
Ecological Sensitivity	High	Moderate
Impacts	Small instream dams and agriculture	Agriculture

3.1.1.5 South African Inventory of Inland Aquatic Ecosystems

Ecosystem threat status (ETS) of aquatic ecosystem types is based on the extent to which each ecosystem type had been altered from its natural condition. In congruency with the terrestrial ecosystem status, these features are categorised as CR, EN, VU or LC, with CR, EN and VU ecosystem types collectively referred to as 'threatened' (Van Deventer *et al.,* 2019; Skowno *et al*., 2019).

The National Wetland Map 5 is part of the SAIIAE which was released as part of the National Biodiversity Assessment (NBA) 2018. Figure 3-7 shows that CR wetlands can be found in the project area and 500 m regulated areas, moreover these wetlands are classified as both *Not Protected* and *Poorly Protected* (Figure 3-8).

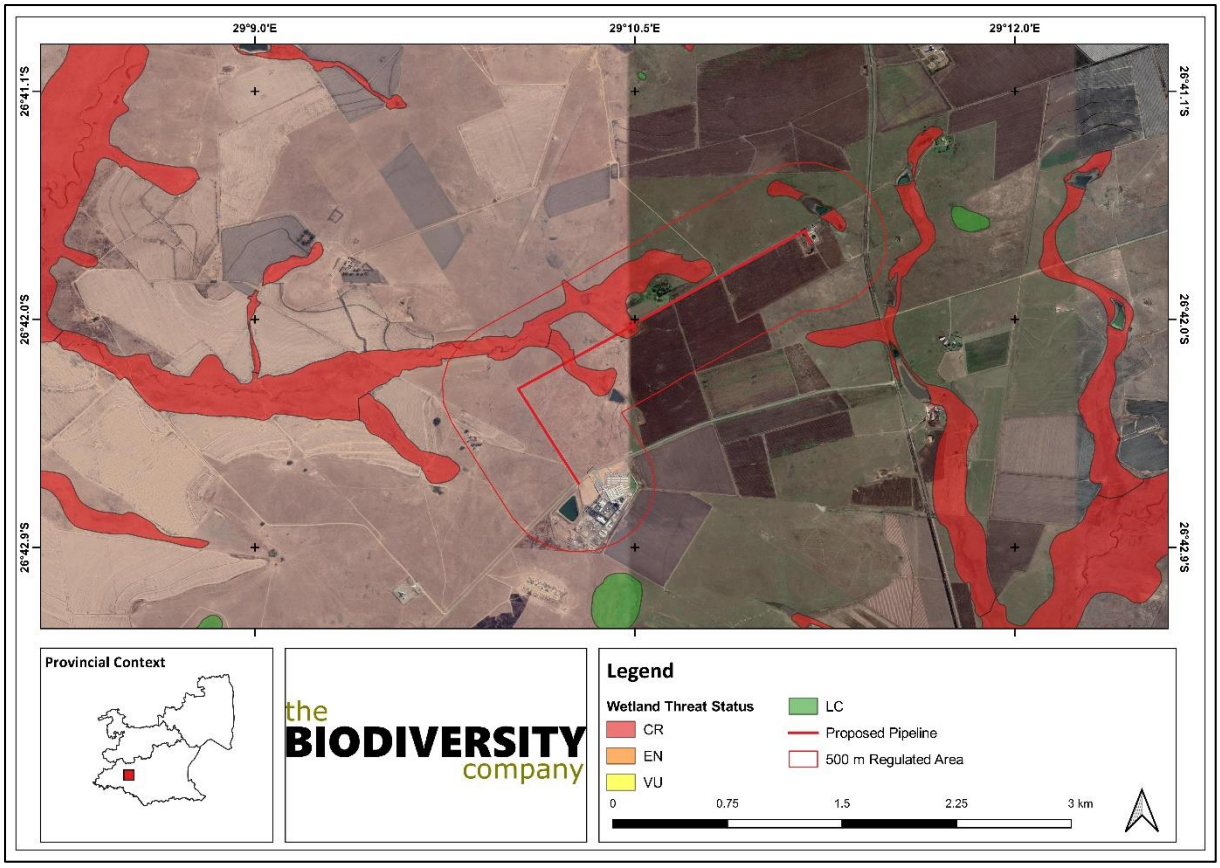

Figure 3-7 Map illustrating the Ecosystem Threat Status of the wetland ecosystems within the assessment area

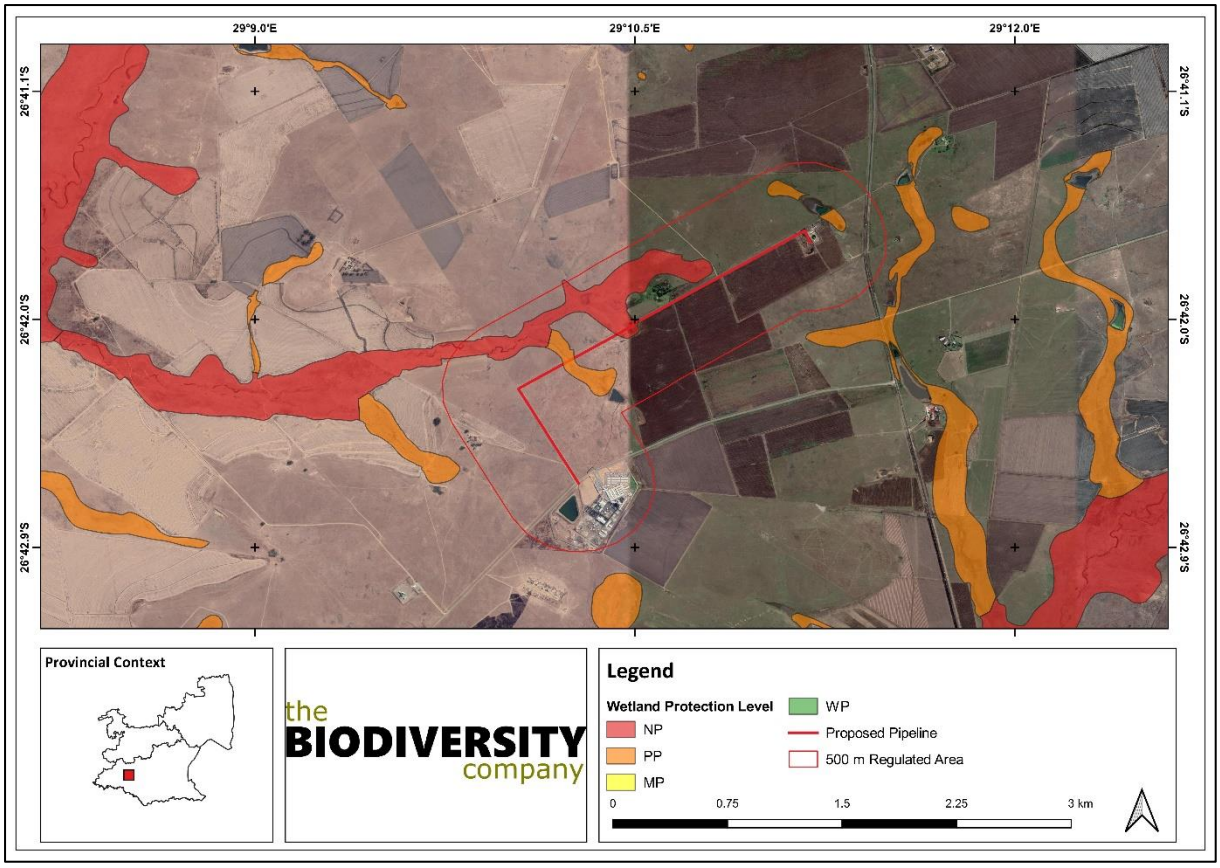

Figure 3-8 Map illustrating the Ecosystem Protection Level of the wetland ecosystems within the assessment area

3.1.1.6 Mpumalanga Highveld Wetlands

The purpose of the Mpumalanga Highveld Grasslands Wetland project was to:

- Ground-truth and refine the current data layers of the extent, distribution, condition and type of freshwater ecosystems in the Mpumalanga Highveld coal belt, to support informed and consistent decision-making by regulators in relation to the water-biodiversity-energy nexus;
- To incorporate these revised data layers into the atlas of high-risk freshwater ecosystems and guidelines for wetland offsets, currently being developed by SANBI, to improve the scientific robustness of these tools; and
- To support the uptake, and development of the necessary capacity to apply the data, atlas and guidelines by regulators and the coal mining industry in their planning and decision-making processes'' (SANBI, 2012).

The Mpumalanga Highveld Grasslands Wetland data also classifies NFEPA land cover based on the defined condition of each area. These are known as the NFEPA wetland conditions categories. The categories are listed in Figure 3-9 and are represented in relation to the project area in Figure 3-10.

Description of NFEPA wetland conditions categories.
PES equivalent provides a description of the condition category that is broadly equivalent to that used by the Department of Water Affairs to describe Present Ecological State. Percentage of total area in each condition category is also provided.

PES equivalent	NFEPA condition	Description	% of total wetland area*
Natural or Good	AB	Percentage natural land cover ≥ 75%	47
Moderately modified	C	Percentage natural land cover 25-75%	18
Heavily to critically modified	DEF	Riverine wetland associated with a D, E, F or Z ecological category river	2
	Z1	Wetland overlaps with a 1:50,000 "artificial" inland water body from the Department of Land Affairs: Chief Directorate of Surveys and Mapping (2005-2007)	7
	Z2	Majority of the wetland unit is classified as "artificial" in the wetland delineation GIS layer	4
	Z3	Percentage natural land cover < 25%	20

** This percentage excludes the unmapped wetlands that have been irreversibly lost due to draining, ploughing and concreting*

Figure 3-9 A breakdown of the National Freshwater Ecosystem Priority Areas wetland condition categories as defined by the Mpumalanga Highveld Grasslands Wetland dataset

Figure 3-9 illustrates that the assessment area overlaps Mpumalanga Highveld Grasslands Wetlands. The majority of these wetlands are classified as class AB, with minimal extent of class C wetlands. However, considering the development date of the dataset, it is possible that the indicated conditions of the wetlands may not be accurate.

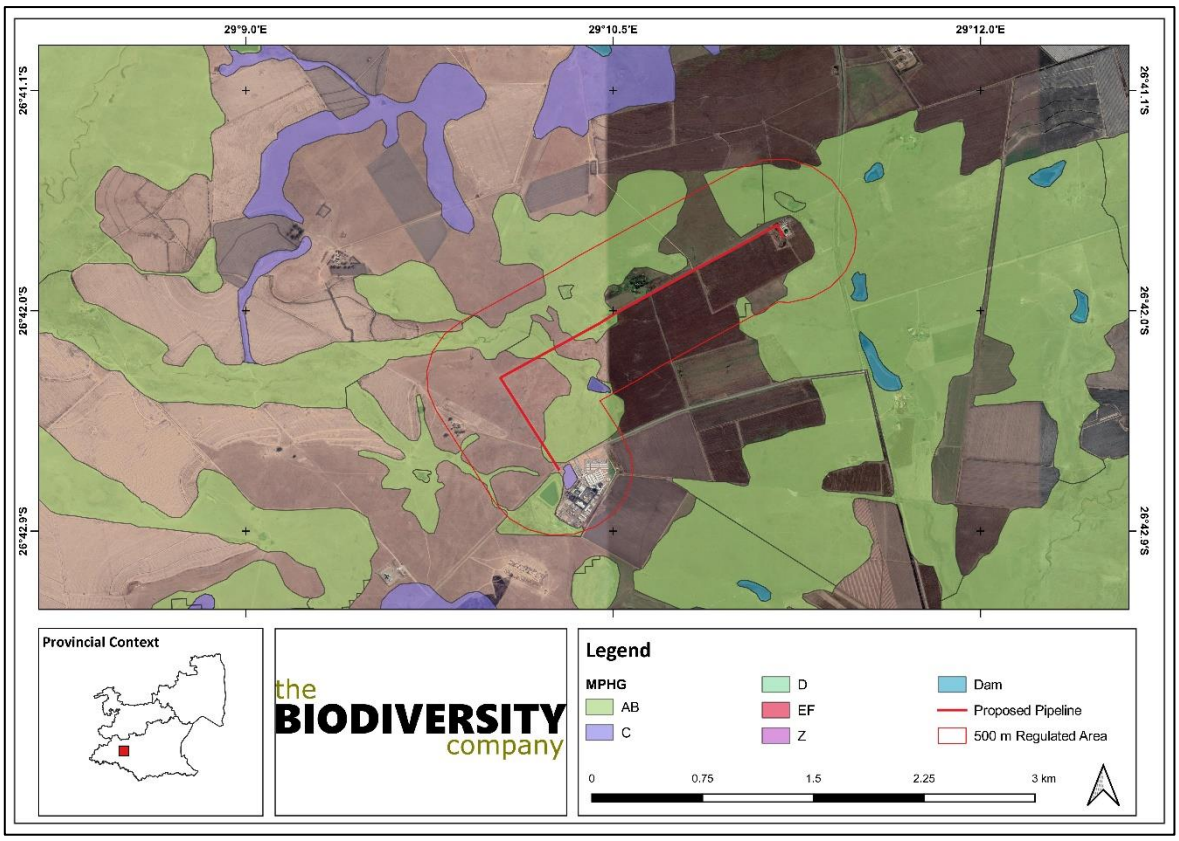

Figure 3-10 Map illustrating the assessment area in relation to the Mpumalanga Highveld Grasslands Wetlands (SANBI, 2012)

3.1.1.7 Important Bird & Biodiversity Areas

Important Bird & Biodiversity Areas (IBAs) are the sites of international significance for the conservation of the world's birds and other nature as identified by BirdLife International. These sites are also all Key Biodiversity Areas; sites that contribute significantly to the global persistence of biodiversity (Birdlife, 2017).

According to Birdlife International (2017), the selection of Important Bird and Biodiversity Areas (IBAs) is achieved through the application of quantitative ornithological criteria, grounded in up-to-date knowledge of the sizes and trends of bird populations. The criteria ensure that the sites selected as IBAs have true significance for the international conservation of bird populations and provide a common currency that all IBAs adhere to, thus creating consistency among, and enabling comparability between, sites at national, continental and global levels.

The assessment area does not overlap with an IBA and the closest IBA, the Devon Grasslands, is approximately 32 km away (Figure 3-11).

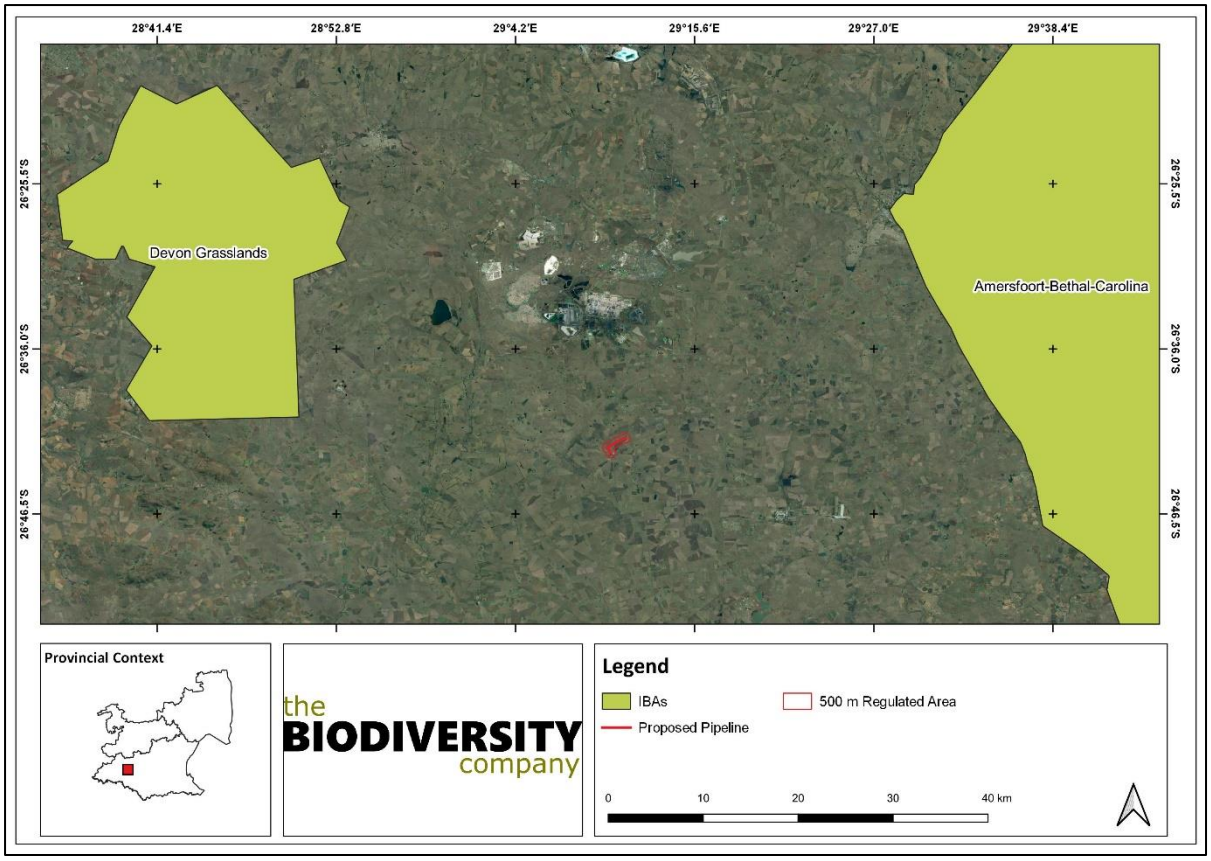

Figure 3-11 Map illustrating the assessment area in relation to Important Bird and Biodiversity Areas

3.1.2 Desktop Flora Assessment

3.1.2.1 Vegetation Type

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

a) Seasonal precipitation; and

b) The minimum temperatures in winter (Mucina & Rutherford, 2006).

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

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

The grassland biome comprises many different vegetation types. The assessment area is situated within the Soweto Highveld Grassland vegetation type (Figure 3-12).

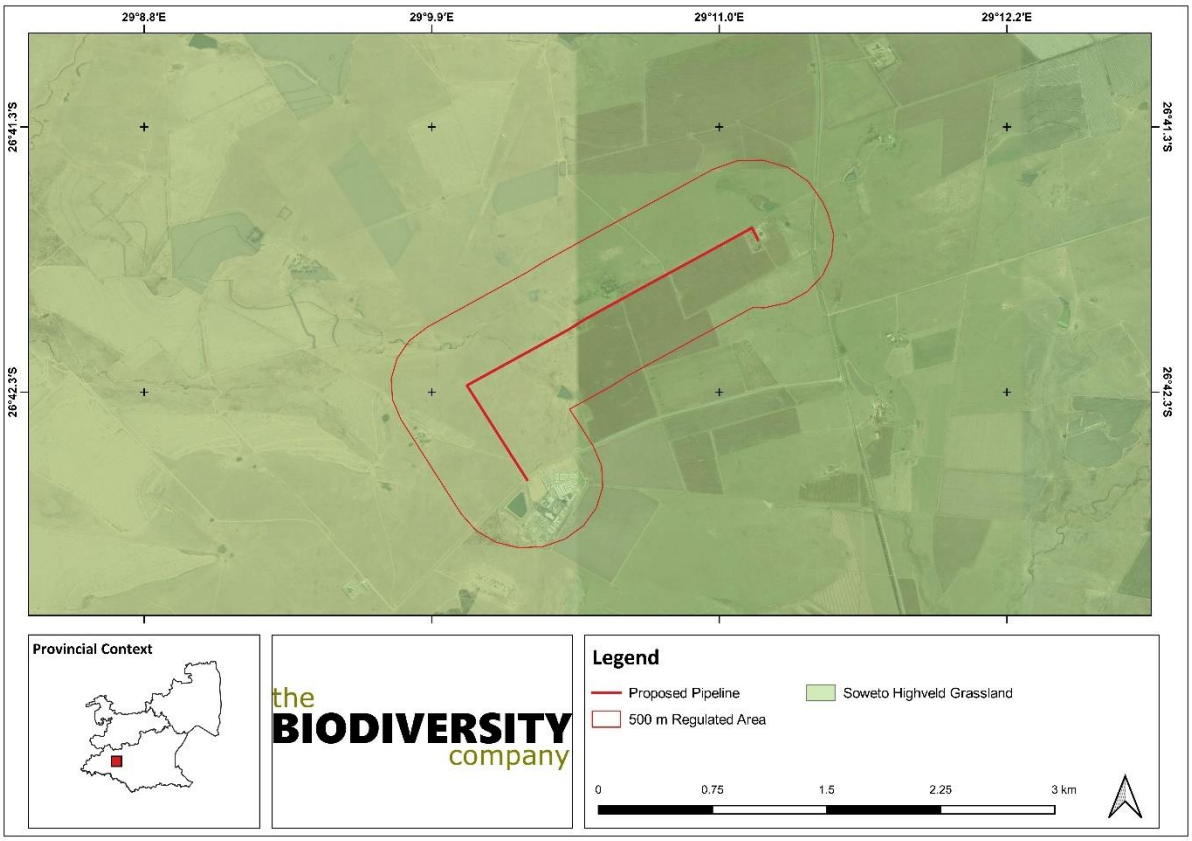

Figure 3-12 Map illustrating the vegetation type based on Mucina and Rutherford (2006), updated Dayaram and Skowno (2018), associated with the assessment area

The Soweto Highveld Grassland vegetation type is found in Mpumalanga, Gauteng and to a little extent also in neighbouring Free State and North-West Provinces. This vegetation type typically comprises of an undulating landscape on the Highveld plateau supporting short to medium-high, dense, tufted grassland dominated almost entirely by *Themeda triandra* and accompanied by a variety of other grasses such as *Elionurus muticus, Eragrostis racemosa, Heteropogon contortus* and *Tristachya leucothrix*. Scattered small wetlands, narrow stream alluvia, pans and occasional ridges or rocky outcrops interrupt the continuous grassland cover (Mucina & Rutherford, 2006).

Important Plant Taxa

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

- **Graminoids –** *Andropogon appendiculatus, Brachiaria serrata, Cymbopogon pospischilii, Cynodon dactylon, Elionurus muticus , Eragrostis capensis, E. chloromelas, E. curvula, E. plana, E. planiculmis, E. racemosa, Heteropogon contortus, Hyparrhenia hirta, Setaria nigrirostris, S. sphacelata, Themeda triandra, Tristachya leucothrix, Andropogon schirensis, Aristida adscensionis, A. bipartita, A. congesta, A. junciformis subsp. galpinii, Cymbopogon caesius, Digitaria diagonalis, Diheteropogon amplectens, Eragrostis micrantha, E. superba, Harpochloa falx, Microchloa caffra, Paspalum dilatatum*

- **Herbs –** *Hermannia depressa, Acalypha angustata, Berkheya setifera, Dicoma anomala, Euryops gilfillanii, Geigeria aspera var. aspera, Graderia subintegra, Haplocarpha scaposa, Helichrysum miconiifolium, H. nudifolium var. nudifolium, H. rugulosum, Hibiscus pusillus, Justicia anagalloides, Lippia scaberrima, Rhynchosia effusa, Schistostephium crataegifolium, Selago densiflora, Senecio coronatus, Vernonia oligocephala, Wahlenbergia undulata*

- **Geophytic Herbs** – *Haemanthus humilis* subsp*. hirsutus, H. montanus.*

- **Herbaceous Climber** – *Rhynchosia totta*

- **Low Shrubs** – *Anthospermum hispidulum, A. rigidum subsp. pumilum, Berkheya annectens, Felicia muricata, Ziziphus zeyheriana*

By 2006 nearly half of the area of occupancy of this vegetation type had already been transformed by cultivation, urban sprawl, mining and building of road infrastructure. The amount of area transformed has most likely increased substantially. Some areas of Soweto Grassland have been flooded by dams including the Grootdraai, Leeukuil, Trichardtsfontein, Vaal and Willem Brummer Dams.

3.1.2.2 Plant Species of Conservation Concern

Based on the Plants of Southern Africa (BODATSA-POSA, 2019) database, 257 plant species have the potential to occur in the assessment area and surrounding landscape (Appendix B). Of these 257 plant species, four (4) species are listed as being of conservation concern based on their conservation status (Table 3-3).

Table 3-3 Summary of plant species of conservation concern expected to occur within the assessment area

Family	Taxon	Conservation Status	Endemism	Habitat
Asphodelaceae	*Kniphofia typhoides*	NT	Endemic	Low lying wetlands and seasonally wet areas in climax *Themeda triandra* grasslands on heavy black clay soils. Tends to disappear from degraded grasslands.
Asteraceae	*Cineraria austrotransvaalensis*	NT	Endemic	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.
Hyacinthaceae	*Drimia elata*	DD		Sandy and clay soils in an array of habitats.
Iridaceae	*Gladiolus robertsoniae*	NT	Endemic	Moist highveld grasslands, found in wet, rocky sites, mostly dolerite outcrops, wedged in rock crevices.

Kniphofia typhoides is reported to have extensive declines in the population in the last 30 years as a result of habitat loss to coal mining, overgrazing by cattle, urban expansion (especially in Gauteng), crop cultivation in the eastern North West Province and alien plant invasion in western Mpumalanga and North West Province. The full extent of the decline is unknown but is suspected to be over 25%.

Cineraria austrotransvaalensis has an EOO of 20 000 km² and is known from only 12 locations. There is continuing decline in habitat due to urban expansion on ridges within Gauteng.

Drimia elata is widely distributed and occurs in the Eastern Cape, Free State, Gauteng, KwaZulu-Natal, Limpopo, Mpumalanga, Northern Cape and North West provinces. The species is regarded as an important medicinal plant. Population data is lacking and studies in this regard needs to be undertaken.

Gladiolus robertsoniae has an EOO of 12 783 km². The 10-20 locations continue to decline due to continuing habitat degradation arising from mining and overgrazing by livestock. Subpopulations are large and not severely fragmented. Agriculture is unlikely to have affected this species severely as moist rocky areas are unsuitable for ploughing and crop cultivation.

3.1.3 Desktop Faunal Assessment

3.1.3.1 Amphibians

Fifteen (15) species of amphibian are expected to occur within the assessment area according to the IUCN Spatial Data (Appendix C). None of these species are regarded as threatened.

3.1.3.2 Reptiles

Based on the IUCN Red List Spatial Data (IUCN, 2017) 13 reptile species have the potential to occur in the assessment area (Appendix D). A single threatened species is expected to occur within the assessment area.

Table 3-4 List of threatened reptile species that are expected to occur within the assessment area.

Species	Common Name	Conservation Status		Likelihood of occurrence
		Regional (SANBI, 2016)	IUCN (2017)	
Crocodylus niloticus	Nile Crocodile	VU	LC	Low

Crocodylus niloticus (Nile Crocodile) is listed as VU on a regional basis. The Nile crocodile is quite widespread throughout sub-Saharan Africa, in different types of aquatic environments such as lakes, rivers, and marshlands. Based on the close proximity of the urban area which will cause the species to be persecuted, the likelihood of occurrence of Nile crocodile is considered to be low.

3.1.3.3 Avifauna

Based on the South African Bird Atlas Project, Version 2 (SABAP2) database, 164 bird species have the potential to occur within the assessment area. The full list of potential bird species is provided in Appendix E. Of the potential bird species, eight (8) species are regarded as threatened either on a regional or global scale (

Table 3-5). These species comprise of the following:

- Five (5) species that are listed as NT on a regional scale;
- Two (2) species that are listed as VU on a global scale; and
- One (1) species that is listed as EN on a regional scale.

Table 3-5 List of threatened avifauna species that are expected to occur within the assessment area.

Family	Species	Common Name	Conservation Status		Likelihood of Occurrence
			Regional	Global	
Accipitridae	*Circus macrourus*	Pallid Harrier	NT	NT	Low
Accipitridae	*Circus ranivorus*	African Marsh-harrier	EN	LC	Low
Anatidae	*Oxyura maccoa*	Maccoa Duck	NT	VU	Low
Falconidae	*Falco vespertinus*	Red-footed Falcon	NT	NT	Moderate
Gruidae	*Anthropoides paradiseus*	Blue Crane	NT	VU	Low
Otididae	*Eupodotis caerulescens*	Blue Korhaan	NT	NT	Moderate
Phoenicopteridae	*Phoenicopterus minor*	Lesser Flamingo	NT	NT	Low
Phoenicopteridae	*Phoenicopterus ruber*	Greater Flamingo	NT	LC	Low

Anthropoides paradiseus (Blue Crane) is listed as NT on a regional scale and as VU on a global scale (BirdLife International, 2019). This species has declined, largely owing to direct poisoning, power-line collisions and loss of its grassland breeding habitat owing to afforestation, mining, agriculture and development. This species breeds in natural grass- and sedge-dominated habitats, preferring secluded grasslands at high elevations where the vegetation is thick and short. Due to the lack of open grassland areas or extensive wetlands within the project site the likelihood of occurrence is rated as low.

Circus macrourus (Pallid Harrier) is currently listed as NT (BirdLife International, 2018a). The species breeds primarily in the steppes of Asiatic Russia, Kazakhstan and north-west China. Small populations breed in Azerbaijan, Romania, Turkey and Ukraine. The species is migratory, with most birds wintering in sub-Saharan Africa or south-east Asia. They leave their breeding grounds between August and November and return in March and April. The global population is estimated at 9 000-15 000 pairs equating to 18,000-30,000 mature individuals. Considerable declines have been recorded and the principle threat is habitat degradation or loss within its breeding and over-wintering range.

Circus ranivorus (African Marsh Harrier) is listed as EN in South Africa (ESKOM, 2014). This species has an extremely large distributional range in sub-equatorial Africa. South African populations of this species are declining due to the degradation of wetland habitats, loss of habitat through over-grazing and human disturbance and possibly, poisoning owing to over-use of pesticides (BirdLife International, 2016). This species breeds in wetlands and forages primarily over reeds and lake margins.

Eupodotis caerulescens (Blue Korhaan) is listed as NT according to the IUCN (BirdLife International, 2017a). Their moderately rapid decline is accredited to habitat loss that is a result of intensive agriculture. They are found in high grassveld in close proximity to water, usually above an altitude of 1500m. The specie nests in bare open ground, situated in thick grass or cropland.

Falco vespertinus (Red-footed Falcon) is currently listed as NT (BirdLife International, 2018b) known to breed from eastern Europe and northern Asia to north-western China, heading south in the non-breeding season to southern Angola and southern Africa. Within southern Africa it

is locally uncommon to common in Botswana, northern Namibia, central Zimbabwe and the area in and around Gauteng, South Africa (Hockey et al, 2005). The habitat it generally prefers open habitats with scattered trees, such as open grassy woodland, wetlands, forest fringes and croplands.

Oxyura maccoa (Maccoa Duck) is presently listed as VU (BirdLife International, 2017b). During the species' breeding season, it inhabits small temporary and permanent inland freshwater lakes, preferring those that are shallow and nutrient-rich with extensive emergent vegetation such as reeds (*Phragmites* spp.) and cattails (*Typha* spp.) on which it relies for nesting. The correlation between population trends and threats are poorly understood. Pollution is a primary concern, since the species feeds mainly on benthic invertebrates, and is therefore more vulnerable to bio-accumulation of pollutants than other duck species. Habitat loss as a result of the drainage and conversion of wetland areas is also a considerable threat.

Phoeniconaias minor (Lesser Flamingo) is listed as NT on a global scale (BirdLife International, 2018c), whereas *Phoenicopterus roseus* (Greater Flamingo) is listed as NT on a regional scale only. Both species have similar habitat requirements and the species breed on large undisturbed alkaline and saline lakes, salt pans or coastal lagoons, usually far out from the shore after seasonal rains have provided the flooding necessary to isolate remote breeding sites from terrestrial predators and the soft muddy material for nest building. Only three main breeding sites exist in Africa for *P. minor*, all facing threats and requiring protection. Threats include land-claim, water pollution, collisions with electric wires and soda-ash mining.

3.1.3.4 Mammals

The IUCN Red List Spatial Data (IUCN, 2017) lists 72 indigenous mammal species that could be expected to occur within the assessment area (Appendix F). This expected species list excludes the larger bovid species that tend to be restricted to protected areas.

Of the 72 small to medium sized mammal species, thirteen (13) are listed as being of conservation concern on a regional or global basis (Table 3-6). The list of potential species includes:

- Three (3) that are listed as EN on a regional basis;
- Five (5) that are listed as VU on a regional basis; and
- Seven (7) that are listed as NT on a regional scale.

On a global scale, 1 species is listed as EN, 2 are listed as VU and 6 as NT (Table 3-6).

Table 3-6 List of threatened mammal species that are expected to occur in the assessment area.

Family	Species	Common Name	Conservation Status		Likelihood of occurrence
			Regional	Global	
Bovidae	*Ourebia ourebi*	Oribi	EN	LC	Low
Bovidae	*Pelea capreolus*	Grey Rhebok	NT	NT	Low
Bovidae	*Redunca fulvorufula*	Mountain Reedbuck	EN	LC	Low
Chrysochloridae	*Amblysomus septentrionalis*	Highveld Golden Mole	NT	NT	Low

Felidae	*Felis nigripes*	Black-footed Cat	VU	VU	Low
Felidae	*Leptailurus serval*	Serval	NT	LC	Moderate
Felidae	*Panthera pardus*	Leopard	VU	VU	Low
Hyaenidae	*Parahyaena brunnea*	Brown Hyaena	NT	NT	Low
Mustelidae	*Aonyx capensis*	Cape Clawless Otter	NT	NT	Low
Mustelidae	*Hydrictis maculicollis*	Spotted-necked Otter	VU	NT	Moderate
Mustelidae	*Poecilogale albinucha*	African Striped Weasel	NT	LC	Low
Nesomyidae	*Mystromys albicaudatus*	White-tailed Rat	VU	VU	Moderate
Pteropodidae	*Eidolon helvum*	African Straw-colored Fruit Bat	LC	NT	Low

Aonyx capensis (Cape Clawless Otter) is the most widely distributed otter species in Africa. This species is predominantly aquatic, and it is seldom found far from water. The main threat to the species is the declining state of freshwater ecosystems in Africa. In parts of their range, they are killed for skins and other body parts, because they are regarded as competitors for food, particularly in rural areas where fishing is an important source of income, or where they are believed to be responsible for poultry losses, and damage to young maize plants.

Eidolon helvum (African Straw-coloured Fruit-bat) is widely distributed throughout sub-saharan Africa across the lowland rainforest and savanna zones. The species is regarded as adaptable as it has been recorded from an array of habitats. It is most commonly found in moist and dry tropical rain forest, including evergreen forest habitats in the form of coastal (including mangrove) and riverine forest, through moist and dry savanna and mosaics of these and similar habitat types. Populations can persist in modified habitats and the species is often recorded in wooded spaces in urban areas. Nevertheless, the species is regarded as NT due to significant declines at an estimated rate of 25–30% over the past 15 years (Cooper-Bohannon *et al*, 2020). Habitat loss, persecution and hunting are considered to be the major threats. It is the most heavily harvested bat for bushmeat in West and Central Africa, and one of the most frequently consumed mammals in this region. In some areas this species is considered to be a pest and roosting trees may be cut down. Large pre-migration colonies are considered particularly vulnerable to any threats.

Felis nigripes (Black-footed cat) is endemic to the arid regions of southern Africa. This species is naturally rare, has cryptic colouring is small in size and is nocturnal. These factors have contributed to a lack of information on this species. The principle long-term threat for the species is the loss of key resources, such as den sites and prey, from anthropogenic disturbance or habitat degradation (Sliwa *et al*, 2016). An additional threat is indirect persecution, such as accidental poisonings (for example locust spraying, predator control lures/baits) and general predator persecution throughout most of their range. The long-term effects of climate change should not be overlooked and may lead to changes in range, changes in timing of breeding events, increases in severe weather such as flooding and droughts, as well as increased disease patterns or risks of the spread of pathogens from parasites.

Hydrictis maculicollis (Spotted-necked Otter) inhabits freshwater habitats where water is un-silted, unpolluted, and rich in small to medium sized fishes. The species is decreasing throughout its range, mainly as a result of the alteration or degradation of freshwater habitats

and riparian vegetation. This rapid habitat loss is exacerbated by a growing population engaged in unsustainable agricultural activity and unsustainable fishing practices. There is evidence of the bioaccumulation of organochlorines and other biocontaminants recorded in Spotted-necked Otters (Reed-Smith *et al*, 2015).

Leptailurus serval (Serval) occurs widely through sub-Saharan Africa and is commonly recorded from most major national parks and reserves (IUCN, 2017). The Serval's status outside reserves is not certain, but they are inconspicuous and may be common in suitable habitat as they are tolerant of farming practices provided there is cover and food available. In sub-Saharan Africa, they are found in habitat with well-watered savanna long-grass environments and are particularly associated with reedbeds and other riparian vegetation types. The major threat is wetland habitat loss and degradation. Wetlands possess higher rodent densities when compared with other habitat types, and form the core areas of Serval home ranges. A secondary threat is the degradation of grasslands through annual burning followed by over-grazing by domestic livestock, which leads to the reduced abundance of small mammals.

Mystromys albicaudatus (White-tailed Rat) is relatively widespread across South Africa and Lesotho and is known to occur in shrubland and grassland areas. A major requirement of the species is black loam soils with good vegetation cover. Currently, the number of mature individuals is estimated to be 6 997-13 648, with a decreasing trend (Avenant *et al*, 2019). The greatest threat to this species is habitat loss of grasslands, both from agricultural and industrial or urban expansion, as well as in the future from climate change through bush encroachment. Suppression of fire is suspected to be the next most severe threat, as the microhabitats that the species requires are not created or recycled.

Ourebia ourebi (Oribi) has a patchy distribution throughout Africa. It occurs occur in a variety of habitats, ranging from savannahs, floodplains and tropical grasslands with moderate to tall grasses, to montane grasslands at low altitudes. Populations are becoming more fragmented as it is gradually eliminated from moderately to densely settled areas (IUCN, 2017).

Panthera pardus (Leopard) has a wide distributional range across Africa and Asia, but populations have become reduced and isolated, and they are now extirpated from large portions of their historic range (IUCN, 2017). Impacts that have contributed to the decline in populations of this species include continued persecution by farmers, habitat fragmentation, increased illegal wildlife trade, excessive harvesting for ceremonial use of skins, prey base declines and poorly managed trophy hunting (IUCN, 2017).

Parahyaena brunnea (Brown Hyaena) is endemic to southern Africa. This species occurs in dry areas, generally with annual rainfall less than 100 mm, particularly along the coast, semi-desert, open scrub and open woodland savanna. Outside protected areas, the Brown Hyaena may come into conflict with humans, and they are often shot, poisoned, trapped and hunted with dogs in predator eradication or control programmes, or inadvertently killed in non-selective control programs. The Brown Hyaena is regarded as a threat to livestock in some areas, despite the finding that Brown Hyaenas very seldom prey on livestock. Their body parts are also used in traditional medicine.

Pelea capreolus (Grey Rhebok) is endemic to a small region in southern Africa, inhabiting montane and plateau grasslands of South Africa, Swaziland, and Lesotho. In South Africa, their distribution is irregular and patchy, and they no longer occur north of the Orange River in

the Northern Cape, or in parts of the North-West Province (IUCN, 2017). Grey Rhebok can be found in suitable habitat which has rocky hills, grassy mountain slopes, and montane and plateau grasslands in southern Africa. They are predominantly browsers, and largely water independent, obtaining most of their water requirements from their food. The principle threat is suspected to be increased levels of bushmeat consumption and illegal sport hunting with dogs.

Poecilogale albinucha (African Striped Weasel) is usually associated with savanna habitats, although it probably has a wider habitat tolerance (IUCN, 2017). Due to its secretive nature, it is often overlooked in many areas where it does occur. The primary threat to the species is hunting for traditional medicine use.

Redunca fulvorufula (Mountain Reedbuck) is listed as EN both regionally and globally. The South African population has undergone a decline of 61-73% in the last three generations (15 years) (IUCN SSC Antelope Specialist Group, 2017). Mountain Reedbuck live on ridges and hillsides in broken rocky country and high-altitude grasslands (often with some tree or bush cover). The main threats to Mountain Reedbuck include the expansion of human settlement, poaching, widespread disturbance by cattle herders and their livestock, and hunting by dogs.

4 Field Survey

4.1 Flora Assessment

The vegetation assessment was conducted throughout the extent of the project area. A total of 52 tree, shrub and herbaceous plant species were recorded in the project area during the field assessment (Table 4-1).). Plants listed as Category 1 alien or invasive species under the National Environmental Management: Biodiversity Act (NEMBA) appear in green text. Plants listed in Category 2 or as 'not indigenous' or 'naturalised' according to NEMBA, appear in blue text. Some of the plant species recorded can be seen in Figure 4-1.

4.1.1 Protected plant species

One individual of a protected plant species that are protected by the Mpumalanga Nature Conservation Act 10 of 1998: Schedule 11 was recorded (Mpumalanga Tourism and Parks Agency, 1998) (Table 4-1). According to the list of protected species under Schedule 11; no person may cut, disturb, damage or destroy any protected tree or possess, collect, remove, transport, export, purchase, sell, donate, or in any other manner acquire or dispose of any protected plant unless he or she is the holder of a permit which authorises him or her to do, and the locations mapped can be seen in Figure 4-5.

Table 4-1 Trees, shrubs and weeds recorded in the project area.

Scientific Name	Common Name	Threat Status (SANBI, 2017)	SA Endemic	Alien Category
Aristida junciformis	Wire Grass	LC	Not Endemic	
Asclepias gibba	Humped Turret-flower	LC	Not Endemic	
Berkheya echinacea	Iphungula	LC	Not Endemic	
Berkheya pinnatifida	Isihlungu	LC	Not Endemic	

Bidens pilosa	Blackjack			Naturalized exotic weed
Cuscuta campestris	Common Dodder			Naturalized exotic weed
Chlorophytum cooperi		LC	Not Endemic	
Cirsium vulgare	Spear Thistle			NEMBA Category 1b
Conyza bonariensis	Hairy Fleabane			Naturalized exotic weed
Cosmos bipinnatus	Cosmos			Naturalized exotic weed
Cotula anthemoides		LC	Not Endemic	
Cyanotis speciosa	Doll's Powderpuff	LC	Not Endemic	
Cymbopogon caesius	Broad-leaved turpentine grass	LC	Not Endemic	
Cynodon dactylon	Couch Grass, Quick Grass	LC	Not Endemic	
Datura ferox	Large Thorn Apple			NEMBA Category 1b.
Datura stramonium	Common Thorn Apple			NEMBA Category 1b.
Digitaria eriantha	Finger Grass	LC	Not Endemic	
Eragrostis chloromelas	Blue Love Grass	LC	Not Endemic	
Eragrostis curvula	Weeping Love Grass	LC	Not Endemic	
Eragrostis gummiflua	Gum Grass	LC	Not Endemic	
Eragrostis lehmanniana	Lehman Love Grass	LC	Not Endemic	
Eragrostis superba	Heart-seed Grass	LC	Not Endemic	
Felicia muricata	Taai-Astertjie	LC	Not Endemic	
Gladiolus elliotii		LC-Mpumalanga Schedule 11 Protected	Not Endemic	
Gomphrena celosioides	Bachelor's button			Naturalized exotic weed
Gomphocarpus fruticosus	Narrow-leaved cotton bush	LC	Not Endemic	
Haplocarpha scaposa	Tonteldoosbossie	LC	Not Endemic	
Helichrysum acutatum	Sticky Everlasting	LC	Not Endemic	
Helichrysum caespititium	Speelwonderboom	LC	Not Endemic	
Helichrysum nudifolium	Hottentot's Tea	LC	Not Endemic	
Helichrysum nudifolium	Hottentot's Tea	LC	Not Endemic	
Helichrysum rugulosum	Marotole (SS)	LC	Not Endemic	
Hermannia transvaalensis		LC	Not Endemic	
Heteropogon contortus	Speargrass	LC	Not Endemic	
Hyparrhenia hirta	Common Thatching Grass	LC	Not Endemic	
Hypoxis rigidula	Silver-leaved Star-flower	LC	Not Endemic	
Melinis repens	Natal Red Top	LC	Not Endemic	
Osteospermum muricatum	Bietou	LC	Not Endemic	

Paspalum dilatatum	Dallis Grass			Naturalized exotic weed
Pelargonium dolomiticum		LC	Not Endemic	
Pennisetum clandestinum	Kikuyu Grass			NEMBA Category 1b in protected areas and wetlands.
Pollichia campestris	Barley Sugar Bush	LC	Not Endemic	
Scabiosa columbaria	Jongmansknoop	LC	Not Endemic	
Schkuhria pinnata	Dwarf Marigold			Naturalized exotic weed
Setaria sphacelata var sphacelata	Common Bristle Grass	LC	Not Endemic	
Sporobolus africanus	Ratstail Dropseed	LC	Not Endemic	
Tagetes minuta	Khaki Bush			Naturalized exotic weed
Tamarix ramosissima	Pink Tamarisk			NEMBA Category 1b.
Themeda triandra	Red Grass	LC	Not Endemic	
Typha capensis	Bulrush, Common Cattail	LC	Not Endemic	
Verbena bonariensis	Wild Verbena			NEMBA Category 1b.
Zea mays	Maize			Foodplant

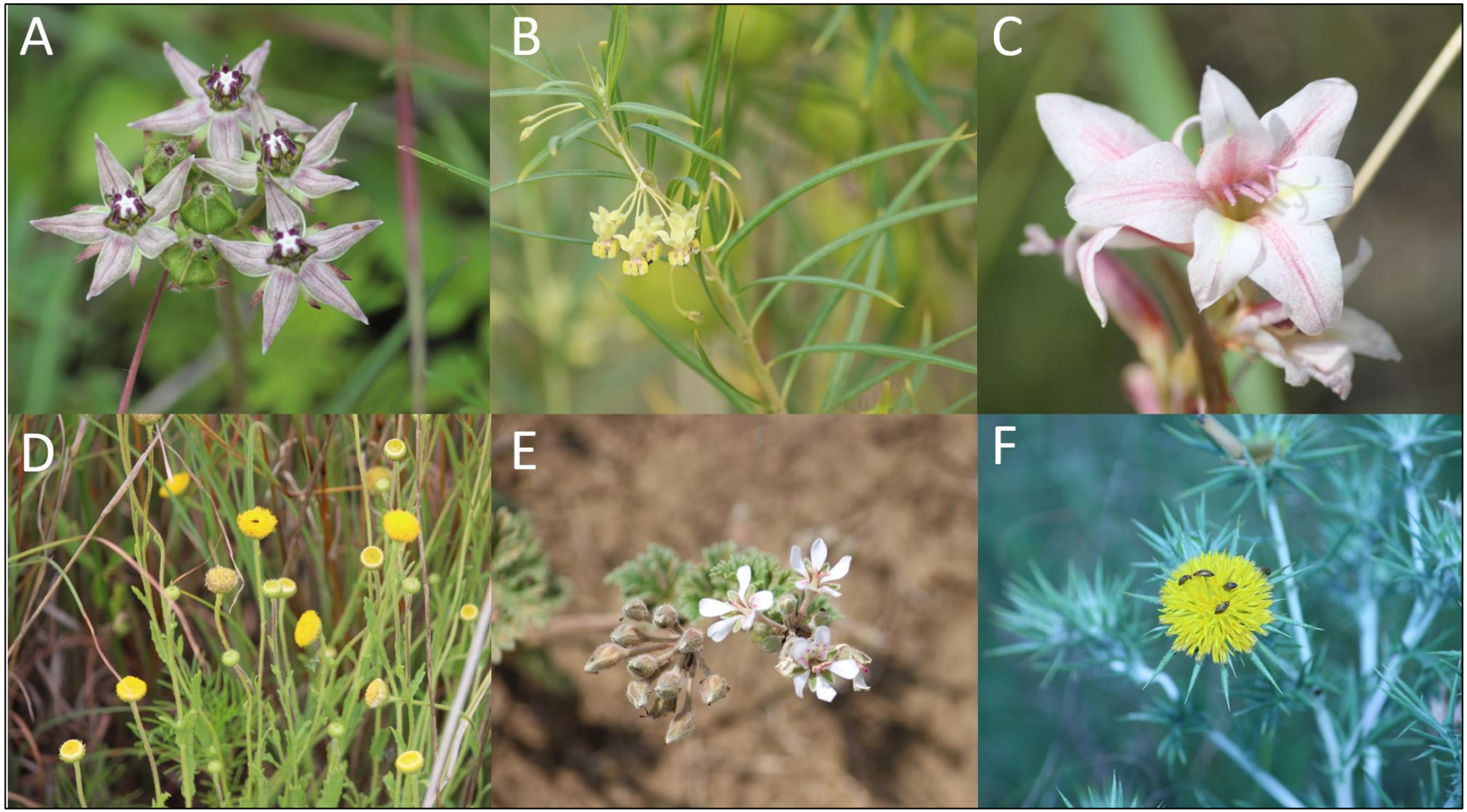

Figure 4-1 ***Some of the flora species recorded in the project area: A) Asclepias gibba, B) Gomphocarpus fruticosus, C) Gladiolus elliotii, D) Cotula anthemoides, E) Pelargonium dolomiticum), F) Berkheya pinnatifida***

4.1.2 Alien and Invasive Plants

Declared weeds and invader plant species have the tendency to dominate or replace the canopy or herbaceous layer of natural ecosystems, thereby transforming the structure, composition, and function of these systems. Therefore, it is important that these plants are controlled and eradicated by means of an eradication and monitoring programme. Some invader plants may also degrade ecosystems through superior competitive capabilities to exclude native plant species.

The National Environmental Management: Biodiversity Act (NEMBA) is the most recent legislation pertaining to alien invasive plant species. In August 2014, the list of Alien Invasive Species was published in terms of the National Environmental Management: Biodiversity Act (Act 10 of 2004) (Government Gazette No 78 of 2014). The Alien and Invasive Species Regulations were published in the Government Gazette No. 37886, 1 August 2014, and was amended in February 2018 in the Government Gazette No. 41445. The legislation calls for the removal and / or control of alien invasive plant species (Category 1 species). In addition, unless authorised thereto in terms of the National Water Act, 1998 (Act No. 36 of 1998), no land user shall allow Category 2 plants to occur within 30 meters of the 1:50 year flood line of a river, stream, spring, natural channel in which water flows regularly or intermittently, lake, dam or wetland. Category 3 plants are also prohibited from occurring within proximity to a watercourse.

Below is a brief explanation of the three categories in terms of the National Environmental Management: Biodiversity Act (Act 10 of 2004) (NEMBA):

- Category 1a: Invasive species requiring compulsory control. Remove and destroy. Any specimens of Category 1a listed species need, by law, to be eradicated from the environment. No permits will be issued.
- Category 1b: Invasive species requiring compulsory control as part of an invasive species control programme. Remove and destroy. These plants are deemed to have such a high invasive potential that infestations can qualify to be placed under a government sponsored invasive species management programme. No permits will be issued.
- 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.
- 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.

Note that according to the regulations, a person who has under his or her control a category 1b listed invasive species must immediately:

- Notify the competent authority in writing
- Take steps to manage the listed invasive species in compliance with:
    - Section 75 of the Act;

- The relevant invasive species management programme developed in terms of regulation 4; and
- Any directive issued in terms of section 73(3) of the Act.

Six (6) alien and/or invasive plants were recorded during the field survey within the project area. It is recommended that an Alien Plant Species Management Plan be implemented within the project areas in order to prevent the prospecting activities and movement exacerbating the infestation.

4.2 Faunal Assessment

The faunal assessment was completed based on the desktop review biodiversity surveys which were conducted across the project area.

4.2.1 Avifauna

Thirty-Three (33) bird species were recorded in the project area during the January 2021 survey based on either direct observation, vocalisations, or the presence of visual tracks & signs.

Table 4-2 Avifaunal species recorded in the project area

Species	Common Name	Conservation Status	
		Regional (SANBI, 2016)	IUCN (2017)
Alopochen aegyptiacus	Goose, Egyptian	Unlisted	LC
Anas undulata	Duck, Yellow-billed	Unlisted	LC
Ardea melanocephala	Heron, Black-headed	Unlisted	LC
Asio capensis	Owl, Marsh	Unlisted	LC
Bostrychia hagedash	Ibis, Hadeda	Unlisted	LC
Calandrella cinerea	Lark, Red-capped	Unlisted	LC
Charadrius tricollaris	Plover, Three-banded	Unlisted	LC
Cisticola juncidis	Cisticola, Zitting	Unlisted	LC
Cisticola tinniens	Cisticola, Levaillant's	Unlisted	LC
Coturnix coturnix	Quail, Common	Unlisted	LC
Crithagra atrogularis	Canary, Black-throated	Unlisted	LC
Elanus caeruleus	Kite, Black-shouldered	Unlisted	LC
Estrilda astrild	Waxbill, Common	Unlisted	LC
Euplectes afer	Bishop, Yellow-crowned	Unlisted	LC
Euplectes orix	Bishop, Southern Red	Unlisted	LC
Euplectes progne	Widowbird, Long-tailed	Unlisted	LC
Falco rupicoloides	Kestrel, Greater	Unlisted	LC
Fulica cristata	Coot, Red-knobbed	Unlisted	LC
Lamprotornis bicolor	Starling, Pied	Unlisted	LC
Lanius collaris	Fiscal, Common (Southern)	Unlisted	LC
Macronyx capensis	Longclaw, Cape	Unlisted	LC
Motacilla capensis	Wagtail, Cape	Unlisted	LC

Myrmecocichla formicivora	Chat, Anteating	Unlisted	LC
Numida meleagris	Guineafowl, Helmeted	Unlisted	LC
Passer diffusus	Sparrow, Southern Grey-headed	Unlisted	LC
Plectropterus gambensis	Goose, Spur-winged	Unlisted	LC
Ploceus velatus	Masked-weaver, Southern	Unlisted	LC
Pternistis swainsonii	Spurfowl, Swainson's	Unlisted	LC
Saxicola torquatus	Stonechat, African	Unlisted	LC
Streptopelia senegalensis	Dove, Laughing	Unlisted	LC
Threskiornis aethiopicus	Ibis, African Sacred	Unlisted	LC
Vanellus armatus	Lapwing, Blacksmith	Unlisted	LC
Vidua macroura	Whydah, Pin-tailed	Unlisted	LC

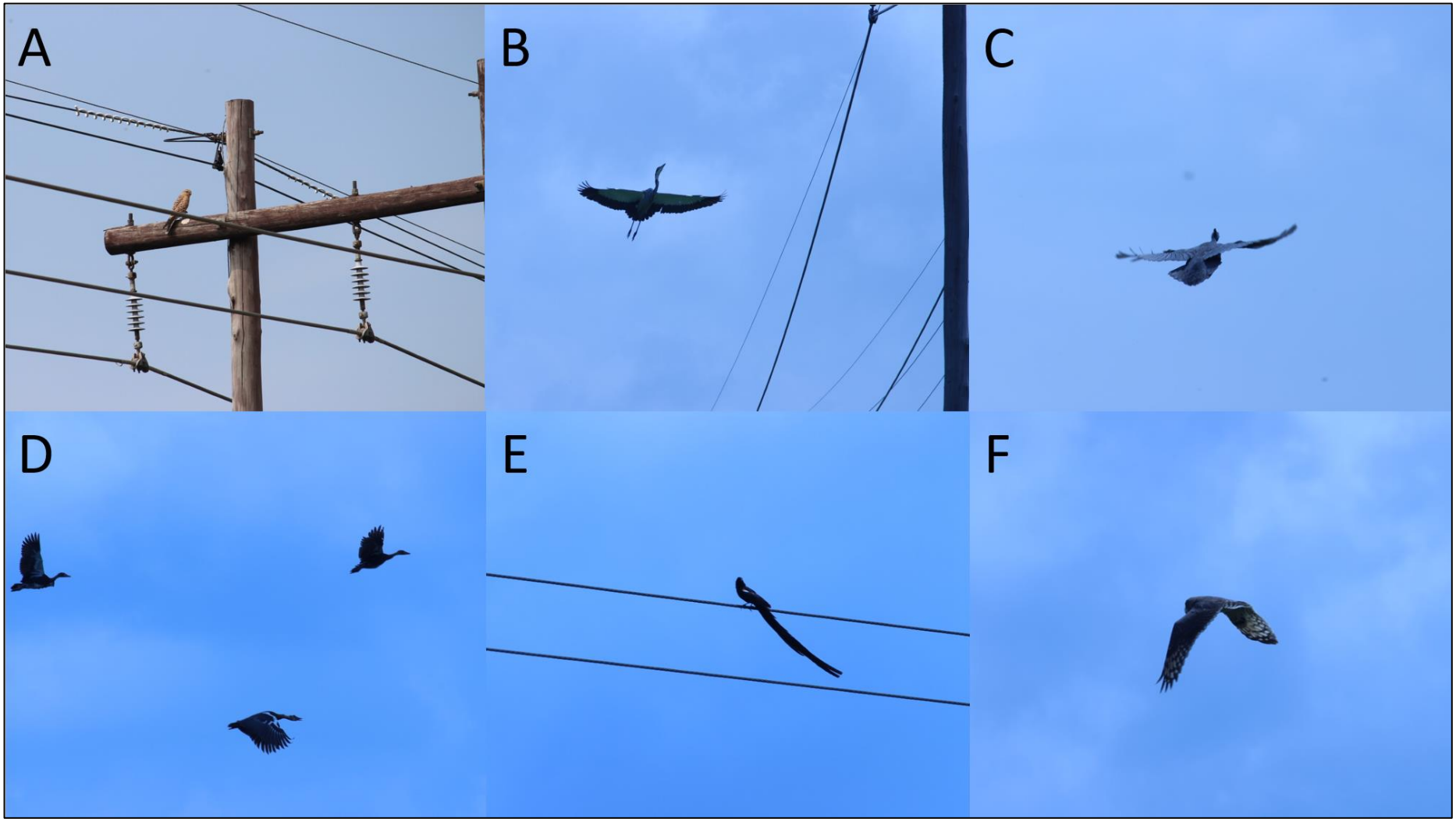

Figure 4-2 A) Greater Kestrel (Falco rupicoloides), B) Black-headed Heron, (Ardea melanocephala), C) Helmeted Guineafowl, (Numida meleagris), D) Spur-winged Goose, (Plectropterus gambensis), E) Long-tailed Widowbird, (Euplectes progne), F) Marsh Owl, (Asio capensis)

4.2.2 Mammals

Four (4) mammal species were recorded in the project area during the surveys; based on either direct observation or the presence of visual tracks & signs (Table 4-3 and Figure 4-3)

Table 4-3 Mammal species recorded in the project area

Species	Common Name	Conservation Status	
		Regional (SANBI, 2016)	IUCN (2017)
Hystrix africaeaustralis	Cape Porcupine	LC	LC
Lepus saxatilis	Scrub Hare	LC	LC
Sylvicapra grimmia	Common Duiker	LC	LC
Xerus inauris	Cape Ground Squirrel	LC	LC

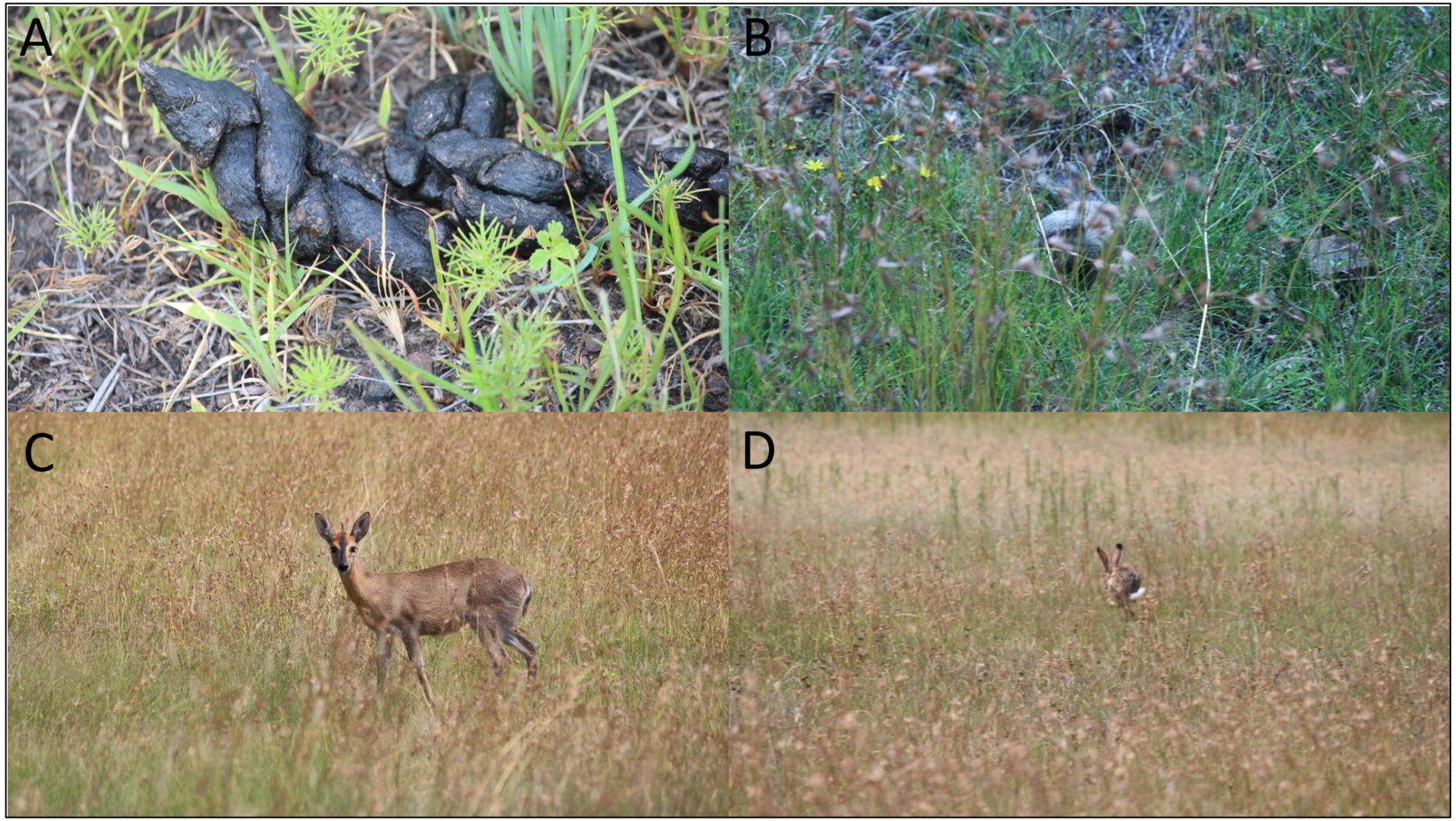

Figure 4-3 ***Some of the mammal species recorded in the project area: A) Cape Porcupine (Hystrix africaeaustralis), B) Cape Ground Squirrel (Xerus inauris), C) Common Duiker (Sylvicapra grimmia), D) Scrub Hare (Lepus saxatilis).)***

4.2.3 Herpetofauna

Herpetofauna diversity was considered to be low with no species recorded in the project area during the survey.

4.3 Habitat Assessment

The main habitat types identified across the project area were initially identified largely based on aerial imagery. These main habitat types were refined based on the field coverage and data collected during the survey. The delineated habitats can be seen in Figure 4-4 and Figure 4-5, whereas in Figure 4-6 is an illustration of these habitats from the project area. Emphasis was placed on limiting timed meander searches within the natural habitats and therefore habitats with a higher potential of hosting SCC. Each of the habitats identified are discussed in the sub-sections below.

Degraded Mesic Grassland

This degraded Mesic Grassland habitat includes grassland areas that is connected to and plays a crucial role with the wetland habitats. This habitat type is regarded as semi-natural grassland, but slightly disturbed due to grazing by livestock, old pipeline servitudes and also human infringement in areas close to roads. The current ecological condition of this habitat in regard to the main driving forces, are intact; which is evident in the amount of, and importance of the species recorded in the faunal assessment, and also to the high species diversity and number of plant species recorded.

The main ecological characteristics of this grassland, which forms part of the Mesic Highveld Grassland system, include (SANBI,2013):

- Climate; warm, wet summers and cool, dry winters that result in a long growing (6 months) season creating high primary productivity;
- High natural incidence of fire, resulting in the treeless character of these grasslands;
- Grazing, if moderately stocked, these grasslands are well adapted to manage the pressure;
- Life-history strategies; due to the environmental conditions, the vegetation that dominate, are long lived perennial species, which reproduces vegetative, thus any impact where areas are cleared, these areas are colonised by annual weeds as there are little seed in the topsoil or indigenous annual species;
- Hydrological characteristics: Mesic Highveld grasslands are located in high rainfall regions and are vitally important for water production; and
- Geology; The underlying geology correlates to high levels of plant species richness and endemism.

This habitat unit can thus be regarded as important, not only within the within the local landscape, but also regionally; it acts as the only remaining greenlands, used for habitat, foraging area and movement corridors for fauna within a landscape fragmented by agriculture and mining to more natural areas where they may reproduce. The habitat sensitivity of the habitat is regarded as high due to the role of this habitat to biodiversity within a very fragmented local landscape, not to mention the various ecological datasets which class it as CBA: Optimal.

The spatial guidelines for land use for these grasslands that are relevant to this project area include (SANBI,2013);

- Avoid any further fragmentation of primary grassland;
- Maintain connectivity between natural areas across the landscape;
- Direct impacting activities away from grasslands on dolomitic substrates; and
- Establish and respect buffers around protected areas, wetlands and rivers.

Wetlands and watercourses

This habitat unit represents the wetland areas as well as watercourse areas with the adjacent Mesic Grassland that it is connected to. This habitat was identified and delineated in the Wetland Assessment compiled by The Biodiversity Company (2020).

Even though somewhat disturbed, the ecological integrity, importance and functioning of these areas play a crucial role as a water resource system and an important habitat for various fauna and flora. The preservation of this system is the most important aspect to consider for the proposed development, even more so due to the high sensitivity of the area according to the various ecological datasets. This habitat needs to be protected and improved due to the role of this habitat as a water resource.

Transformed

This habitat unit represents all areas of agriculture farms or infrastructure and includes agricultural lands as well as the associated roads. Due to the transformed nature of this habitat, it is unlikely ever to return to a natural state and is thus regarded as having a low sensitivity.

Modified

This habitat are areas where the grassland has been altered due to historic and or recent impacts. This habitat is regarded as modified due to the nature of the modification of the area to such a point where it wouldn't be able to return to its previous state without anthropogenic influence. It was observed that excavations and a road occur along the current pipeline route have occurred in the past and is located between the current powerlines (existing servitude) (Figure 4-7). It is visible one the Google Earth Historic imagery, this disturbed area, even though it occurs within the degraded Mesic Grassland, will form part of the modified habitat and should be used for the alignment for the proposed pipeline to avoid affecting the highly sensitive areas. Due to the nature of this habitat, it is regarded as having a low sensitivity.

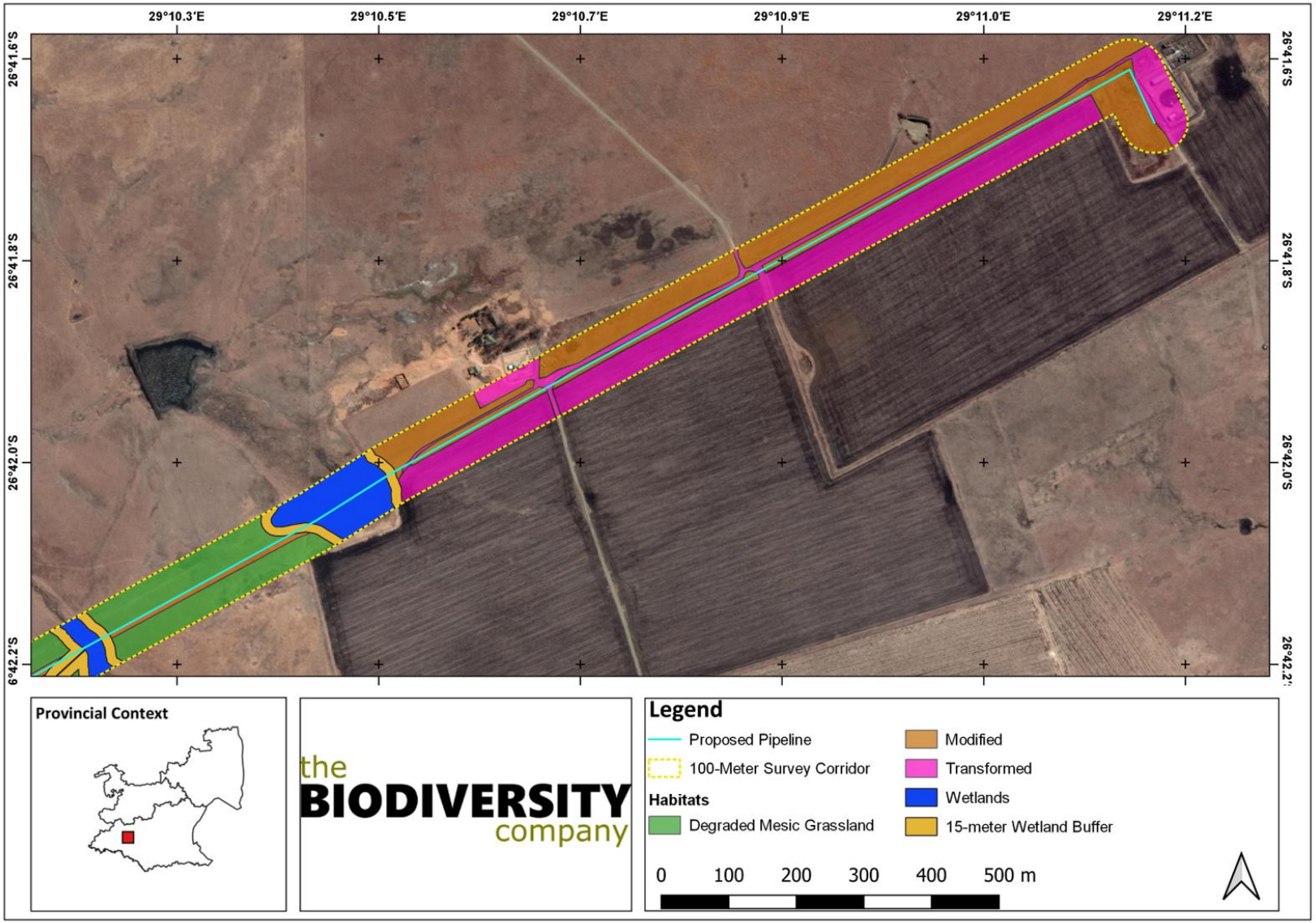

Figure 4-4 Habitats identified and delineated within the project area.

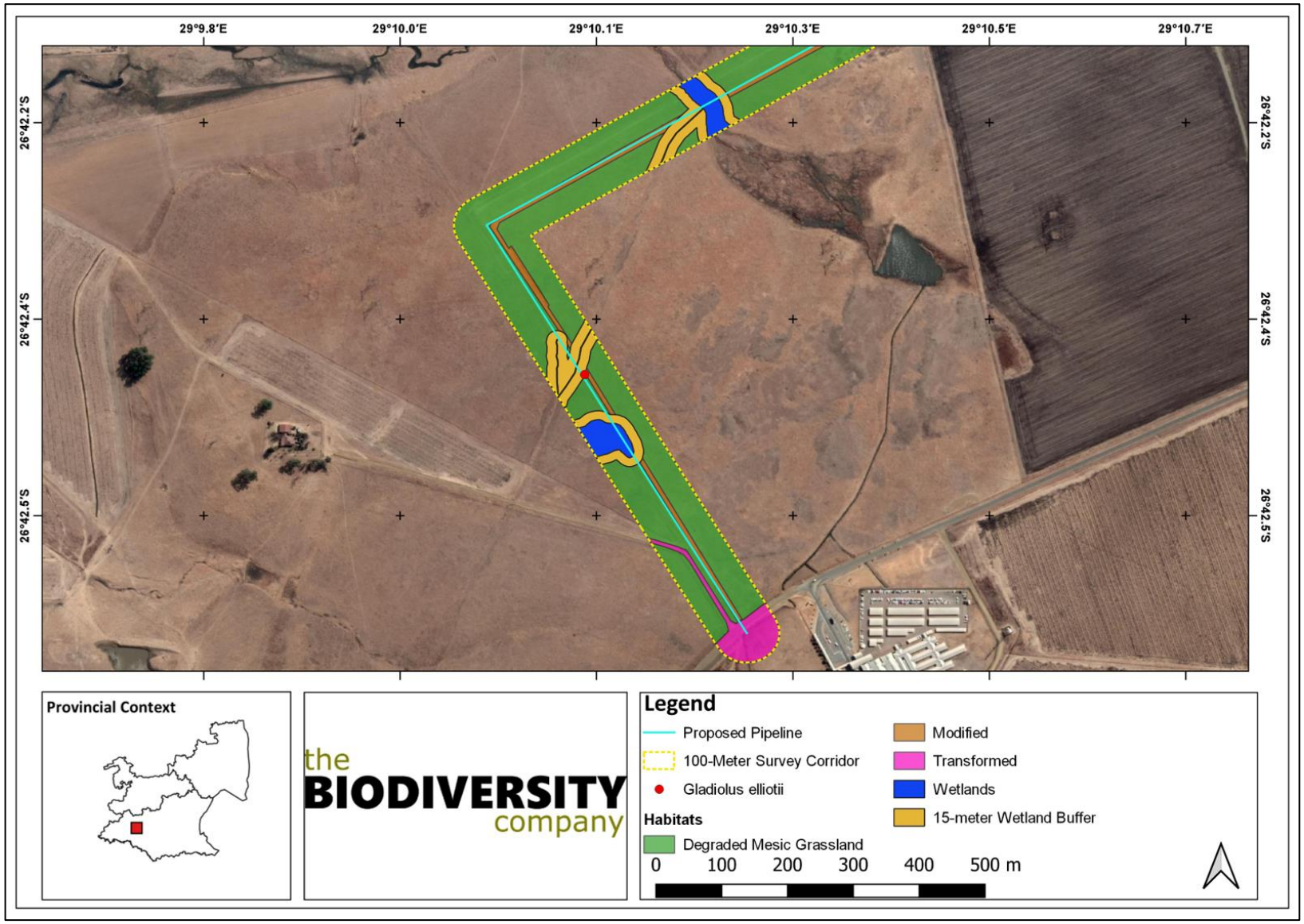

Figure 4-5 Habitats identified and delineated within the project area.

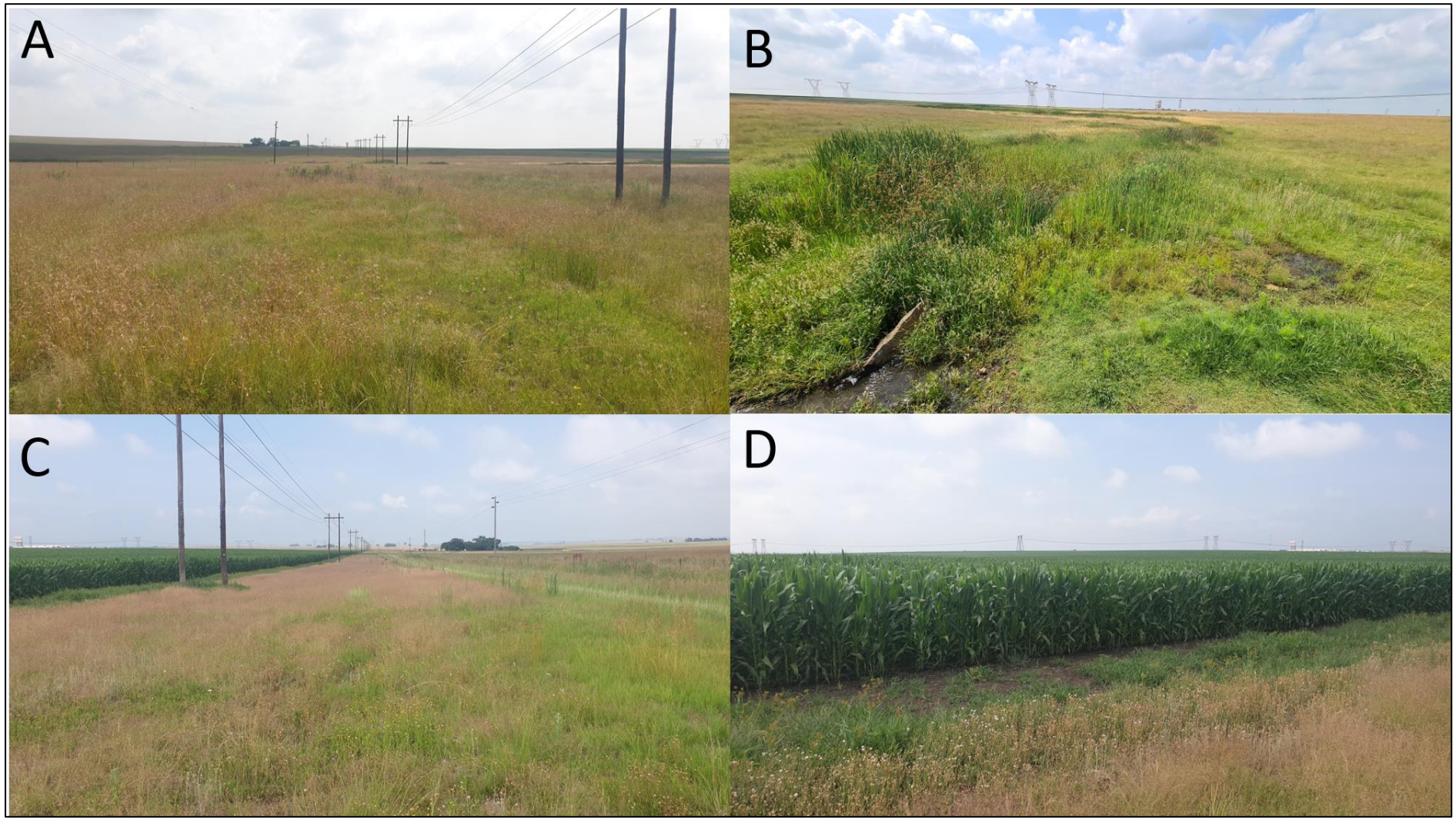

Figure 4-6 Photographs of the habitats observed during the field visit: A) Degraded Mesic Grassland, B) Wetlands, C) Modified Grassland and D) Transformed

Figure 4-7 Photographs of the previously modified area (Red arrow) in close relation to the powerlines which is the preferable area to where the proposed pipeline should be placed.

5 Sensitivity Analysis

5.1 Terrestrial Sensitivity

The biodiversity theme sensitivity as indicated in the screening report was derived to be Very High (Figure 5-1).

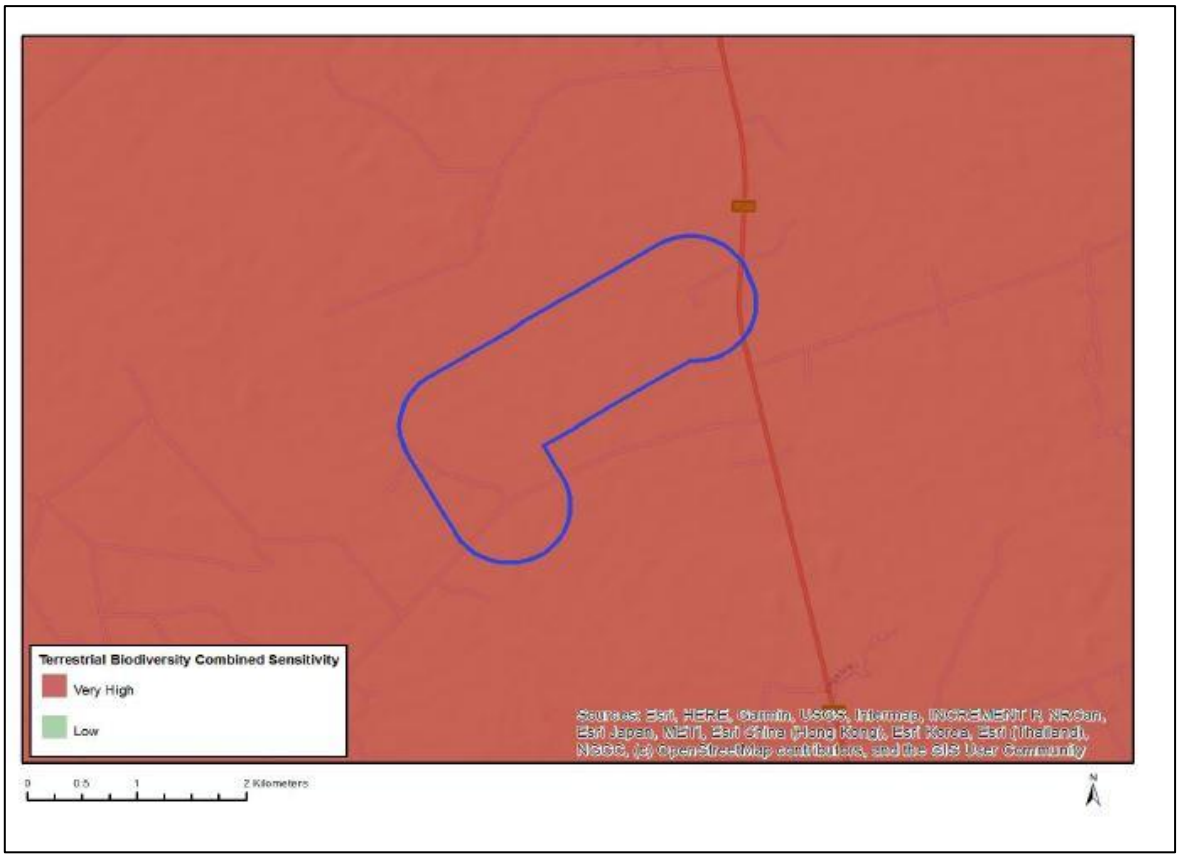

Figure 5-1 Biodiversity Theme Sensitivity, TBC Screening Report

The completion of the terrestrial biodiversity assessment confirmed the still high sensitivity of the degraded Mesic Grassland and the wetlands within the project area and therefore corroborates the screening report in those areas.

As per the terms of reference for the project, GIS sensitivity maps are required in order to identify sensitive features in terms of the relevant specialist discipline/s within the project area. The sensitivity scores identified during the field survey for each terrestrial habitat are mapped in Figure 5-2 and Figure 5-3.

In terms of terrestrial habitats, areas that were classified as having a low sensitivity are those areas which were deemed by the specialists to have been impacted upon and/or were modified from their original condition due to factors such as removal/clearing of vegetation.

The habitats rated as high are habitats that still;

- Serve as and represent CBA; Optimal respectively, as identified by the MBSP;
- Serve as crucial habitat to contribute to the primary goal of the MPAES to protect biodiversity targets and meet the Provincial Protected Areas goal;

- Support various faunal and floral species, as habitat and a movement corridor.

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

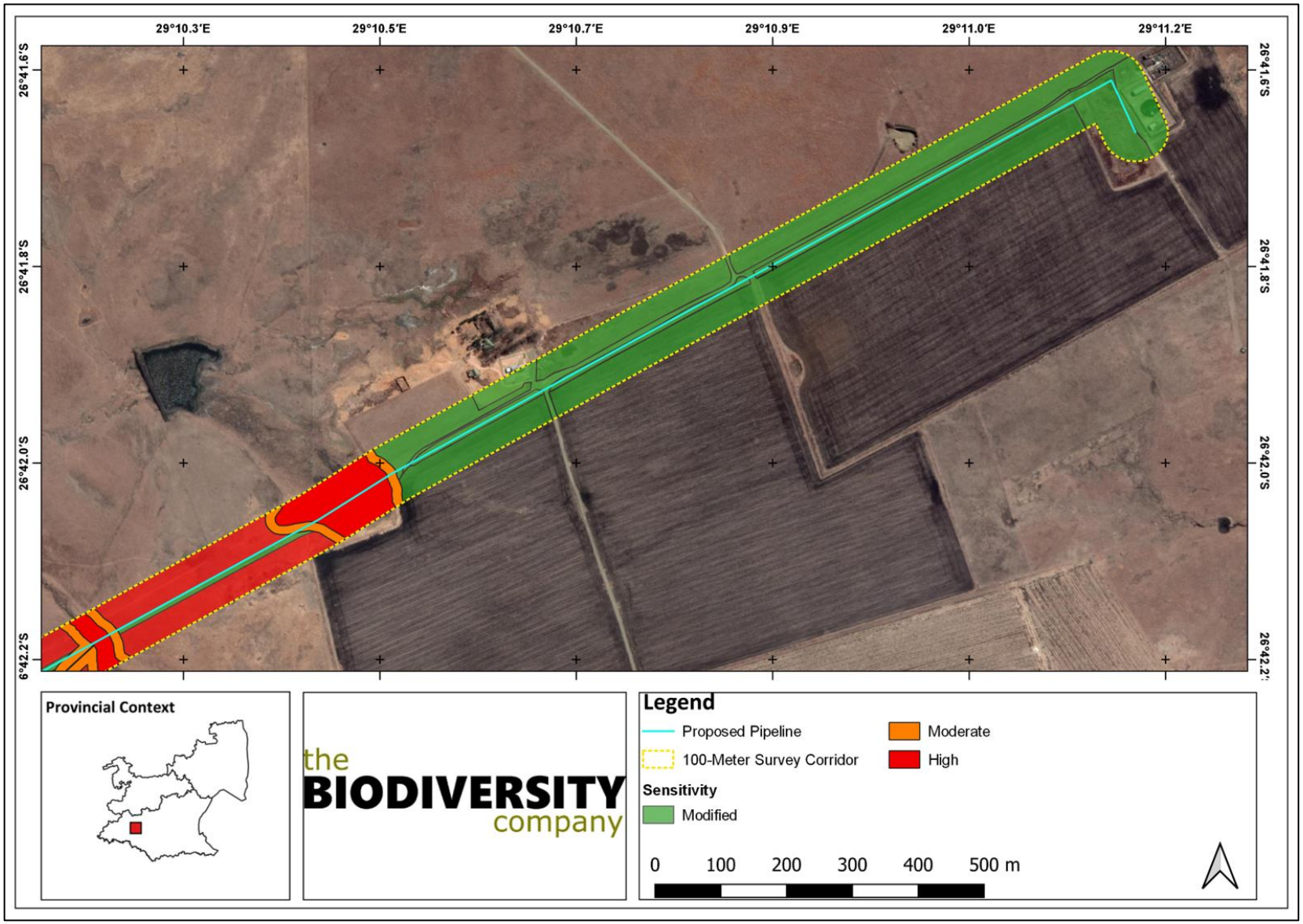

Figure 5-2 Biodiversity sensitivity of the project area

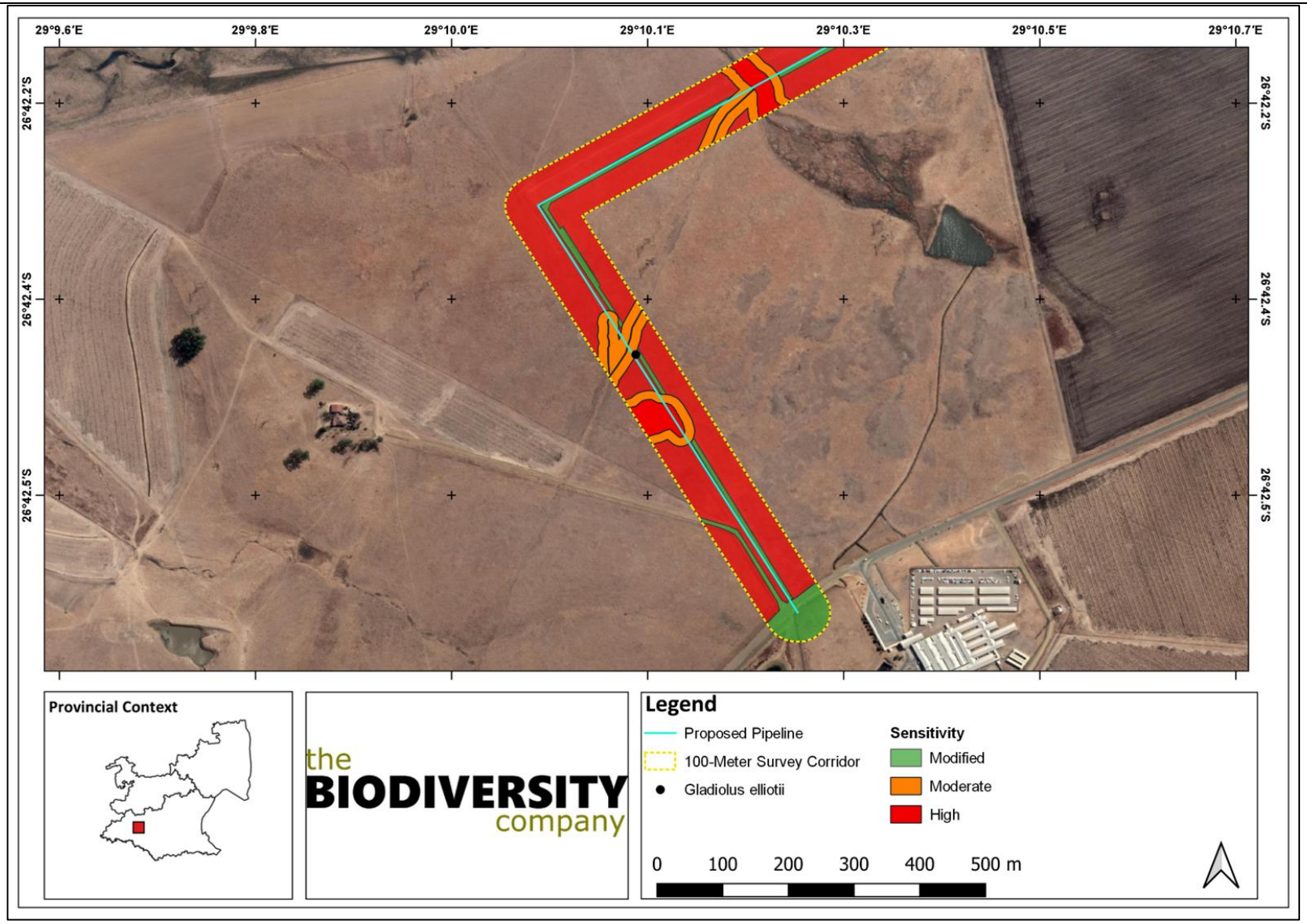

Figure 5-3 Biodiversity sensitivity of the project area

6 Impact Assessment

Potential impacts were evaluated against the data captured during the fieldwork to identify relevance to the project area, specifically the proposed development footprint area. The relevant impacts were then subjected to a prescribed impact assessment methodology. The details of this methodology can be provided on request.

6.1 Alternatives Considered

No alternatives were considered in this assessment.

6.2 Terrestrial Impact Assessment

6.2.1 Current impacts

The current impacts observed during surveys are listed below. Photographic evidence of a selection of these impacts is shown in Figure 6-1.

- Grazing and trampling of natural vegetation and wetlands by livestock;
- Farm roads (and associated traffic and wildlife road mortalities);
- Agriculture;
- Alien and/or Invasive Plants (AIP);
- Vegetation removal/destruction.

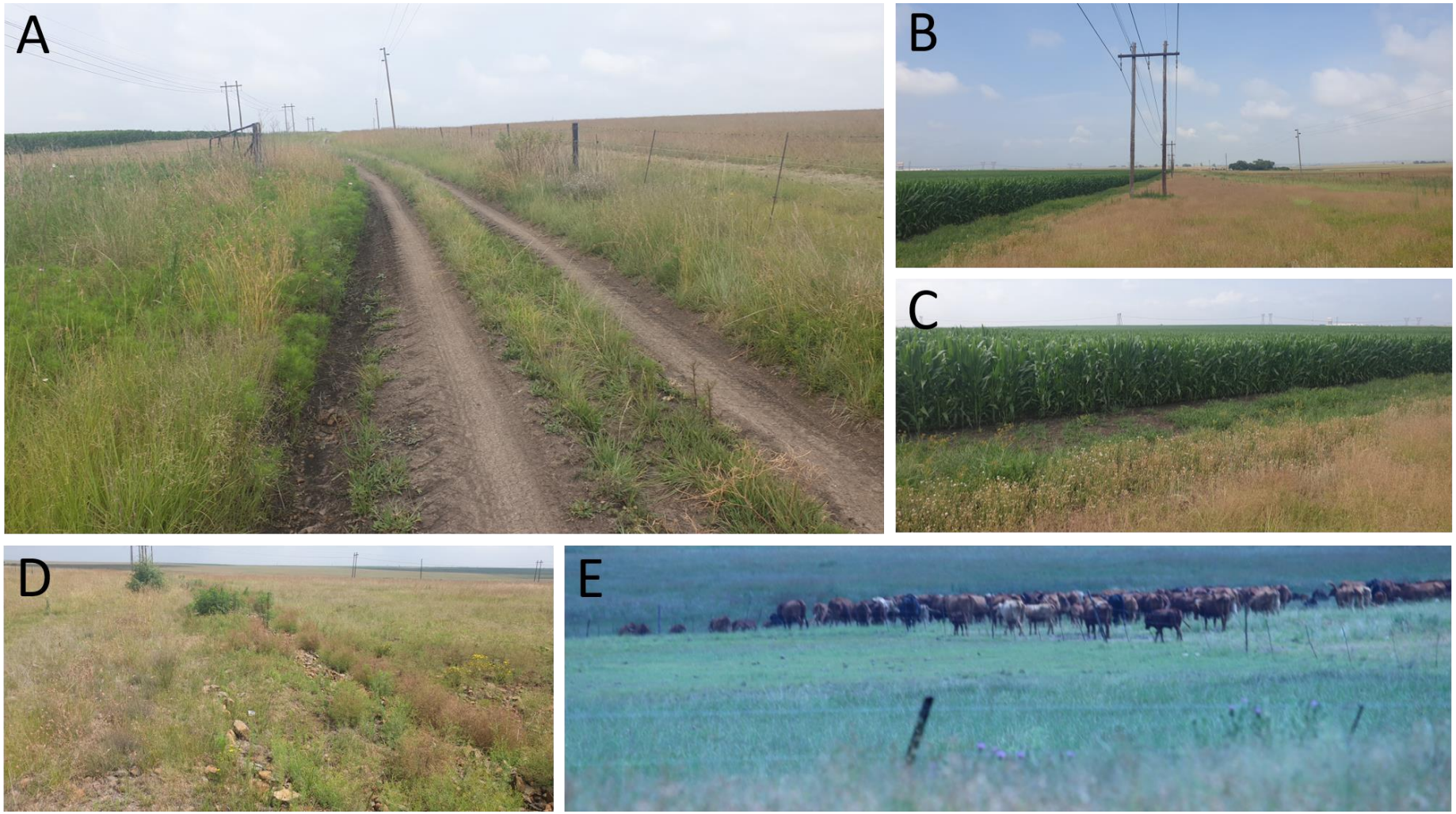

Figure 6-1 Current impacts observed during the field survey: A) Roads, B) Powerlines, C) Agriculture (Maize), D) Old disturbed areas and E) Livestock.

6.3 Terrestrial Impact Assessment

6.3.1 Construction Phase

The following potential impacts on the biodiversity were considered for the construction phase of the pipeline. This phase refers to the period during construction when the proposed infrastructure is constructed or upgraded. This phase usually has the largest direct impact on biodiversity. The following potential impacts to terrestrial biodiversity were considered:

- Destruction, further loss and fragmentation of the vegetation community including plant species;
- Introduction of alien species, especially plants; and
- Displacement of faunal community (Including SCC) due to habitat loss, direct mortalities and disturbance (road collisions, noise, dust, vibration and possible poaching).

6.3.2 Operational Phase

This phase refers to when construction has been completed and the proposed infrastructure has been built and is functional. The following potential impacts were considered.

- Continued encroachment and displacement of the natural vegetation community due to alien invasive plant species and erosion;
- Continued displacement and fragmentation of the faunal community, particularly the disruption of natural faunal movement corridors; and
- Increased anthropogenic disturbances (noise, human presence, litter and poaching/snaring).

6.3.3 Assessment of Impact Significance

The assessment of impact significance considers pre-mitigation as well as implemented of post-mitigation scenarios. The mitigation actions required to lower the risk of the impact are provided in Section 7 of this report.

6.3.3.1 Construction Phase

Table 6-1 summarises the significance of potential impacts associated with the development on biodiversity before and after implementation of mitigation measures. Prior to implementation of mitigation measures the significance of impact to the vegetation community, introduction of alien species and fauna were rated as “Moderately-High”. Implementation of mitigation measures reduced the significance of potential impact on the biodiversity community to a ‘Low’ level.

6.3.3.2 Operational Phase

Table 6-2 summarises the significance of the operational phase impacts on biodiversity before and after implementation of mitigation measures. The impact significance of encroachment by alien invasive plant species was rated as ‘Moderately-High’ prior to mitigation. Implementation of mitigation measures reduced the significance of the impact to an ‘Absent’ level.

Table 6-1 Assessment of significance of potential impacts on terrestrial biodiversity associated with the construction phase of the project

	Prior to mitigation						Post mitigation					
Impact	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance
	5	3	3	3	4		3	2	2	2	2	
Destruction, further loss and fragmentation of the vegetation community including plant species	Permanent	Local area/ within 1 km of the site boundary / < 5000ha impacted / Linear features affected < 1000m	Significant / ecosystem structure and function moderately altered	Ecology moderately sensitive/ /important	Highly likely	**Moderately High**	One year to five years: Medium Term	Development specific/ within the site boundary / < 100 ha impacted / Linear features affected < 100m	Small / ecosystem structure and function largely unchanged	Ecology with limited sensitivity/importance	Possible	**Low**
	4	4	4	3	4		3	2	2	2	2	
Introduction of alien spp, especially plants	Life of operation or less than 20 years: Long Term	Regional within 5 km of the site boundary / < 2000ha impacted / Linear features affected < 3000m	Great / harmful/ ecosystem structure and function largely altered	Ecology moderately sensitive/ /important	Highly likely	**Moderately High**	One year to five years: Medium Term	Development specific/ within the site boundary / < 100 ha impacted / Linear features affected < 100m	Small / ecosystem structure and function largely unchanged	Ecology with limited sensitivity/importance	Possible	**Low**
	4	4	3	3	4		3	2	2	2	2	
Displacement of faunal community (Including SCC) due to habitat loss, direct mortalities and disturbance (road collisions, noise, dust, vibration and possible poaching).	Life of operation or less than 20 years: Long Term	Regional within 5 km of the site boundary / < 2000ha impacted / Linear features affected < 3000m	Significant / ecosystem structure and function moderately altered	Ecology moderately sensitive/ /important	Highly likely	**Moderately High**	One year to five years: Medium Term	Development specific/ within the site boundary / < 100 ha impacted / Linear features affected < 100m	Small / ecosystem structure and function largely unchanged	Ecology with limited sensitivity/importance	Possible	**Low**

Table 6-2 Assessment of significance of potential impacts on terrestrial biodiversity associated with the operational phase of the project

Impact	Prior to mitigation						Post mitigation					
	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance
Continued encroachment and displacement of the natural vegetation community due to alien invasive plant species and erosion	4 Life of operation or less than 20 years: Long Term	4 Regional within 5 km of the site boundary / < 2000ha impacted / Linear features affected < 3000m	3 Significant / ecosystem structure and function moderately altered	3 Ecology moderately sensitive/ /important	4 Highly likely	**Moderately High**	2 One month to one year: Short Term	2 Development specific/ within the site boundary / < 100 ha impacted / Linear features affected < 100m	2 Small / ecosystem structure and function largely unchanged	2 Ecology with limited sensitivity/importance	2 Possible	**Absent**
Continued displacement and fragmentation of the faunal community, particularly the disruption of natural faunal movement corridors	4 Life of operation or less than 20 years: Long Term	4 Regional within 5 km of the site boundary / < 2000ha impacted / Linear features affected < 3000m	4 Great / harmful/ ecosystem structure and function largely altered	3 Ecology moderately sensitive/ /important	3 Likely	**Moderate**	2 One month to one year: Short Term	2 Development specific/ within the site boundary / < 100 ha impacted / Linear features affected < 100m	2 Small / ecosystem structure and function largely unchanged	2 Ecology with limited sensitivity/importance	2 Possible	**Absent**
Increased anthropogenic disturbances (noise, human presence, litter and poaching/snaring);	4 Life of operation or less than 20 years: Long Term	4 Regional within 5 km of the site boundary / < 2000ha impacted / Linear features affected < 3000m	3 Significant / ecosystem structure and function moderately altered	3 Ecology moderately sensitive/ /important	3 Likely	**Moderate**	2 One month to one year: Short Term	2 Development specific/ within the site boundary / < 100 ha impacted / Linear features affected < 100m	2 Small / ecosystem structure and function largely unchanged	2 Ecology with limited sensitivity/importance	2 Possible	**Absent**

7 Specialist Management Plan

The aim of the management outcomes is to present the mitigations in such a way that the can be incorporated into the Environmental Management Programme (EMPr), allowing for more successful implementation and auditing of the mitigations and monitoring guidelines Table 7-1. presents the recommended mitigation measures and the respective timeframes, targets and performance indicators for the terrestrial study.

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

- Prevent the further loss and fragmentation of vegetation communities and the CBA areas in the vicinity of the project area;
- As far as possible, reduce the negative fragmentation effects of the linear development and enable safe movement of faunal species; and
- Prevent the direct and indirect loss and disturbance of faunal species and community (including occurring and potentially occurring species of conservation concern).

Table 7-1 Mitigation measures including requirements for timeframes, roles and responsibilities for this report.

Management outcome: Vegetation and Habitats				
Impact Management Actions	Implementation		Monitoring	
	Phase	Responsible Party	Aspect	Frequency
The areas to be developed must be specifically demarcated to prevent movement into sensitive surrounding environments, i.e the wetlands and degraded Mesic Grassland.	Pre-construction	Project manager, Environmental Officer	Development footprint	Ongoing
Areas of indigenous vegetation, even secondary communities outside of the direct project footprint, should under no circumstances be fragmented or disturbed further.	Life of operation	Project manager, Environmental Officer	Areas of indigenous vegetation (All high sensitivity areas)	Ongoing
Areas to be developed be specifically demarcated so that during the construction phase, only the demarcated areas be impacted upon (including fencing off the defined project area);	Life of operation	Project manager, Environmental Officer	Development within demarcated areas	Ongoing
All construction/operational and access must make use of the existing roads and paths.	Construction/Operational Phase	Environmental Officer & Design Engineer	Roads and paths used	Ongoing
All laydown, chemical toilets etc. should be restricted to low sensitivity areas. Any materials may not be stored for extended periods of time and must be removed from the project area once the construction/closure phase has been concluded. No permanent construction structures should be permitted. No storage of vehicles or equipment will be allowed outside of the designated project areas.	Construction/Operational Phase	Environmental Officer & Design Engineer	Laydown areas and material storage & placement.	Ongoing
Areas that are denuded during construction, especially the area for the new pipeline need to be re-vegetated with indigenous vegetation to prevent likelihood of encroachment by alien invasive plant species and any erosion.	Closure Phase/Rehabilitation phase	Environmental Officer & Contractor	Assess the state of rehabilitation and encroachment of alien vegetation	Quarterly for up to two years after the closure
All structure footprints to be rehabilitated and landscaped after the development is complete. Rehabilitation of the disturbed areas existing in the project area must be made a priority. Topsoil must also be utilised, and any disturbed area must be re-vegetated with plant and grass species which are endemic to this vegetation type;	Operational Phase	Environmental Officer & Contractor	Footprint rehabilitation	Quarterly monitoring
Progressive rehabilitation as the construction of the pipeline continues as well as any cleared areas will enable topsoil to be returned more rapidly, thus ensuring more recruitment from the existing seedbank	Operational Phase	Environmental Officer & Contractor	Footprint rehabilitation	During Phase
A hydrocarbon spill management plan must be put in place to ensure that should there be any chemical spill out or over that it does not run into the surrounding areas. The Contractor shall be in possession of an emergency spill kit that must always be complete and available on site. Drip trays or any form of oil absorbent material must be placed underneath vehicles/machinery and equipment when not in use. No servicing of	Life of operation	Environmental Officer & Contractor	Spill events, Vehicles dripping.	Ongoing

equipment on site unless necessary. All contaminated soil should be treated in situ or removed and be placed in containers				
Leaking equipment and vehicles must be repaired immediately or be removed from project area to facilitate repair	Life of operation	Environmental Officer & Contractor	Leaks and spills	Ongoing
It should be made an offence for any staff to /take bring any plant species into/out of any portion of the project area. No plant species whether indigenous or exotic should be brought into/taken from the project area, to prevent the spread of exotic or invasive species or the illegal collection of plants.	Life of operation	Project manager, Environmental Officer	Any instances	Ongoing
Protected plant species need either a permit to be destroyed, or can be relocated within the area by a qualified person	Construction Phase	Environmental Officer & Contractor	Protected plant species	During Phase
Management outcome: Fauna				
Impact Management Actions	Implementation		Monitoring	
	Phase	Responsible Party	Aspect	Frequency
The areas to be developed must be specifically demarcated to prevent movement of staff or any individual into the surrounding environments; • Signs must be put up to enforce this	Construction/Operational Phase	Project manager, Environmental Officer	Infringement into these areas	Ongoing
No trapping, killing, or poisoning of any wildlife is to be allowed. • Signs must be put up to enforce this;	Life of operation	Environmental Officer	Evidence of trapping etc	Ongoing
The duration of the construction should be minimized to as short term as possible, to reduce the period of disturbance on fauna	Construction/Operational Phase	Project manager, Environmental Officer & Design Engineer	Construction/Closure Phase	Ongoing
All construction and maintenance motor vehicle operators should undergo an environmental induction that includes instruction on the need to comply with speed limits, to respect all forms of wildlife. Speed limits must still be enforced to ensure that road killings and erosion is limited.	Life of operation	Health and Safety Officer	Compliance to the training.	Ongoing
All construction and maintenance motor vehicle operators should undergo an environmental induction that includes instruction on the need to comply with speed limits, to respect all forms of wildlife. Speed limits must still be enforced to ensure that road killings and erosion is limited.	Life of operation	Health and Safety Officer	Compliance to the training.	Ongoing
Any holes/excavations need to be sealed to ensure that no fauna species can fall in.	Construction/Operational Phase	Environmental Officer & Design Engineer	Sealing holes/excavations	Daily.
Management outcome: Alien Vegetation and fauna				
Impact Management Actions	Implementation		Monitoring	
	Phase	Responsible Party	Aspect	Frequency
Compilation of and implementation of an alien vegetation management plan.	Life of operation	Project manager, Environmental Officer & Contractor	Assess presence and encroachment of alien vegetation	Quarterly monitoring

The footprint area of the construction should be kept to a minimum. The footprint area must be clearly demarcated to avoid unnecessary disturbances to adjacent areas	Construction/Operational Phase	Project manager, Environmental Officer & Contractor	Footprint Area	Life of operation
Waste management must be a priority and all waste must be collected and stored adequately. It is recommended that all waste be removed from site on a weekly basis to prevent rodents and pests entering the site	Life of operation	Environmental Officer & Health and Safety Officer	Presence of waste	Life of operation
Management outcome: Dust				
Impact Management Actions	Implementation		Monitoring	
	Phase	Responsible Party	Aspect	Frequency
Dust-reducing mitigation measures must be put in place and must be strictly adhered to, for all roads and dumps especially. This includes wetting of exposed soft soil surfaces and not conducting activities on windy days which will increase the likelihood of dust being generated**.**	Life of operation	Contractor	Dustfall	As per the air quality report and the dust monitoring program.
Management outcome: Waste management				
Impact Management Actions	Implementation		Monitoring	
	Phase	Responsible Party	Aspect	Frequency
Waste management must be a priority and all waste must be collected and stored adequately. It is recommended that all waste be removed from site on a weekly basis to prevent rodents and pests entering the site. • Refuse bins will be emptied and secured; • Temporary storage of domestic waste shall be in covered waste skips; and • Maximum domestic waste storage period will be 10 days.	Life of operation	Environmental Officer & Health and Safety Officer	Presence of waste	Life of operation
Litter, spills, fuels, chemicals and human waste in and around the project area.	Construction/Closure Phase	Environmental Officer & Health and Safety Officer	Presence of Waste	Daily
A minimum of one toilet must be provided per 10 persons. Portable toilets must be pumped dry to ensure the system does not degrade over time and spill into the surrounding area.	Life of operation	Environmental Officer & Health and Safety Officer	Number of toilets per staff member. Waste levels	Daily
The Contractor should supply sealable and properly marked domestic waste collection bins and all solid waste collected shall be disposed of at a licensed disposal facility	Life of operation	Environmental Officer & Health and Safety Officer	Availability of bins and the collection of the waste.	Ongoing
Where a registered disposal facility is not available close to the project area, the Contractor shall provide a method statement with regard to waste management. Under no circumstances may domestic waste be burned on site	Life of operation	Environmental Officer, Contractor & Health and Safety Officer	Collection/handling of the waste.	Ongoing
Refuse bins will be emptied and secured Temporary storage of domestic waste shall be in covered waste skips. Maximum domestic waste storage period will be 10 days.	Life of operation	Environmental Officer, Contractor & Health and Safety Officer	Management of bins and collection of waste	Ongoing

Management outcome: Environmental awareness training				
Impact Management Actions	Implementation		Monitoring	
	Phase	Responsible Party	Aspect	Frequency
All personnel and contractors to undergo Environmental Awareness Training. A signed register of attendance must be kept for proof. Discussions are required on sensitive environmental receptors within the project area to inform contractors and site staff of the presence of Red / Orange List species, their identification, conservation status and importance, biology, habitat requirements and management requirements the Environmental Authorisation and within the EMPr.	Life of operation	Health and Safety Officer	Compliance to the training.	Ongoing

8 Conclusion

The project area has been altered both currently and historically. The farming activities (agriculture and livestock) in the area has had an impact on both the fauna and the flora in the area, which is evident in the modified and transformed habitats. However, the degraded Mesic Grassland can be regarded as important, not only within the local landscape, but also regionally; as they are used for habitat, foraging and movement corridors for fauna within a fragmented landscape to more natural areas where they may reproduce. The degraded Mesic Grassland was rated with a high sensitivity because it:

- Serve as and represent CBA; Optimal respectively, as identified by the MBSP;
- Serve as crucial habitat to contribute to the primary goal of the MPAES to protect biodiversity targets and meet the Provincial Protected Areas goal;
- Support various faunal and floral species, as habitat and a movement corridor.

The ecological integrity, importance and functioning of these terrestrial biodiversity areas provide a variety of ecological services considered beneficial, with one key service being the maintenance of biodiversity. The preservation of these systems is the most important aspect to consider for the proposed project. It was observed that excavations and a road occur along the current pipeline route have occurred in the past and is located between the current powerlines existing servitude (Figure 4-7).This disturbed area, even though it occurs within the degraded Mesic Grassland, will form part of the modified habitat and should be used for the alignment for the proposed pipeline to avoid affecting the highly sensitive areas.

9 Impact Statement

An impact statement is required as per the NEMA regulations with regards to the proposed development.

Considering the above-mentioned information, no fatal flaws are evident for the proposed project, the development will result in the destruction and fragmentation of intact and functional CBA areas, areas rated “Very High” by the screening report. It is the opinions of the specialists that the project, may be favourably considered, should on condition all prescribed mitigation measures and supporting recommendations are implemented.

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11 Appendices

11.1 Appendix A – Specialist declarations

DECLARATION

I, Martinus Erasmus, declare that:

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing any decision to be taken with respect to the application by the competent authority; and the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of Regulation 71 and is punishable in terms of Section 24F of the Act.

Martinus Erasmus

Terrestrial Ecologist

The Biodiversity Company

January 2021

DECLARATION

I, Andrew Husted, declare that:

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing any decision to be taken with respect to the application by the competent authority; and the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of Regulation 71 and is punishable in terms of Section 24F of the Act.

Andrew Husted

Wetland Ecologist

The Biodiversity Company

January 2021

11.2 Appendix B – Flora species expected in the assessment area

Family	Species Name	IUCN	Endemism
Acanthaceae	*Blepharis subvolubilis*	LC	
Acanthaceae	*Crabbea acaulis*	LC	
Acanthaceae	*Crabbea hirsuta*	LC	
Acanthaceae	*Dyschoriste burchellii*	LC	
Acanthaceae	*Thunbergia atriplicifolia*	LC	
Agavaceae	*Chlorophytum fasciculatum*	LC	
Amaranthaceae	*Amaranthus thunbergii*	LC	
Amaranthaceae	*Chenopodium phillipsianum*		
Amaryllidaceae	*Boophone disticha*	LC	
Amaryllidaceae	*Haemanthus humilis subsp. hirsutus*	LC	
Amaryllidaceae	*Haemanthus montanus*	LC	
Amaryllidaceae	*Nerine laticoma*	LC	
Anacardiaceae	*Searsia dentata*	LC	
Anacardiaceae	*Searsia discolor*	LC	
Anacardiaceae	*Searsia gerrardii*	LC	
Anacardiaceae	*Searsia rigida var. rigida*	LC	Endemic
Apiaceae	*Berula repanda*	LC	
Apiaceae	*Centella asiatica*	LC	
Apiaceae	*Conium chaerophylloides*	LC	
Apocynaceae	*Asclepias gibba var. gibba*	LC	
Apocynaceae	*Asclepias gibba var. media*	LC	
Apocynaceae	*Asclepias stellifera*	LC	
Apocynaceae	*Aspidoglossum interruptum*	LC	
Apocynaceae	*Gomphocarpus fruticosus subsp. fruticosus*	LC	
Apocynaceae	*Pachycarpus schinzianus*	LC	
Apocynaceae	*Stenostelma periglossoides*		Endemic
Apocynaceae	*Xysmalobium undulatum var. undulatum*	LC	
Aponogetonaceae	*Aponogeton junceus*	LC	
Asparagaceae	*Asparagus cooperi*	LC	
Asphodelaceae	*Aloe ecklonis*	LC	
Asphodelaceae	*Bulbine capitata*	LC	
Asphodelaceae	*Kniphofia albescens*	LC	Endemic
Asphodelaceae	*Kniphofia typhoides*	NT	Endemic
Aspleniaceae	*Asplenium cordatum*	LC	
Asteraceae	*Afroaster serrulatus*	LC	
Asteraceae	*Arctotis arctotoides*	LC	
Asteraceae	*Berkheya discolor*	LC	
Asteraceae	*Berkheya onopordifolia var. onopordifolia*	LC	
Asteraceae	*Berkheya pinnatifida subsp. ingrata*	LC	Endemic
Asteraceae	*Berkheya radula*	LC	
Asteraceae	*Cineraria austrotransvaalensis*	NT	Endemic
Asteraceae	*Cineraria lyratiformis*	LC	
Asteraceae	*Conyza podocephala*		
Asteraceae	*Cotula australis*	LC	
Asteraceae	*Denekia capensis*	LC	
Asteraceae	*Dicoma anomala subsp. gerrardii*	LC	
Asteraceae	*Geigeria aspera var. aspera*	LC	
Asteraceae	*Geigeria burkei subsp. burkei*	NE	

Family	Species Name	IUCN	Endemism
Asteraceae	*Haplocarpha nervosa*	LC	
Asteraceae	*Haplocarpha scaposa*	LC	
Asteraceae	*Helichrysum chionosphaerum*	LC	
Asteraceae	*Helichrysum nudifolium var. nudifolium*	LC	
Asteraceae	*Helichrysum psilolepis*	LC	
Asteraceae	*Helichrysum rugulosum*	LC	
Asteraceae	*Lactuca inermis*	LC	
Asteraceae	*Nidorella anomala*	LC	
Asteraceae	*Nidorella hottentotica*	LC	
Asteraceae	*Nidorella resedifolia subsp. resedifolia*	LC	
Asteraceae	*Osteospermum scariosum var. scariosum*	NE	
Asteraceae	*Othonna natalensis*	LC	
Asteraceae	*Platycarphella parvifolia*	LC	Endemic
Asteraceae	*Pseudognaphalium luteoalbum*	LC	Cryptogenic
Asteraceae	*Pseudognaphalium oligandrum*	LC	
Asteraceae	*Pulicaria scabra*	LC	
Asteraceae	*Schistostephium crataegifolium*	LC	
Asteraceae	*Senecio affinis*	LC	
Asteraceae	*Senecio burchellii*	LC	Endemic
Asteraceae	*Senecio coronatus*	LC	
Asteraceae	*Senecio hieracioides*	LC	
Asteraceae	*Senecio inaequidens*	LC	
Asteraceae	*Senecio inornatus*	LC	
Asteraceae	*Senecio laevigatus var. laevigatus*	LC	Endemic
Asteraceae	*Senecio othonniflorus*	LC	
Asteraceae	*Senecio venosus*	LC	
Asteraceae	*Sonchus nanus*	LC	
Asteraceae	*Tolpis capensis*	LC	
Asteraceae	*Ursinia nana subsp. leptophylla*	LC	
Boraginaceae	*Anchusa riparia*	LC	
Boraginaceae	*Cynoglossum hispidum*	LC	
Boraginaceae	*Cynoglossum lanceolatum*	LC	
Boraginaceae	*Lithospermum cinereum*	LC	
Brassicaceae	*Erucastrum austroafricanum*	LC	
Brassicaceae	*Lepidium transvaalense*	LC	
Brassicaceae	*Rorippa fluviatilis var. fluviatilis*	LC	
Brassicaceae	*Sisymbrium capense*	LC	
Brassicaceae	*Sisymbrium turczaninowii*	LC	
Campanulaceae	*Wahlenbergia undulata*	LC	
Caryophyllaceae	*Dianthus basuticus subsp. basuticus*	NE	
Caryophyllaceae	*Dianthus mooiensis subsp. mooiensis*	NE	Endemic
Caryophyllaceae	*Herniaria erckertii subsp. erckertii*	LC	
Caryophyllaceae	*Pollichia campestris*	LC	
Caryophyllaceae	*Silene undulata*		
Cleomaceae	*Cleome monophylla*	LC	
Commelinaceae	*Commelina africana var. africana*	LC	
Commelinaceae	*Cyanotis speciosa*	LC	
Convolvulaceae	*Convolvulus sagittatus*	LC	
Convolvulaceae	*Ipomoea crassipes var. crassipes*	LC	

Family	Species Name	IUCN	Endemism
Crassulaceae	*Crassula alba var. alba*	NE	
Crassulaceae	*Crassula lanceolata subsp. lanceolata*	LC	
Crassulaceae	*Crassula natans var. natans*	LC	
Crassulaceae	*Crassula setulosa var. setulosa*	NE	
Cucurbitaceae	*Cucumis myriocarpus subsp. myriocarpus*	LC	
Cyperaceae	*Abildgaardia ovata*	LC	
Cyperaceae	*Bulbostylis humilis*	LC	
Cyperaceae	*Carex spartea*		
Cyperaceae	*Cyperus congestus*	LC	
Cyperaceae	*Cyperus fastigiatus*	LC	
Cyperaceae	*Cyperus longus var. tenuiflorus*	NE	
Cyperaceae	*Cyperus semitrifidus*	LC	
Dipsacaceae	*Cephalaria pungens*	LC	
Dipsacaceae	*Cephalaria zeyheriana*	LC	
Dipsacaceae	*Scabiosa columbaria*	LC	
Ebenaceae	*Diospyros austro-africana var. microphylla*	LC	
Euphorbiaceae	*Euphorbia clavarioides*	LC	
Euphorbiaceae	*Euphorbia inaequilatera var. inaequilatera*	NE	
Euphorbiaceae	*Euphorbia striata*	LC	
Fabaceae	*Argyrolobium tuberosum*	LC	
Fabaceae	*Eriosema nutans*	LC	
Fabaceae	*Erythrina zeyheri*	LC	
Fabaceae	*Indigofera evansiana*	LC	
Fabaceae	*Indigofera obscura*	LC	
Fabaceae	*Indigofera zeyheri*	LC	
Fabaceae	*Leobordea adpressa subsp. adpressa*	LC	
Fabaceae	*Leobordea mucronata*		
Fabaceae	*Lessertia affinis*	LC	Endemic
Fabaceae	*Listia heterophylla*	LC	
Fabaceae	*Melolobium candicans*	LC	
Fabaceae	*Rhynchosia adenodes*	LC	
Fabaceae	*Rhynchosia totta var. totta*	LC	
Fabaceae	*Tephrosia capensis var. capensis*	LC	
Fabaceae	*Tephrosia multijuga*	LC	
Fabaceae	*Trifolium africanum var. africanum*	NE	
Fabaceae	*Trifolium burchellianum subsp. burchellianum*	LC	
Fabaceae	*Vigna vexillata var. vexillata*	LC	
Gentianaceae	*Chironia palustris subsp. palustris*	LC	
Gentianaceae	*Sebaea repens*	LC	
Geraniaceae	*Pelargonium luridum*	LC	
Gesneriaceae	*Streptocarpus pentherianus*	LC	
Gisekiaceae	*Gisekia pharnaceoides var. pharnaceoides*	LC	
Hyacinthaceae	*Albuca baurii*	LC	Endemic
Hyacinthaceae	*Dipcadi viride*	LC	
Hyacinthaceae	*Drimia elata*	DD	
Hyacinthaceae	*Drimia multisetosa*	LC	
Hyacinthaceae	*Eucomis autumnalis subsp. clavata*	NE	
Hyacinthaceae	*Ledebouria ovatifolia*		
Hyacinthaceae	*Ornithogalum flexuosum*	LC	

Family	Species Name	IUCN	Endemism
Hydrocharitaceae	*Lagarosiphon major*	LC	
Hypoxidaceae	*Empodium elongatum*	LC	
Hypoxidaceae	*Hypoxis acuminata*	LC	
Hypoxidaceae	*Hypoxis argentea var. argentea*	LC	
Hypoxidaceae	*Hypoxis multiceps*	LC	
Hypoxidaceae	*Hypoxis rigidula var. rigidula*	LC	
Iridaceae	*Babiana bainesii*	LC	
Iridaceae	*Gladiolus dalenii subsp. dalenii*	LC	
Iridaceae	*Gladiolus elliotii*	LC	
Iridaceae	*Gladiolus longicollis subsp. longicollis*	LC	
Iridaceae	*Gladiolus longicollis subsp. platypetalus*	LC	
Iridaceae	*Gladiolus robertsoniae*	NT	Endemic
Iridaceae	*Moraea simulans*	LC	
Juncaceae	*Juncus dregeanus subsp. dregeanus*	LC	
Juncaceae	*Juncus exsertus*	LC	
Lamiaceae	*Aeollanthus buchnerianus*	LC	
Lamiaceae	*Ajuga ophrydis*	LC	
Lamiaceae	*Mentha longifolia subsp. polyadena*	LC	
Lamiaceae	*Salvia repens var. repens*	LC	
Lamiaceae	*Salvia repens var. transvaalensis*	LC	
Lamiaceae	*Salvia runcinata*	LC	
Lamiaceae	*Stachys hyssopoides*	LC	
Limeaceae	*Limeum viscosum subsp. viscosum*	NE	
Lobeliaceae	*Lobelia sonderiana*	LC	
Lobeliaceae	*Monopsis decipiens*	LC	
Lythraceae	*Nesaea sagittifolia var. sagittifolia*	LC	
Lythraceae	*Nesaea schinzii*	LC	
Malvaceae	*Hermannia coccocarpa*	LC	
Malvaceae	*Hermannia cordata*	LC	Endemic
Malvaceae	*Hermannia depressa*	LC	
Malvaceae	*Hermannia oblongifolia*	LC	Endemic
Malvaceae	*Hibiscus microcarpus*	LC	
Malvaceae	*Sida rhombifolia subsp. rhombifolia*	LC	
Melianthaceae	*Greyia sutherlandii*	LC	
Molluginaceae	*Psammotropha myriantha*	LC	
Orchidaceae	*Eulophia ovalis var. ovalis*	LC	
Orchidaceae	*Habenaria falcicornis subsp. caffra*	LC	
Orobanchaceae	*Cycnium tubulosum subsp. tubulosum*	LC	
Orobanchaceae	*Striga bilabiata subsp. bilabiata*	LC	
Orobanchaceae	*Striga elegans*	LC	
Oxalidaceae	*Oxalis obliquifolia*	LC	
Papaveraceae	*Papaver aculeatum*	LC	
Peraceae	*Clutia natalensis*	LC	
Phrymaceae	*Mimulus gracilis*	LC	
Phytolaccaceae	*Phytolacca heptandra*	LC	
Plantaginaceae	*Plantago lanceolata*	LC	
Plantaginaceae	*Veronica anagallis-aquatica*	LC	
Poaceae	*Alloteropsis semialata subsp. semialata*	LC	
Poaceae	*Andropogon appendiculatus*	LC	

Family	Species Name	IUCN	Endemism
Poaceae	*Aristida junciformis subsp. junciformis*	LC	
Poaceae	*Brachiaria eruciformis*	LC	
Poaceae	*Brachiaria serrata*	LC	
Poaceae	*Catalepis gracilis*	LC	
Poaceae	*Cymbopogon caesius*	LC	
Poaceae	*Cynodon dactylon*	LC	
Poaceae	*Digitaria eriantha*	LC	
Poaceae	*Elionurus muticus*	LC	
Poaceae	*Eragrostis capensis*	LC	
Poaceae	*Eragrostis chloromelas*	LC	
Poaceae	*Eragrostis cilianensis*	LC	
Poaceae	*Eragrostis curvula*	LC	
Poaceae	*Eragrostis plana*	LC	
Poaceae	*Eragrostis planiculmis*	LC	
Poaceae	*Eragrostis racemosa*	LC	
Poaceae	*Heteropogon contortus*	LC	
Poaceae	*Imperata cylindrica*		
Poaceae	*Leersia hexandra*	LC	
Poaceae	*Panicum schinzii*	LC	
Poaceae	*Panicum volutans*	LC	Endemic
Poaceae	*Setaria incrassata*	LC	
Poaceae	*Setaria nigrirostris*	LC	
Poaceae	*Setaria sphacelata var. sphacelata*	LC	
Poaceae	*Stipagrostis zeyheri subsp. sericans*	LC	
Poaceae	*Themeda triandra*	LC	
Poaceae	*Trachypogon spicatus*	LC	
Polygalaceae	*Polygala gracilenta*	LC	
Polygonaceae	*Persicaria hystricula*	LC	
Polygonaceae	*Persicaria madagascariensis*		
Polygonaceae	*Rumex lanceolatus*	LC	
Pteridaceae	*Cheilanthes hirta var. hirta*	LC	
Pteridaceae	*Pellaea calomelanos var. calomelanos*	LC	
Ranunculaceae	*Ranunculus dregei*	LC	
Ranunculaceae	*Ranunculus multifidus*	LC	
Ranunculaceae	*Ranunculus trichophyllus*	LC	
Rhamnaceae	*Ziziphus mucronata subsp. mucronata*	LC	
Rubiaceae	*Anthospermum rigidum subsp. rigidum*	LC	
Rubiaceae	*Galium capense subsp. capense*	LC	
Santalaceae	*Thesium lesliei*	LC	
Scrophulariaceae	*Diclis reptans*	LC	
Scrophulariaceae	*Diclis rotundifolia*	LC	
Scrophulariaceae	*Gomphostigma virgatum*	LC	
Scrophulariaceae	*Hebenstretia rehmannii*	LC	Endemic
Scrophulariaceae	*Jamesbrittenia aurantiaca*	LC	
Scrophulariaceae	*Jamesbrittenia montana*	LC	
Scrophulariaceae	*Jamesbrittenia stricta*	LC	
Scrophulariaceae	*Manulea paniculata*	LC	
Scrophulariaceae	*Manulea rhodantha subsp. aurantiaca*	LC	Endemic
Scrophulariaceae	*Selago cucullata*	LC	

Family	Species Name	IUCN	Endemism
Scrophulariaceae	*Selago densiflora*	LC	
Solanaceae	*Solanum campylacanthum*		
Solanaceae	*Solanum capense*	LC	
Solanaceae	*Solanum lichtensteinii*	LC	
Solanaceae	*Solanum retroflexum*	LC	
Solanaceae	*Withania somnifera*	LC	
Thymelaeaceae	*Gnidia gymnostachya*	LC	
Thymelaeaceae	*Lasiosiphon burchellii*	LC	
Thymelaeaceae	*Lasiosiphon capitatus*	LC	
Typhaceae	*Typha capensis*	LC	
Verbenaceae	*Lantana rugosa*	LC	
Zygophyllaceae	*Tribulus terrestris*	LC	

11.3 Appendix C – Amphibian species expected in the assessment area

Family	Scientific Name	Conservation Status
Bufonidae	*Sclerophrys capensis*	LC
Bufonidae	*Sclerophrys gutturalis*	LC
Hyperoliidae	*Kassina senegalensis*	LC
Hyperoliidae	*Semnodactylus wealii*	LC
Phrynobatrachidae	*Phrynobatrachus natalensis*	LC
Pipidae	*Xenopus laevis*	LC
Ptychadenidae	*Ptychadena porosissima*	LC
Pyxicephalidae	*Amietia delalandii*	LC
Pyxicephalidae	*Cacosternum boettgeri*	LC
Pyxicephalidae	*Pyxicephalus adspersus*	LC
Pyxicephalidae	*Strongylopus fasciatus*	LC
Pyxicephalidae	*Strongylopus grayii*	LC
Pyxicephalidae	*Tomopterna cryptotis*	LC
Pyxicephalidae	*Tomopterna natalensis*	LC
Pyxicephalidae	*Tomopterna tandyi*	LC

11.4 Appendix D – Reptile species expected in the assessment area

Family	Scientific Name	Conservation Status
Atractaspididae	*Aparallactus capensis*	LC
Chamaeleonidae	*Chamaeleo dilepis*	LC
Colubridae	*Dasypeltis scabra*	LC
Crocodylidae	*Crocodylus niloticus*	LC
Elapidae	*Hemachatus haemachatus*	LC
Gekkonidae	*Afroedura nivaria*	LC
Gekkonidae	*Pachydactylus vansoni*	LC
Lamprophiidae	*Lamprophis aurora*	LC
Lamprophiidae	*Lycodonomorphus inornatus*	LC
Prosymnidae	*Prosymna ambigua*	LC
Psammophiidae	*Psammophylax tritaeniatus*	LC
Pseudoxyrhophiidae	*Duberria lutrix*	LC
Scincidae	*Trachylepis punctatissima*	LC

11.5 Appendix E – Avifauna species expected in the assessment area

Scientific Name	Common Name	Conservation Status	
		Regional	Global
Acrocephalus arundinaceus	Reed-warbler, Great	Unlisted	LC
Acrocephalus baeticatus	Reed-warbler, African	Unlisted	Unlisted
Acrocephalus gracilirostris	Swamp-warbler, Lesser	Unlisted	LC
Acrocephalus schoenobaenus	Warbler, Sedge	Unlisted	LC
Actitis hypoleucos	Sandpiper, Common	Unlisted	LC
Alcedo cristata	Kingfisher, Malachite	Unlisted	Unlisted
Alopochen aegyptiacus	Goose, Egyptian	Unlisted	LC
Amadina erythrocephala	Finch, Red-headed	Unlisted	LC
Anas capensis	Teal, Cape	Unlisted	LC
Anas erythrorhyncha	Teal, Red-billed	Unlisted	LC
Anas hottentota	Teal, Hottentot	Unlisted	LC
Anas platyrhynchos	Duck, Mallard	Unlisted	LC
Anas smithii	Shoveler, Cape	Unlisted	LC
Anas sparsa	Duck, African Black	Unlisted	LC
Anas undulata	Duck, Yellow-billed	Unlisted	LC
Anastomus lamelligerus	Openbill, African	Unlisted	LC
Anhinga rufa	Darter, African	Unlisted	LC
Anthropoides paradiseus	Crane, Blue	VU	VU
Anthus cinnamomeus	Pipit, African	Unlisted	LC
Apus affinis	Swift, Little	Unlisted	LC
Apus apus	Swift, Common	Unlisted	LC
Apus barbatus	Swift, African Black	Unlisted	LC
Apus caffer	Swift, White-rumped	Unlisted	LC
Ardea cinerea	Heron, Grey	Unlisted	LC
Ardea goliath	Heron, Goliath	Unlisted	LC
Ardea melanocephala	Heron, Black-headed	Unlisted	LC
Ardea purpurea	Heron, Purple	Unlisted	LC
Asio capensis	Owl, Marsh	Unlisted	LC
Bostrychia hagedash	Ibis, Hadeda	Unlisted	LC
Bubo africanus	Eagle-owl, Spotted	Unlisted	LC
Bubulcus ibis	Egret, Cattle	Unlisted	LC
Burhinus capensis	Thick-knee, Spotted	Unlisted	LC
Buteo rufofuscus	Buzzard, Jackal	Unlisted	LC
Buteo vulpinus	Buzzard, Steppe	Unlisted	Unlisted
Calandrella cinerea	Lark, Red-capped	Unlisted	LC
Calidris ferruginea	Sandpiper, Curlew	Unlisted	LC
Calidris minuta	Stint, Little	Unlisted	LC
Ceryle rudis	Kingfisher, Pied	Unlisted	LC
Charadrius pecuarius	Plover, Kittlitz's	Unlisted	LC
Charadrius tricollaris	Plover, Three-banded	Unlisted	LC
Chersomanes albofasciata	Lark, Spike-heeled	Unlisted	LC
Chlidonias hybrida	Tern, Whiskered	Unlisted	LC
Chrysococcyx caprius	Cuckoo, Diderick	Unlisted	LC

Scientific Name	Common Name	Conservation Status	
		Regional	Global
Ciconia ciconia	Stork, White	Unlisted	LC
Circus macrourus	Harrier, Pallid	NT	NT
Circus pygargus	Harrier, Montagu's	Unlisted	LC
Circus ranivorus	Marsh-harrier, African	EN	LC
Cisticola ayresii	Cisticola, Wing-snapping	Unlisted	LC
Cisticola cinnamomeus	Cisticola, Pale-crowned	Unlisted	LC
Cisticola juncidis	Cisticola, Zitting	Unlisted	LC
Cisticola textrix	Cisticola, Cloud	Unlisted	LC
Cisticola tinniens	Cisticola, Levaillant's	Unlisted	LC
Colius striatus	Mousebird, Speckled	Unlisted	LC
Columba guinea	Pigeon, Speckled	Unlisted	LC
Columba livia	Dove, Rock	Unlisted	LC
Coracias caudatus	Roller, Lilac-breasted	Unlisted	LC
Coracias garrulus	Roller, European	Unlisted	LC
Corvus albus	Crow, Pied	Unlisted	LC
Corvus capensis	Crow, Cape	Unlisted	LC
Cossypha caffra	Robin-chat, Cape	Unlisted	LC
Coturnix coturnix	Quail, Common	Unlisted	LC
Crithagra atrogularis	Canary, Black-throated	Unlisted	LC
Crithagra flaviventris	Canary, Yellow	Unlisted	LC
Crithagra mozambicus	Canary, Yellow-fronted	Unlisted	LC
Cypsiurus parvus	Palm-swift, African	Unlisted	LC
Delichon urbicum	House-martin, Common	Unlisted	LC
Dendrocygna viduata	Duck, White-faced	Unlisted	LC
Egretta alba	Egret, Great	Unlisted	LC
Egretta garzetta	Egret, Little	Unlisted	LC
Egretta intermedia	Egret, Yellow-billed	Unlisted	LC
Elanus caeruleus	Kite, Black-shouldered	Unlisted	LC
Emberiza tahapisi	Bunting, Cinnamon-breasted	Unlisted	LC
Estrilda astrild	Waxbill, Common	Unlisted	LC
Euplectes afer	Bishop, Yellow-crowned	Unlisted	LC
Euplectes albonotatus	Widowbird, White-winged	Unlisted	LC
Euplectes axillaris	Widowbird, Fan-tailed	Unlisted	LC
Euplectes orix	Bishop, Southern Red	Unlisted	LC
Euplectes progne	Widowbird, Long-tailed	Unlisted	LC
Eupodotis caerulescens	Korhaan, Blue	NT	NT
Falco amurensis	Falcon, Amur	Unlisted	LC
Falco rupicoloides	Kestrel, Greater	Unlisted	LC
Falco rupicolus	Kestrel, Rock	Unlisted	LC
Falco vespertinus	Falcon, Red-footed	NT	NT
Fulica cristata	Coot, Red-knobbed	Unlisted	LC
Gallinago nigripennis	Snipe, African	Unlisted	LC
Gallinula chloropus	Moorhen, Common	Unlisted	LC
Glareola nordmanni	Pratincole, Black-winged	Unlisted	LC

Scientific Name	Common Name	Conservation Status	
		Regional	Global
Himantopus himantopus	Stilt, Black-winged	Unlisted	LC
Hirundo abyssinica	Swallow, Lesser Striped	Unlisted	LC
Hirundo albigularis	Swallow, White-throated	Unlisted	LC
Hirundo cucullata	Swallow, Greater Striped	Unlisted	LC
Hirundo fuligula	Martin, Rock	Unlisted	LC
Hirundo rustica	Swallow, Barn	Unlisted	LC
Hirundo spilodera	Cliff-swallow, South African	Unlisted	LC
Ixobrychus minutus	Bittern, Little	Unlisted	LC
Jynx ruficollis	Wryneck, Red-throated	Unlisted	LC
Lamprotornis nitens	Starling, Cape Glossy	Unlisted	LC
Lanius collaris	Fiscal, Common (Southern)	Unlisted	LC
Lanius collurio	Shrike, Red-backed	Unlisted	LC
Lanius minor	Shrike, Lesser Grey	Unlisted	LC
Larus cirrocephalus	Gull, Grey-headed	Unlisted	LC
Lybius torquatus	Barbet, Black-collared	Unlisted	LC
Macronyx capensis	Longclaw, Cape	Unlisted	LC
Megaceryle maximus	Kingfisher, Giant	Unlisted	LC
Milvus aegyptius	Kite, Yellow-billed	Unlisted	LC
Mirafra africana	Lark, Rufous-naped	Unlisted	LC
Motacilla capensis	Wagtail, Cape	Unlisted	LC
Muscicapa striata	Flycatcher, Spotted	Unlisted	LC
Myrmecocichla formicivora	Chat, Anteating	Unlisted	LC
Netta erythrophthalma	Pochard, Southern	Unlisted	LC
Numida meleagris	Guineafowl, Helmeted	Unlisted	LC
Nycticorax nycticorax	Night-Heron, Black-crowned	Unlisted	LC
Oena capensis	Dove, Namaqua	Unlisted	LC
Oenanthe monticola	Wheatear, Mountain	Unlisted	LC
Oenanthe pileata	Wheatear, Capped	Unlisted	LC
Oriolus larvatus	Oriole, Black-headed	Unlisted	LC
Ortygospiza atricollis	Quailfinch, African	Unlisted	LC
Oxyura maccoa	Duck, Maccoa	NT	NT
Passer diffusus	Sparrow, Southern Grey-headed	Unlisted	LC
Passer melanurus	Sparrow, Cape	Unlisted	LC
Phalacrocorax africanus	Cormorant, Reed	Unlisted	LC
Phalacrocorax carbo	Cormorant, White-breasted	Unlisted	LC
Philomachus pugnax	Ruff, Ruff	Unlisted	LC
Phoenicopterus minor	Flamingo, Lesser	NT	NT
Phoenicopterus ruber	Flamingo, Greater	NT	LC
Platalea alba	Spoonbill, African	Unlisted	LC
Plectropterus gambensis	Goose, Spur-winged	Unlisted	LC
Plegadis falcinellus	Ibis, Glossy	Unlisted	LC
Plocepasser mahali	Sparrow-weaver, White-browed	Unlisted	LC
Ploceus capensis	Weaver, Cape	Unlisted	LC
Ploceus velatus	Masked-weaver, Southern	Unlisted	LC

Scientific Name	Common Name	Conservation Status	
		Regional	Global
Podiceps cristatus	Grebe, Great Crested	Unlisted	LC
Porphyrio madagascariensis	Swamphen, African Purple	Unlisted	LC
Prinia flavicans	Prinia, Black-chested	Unlisted	LC
Psittacula krameri	Parakeet, Rose-ringed	Unlisted	LC
Pternistis swainsonii	Spurfowl, Swainson's	Unlisted	LC
Pycnonotus tricolor	Bulbul, Dark-capped	Unlisted	LC
Quelea quelea	Quelea, Red-billed	Unlisted	LC
Recurvirostra avosetta	Avocet, Pied	Unlisted	LC
Riparia cincta	Martin, Banded	Unlisted	LC
Riparia paludicola	Martin, Brown-throated	Unlisted	LC
Saxicola torquatus	Stonechat, African	Unlisted	LC
Scleroptila africanus	Francolin, Grey-winged	Unlisted	LC
Scleroptila levaillantoides	Francolin, Orange River	Unlisted	Unlisted
Scopus umbretta	Hamerkop, Hamerkop	Unlisted	LC
Spizocorys conirostris	Lark, Pink-billed	Unlisted	LC
Streptopelia capicola	Turtle-dove, Cape	Unlisted	LC
Streptopelia semitorquata	Dove, Red-eyed	Unlisted	LC
Streptopelia senegalensis	Dove, Laughing	Unlisted	LC
Struthio camelus	Ostrich, Common	Unlisted	LC
Tachybaptus ruficollis	Grebe, Little	Unlisted	LC
Tadorna cana	Shelduck, South African	Unlisted	LC
Telophorus zeylonus	Bokmakierie, Bokmakierie	Unlisted	LC
Thalassornis leuconotus	Duck, White-backed	Unlisted	LC
Threskiornis aethiopicus	Ibis, African Sacred	Unlisted	LC
Tringa glareola	Sandpiper, Wood	Unlisted	LC
Tringa nebularia	Greenshank, Common	Unlisted	LC
Tringa stagnatilis	Sandpiper, Marsh	Unlisted	LC
Turdus smithi	Thrush, Karoo	Unlisted	LC
Vanellus armatus	Lapwing, Blacksmith	Unlisted	LC
Vanellus coronatus	Lapwing, Crowned	Unlisted	LC
Vanellus senegallus	Lapwing, African Wattled	Unlisted	LC
Vidua macroura	Whydah, Pin-tailed	Unlisted	LC
Zosterops virens	White-eye, Cape	Unlisted	LC

11.6 Appendix F – Mammal species expected in the assessment area

Family	Scientific Name	Conservation Status
Bathyergidae	*Cryptomys hottentotus*	LC
Bovidae	*Antidorcas marsupialis*	LC
Bovidae	*Ourebia ourebi*	LC
Bovidae	*Pelea capreolus*	LC
Bovidae	*Raphicerus campestris*	LC
Bovidae	*Redunca fulvorufula*	LC
Bovidae	*Sylvicapra grimmia*	LC
Canidae	*Canis mesomelas*	LC
Canidae	*Vulpes chama*	LC
Cercopithecidae	*Papio ursinus*	LC
Chrysochloridae	*Amblysomus septentrionalis*	NT
Emballonuridae	*Taphozous mauritianus*	LC
Erinaceidae	*Atelerix frontalis*	LC
Felidae	*Caracal caracal*	LC
Felidae	*Felis nigripes*	VU
Felidae	*Felis silvestris*	LC
Felidae	*Leptailurus serval*	LC
Felidae	*Panthera pardus*	VU
Herpestidae	*Atilax paludinosus*	LC
Herpestidae	*Cynictis penicillata*	LC
Herpestidae	*Herpestes sanguineus*	LC
Herpestidae	*Ichneumia albicauda*	LC
Herpestidae	*Mungos mungo*	LC
Herpestidae	*Suricata suricatta*	LC
Hyaenidae	*Parahyaena brunnea*	NT
Hyaenidae	*Proteles cristata*	LC
Hystricidae	*Hystrix africaeaustralis*	LC
Leporidae	*Lepus saxatilis*	LC
Leporidae	*Lepus victoriae*	LC
Leporidae	*Pronolagus saundersiae*	LC
Macroscelididae	*Elephantulus myurus*	LC
Molossidae	*Tadarida aegyptiaca*	LC
Muridae	*Aethomys ineptus*	LC
Muridae	*Aethomys namaquensis*	LC
Muridae	*Gerbilliscus brantsii*	LC
Muridae	*Gerbilliscus leucogaster*	LC
Muridae	*Mastomys coucha*	LC
Muridae	*Mastomys natalensis*	LC
Muridae	*Maxomys dollmani*	DD
Muridae	*Mus musculus*	LC
Muridae	*Otomys angoniensis*	LC
Muridae	*Otomys irroratus*	LC
Muridae	*Rattus rattus*	LC
Muridae	*Rhabdomys pumilio*	LC
Mustelidae	*Aonyx capensis*	NT
Mustelidae	*Hydrictis maculicollis*	NT
Mustelidae	*Ictonyx striatus*	LC
Mustelidae	*Mellivora capensis*	LC

Family	Scientific Name	Conservation Status
Mustelidae	*Poecilogale albinucha*	LC
Nesomyidae	*Dendromus melanotis*	LC
Nesomyidae	*Mystromys albicaudatus*	EN
Nesomyidae	*Steatomys krebsii*	LC
Nesomyidae	*Steatomys pratensis*	LC
Nycteridae	*Nycteris thebaica*	LC
Orycteropodidae	*Orycteropus afer*	LC
Pedetidae	*Pedetes capensis*	LC
Procaviidae	*Procavia capensis*	LC
Pteropodidae	*Eidolon helvum*	NT
Rhinolophidae	*Rhinolophus clivosus*	LC
Rhinolophidae	*Rhinolophus darlingi*	LC
Soricidae	*Crocidura cyanea*	LC
Soricidae	*Crocidura maquassiensis*	LC
Soricidae	*Suncus varilla*	LC
Suidae	*Phacochoerus africanus*	LC
Thryonomyidae	*Thryonomys swinderianus*	LC
Vespertilionidae	*Eptesicus hottentotus*	LC
Vespertilionidae	*Kerivoula lanosa*	LC
Vespertilionidae	*Myotis welwitschii*	LC
Vespertilionidae	*Neoromicia capensis*	LC
Vespertilionidae	*Neoromicia zuluensis*	LC
Vespertilionidae	*Scotophilus dinganii*	LC
Viverridae	*Genetta genetta*	LC