May 2023

ECOLOGICAL ASSESSMENT

for the

The construction of the Proposed Residential Development and Related Infrastructure on Derdepoortpark Extension 44 on Portions 426 and 679 of the Farm Derdepoort 326-JR, City of Tshwane (COT) Metropolitan Municipality

Compiled for

Zotec Developments (Pty) Ltd

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List of Acronyms

BGIS SANBI	South African National Biodiversity Institute: Biodiversity Geographic Information System
BI	Biodiversity Importance
BODATSA	Botanical Database of Southern Africa
BPA	Biodiversity Priority Area
C-plan	Conservation Plan
CBA	Critical Biodiversity Areas
CI	Conservation Importance
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CR	Critically Endangered
CREW	Custodians of Rare and Endangered Wildflowers
CSIR	Council for Scientific and Industrial Research
DD	Data Deficient
EN	Endangered
ESA	Ecological Support Areas
FI	Functional Integrity
GG	Government Gazette
GN	Government Notice
IUCN	International Union for Conservation of Nature and Natural Resources
KBA	Key Biodiversity Areas
LC	Least Concern
MAP	Mean Annual Precipitation
NEMA	National Environmental Management Act
NFEPA	National Freshwater Ecosystems Priority Areas
NSBA	National Spatial Biodiversity Assessment
NT	Near Threatened Species
PA	Protected Areas
PAOI	Project Area of Influence
PRECIS	Pretoria (PRE) Computerised Information System
RR	Receptor Resilience

List of Acronyms (cont.)

SAIIAE	South African Inventory of Inland Aquatic Ecosystems
SCC	Species of Conservation Concern
SDF	Spatial Development Framework
SEI	Site Ecological Importance
SG	Surveyor General
SIBIS	Integrated Biodiversity Information System
SOSC	Species of Special Concern
SWSA-sw	Strategic WSAs for surface water
TOPS	Threatened or Protected Species
TSP	Threatened plant species
VU	Vulnerable
WMA	Water Management Area
WSAs	Water Source Areas
WWF-SA	Worldwide Fund for Nature – South Africa
WRC	Water Research Commission

DECLARATION OF INDEPENDENCE

I, Kelly Joubert (Exigent Engineering Consultants CC) declare that:

General declaration:

- I act as the independent specialist in this application;
- do not have and will not have any vested interest (either business, financial, personal or other) in the undertaking of the proposed activity, other than remuneration for work performed in terms of the Environmental Impact Assessment Regulations, 2014, as amended;
- 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 am aware that a person is guilty of an offence in terms of Regulation 48 (1) of the EIA Regulations, 2014, as amended, if that person provides incorrect or misleading information. A person who is convicted of an offence in terms of sub-regulation 48(1) (a)-(e) is liable to the penalties as contemplated in section 49B(1) of the National Environmental Management Act, 1998 (Act 107 of 1998).

Date: 30 November 2022

DATE	REVISION	STATUS	PREPARED BY	CHECKED AND APPROVED BY
5 April	0	Approved for submission	Salona Reddy (Pr. Sci. Nat., Application in review)	Jacolette Adam (Pr. Sci. Nat., Reg number: 400088/02)
				
			Kelly Joubert (Pr. Sci. Nat., Reg number: 142182)	
				

1. INTRODUCTION

Exigent Engineering Consultants CC (hereafter referred to as Exigent) has been appointed by Zotec Developments (Pty) Ltd to conduct the ecological assessment for the proposed residential development and related infrastructure (to be known as Derdepoortpark Extension 44) on with a density of around 560 units with a density of 65 units per hectare on Portion 426 on Derdepoortpark Extension 1 and Portion 679 on Derdepoortpark Extension 11 of the Farm Derdepoort 326 - JR), approximately 7.935 ha in extent., City of Tshwane Metropolitan Municipality, Gauteng Province.

According to Government Notice (GN) No. 960 which was published in Government Gazette (GG) No. 42561 of 05 July 2019, it is a requirement to submit a report generated by the national web-based environmental screening tool in terms of section 24(5)(h) of the National Environmental Management Act (NEMA), 1998 (Act No 107 of 1998) and regulation 16(1)(b)(v) of the Environmental Impact Assessment (EIA) Regulations, 2014, as amended. This GN came into effect from 4 October 2019. According to the results from the environmental screening assessment, the site falls within a very high Terrestrial Biodiversity theme, medium animal species theme and a low plant species theme.

The Terrestrial Biodiversity theme was classified as a very high because the theme classified the study area as a Critically Endangered Ecosystem. The animal theme was classified as medium as the theme indicated that there are five (5) sensitive species which may occur onsite. These species include Mammalia-*Crocidura maquassiensis* (Makwassie musk shrew), Mammalia-*Dasymys robertsii* (Robert's shaggy rat), Mammalia-*Neamblysomus julianae (*Juliana's golden mole*)*, Reptilia-*Kinixys lobatsiana (*Lobatse hinge-back tortoise*)* and Invertebrate-*Clonia uvarovi (*bush cricket*).* The plant theme was classified as medium as the theme indicated that there are eight (8) sensitive species which may occur onsite Sensitive species 1252, *Delosperma gautengense*, Sensitive species 733, Sensitive species 430, *Dicliptera magaliesbergensis*, *Brachycorythis conica* subsp. *Transvaalensis*, Sensitive species 1248 and *Prunus Africana*.

GN No. 648 of 10 May 2019 prescribed procedures to be followed for the assessment and the minimum criteria for reporting of identified environmental themes in terms of Section 24(5)(a) and (h) of NEMA, when applying for Environmental Authorisation. In line with GN No. 1150 of 30 October 2020, Section 2.3, a terrestrial Animal Species report and Plant Species report will be submitted together with a Terrestrial Biodiversity report in line with the Draft Ecosystem Environmental Assessment Guideline of July 2021.

2. DETAILS OF THE SPECIALISTS

Exigent was established in 1998 providing multidisciplinary engineering and environmental services. The Exigent Environmental Business Unit provides sustainable answers within an environmental developmental framework. Our foundations are built upon ecological principles with wide ranging expertise in environmental management and assessment processes. The qualifications and experience of the primary specialists and report compilers are listed in Table 2.1. The specialists' Curriculum Vitae are attached as Appendix A.

Table 2.1. Specialist details

Specialist and contact details	Qualifications	SACNASP Registration	Experience
Jacolette Adam Email: jacolette@exigent.co.za Mobile:082 852 6417	M.Sc. LLM (Environmental Law)	No: 400088/02	22 years of professional experience in the environmental sector and has been a certified Pr. Sci. Nat since 2002. She has successfully completed numerous specialist assessments

Specialist and contact details	Qualifications	SACNASP Registration	Experience
			throughout South Africa for a wide range of clients.
Kelly Joubert	M. Env. Man.	No: 142182	Kelly is a certified Professional Natural Scientist since 2021 (142182), and a member of the Golden Key International Honour Society. She has over 6 years of experience in the field of environmental management. She specifically has experience in data collection, environmental report writing, legal compliance auditing, basic assessment reports, mine closure plans, research and analysis, environmental impact assessments, ecological studies, water sampling, GIS data analysis and water use licence application processes.
Salona Reddy	MSc	Application in review	Salona has 6 years of work experience in the field of environmental management and ecological assessments. She obtained her BSc Hons in 2015 and has recently been awarded her MSc. She has been responsible for the compilation of numerous EIA and EMPs for a wide range of clients. She has also recently submitted her application to SACNASP.

3. PROJECT DESCRIPTION

The proposed project includes the construction of the Derdepoortpark Extension 44 residential township with a density of 912 units and with a density of 120 units/ hectare on Portion 426 and Portion 679 on the Farm Derdepoort 326-JR, City of Tshwane Metropolitan Municipality, Gauteng. The proposed development includes the internal and external services infrastructure for the future residential development. This will include all earth works, services infrastructure (such as roads, stormwater infrastructure, sewer. Water and electricity infrastructure) and buildings. The proposed housing development will be Residential 3 zoning and will accommodate 120 units / ha. The town planning of the proposed development will also make provisions for Public Open Space and a small portion of the property will be zoned Municipal. Engineering services will be installed as per the specification of the Council and all buildings will be constructed according to the specifications of the South African Bureau of Standards (SABS).

4. PROJECT LOCATION

The proposed development will be located on Portion 426 and Portion 679 of the Farm Derdepoort 326-JR, within the jurisdiction of the City of Tshwane Metropolitan Municipality, Gauteng (Figure 4.1). The study area is approximately 7.935 ha (79350 m^2).

The development is proposed within the quarter degree grid cell 2528CB, quaternary catchment A23A, with the centre point geographical coordinates of the proposed development site situated at: (Table 4-1).

Table 4.1. Centre point coordinates of the proposed development.

LATITUDE/LONGITUDE	DEGREES	MINUTES	SECONDS
South	25°	41’	17.26”

East	28º	17’	39.25”

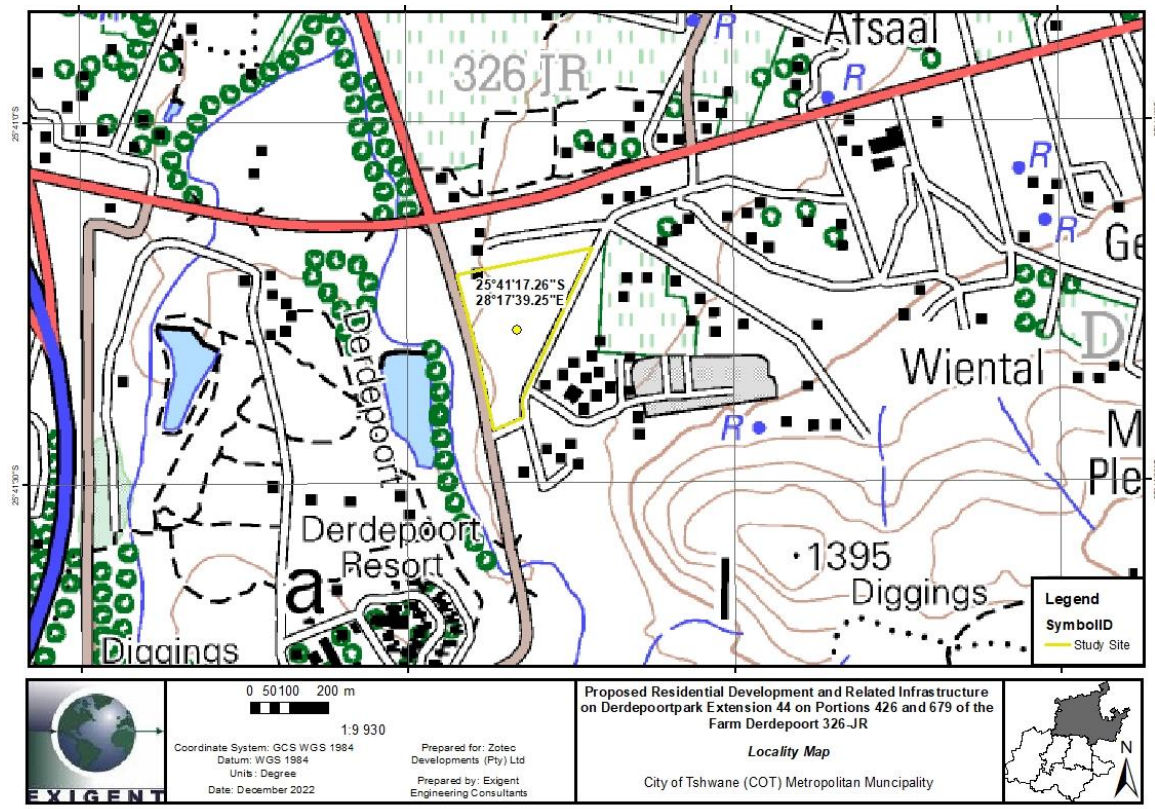

Figure 4.1. Locality of the proposed development area.

The 21-digit surveyor general (SG) code for the property for the proposed housing development is provided in Table 4.2 below.

Table 4.2. 21-digit Surveyor General code for the property affected by the proposed township development.

Surveyor-general 21-digit codes of the main development																				
T	0	J	R	0	0	0	0	0	0	0	0	0	3	2	6	0	0	6	7	9
T	0	J	R	0	0	0	0	0	0	0	0	0	3	2	6	0	0	4	2	6
T	0	J	R	0	0	0	0	0	0	0	0	0	3	2	6	0	0	0	0	0

5. ASSUMPTIONS

It is assumed that all third-party information used was correct at the time of the compilation of the report. The site survey was done on 07 October 2022 and the findings of both site visits have been incorporated into this report.

In order to obtain a comprehensive understanding of the dynamics of the study area, as well as the status of endemic, rare or threatened species in any area, assessments should always consider investigations at different time scales (across seasons/years) and replication. However, due to time constraints, such long-term studies are not always feasible, and all conclusions represented herein will be based on the field survey undertaken on as stipulated above.

6. RECEIVING ENVIRONMENT

6.1. Climate

The climate of the study area can be described as warm and temperate with summer rainfall and very dry winters. The summers are long and warm, and the winters are short, cool, dry and clear. Pretoria has been categorised as a Cwa zone which includes humid to subtropical climates according to the Köppen-Geiger climate classification system (Climate-Data.Org, 2019). The Mean Annual Precipitation (MAP) of the area is between 600 and 700 mm a year with frequent occurrences of frost in winter (Mucina & Rutherford, 2006). The average maximum temperature is 35.3°C and the minimum temperature is -3.3 °C for January and June respectively. Corresponding values are 32.8°C and -1.0°C for January and July.

The rainy period of the year lasts for 5.5 months, from October 17 to April 1, with a sliding 31-day rainfall of at least 13 mm. The most rain falls during the 31 days centred around January 17, with an average total accumulation of 97 mm. The rainless period of the year lasts for 3.9 months, from May 11 to September 8. The least rain falls around July 14, with an average total accumulation of 3 millimetres (www.weatherspark.com).

6.2. Geology topography and soils

The proposed development is located within the mafic intrusive rocks of the Rustenberg Layered Suite of the Bushveld Igneous Complex. Rocks include gabbro, norite, pyroxenite and anorthosite. The shales and quartzites of the Pretoria Group (Transvaal Supergroup) also contribute. Mainly vertic melanic clays with some dystrophic or mesotrophic plinthic catenas and some freely drained, deep soils. The area is dominated by the Black and Red Clay Soils (Ea), Ba indicates land in which red and or yellow brown apedal soils (Hutton, Bainsvlei, Avalon, Glencoe and Pinedene soil forms) that are dystrophic and or mesotrophic, dominate over red and or yellow brown eutrophic soils and lastly Apedal Eutrophic Soils (Ae) described as freely drained, red, eutrophic, apedal soils comprise >40% of the land type (yellow soils comprise <10).

6.3. Hydrology

The National Freshwater Ecosystems Priority Areas (NFEPA) used Water Source Areas (WSAs) to create a database that present various water and water related layers, including wetland delineation and vegetation data, catchment data, area of high groundwater recharge and water management areas using the criterion of the production of relatively large volumes of runoff which sustain lowland areas downstream. This work was then taken further in a study by the World Wide Fund for Nature – South Africa (WWF-SA) and the Council for Scientific and Industrial Research (CSIR) who identified 21 Strategic WSAs for surface water (SWSA-sw) which covered 8% of South Africa and supplied 50% of the mean annual runoff. More recently, the Water Research Commission (WRC) funded a study which identified water source areas for both ground and surface water resources (BGIS SANBI 2017). Strategic Water Source Areas (SWSAs) are now defined as areas of land that either:

(a) supply a disproportionate (i.e. relatively large) quantity of mean annual surface water runoff in relation to their size and so are considered nationally important; or

(b) have high groundwater recharge and where the groundwater forms a nationally important resource; or

(c) areas that meet both criteria (a) and (b). They include transboundary Water Source Areas that extend into Lesotho and Swaziland.

Based on the South African National Biodiversity Institute: Biodiversity Geographic Information System (BGIS SANBI) SWSAs database (2017) the study area is not strategically important for the water and economic security for South Africa. The Freshwater Biodiversity Information System classifies the study area as a Southern Temperate Highveld Freshwater Ecoregion.

6.3.1.1. Surface Water

The study area is located within the 3 – Crocodile (West) and Marcia Water Management Area (DWS, 2016). The study area is located within the Apies-Pienaars Sub Water Management Area and within primary catchment A, secondary catchment A2, tertiary catchment A23, quaternary catchment A23A and quinary catchment A23A3 which is highly developed and is comprised of eight quaternary catchments which cover an area of 4,446,504 km2. The Apies River / Pienaars River sub-management area of the Crocodile (West) and Marico Water Management Area (WMA) includes the Apies, Pienaar, Moretele and Tlholwe Rivers and their tributaries (As Gazetted in GN 1056 in GG 40279 of 16 September 2016). The study site does not fall within a Strategic Water Source Area (SWSA) for surface water.

The site does not intersect any drainage lines nor rivers and does not display any NFEPA nor National Wetland 5 wetlands (Figure 6.1), however is located within 120 m of the Moretele NFEPA river.

The screening tool indicated that the sensitivity of the site is low. Upon site verification there no wetlands or water courses located on site. However as per the DWS regulatory area, the wetlands located within 500 m of the site was delineated for the study area were investigated at a desktop level. The hydrological map in Figure 6.1 indicated that the depression and unchanneled valley bottom wetlands occur outside the site however within the 500 m regulatory area.

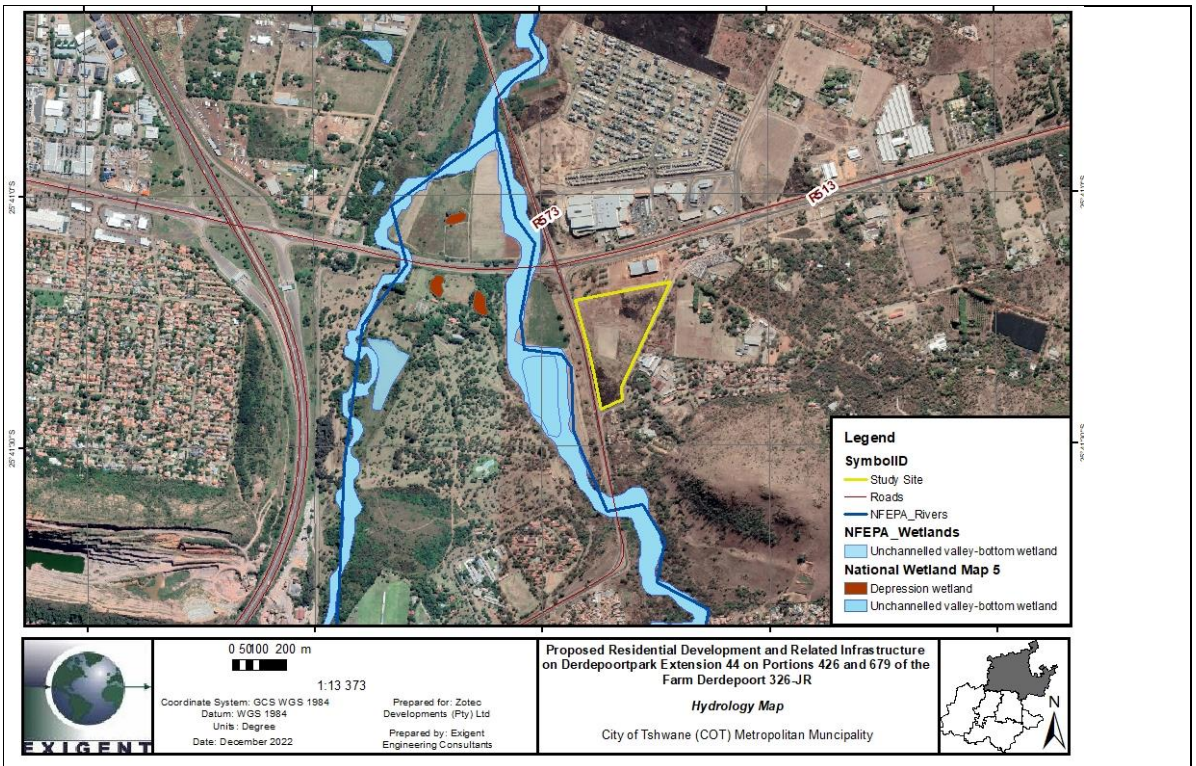

Figure 6.1. Surface hydrology of the area within close proximity to the proposed development area (NFEPA, 2012; NBA, 2018).

6.3.1.2. Ground Water

The groundwater recharge areas of South Africa has been mapped and distributed as part of the NFEPAs in 2011. This data aimed to provide the sub-quaternary catchments where the groundwater recharge was three-times higher than the average recharge ratio. Areas of high groundwater recharge are not necessarily classified as FEPAs, however they can be perceived as the 'recharge hotspots' of a region. It is critical to maintain the natural habitat in these areas of high groundwater recharge as to protect the functioning of the groundwater dependent ecosystems. Areas of groundwater recharge values higher than 300 Mm^3/a indicate high groundwater recharge areas.

The Apies-Pienaars tertiary catchment has been highly developed. Groundwater resources in the catchment have been extensively utilised, by extensive livestock grazing by rural communities and possibly over-exploited by the dominating irrigation sector.

The study area falls within Crocodile (West) Marico Water Management Area (WMA). Groundwater forms an important feature with regard to water resources in the Crocodile River (West) Catchment. According to DWS (2009) a large dolomitic aquifer stretches along the southern parts of the catchment. Hence a significant volume of water is drawn for irrigation and other purposes from this aquifer, including a significant portion of the water supply to the City of Tshwane. The aquifer extends across the boundaries of the various WMAs in this area. The sandy aquifers occur along the Lower Crocodile River, from which large quantities of water are abstracted for irrigation. These aquifers are recharged from rainfall as well as river flow. The remainder of the catchment is mostly underlain by fractured rock aquifers, which are well utilised for rural community water supplies (DWA, 2009). The study site does not fall within a Strategic Water Source Area (SWSA) for groundwater.

The study area has a groundwater recharge ratio of 28.30 Mm3/a. The aquifer classification map of South Africa has indicated that the study area has been identified as a minor aquifer system. The water source in this area is a combination of ground and surface water. According to the groundwater quality component in Table 6.1 of the National Water Act no. 36 of 1998 (Government Gazette no. 1050, 2 October 2020) the electrical conductivity of the groundwater in the Quaternary catchment A23A ranges between 47-51.70 mS/m.

6.4. Vegetation

According to the National Vegetation Map (SANBI, 2018), the proposed development lies within the Rand Highveld Grassland vegetation type of the Mesic Highveld Grassland Bioregion and the Grassland Biome along with the Marikana Thornveld vegetation type of the Central Bushveld Bioregion and the Savanna Biome.

The Marikana Thornveld vegetation type has a broad extent, reaching from the Johannesburg Dome extending in the region between northern Johannesburg in the south, and from near Lanseria Airport and Centurion (south of Pretoria) to the north, westwards to about Muldersdrif and eastwards to Tembisa. The altitude of the vegetation type ranges between 1280 m and 1660 m above sea mean level (Mucina & Rutherford, 2006). The vegetation type is defined by moderately undulating plains and low hills, supporting tall (*Hyparrhenia* hirta-dominated) grasslands. With sporadic occurrences of woody species on rocky out-crops or rock sheets. Rocky habitats show a high diversity of woody species, which are either scattered shrub groups or solitary small trees Table 6.2. The National Biodiversity Assessment (NBA,2018), in terms of the IUCN red list of ecosystems, indicated the Ecosystem Threat status of the Marikana Thornveld vegetation types as **Endangered** (Table 6.3). The greatest threat to the conservation of this vegetation type is seen by agricultural development and industrial development.

The Rand Highveld vegetation type has been determined to occur in the Gauteng, North-West, Free State and Mpumalanga provinces on undulating and/or sloping plains with series of ridges and is generally found to occur in the areas between rocky ridges, but may also extend onto them. Vegetation is species rich, wiry, sour grassland which alternates with low, sour shrubland on the ridges and outcrops. Herb diversity is high within the vegetation type Table 6.1. The vegetation type is regarded as endangered with 1% of a target 24% currently conserved. Transformation factors include poor land management, cultivation, plantations and urbanisation. Alien species affect some 7% of the vegetation unit and up to 7% is additionally affected by moderate to high erosion. The National Biodiversity Assessment (NBA,2018), in terms of the IUCN red list of ecosystems, indicated the Ecosystem Threat status of the Rand Highveld Grassland as **Vulnerable** (Table 6.3).

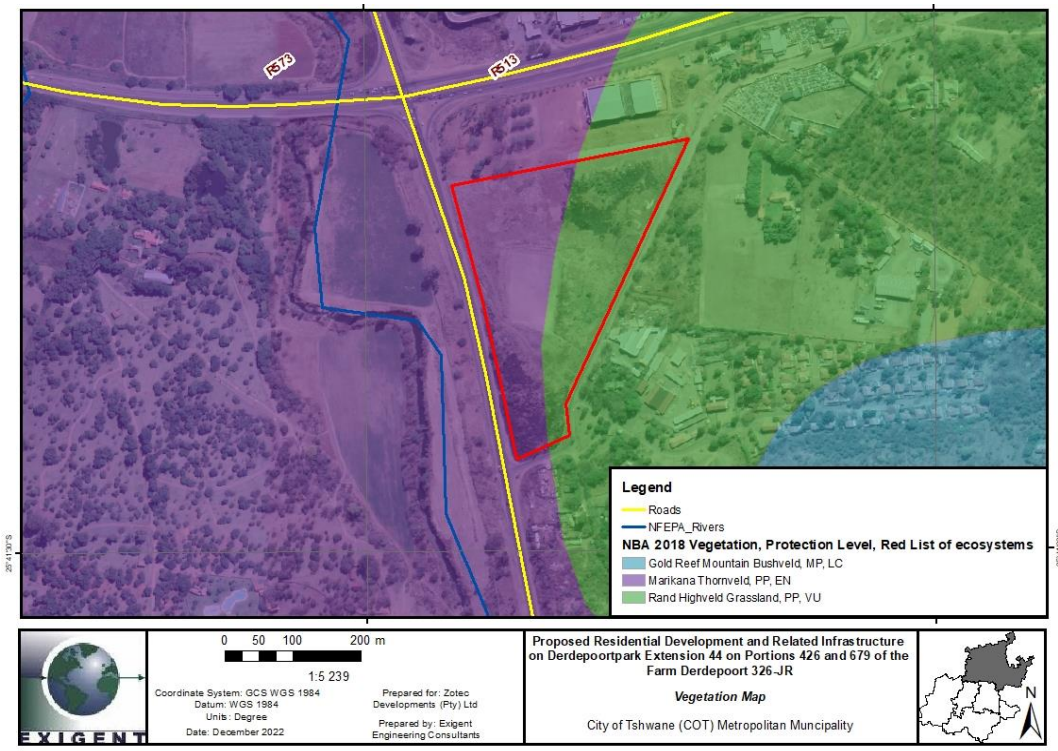

Figure 6.2 National Vegetation map (NBA, 2018)

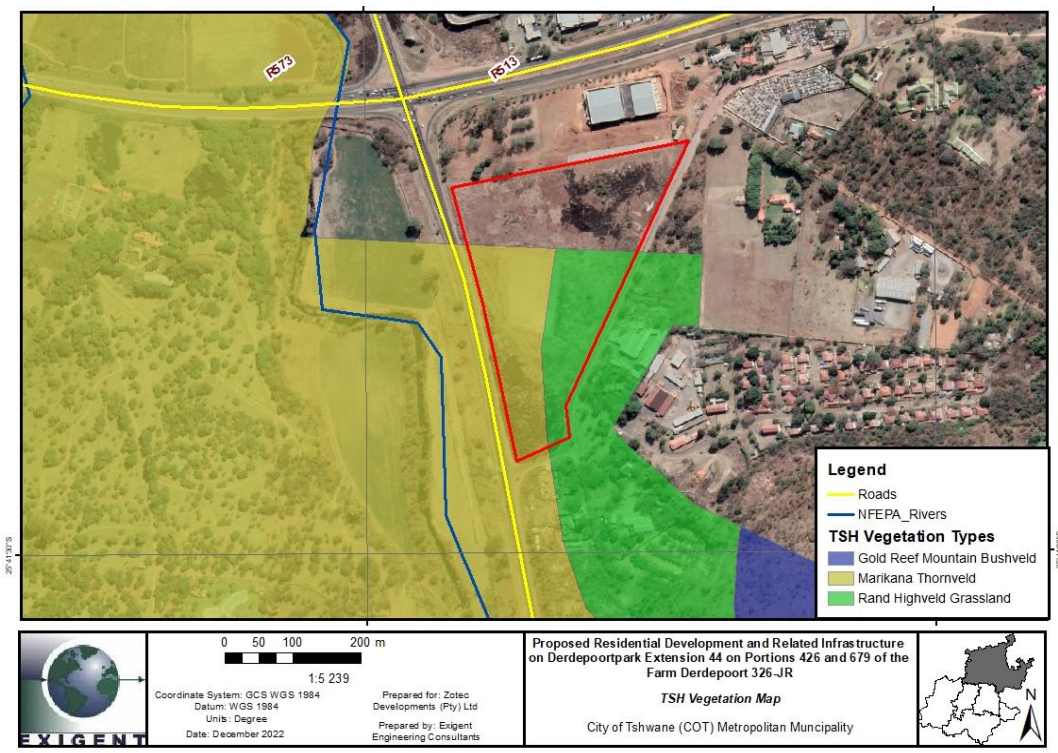

Figure 6.3 Provincial vegetation Map (SANBI, 2006)

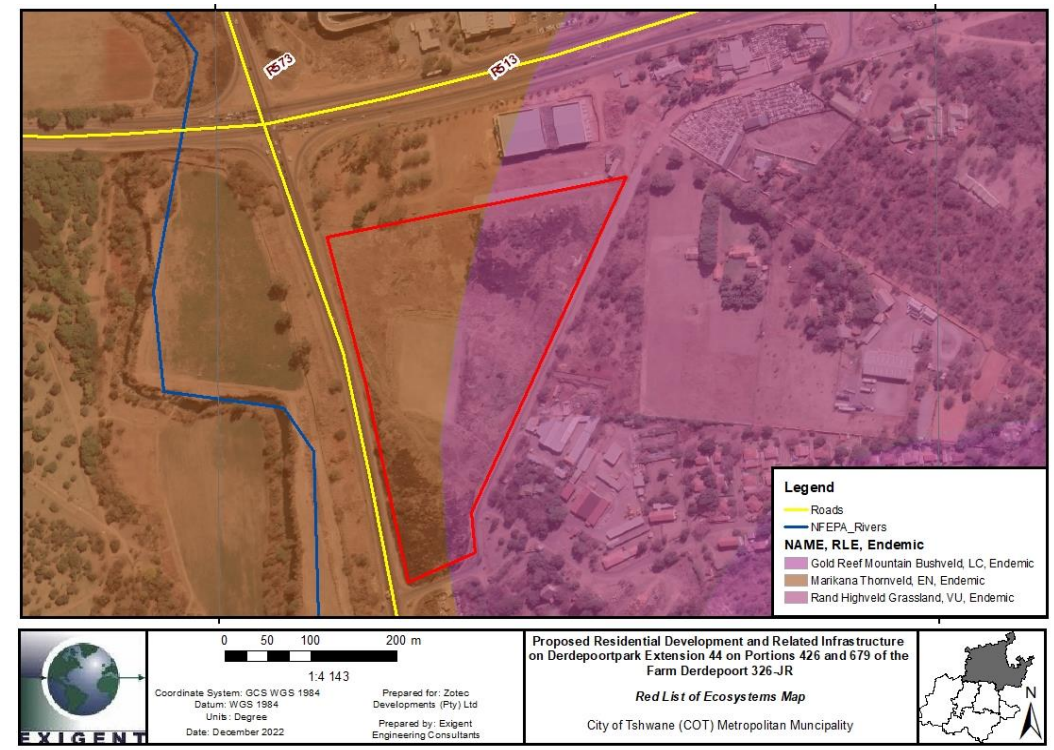

Figure 6.4 Red List of Ecosystems (RLE) for terrestrial realm for South Africa – remnants National Threatened Ecosystem map (NBA, 2018)

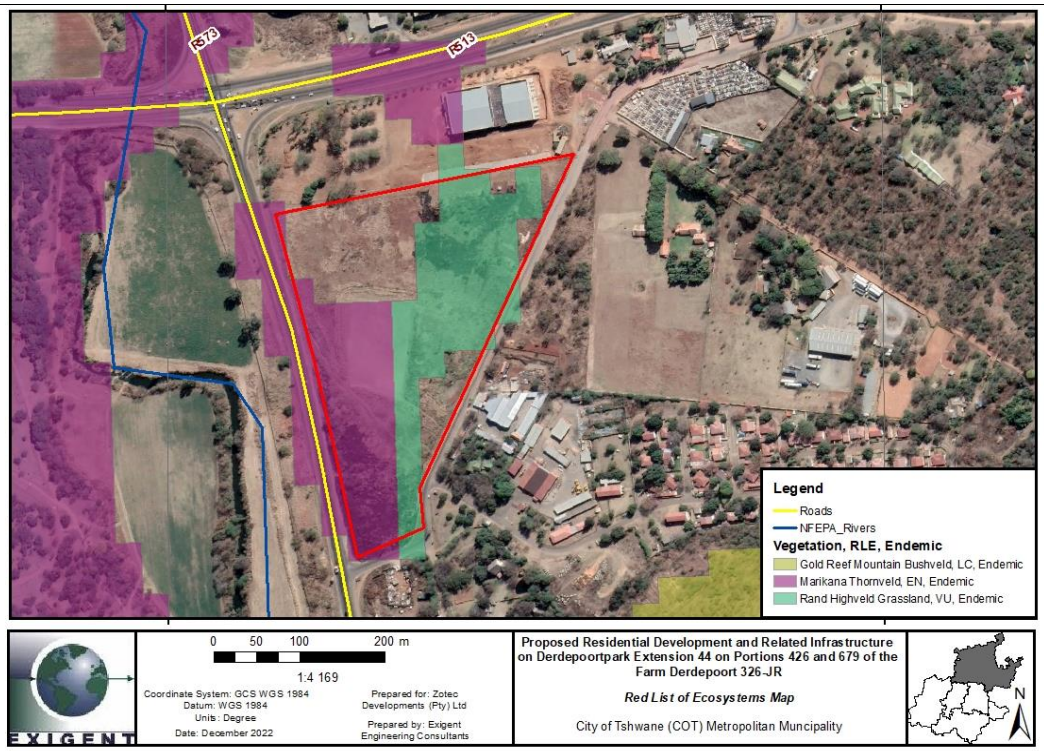

Figure 6.5. Red List of Ecosystems (RLE) for terrestrial realm for South Africa – remnants (June, 2021)

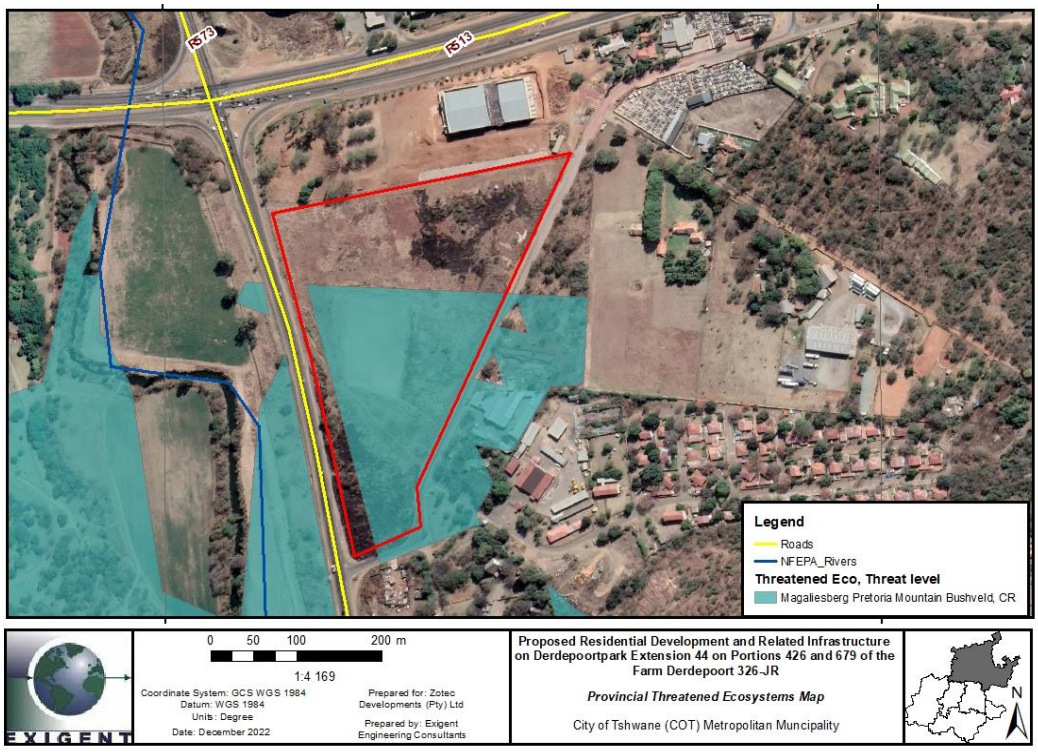

Figure 6.6 Provincial Threatened Ecosystem Map (SANBI, 2006)

Table 6.1. Dominant species representative from different stratums of the Rand Highveld Grassland type (Mucina & Rutherford, 2006).

Graminoids	Graminoids (cont.)	Geophytic Herbs
Andropogon schirensis	*Tristachya biseriate*	*Boophane disticha*
Aristida aequiglumis	*T. rehmannii, Urelytrum agropyroides*	*Cheilanthes hirta*
A. congesta, A. junciformis	**Herbs**	*Haemanthus humillis*
Bewisia biflora	*Acalypha angustata, reteniveris*	*Hypoxis rigidula*
Brachiaria nigropedata	*Acanthospermum australe*	*Ledebouria revoluta*
B. serrata	*Chamaecrista mimosoides*	*Oxalis corniculata*
Bulbostylis burchellii	*Dicoma anomala*	**Geoxylic Scffrutex**
Ctenium concinnum	*Helichrysum caespititium*	*Elephantorrhiza elephantina*
Cymbopogon caesius	*H. nudifolium, H. rugulosum*	**Geophytic Herbs**
Cynodon dactylon	*Ipomoea crassipes*	*Boophane disticha*
Digitaria monodactyla	*Justicia anagalloides*	*Cheilanthes hirta*
D. tricholaenoides	*Kohautia amatymbica*	*Haemanthus humillis*
Diheteropogon amplectens	*Lactuca inermis,*	*Hypoxis rigidula*
Elionurus muticus	*Macledium zeyheri*	*Ledebouria revoluta*
Eragrostis capensis	*Nidorella hottentotica*	*Oxalis corniculata*
E. chloromelas	*Oldenlandia herbacea*	**Succulent**
E. curvula	*Rotheca hirsute*	*Aloe greatheadii var davyana*
E. gummiflua	*Selago densiflora*	
E. plana	*Senecio coronatus*	
E. racemosa	*Sonchus dregeanus*	
Heteropogon contortus	*Vernonia oligocephala, Xerophyta*	
Hyparrhenia hirta		
Loudetia simplex		
Melinis nerviglumis		
M. repens		
Microchloa caffra		
Monocymbium ceresiiforme		
Panicum natalense		
Schizachyrium sanguineum		
Setaria nigrirostris		
S. sphacelate		
Sporobolus pectinatus		
Themeda triandra		
Trachypogon spicatus		
Trichoneura grandiglumis		

Table 6.2. Dominant species representative from different stratums of the Marikana Thornveld type (Mucina & Rutherford, 2006).

Table 6.3. The key vegetation type present in the study area based on Mucina and Rutherford (2006).

Vegetation type	Status (NSBA)*	Description
Marikana Thornveld	Endangered	Approximately 1% of the 19% conservation target currently being statutorily conserved, in reserves such as the Magaliesberg Nature Area and De Onderstepoort Nature Reserve. This vegetation type has been considerably impacted, with 48% being transformed predominantly via cultivation, urban or built up areas. Nearer Pretoria, industrial development is the greatest threat of land transformation, with agriculture being the dominant threat in the more rural regions where this vegetation type occurs. Erosion potential within this vegetation type is low to moderate, with localised, high densities of invasive species.
Rand Highveld Grassland	Vulnerable	Only a very small fraction is conserved in the statutory reserves. Around 44% is transformed by cultivation, plantation s, mines, urbanisation and building of dams. Cultivation may have had an extensive impact which is indicated by landcover data and erosion is low.

*National Spatial Biodiversity Assessment

7. METHODOLOGY

7.1. Desktop site verification

Prior to conducting the physical study area visit, an initial desktop survey was done using Google Earth's map timeline function to detect changes in visible vegetation gradients. Possible sensitive features were identified, and GPS coordinates were noted to assist with the study area visit.

7.1.1.1. Literature and database survey

A literature survey was conducted to assist with the study. The full reference to resources used is listed in Section 13.

Relevant resources included:

- VEGMAP (2018);
- National Spatial Biodiversity Assessment (2018);
- Mucina & Rutherford (2006);
- Red Data Animal Lists; and
- Various field guides and books.

7.1.1.2. Local databases

As per the zoning allocation of the CoT Metropolitan Municipality, the proposed properties are zoned Suburban density in the Spatial Development Framework 2020 (SDF, 2020) within CoT. Portion 426 on the Farm Derdepoort 326-JR, is classified as mixed land use according to the SDF, 2020 City of Tshwane Metropolitan Municipality. The proposed development is also located within an Urban Development Zone in terms of the Zoning data.

7.1.1.3. Provincial databases

The Gauteng Conservation Plan (C-plan) Version 3.3 (2011) (C-Plan (3.3))focuses on three key areas:

- Species requirements: The persistence requirements for each of the threatened species included in the plan were identified and incorporated into the plan. For instance, range sizes and habitat requirements, as well as buffers around known species locations, were built into the plan.
- Climate change: The plan identifies and includes (a) corridors, (b) areas that represent the full range of bioclimatic variables (altitude, aspect, geology), and (c) intact ridges, which represent important environmental gradients and linkages.
- Hydrological processes: Key wetland and river systems are included in the plan. In addition, targets were set for identified priority freshwater catchments and dolomite systems.

The C-Plan (3.3), as amended, focuses on three key areas:

- Species requirements: The persistence requirements for each of the threatened species included in the plan were identified and incorporated into the plan. For instance, range sizes and habitat requirements, as well as buffers around known species locations, were built into the plan.
- Climate change: The plan identifies and includes (a) corridors, (b) areas that represent the full range of bioclimatic variables (altitude, aspect, geology), and (c) intact ridges, which represent important environmental gradients and linkages.
- Hydrological processes: Key wetland and river systems are included in the plan. In addition, targets were set for identified priority freshwater catchments and dolomite systems.

The C-Plan includes three main purposes

- to serve as the primary decision support tool for the biodiversity component of the Environmental Impact Assessment (EIA) process;
- to inform protected area expansion and biodiversity stewardship programmes in the province; and
- to serve as a basis for development of Bioregional Plans in municipalities within the province.

The C-Plan (3.3) was used during a Geographic Information System (GIS) based assessment of the study area. The C-Plan (3.3) delineates (at approximately 1:50 000 scale) biodiversity priority areas called Critical Biodiversity Areas (CBA), Ecological Support Areas (ESA) and Protected Areas (PA). The C-Plan (3.3) was consulted for the compilation of this report. Results indicates that the proposed development is not located within a CBA or ESA (Figure 8.7). Provincially the site partially falls within the Marikana Thornveld and Rand Highveld Grassland as per the TSHThreatenedEcosystems layer (SANBI, 2006)**.** The provincial threatened ecosystem layer indicated that the site falls within the Magaliesberg Pretoria Mountain Bushveld which is classified as **critical** as per the TSHThreatenedEcosystems layer (SANBI, 2006).

The province of Gauteng includes four categories for the National Protected Area Expansion Strategy (NPAES) such as Protected Areas (Pas), Negotiated Areas, Priority Focus Areas (PFAs) and remains severely under-protected (DEA, 2016). Upon consultation with the NPAES database, it was determined that there are no NPAES areas within the boundaries of the proposed development indicated (Figure 8.10).

7.1.1.4. National databases

The Integrated Biodiversity Information System (SIBIS) database from the South African National Biodiversity Institute (SANBI) contains information from several SANBI databases, namely:

- Acocks (plant species observations);
- Custodians of Rare and Endangered Wildflowers (CREW) (threatened plant species localities);
- Species Status (NEMBA-listed species);
- TSP (threatened plant species): NFEPA – (Nel *et al*., 2011). This mapping product highlights potential rivers and wetlands that should be earmarked for conservation on a national basis; and
- National Spatial Biodiversity Assessment.
- Protected Areas
- National Landcover

The SIBIS database provides information of the IUCN Red List status, Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) Appendix listing or Threatened or Protected Species (TOPS) status of the study area, on an interactive map. The NFEPA database includes various water and water related layers, including wetland delineation and vegetation data, catchment data, area of high groundwater recharge and water management areas. Based on National Biodiversity Assessment classification, the study area partly falls within a **NEMBA Endangered ecosystem** known as the **Marikana Thornveld and NEMBA Vulnerable known as the Rand Highveld Grassland** as per the VEGMAP2018 layer (NBA, 2018). The Red List of Ecosystems (RLE) for terrestrial realm for South Africa – remnants indicates that the Marikana Thornveld is classified as **Endangered** and the Rand Highveld Grassland as V**ulnerable** (NEMBA, 2021) this list is promulgated and will be used to describe the vegetation threat status hereof. Although the study area is classified as both Endangered and vulnerable ecosystem the study site is highly transformed, therefore not a clear representative of an Endangered ecosystem. The study site is classified as poorly protected within the terrestrial threat status.

7.2. Vegetation

Prior to the site investigation, the development site was stratified into relatively homogeneous vegetation/habitat units based on the morphology of the terrain and the growth-form of the vegetation. This was done with the help of 1:50 000 topographical maps and Google earth aerial photos of the development site. The physical site surveys were conducted on 7 October 2022 and 26 May 2022, as required for species identification. Species lists were compiled during the site visit to ensure that representative species observed were captured. The species listed within the findings of the screening tool were also searched for during the site visit.

Fauna distribution data were obtained from various available databases, publications and field guides to ascertain the historical occurrence of species within 2528CB.

7.2.1.1. Vegetation Sensitivity Summary

A summary of environmental sensitivity information provided above is listed in Table 7 1 below.

Table 7.1. Summary of environmental sensitivities in the project area.

Database	Importance	Criteria	–Project site
National vegetation types	Savanna	Least concern	A common vegetation unit
	Central Bushveld	Least concern	A common vegetation unit
Provincial vegetation types	Marikana Thornveld	Endangered	A common vegetation unit
	Rand Highveld Grassland	Vulnerable	A common vegetation unit
NFEPA	N/A	N/A	Not in study site
PA Expansion Focus area	Protection Areas Priority Expansion Areas	N/A	Not in construction footprint
IBA	N/A	N/A	None close to site
Provincial CBA	N/A	N/A	Not in construction footprint
Provincial ESA	N/A	N/A	Not within the construction footprint
Threatened Ecosystems	Marikana Thornveld	Endangered	In study site
	Rand Highveld Grassland	Vulnerable	
TSH Threatened Ecosystems	Magaliesberg Pretoria Mountain Bushveld	Critical Endangered	In study site
Gauteng_C_Plan	N/A	N/A	Not within the construction footprint
NEMBA List 2011	Marikana Thornveld	Endangered	In study site
	Rand Highveld Grassland	Vulnerable	
Landscape corridors	N/A	N/A	Not in study site

7.3. Riparian delineation method

The following methods were utilised in order to delineate the "riparian edge" and "wetland edge" of such systems located within the study area.

Reference was made to the delineation protocols contained within the Department of Water Affairs' "A Practical Field Procedure for Identification of Wetlands and Riparian Areas" (2005). Indicators of a riparian system include the following (as per DWAF 2005):

1. An "obvious" floodplain and active channel.

2. Evidence of active erosion indicating a high energy system.

3. The absence of "classic" hydromorphic vegetation, with species associated with riparian areas dominating, or simply a change in vegetation density and structure.

As such, the approach to defining the riparian zone is not strictly defined (DWAF 2005) and a number of methods can be used. Accepted riparian indicators include:

1. Topography: identification of flood terraces and macro-channels.
2. Vegetation: identification of a distinct area of vegetation change, often in close association with the macro-channel. Changes can be in relation to species diversity or physical nature (density or health).
3. Alluvial soils and deposited material: identification of recent deposits of sand or mud, serves as a confirmatory indicator.

A number of methods exist for identifying riparian indicators. Acceptable methods include (DWAF 2005):

1. The use of topographical maps;
2. Ecoregions (e.g. using climatic, geological or vegetative community indicators can be useful as a predictive method); and
3. Field work (i.e. confirming desktop observations by locating indicators on site).

7.4. Calculating the Project Area Of Influence (PAOI)

The following steps were followed in calculating the PAOI:

1. The project activities interaction with the flora of the region assessed based on the following sources:
    a. SA National Land Cover (BGIS 2014);
    b. National Spatial Biodiversity Assessment (2018);
    c. National Freshwater Ecosystems Priority Areas (NFEPA) – (Nel *et al*., 2011);
    d. South African Inventory of Inland Aquatic Ecosystems (SAIIAE, 2018); and
    e. Previous specialist assessments for the project area.
2. Calculate how far the project activities could influence on the vegetation communities.

7.5. Evaluation of Site Ecological Importance

SANBI (2020) defines Site Ecological Importance (SEI) as a function of the *Biodiversity Importance (BI)* of the receptor, which is either defined as the species of conservation concern, or fir instance a faunal community or habitat type present on the site), and its resilience to impacts, *Receptor Resilience (RR),* and is then calculated as follows:

$$SEI = BI + RR$$

BI is the function of Conservation Importance (CI) and the Functional Integrity (FI) of the receptor and is calculated as follows:

$$BI = CI + FI$$

7.6. Conservation Importance

CI is evaluated in line with the various internationally accepted principles and criteria for the determination of biodiversity-related value, including the IUCN Red List species, Red list of Ecosystems and the Key Biodiversity Areas (KBA)of the IUCN (IUCN 2016).

This CI evaluation is based on the following criteria:

1. **IUCN Threatened and Near Threatened Species** (CR, EN, VU & NT) on a national or global scale as per the IUCN criteria (www.iucnredlist.org). The Guideline states that should the national and global assessment status differ for the same taxon, the most recent evaluation of status should be used in the SEI calculation.
2. **Rare species** as included on the South African National Red List as Rare of Critically Rare or Extremely Rare. These species are highly restricted even though not currently declining. Should a proposed development impact on a population of these species they will quality under an IUCN category of threat.
3. **Range-restricted species** – the presence of terrestrial fauna, flora with a global population Extent of Occurrence (EOO) of 10 000km^2 or less.
4. **Globally significant populations of congregatory species** - a roughly estimated proportion (%) of the global population of a fauna species that congregate for breeding/feeding/hibernation/ other reasons;
5. **Significant areas of threatened vegetation types** – function of both the size being considered in relation to the total extent of that vegetation type (i.e. proportion) and how threatened (CR, EN, VU) the vegetation types are;
6. **Natural processes** – natural unmanaged areas with low levels of ecological disturbance have largely intact natural processes such as pollination, seed dispersal and migration, and thus have greater intrinsic conservation importance than those modified through ecological disturbance.

In calculating the CI, the criteria as set out below in

Table 7.2 has been implemented.

Table 7.2. Conservation Importance Criteria

Conservation Importance	Fulfilling Criteria
Very High	Confirmed or highly likely occurrence of CR, EN, VU, extremely rare[1], critically rare[2], species that have a global EOO <10km^2 Any area of natural habitat or a CR ecosystem or large area (>0.1% of the total ecosystem type extent) of natural habitat of EN ecosystem type Globally significant populations of congregatory species (>10% of the global population)
High	Confirmed or highly likely occurrence of CR, EN, VU, extremely rare, critically rare, species that have a global EOO >10km^2 IUCN threatened species (CR, EN, VU) must be listed under any criterion other than A. If listed only under Criterion A, include if there are less than 10 locations or <10 000 mature individuals remaining. Small area (>0,01% but smaller than (>0.1% of the total ecosystem type extent) of natural habitat of EN ecosystem type or large area (>0,01%) of natural habitat of VY ecosystem type Presence of Rare species Globally significant populations of congregatory species (>1% but <10% of the global population)
Medium	Confirmed or highly likely occurrence of populations of NT species, threatened species (CR, EN, VU) listed under Criterion A only and which have more than 10 locations or more than 10 000 mature individuals. Any area of natural habitat of threatened ecosystem type with status of VU Presence of range-restricted species >50% of receptor contains natural habitat with potential to support SCC
Low	No confirmed or highly likely populations of SCC No confirmed or highly likely populations of range-restricted species <50% of receptor contains natural habitat with limited potential to support SCC
Very low	No confirmed and highly unlikely populations of SCC No confirmed and highly unlikely populations of range-restricted species No natural habitat remaining

7.7. Functional Integrity

Functional Integrity (FI) of the receptor[3], used as the vegetation/faunal community or habitat type) is defined as the receptor's ability to maintain the structure and functions that define it, compared to its known or predicted state under ideal conditions. In calculating the FI, the criteria as set out below in Table 7.3 has been implemented.

Table 7.3. Functional Integrity Criteria

Functional Integrity	Fulfilling Criteria
Very High	Very large (>100ha) intact area for any conservation status of ecosystem type or >5ha for CR ecosystem types High connectivity serving as functional ecological corridors, limited road network between intact habitat patches No or minimal criteria negative ecological impacts with no signs of major past disturbances
High	Large (>20ha, but <100ha) intact area for any conservation status of ecosystem type or >10ha for EN ecosystem types Good habitat connectivity with potential functional ecological corridors and a regularly used road network between habitat intact patches

[1] Applicable to butterflies (as per Mecenero *et al* 2013)
[2] Applicable to plants (as per Raimondo *et al* 2009)
[3] Defined as the measure of ecological condition of the impact receptor as determined by its remaining intact and functional area, its connectivity to other natural areas and the degree of current persistent ecological impacts.

Functional Integrity	Fulfilling Criteria
	Only minor current negative ecological impacts with no signs of major past disturbance (e.g. ploughing) and good rehabilitation potential
Medium	Medium (>5ha but <20ha) semi-intact area for any conservation status of ecosystem type or >20ha for VU ecosystem types Only narrow corridors of good habitat connectivity or larger areas of poor habitat connectivity and a busy used road network between intact habitat patches Mostly minor current negative ecological impacts with some major impacts (e.g. established population of alien and invasive flora) and a few signs of past disturbance with moderate rehabilitation potential
Low	Small (>1ha but <5ha) area Almost no habitat connectivity but migrations still possible across some transformed or degraded natural habitat and a very busy used road network surrounds the area. Low rehabilitation potential. Several minor and major current negative ecological impacts.
Very low	Very small <1ha area No habitat connectivity except for flying species or flora with wind dispersed seeds. Several major current negative ecological impacts.

7.8. Biodiversity Importance

Based on the above criteria, the BI is then calculated as per the matrix below.

Biodiversity Importance		Conservation Importance				
		Very High	**High**	**Medium**	**Low**	**Very Low**
Functional Integrity	**Very high**	Very High	Very High	High	Medium	Low
	High	Very High	High	Medium	Medium	Low
	Medium	High	Medium	Medium	Low	Very low
	Low	Medium	Medium	Low	Low	Very low
	Very low	Medium	Low	Very low	Very low	Very low

7.9. Receptor Resilience

The Receptor Resilience (RR)[4] is based on the estimated recovery time to restore an appreciable portion of the functionality of the receptor. These resilience aspects should be evaluated based on the specific conditions, such as large birds of prey having different resilience levels to noise disturbances based on the breeding cycle.

The RR is calculated based on the criteria as set out in

Table 7.4.

Table 7.4. Receptor Resilience Criteria

[4] Intrinsic capacity of the receptor to resist major damage from disturbance and/or to recover to its original state with limited or no human intervention

Receptor Resilience Criteria	Fulfilling Criteria
Very High	Habitat that can recover rapidly (less than 5 years) to restore >70% of the original species composition and functionality of the receptor functionality, or species that have a high likelihood of remaining at a site even when a disturbance or impact is occurring, or species that might have a very high likelihood of returning to a site once the disturbance has been removed.
High	Habitat that can recover relatively quickly (5 -10 years) to restore >70% of the original species composition and functionality of the receptor functionality, or species that have a high likelihood of remaining at a site even when a disturbance or impact is occurring, or species that might have a high likelihood of returning to a site once the disturbance has been removed.
Medium	Will recover slowly (more than 10 years) to restore >70% of the original species composition and functionality of the receptor functionality, or species that have a moderate likelihood of remaining at a site even when a disturbance or impact is occurring, or species that might have a moderate likelihood of returning to a site once the disturbance has been removed.
Low	Habitat that is unlikely to be able to recover fully after a long period: >15 years required to restore less than 50% of the original species composition and functionality of the receptor functionality, or species that have a low likelihood of remaining at a site even when a disturbance or impact is occurring, or species that might have a low likelihood of returning to a site once the disturbance has been removed.
Very low	Habitat that is unable to recover from major impacts, or species that are unlikely to remain at a site even when a disturbance or impact is occurring, or species that are likely to return to a site once a disturbance or impact has been removed.

Based on the above criteria, the SEI is then calculated as per the matrix below.

Site Ecological Importance		Biodiversity Importance				
		Very High	**High**	**Medium**	**Low**	**Very Low**
Receptor resilience	**Very high**	Very High	Very High	High	Medium	Low
	High	Very High	High	Medium	Medium	Low
	Medium	High	Medium	Medium	Low	Very low
	Low	Medium	Medium	Low	Low	Very low
	Very low	Medium	Low	Very low	Very low	Very low

The SEI is then interpreted based on the guideline as set out in Table 7.5.

Table 7.5. Interpretation of Site Ecological Importance

Site Ecological Importance	Fulfilling Criteria
Very High	Avoidance mitigation - No destructive development activities should be considered. Offset mitigation not possible as this would be the last remaining species/good patches of habitat/unique species assemblages. Destructive impacts for species/ecosystems where persistence target remains.
High	Avoidance mitigation whenever possible - Minimization mitigation. Changes to project infrastructure design to limit the amount of habitat impacted. Limited development activities of low impact acceptable. Offset mitigation may be required for high impact activities.
Medium	Minimization and restoration mitigation - Development activities of medium impact acceptable followed by appropriate restoration activities.
Low	Minimization and restoration mitigation - Development activities of medium to high impact acceptable followed by appropriate restoration activities.
Very low	Minimization mitigation - Development activities of medium to high impact acceptable and restoration activities may not be required.

The combination of SEI for various taxon into a single SEI for the PAOI can be done by means of ad hoc combining the maximum SEI for each receptor, or via an evaluation of the SEI once per receptor for all necessary taxon, but in these instances the highest CI, FI and lowest RR ratings across all taxon should be applied.

7.10. Desktop Site Verification for species of conservation concern

7.10.1.1. TOP species Desktop Lists for the Development Area

In addition to the species identified in the DEA screening tool and those identified by the Gauteng Department: Agriculture and Rural Development (GDARD), the National Environmental Management: Biodiversity Act (Act No. 10 of 2004, NEMBA) TOP species were also considered for the proposed development. TOP species were identified in terms of the threatened and protected species lists as published under the NEMBA GN 151 of 2007 (GN151, 2007). The International Union for Conservation of Nature and Natural Resources (IUCN) Red-list species for South Africa were also consulted for the distribution and status for mammals, reptiles, and invertebrates. Where variation occurred, this was indicated on the list.

7.10.1.2. Species of special concern

The available habitat on the development site was compared to the habitat requirements of Species of Special Concern (SOSC) potentially occurring in the study area as determined from the literature review. Based on this assessment, SOSC with a probability of occurring on the development site were identified.

7.10.1.3. Red data listed species

South Africa is a signatory to the United Nations Convention on Biological Diversity (1992) and, as such, needs to conserve biological diversity, promote the sustainable use of biological diversity, and ensure the fair and equitable sharing of benefits arising out of the utilisation of genetic resources. Principle 4(a) of the NEMA states that disturbance to ecosystems and loss of biodiversity should be avoided, minimised and remedied.

To promote the conservation of biodiversity, species of concern have been identified by the World Conservation Organisation (IUCN) Red Data lists which they feel require protection (Hilton-Taylor, 1996; IUCN 2002). The World Conservation Organisation (IUCN) has three threatened categories, namely Critically Endangered, Endangered and Vulnerable. Species that have been evaluated according to the IUCN criteria and do not fall into one of the threatened categories can be classified as Least Concern, Near Threatened or Data Deficient (Minter *et al.,* 2004; Hilton-Taylor, 1996):

Extinct: The species are presumed extinct when extensive surveys have failed to record an individual. Surveys should be in known and expected habitat, at appropriate times and throughout its historic range.

- **Extinct in the Wild:** Exhaustive surveys in known and expected habitat, at appropriate times and throughout its historic range have failed to record an individual. Populations occur well outside the past range, in cultivation or in captivity.
- **Critically Endangered (CR):** Species facing an extremely high risk of extinction in the wild.
- **Endangered (EN):** These taxa are in danger of extinction and are unlikely to survive if the current situation continues.
- **Vulnerable (VU):** Vulnerable species are facing a high risk of extinction in the wild. Vulnerable species are taxa that are likely to move into the Endangered category in the near future if the factors causing the decline to continue to be present.

- **Near Threatened (NT):** Species are classified as Near Threatened when they do not meet the criteria for the threatened categories but are close to classifying as Threatened or will likely classify as Threatened in the near future.
- **Data Deficient (DD):** A species is classified as a Data Deficient when there is a lack of appropriate data on the distribution and/or population status of the species. The species may be well studied, and the biology known, but data on the abundance and/or distribution are not available. The category indicates that more data are required and that there is a possibility that the species may be classified into one of the threat categories in the future.
- **Least Concern (LC):** Species that are widespread and abundant are normally included in this category.
- **Not Listed (NL):** Species that are not listed in terms of the various databases used.

7.11. Riparian assessment

Natural channels or drainage lines are classified as watercourses according to the NWA definition and therefore require protection. The NWA defines a watercourse as:

- A river or spring;
- **A natural channel in which water flows regularly or intermittently;**
- A wetland, lake or dam into which, or from which, water flows; and
- Any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse, and a reference to a watercourse includes, where relevant, its bed and banks.

The NWA further defines riparian habitat as:

'*The physical structure and associated vegetation of areas associated with a watercourse which are commonly characterised by alluvial soil, and which are inundated or flooded to an extent and with a frequency sufficient to support vegetation of species with a composition and physical structure district from those of adjacent land areas*.'

Riparian areas are important ecosystems, especially due to the role they play in protection and improvement of water resources and the provision of habitat for plant and animal species (DWAF, 2005). It provides several functions which include:

- storage of water to aid in flood reduction;
- stabilization of stream banks;
- improve water quality by trapping sediment and nutrients;
- maintain natural water temperature for aquatic species;
- provide shelter and food for birds and other animals;
- provide corridors for movement and migration of different species;
- act as a buffer between aquatic ecosystems and adjacent land uses;
- can be used as recreational sites; and
- provide material for building, muti, crafts and curios.

Not all riparian areas are similar and may differ in the functions that they perform. It is however important that a riparian area's capacity to provide the said benefits is not reduced. Many of these areas are best managed as natural areas, rather than being converted to other uses (DWAF, 2005).

7.11.1.1. Riparian vegetation

The riparian vegetation present on the proposed development site was assessed by means of a Level 3 Assessment of the Riparian Vegetation Assessment Response Index (VEGRAI) method (Kleynhans *et al*., 2007) in conjunction with the minimum requirements for riparian vegetation assessments as outlined by DWAF (2008) which are:

- distinction of marginal and non-marginal zones;
- the condition of different vegetation zones within the riparian zone, and the principal drivers of degradation;
- influence of riparian vegetation on instream habitat;
- description of native woody and non-woody vegetation; and
- determination of introduced/exotic vegetation.

The results from the VEGRAI surveys were used to determine the current condition (PES) of the riparian vegetation. A description of the outcome categories is presented in **Table 7-6** below.

Table 7-6. Descriptive categories used to describe the present ecological status (PES) of biotic components (adapted from Kleynhans *et al*, 2007).

ECOLOGICAL CATEGORY	DESCRIPTION	SCORE (% OF TOTAL)
A	**Unmodified, natural**	90-100
B	**Largely natural with few modifications**. A small change in natural habitats and biota may have taken place but the ecosystem functions are essentially unchanged.	80-89
C	**Moderately modified**. Loss and change of natural habitat and biota have occurred, but the basic ecosystem functions are still predominantly unchanged.	60-79
D	**Largely modified**. A large loss of natural habitat, biota and basic ecosystem functions has occurred.	40-59
E	**Seriously modified**. The loss of natural habitat, biota and basic ecosystem functions is extensive.	20-39
F	**Critically modified**. Modifications have reached a critical level and the lotic system has been modified completely with an almost complete loss of natural habitat and biota. In the worst instances the basic ecosystem functions have been destroyed and the changes are irreversible	0-19

Importantly, the A to F scale represents a continuum in which a particular entity may potentially have membership of both the upper and lower classes. These situations are referred to as boundary categories and are denoted as B/C, C/D and so forth.

8. SITE VERIFICATION AND RESULTS FOR BIODIVERSITY ASSESSMENT

8.1. Site Verification Method

Field verification session were held on 7 October 2022. The season that the field survey was conducted was in Spring.

The specialist investigated the study area on foot during for a combined period of 8 hours. The entire site of 7.935 ha was surveyed on foot to locate and characterise habitats. Photographs were taken and the assessment of the likelihood of any terrestrial ecosystems and BPAs being present was conducted. The terrestrial ecosystems observed on site were captured using a VIVO X50 Pro. Habitat characteristics and the likelihood of terrestrial ecosystem BPAs found on site is provided in Figure 8.1 and Figure 8.2.

The land uses surrounding the development footprint includes a high-density business area, a main road (M15; Baviaanspoort Rd), and a great deal of transformation and development. The study area is currently being utilized as an open space and is zoned as an Urban Developmental Zone. The pre-existing impacts within the development area include main roads bordering the site, the dilapidated remnants of previous infrastructure located on site, dumping areas, footpaths, localised areas of clearance and alien invasive species encroachment in the soccer field area. An active construction site is situated on the northern edge of the proposed project area against the R513. The eastern edge consists of a small unnamed tar road. The western edge of the proposed project area runs along the M15. Currently, the proposed development area is vacant, and a few isolated tents used as informal shelters are present the site is not fenced and is accessible via Wonderboom Street.

8.2. Site Verification result

8.2.1.1. Flora

Although the site is classified as having Marikana Thornveld Grassland and Rand Highveld Grassland, the site has undergone major transformation as it has been cleared and development has taken place on adjacent sites. Some activities observed on site included clearing, dumping, development and various number of footpaths. The area throughout the google earth historical imagery indicates transformation, development and vegetation clearing. During the interrogation of historical imagery one development was present on site during 2010 and was later demolished in 2015. After 2018 the site was left to undergo regrowth of vegetation and developed numerous localised impacts of various degrees (creation of tracks, dumping, small areas of clearance; the presence of informal settlements).

The vast majority of the northern and central areas (the dominant habitat feature) can be described as open exotic woodland with a maintained grass basal layer. The maintained grass basal layer is made up of the *Aristida transvaalensis – Cymbopogon validus* grassland species and a number of alien tree species and associated alien forb and sedge species due to the severe transformation and disturbance which is directly a result of anthropogenic impacts surrounding the project area as well as historical land use activities as mentioned above. Some key grass species located on site include *Digitaria eriantha, Aristida transvaalensis* and *Hyparrhenia anamesa*. Characteristic species associated with this plant community are the trees *Hyperrhenia hirta, Searsia lancea, Bidens pilosa, Cynodon dactylon, Datura stramonium, Pennisetum clandestinum, Melia azedarach, Morus* (Mullberries), *Imperata cylindrical, Aristida congesta, Hyphaene petersiana* and *Verbena bonariensis*. Exotic species on site included *Cereus jamacaru* (Queen-of-the night), Eucalyptus species (Gum trees), *Lantana*

camara (tickberry), *Melia azedarach* (white cedar), *Opuntia ficus-indica* (Prickly pear) and *Sesbania punicea* (Spanish gold).

An alien species such as *Crotalaria agatiflora* (Canary Bird Bush) was found within the grassland and savanna biomes this species is potentially invasive particularly occupying cleared grassy areas.

The project footprint or PAOI is calculated to be 79 350 m^2 (7.935 ha).

The vegetation areas classified in Figure 8-1 depicts the site's status quo as a highly disturbed grassland.

(a)

(b)

(c)

(d)

(e) (f)

Figure 8.1. Land-uses and impacts along the proposed development site. (a-b) Presence of Dumping areas; (c-d) Construction impacts via anthropogenic impacts; (e-f) Presence of Alien invasive species

The site indicated species which represent highly disturbed *Aristida transvaalensis – Cymbopogon validus* grassland vegetation type and alien species because of severe transformation and development across the 7.935 ha area. The dominant species located within the PAOI is described in Section 10.1.

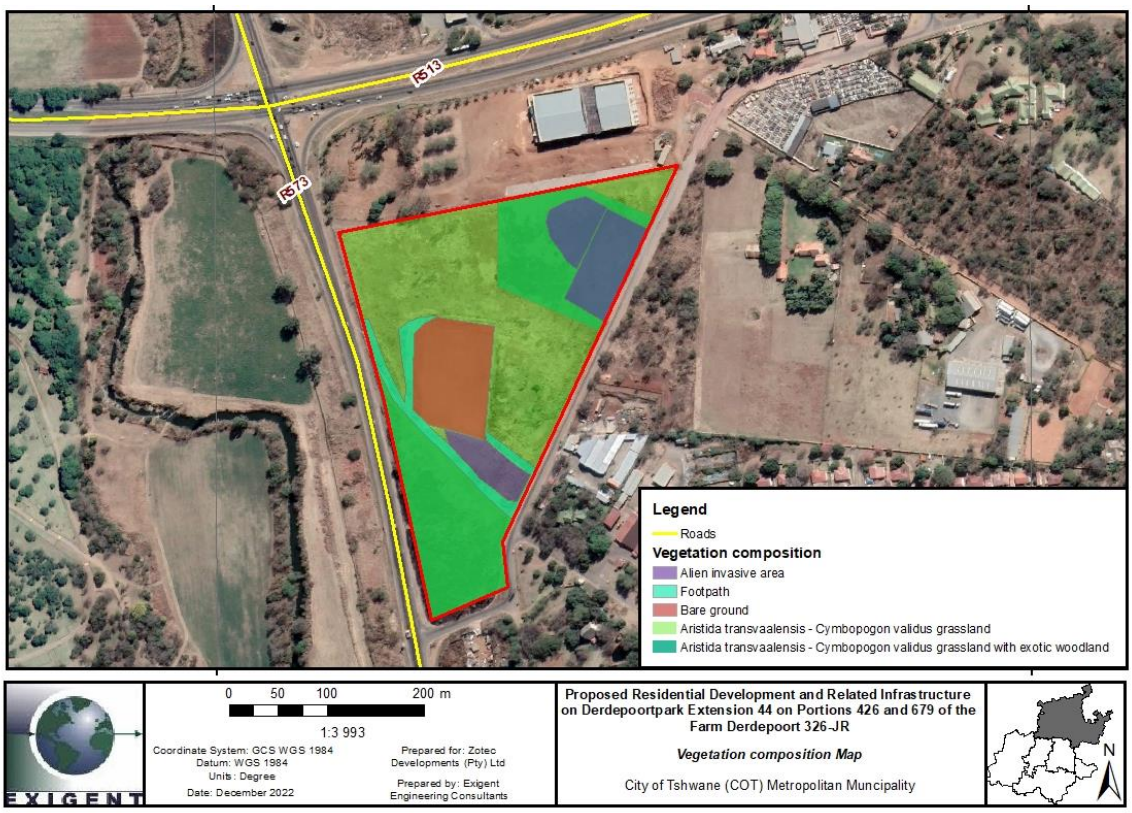

Figure 8.2. Vegetation communities within the proposed development, indicated relative to the PAOI.

Figure 8.3. A historical google earth imagery of the study site in 2001

Figure 8.4. A historical google earth imagery of the study site in 2011

Figure 8.5. A historical google earth imagery of the study site in 2017

8.2.1.2. Riparian vegetation assessment

Riparian vegetation assessments were conducted using the VEGRAI method for the riparian habitat. The PES of these riparian habitats is described as follows:

The riparian area associated with the Moretele spruit can be described as riverine area. The riparian zone associated with the channel has been classified as largely modified (Class E). Modifications to the riparian zone are due to a change in floral species composition as a result of the encroachment of alien invasive species and the removal of indigenous species for the creation of roads to service both the resort, pathway and M15. Species identified within this area mostly includes *Arundo donax* (Spanish Reed) with the presence of alien invasive vegetation identified within the riparian zone such as *Eucalyptus globulus* (blue gum) and some woody vegetation. Both *Lippia javanica* (Fever tea/ Lemon Bush) and *Lippia rehmanni* are known to occur along the Moretele spruit. It should be noted that *Lippia javanica* grows in open veld, in the bush as well as on forest margins. Both threatened status of this species is listed as least concern by the IUCN and as unknown on NEMBA. During the site investigation these threatened species were not identified.

Table 8-1. Ecological Category (EC) summaries for riparian vegetation based on Level 3 VEGRAI

VEGRAI LEVEL 3 ASSESSMENT						
METRIC GROUP	CALCULATED RATING	WEIGHTED RATING	CONFIDENCE	RANK	% WEIGHT	NOTES:
Marginal	33,3	13,7	3,0	2,0	70,0	The marginal vegetation played a secondary role in terms of maintaining the instream habitat integrity of the river

Non-marginal	32,2	19,0	3,3	1,0	100,0	The non-marginal vegetation played a primary role in terms of maintaining the instream habitat integrity of the river
	2,0				170,0	
LEVEL 3 VEGRAI (%)				32,7		
VEGRAI EC				**E**		
AVERAGE CONFIDENCE				3,2		

Riparian zone buffer

Buffer zones associated with watercourse perform a wide range of functions (Macfarlane *et al*., 2014) which include:

- Maintaining basic aquatic processes;
- Reducing impacts on water resources from upstream activities and adjoining land uses;
- Providing habitat for aquatic and semi-aquatic species;
- Providing habitat for terrestrial species; and
- A range of ancillary societal benefits.

Watercourses must be accurately delineated and the starting point used for delineating aquatic impact buffer zones depends on the type of water resource. The buffer zones for rivers and streams are determined from the outer edge of the active channel and due to the riparian habitat being located directly adjacent to the associated streams and rivers, it will typically be incorporated into the buffer zone. Instances in which the riparian zone extends beyond the aquatic impact buffer zone, the full extent of the riparian zone must be included (Macfarlane et al., 2014). A 32 m buffer zone is recommended for the Moretele spruit. This buffer zone includes all riparian vegetation.

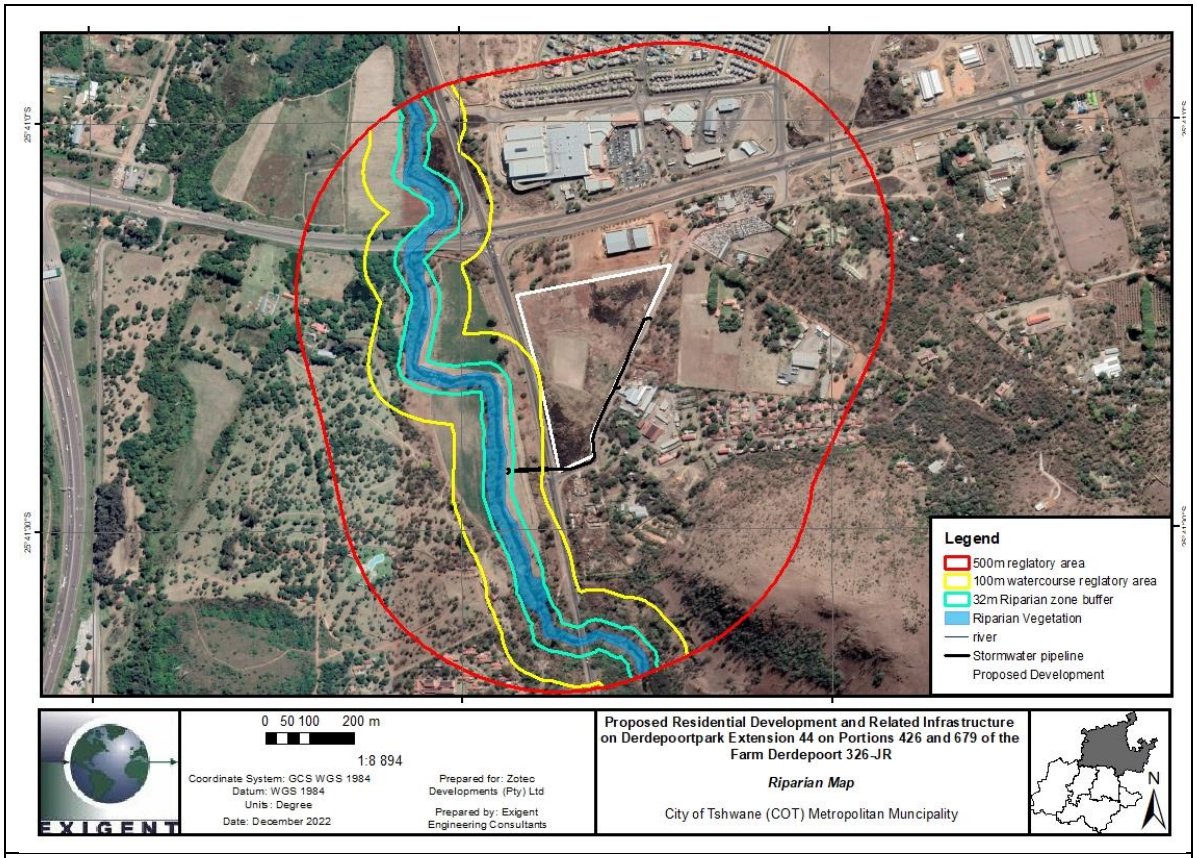

Figure 8.6. Riparian delineation with an extended32 m buffer to include all riparian vegetation

8.2.1.3. Fauna

Mammals

There were no species observed on the site. A species list of those species that have the possibility of occurring on site have been compiled for the site and is attached in Appendix A of this report. Generally, mammal distribution correlate with vegetation biomes defined by the VEGMAP (2018), Mucina and Rutherford (2006) and those authors preceding but local occurrences are more dependent on broad-scale habitat types such as terrestrial and arboreal. The terrestrial habitat is the most abundant and provide habitat to a vast variety of small mammals such as rodents, shrews, mongooses etc. At present, large mammals are only expected in protected and privately owned reserves. Arboreal habitat is represented by trees, often used by bats while shrews occasionally find refuge in vegetation associated with water bodies of aquatic habitats.

Approximately 81 species have the potential of occurring within the site and its surrounding areas (Appendix A) as previously observed in the Quarter Degree Grid 2528CB and recorded on the MammalMap. Five of these species are considered Near Threatened (*Equus quagga, Atelerix frontalis, Dasymys incomtus, Crocidura mariquensis, Pipistrellus (Pipistrellus) rusticus*) two Vulnerable (*Mystromys albicaudatus, Crocidura maquassiensis*) and none endangered. The screening tool identified *Neamblysomus julianae, Dasymys robertsii* and *Crocidura maquassiensis* as potential mammals which may occur on site.

The Juliana's Golden Mole (*Neamblysomus julianae*) is endemic to South Africa and was described from its type locality in The Willows suburb in south-eastern Tshwane (formerly Pretoria) in Gauteng Province just over 40 years ago (Meester 1972). Its distributional range includes three highly restricted and geographically isolated populations from the Bronberg Ridge area south-east of Tshwane (Gauteng), Nylsvley Nature Reserve and surrounding farms in the district of Modimolle (Limpopo Province, 125km away), and the Pretoriuskop region of the south-western Kruger National Park (Mpumalanga Province, about 400km away) (Bronner 2013; Maree et al. 2003; Maree 2015a, 2015b; IUCN 2015). Its occurrence is however extremely patchy with limited geographic range and with the limited data available (there are no data on population size available). A Species Distribution Model (SDM) compiled for all three populations using ecological niche modelling identified limited potentially suitable habitat for the species and enabled identification of two previously unrecorded localities in the Modimolle area (Jackson and Robertson 2011). No new populations were found in Gauteng[5].

During the site assessment for the soil conditions were noted for potential occurrence of the Golden Mole habitat, however no habitats were found suitable.

All caution should however be taken to ensure that none of the species and especially those species listed as Near Threatened, Vulnerable or Endangered is not impacted as part of the activities planned.

Reptiles

Approximately 67 species have the potential of occurring within the site and its surrounding areas (Appendix B) as previously observed in the Quarter Degree Grid 2528CB and recorded on the ReptileMap. There are 2 reptile species of which two were classified as Near threatened (*Chamaesaura aenea, Homoroselaps dorsalisII*), however none are considered endangered or vulnerable. The screening tool identified *Kinixys lobatsiana* (VU) as a potential reptile which may occur on site. This species requires Savanna bushveld and thornveld habitats. Absent from grassland and subtropical lowveld. However, is known from small, wooded rocky ridges in certain grassland areas of Gauteng. It should be noted that in terms of habitat, the site is not suitable. The possibility of these species recorded in Appendix B occurring on the site is therefore low, however all caution should however

[5] Maree, S. (2015). "Neamblysomus julianae". IUCN Red List of Threatened Species. 2015: Web address:

be taken to ensure that none of the species and especially those species listed as Near Threatened, Vulnerable or Endangered is not impacted as part of the activities planned.

Invertebrates

Approximately 67 species have the potential of occurring within the site and its surrounding areas (Appendix C) as previously observed in the Quarter Degree Grid 2528CB and recorded on the OdonataMap. There are 2 invertebrate species of which two were classified as vulnerable (*Lestes dissimulans*), however none are considered endangered or Near threatened. The screening tool identified *Clonia uvarovi* (VU) as a potential invertebrate which may occur on site. Other Invertebrate species that have the possibility of occurring on site is recorded in Appendix C occurring on the site is possible. All caution should however be taken to ensure that none of the species and especially those species listed as Near Threatened, Vulnerable or Endangered is not impacted as part of the activities planned.

Avifauna

Approximately 329 bird species have been recorded in pentad 2540_2815 (Appendix D, SABAP2), and 201 bird species were identified within the quarter degree cell 2528CB.Three species were classified as Vulnerable (*Pelecanus rufescens*, *Anthropoides paradiseus* and *Aquila verreauxii*) and 2 as endangered (*Balearica regulorum* and *Ephippiorhynchus senegalensis*) . The diversity is expected to be high due to the resort and koppie (closest one within 500 m) and the availability of the aquatic systems surrounding the site.

8.3. Terrestrial ecosystems and Ecological processes within the PAOI

The PAOI was calculated as per Table 8.2 below. The PAOI was calculated as the actual footprint of the proposed activities including the construction footprint.

Table 8.2. Area calculations for the PAOI (Portion 426 and 679 of Farm 326)

	Area (ha)	Description	Probability
PAOI			
Portion 426 and 679 of farm 326	7.935	Actual infrastructure footprint including the proposed construction footprint area.	Definite
Other zonings			
TOTAL	**7.935**		

The PAOI has been studied using various key references and resources. The PAOI is located within the Grassland and Savanna Biome within the Marikana Thornveld and Rand Highveld Grassland (VEGMAP, 2018). The Marikana Thornveld classified as Endangered, and Rand Highveld Grassland classified as Vulnerable (NEMBA, 2011) in terms of the NEMBA (2018) classification.

The PAOI, does not lie within either a CBA or ESA (Figure 8.7).

The results indicate that the PAOI does not fall in a protected area and falls within the cultivated and natural land use. No ridges were located within the PAOI. The National Landcover indicates that the PAOI consists of natural and urban built up (Figure 8.2).

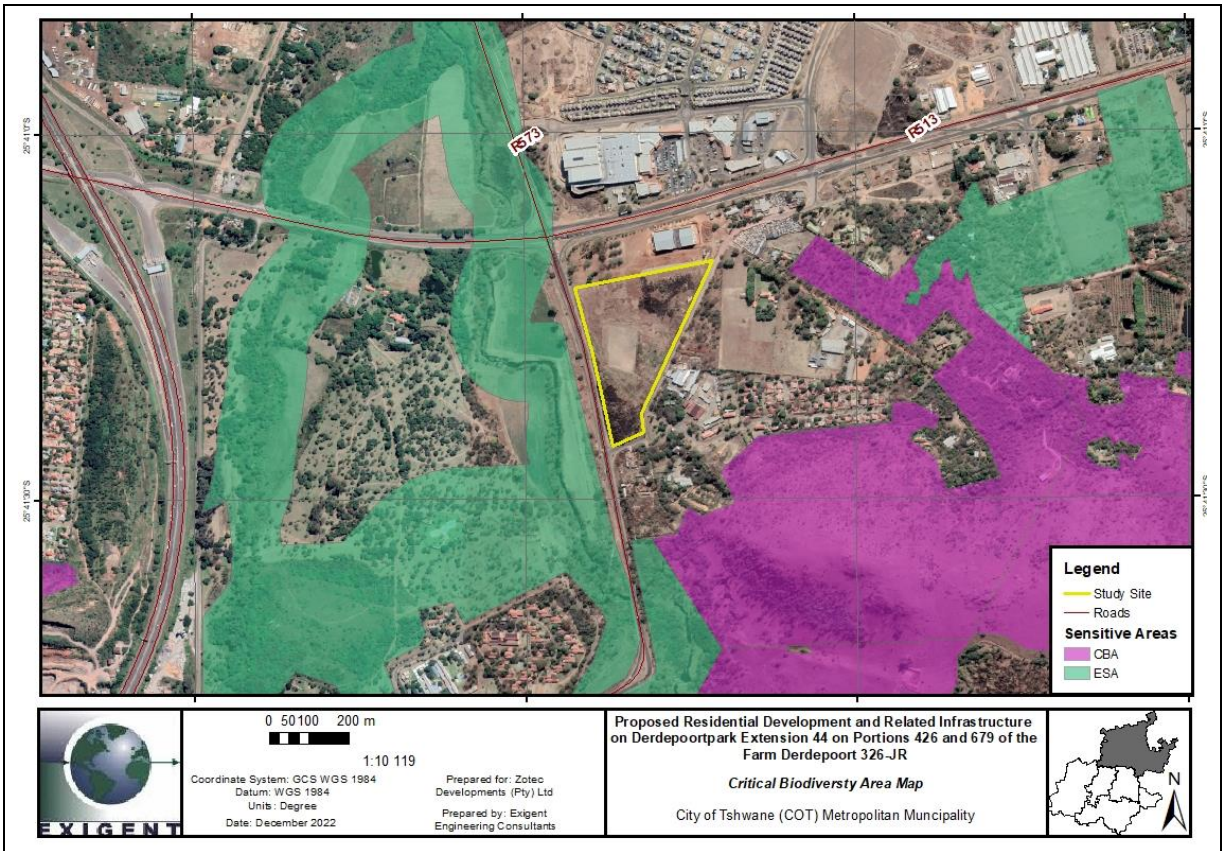

Figure 8.7. Gauteng Conservation Plan V3.3 (Gauteng C-plan, 2011).

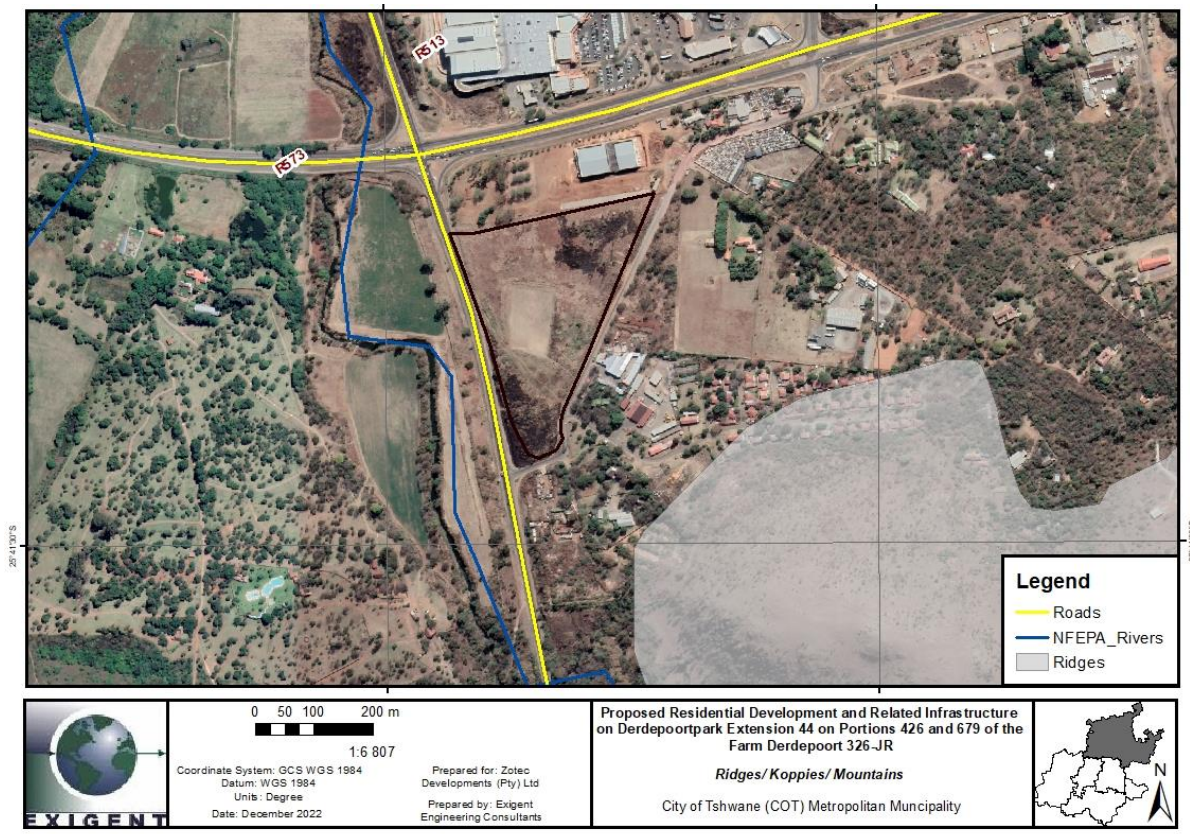

Figure 8.8. Ridges in the area (Ridges Guideline, 2001)

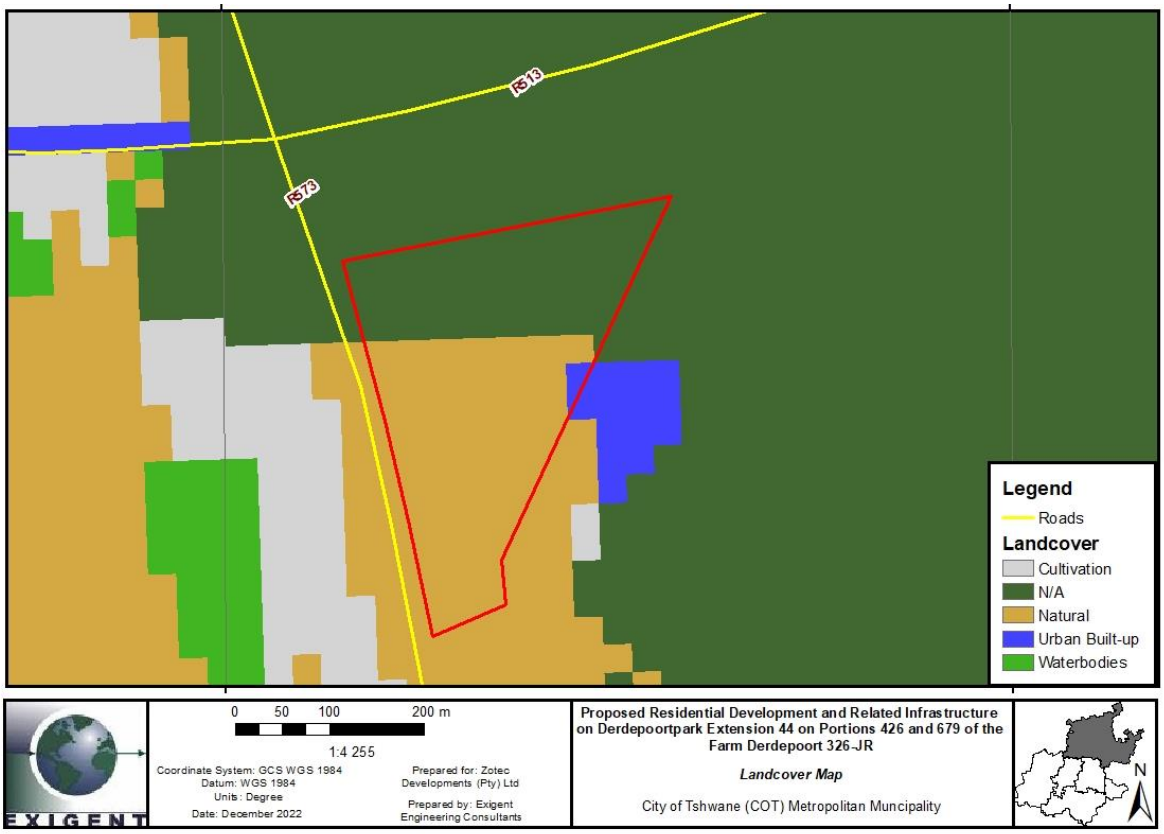

Figure 8.9. A map of the landuse in the area (SANBILC, 2020)

8.4. Expected Ecological Condition

Table 8.3. Combined SEI for the Infrastructure Assessment of the PAOI.

Habitat	Conservation Importance	Functional Importance	Receptor Resilience	Biodiversity importance	Site Ecological Importance
Aristida transvaalensis - *Cymbopogon validus* grassland with trees	Very Low	Low	Very Low	Low	Very Low
Aristida transvaalensis - *Cymbopogon validus* grassland	Low	Low	Low	Very Low	Very Low

The expected ecological condition was determined using a coalition of desktop ecological conditions and level of degradation of ecosystems within the PAOI. From the observation at a desktop level, it is important to note the various surrounding impacts which already exist and have existed through time. This included the SA Vegetation map, Provincial Spatial Biodiversity Plans, Bioregional Plans, Land cover maps, topographical maps, recent historical aerial photography, Google Earth, satellite imagery, and contour lines. The findings were also based on the on-site survey conducted for the proposed development.

Based on the various databases it can be seen that the PAOI has been transformed and disturbed over time. The expected ecological condition from a desktop level was determined to be low when considering the various surrounding impacts and where the PAOI is placed.

8.5. Biodiversity Priority areas

The proposed development is not located within a PA and the PAOI's existing land use has been classified initially at a desktop level and later verified by a site inspection. The PAOI is made up of a disturbed grassland vegetation type and alien species which is observed to have been transformed over time through anthropogenic and existing impacts such as local vegetation clearance and historical farming practices.

The BPAs (SANBI), landcover maps (SANBI), various topographic maps, recent and historical imagery, Google Earth, Satellite imagery and contour lines were consulted in determining if the PAOI and surrounding landscape represents any biodiversity priority areas. After consultation of these various datasets, it was determined that no biodiversity priority areas exist within the PAOI.

Upon review of the Municipal zoning database, it was determined that the proposed study area is located within the area zoned as Urban Development Zone and will therefore not be impacted upon by the development of the Project Area of Impact (PAOI) as described below (Figure 8.10).

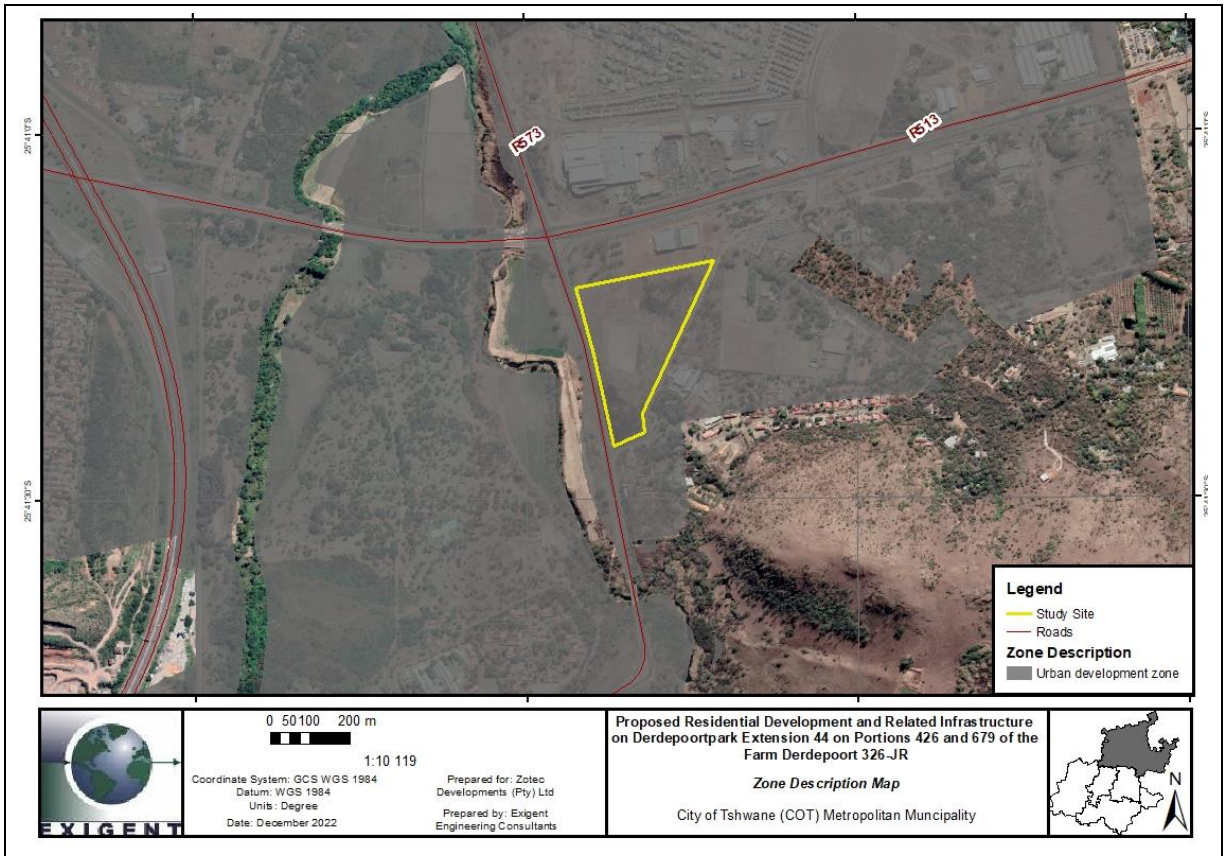

Figure 8.10. Municipal Zoning

9. PROPOSED IMPACT MANAGEMENT ACTIONS

The impacts of the proposed project have been assessed according to the criteria in **Table 9.1** including the degree to which these impacts can be reversed, may cause irreplaceable loss of resources and can be avoided, managed or mitigated.

Table 9.1. Criteria by which impacts were assessed in the EIA Phase

ASPECT	***IMPACT RATING***
Status of the impact: *A statement of whether the impact is positive (a benefit), negative (a cost), or neutral.*	
Direct impacts	*Impacts that are caused directly by the activity and generally occur at the same time and at the place of the activity. These impacts are usually associated with the construction, operation or maintenance of an activity and are generally obvious and quantifiable.*
Indirect impacts	*Impacts of an activity are indirect or induced changes that may occur as a result of the activity. These types of impacts include all the potential impacts that do not **manifest** immediately when the activity is undertaken, or which occur at a different place as a result of the activity.*
Cumulative impacts	*Impacts that result from the incremental impact of the proposed activity on a common resource when added to the impacts of other past, present or reasonably foreseeable future activities. Cumulative impacts can occur from the collective impacts of individual minor actions over a period of time and can include both direct and indirect impacts.*
Nature of the impact: *The evaluation of the nature is impact specific. Most negative impacts will remain negative, however, after mitigation, significance should reduce:* • *Positive.* • *Negative.*	
Extent: *A description of whether the impact would occur on a scale limited to within the site (local), limited to within 5 km of the site (area); on a regional scale i.e., Hlabisa Big 5 Local Municipality & KZN (region); or would occur at a national or international scale.*	

Local	*1*
Area	*2*
Region	*3*
National	*4*
International	*5*

Table 9.1. Criteria by which impacts were assessed in the EIA Phase

ASPECT	***IMPACT RATING***

Duration*:*

A prediction of whether the duration of the impact would be Immediate and once-off (less than one month), more than once, but short term (less than one year), regular, medium term (1 to 5 years), Long term (6 to 15 years), Project life/permanent (> 15 years, with the impact ceasing after the operational life of the development or should be considered as permanent).

Immediate	*1*
Short term	*2*
Medium term	*3*
Long term	*4*
Project life/permanent	*5*

Severity(extent +duration + intensity)

Intensity: *This provides an order of magnitude of whether or not the intensity (magnitude/size/frequency) of the impact would be negligible, low, medium, high or very high. This is based on the following aspects:*

- *an assessment of the reversibility of the impact (permanent loss of resources, or impact is reversible after project life).*
- *whether or not the aspect is controversial.*
- *an assessment of the irreplaceability of the resource loss caused by the activity (whether the project will destroy the resources which are easily replaceable, or the project will destroy resources which are irreplaceable and cannot be replaced).*
- *the level of alteration to the natural systems, processes or systems.*

Negligible	*The impact does not affect physical, biophysical or socio-economic functions and processes.*	*1*
Low/potential harmful	*The impact has limited impacts on physical, biophysical or socio-economic functions and processes.*	*2*
Medium/slightly harmful	*The impact has an effect on physical, biophysical and socio-economic functions and processes, but in such a way that these processes can still continue to function albeit in a modified fashion.*	*3*
High/Harmful	*Where the physical, bio-physical and socio-economic functions and processes are impacted on in such a way as to cause them to temporarily or permanently cease.*	*4*
Very high/Disastrous	*Where the physical, bio-physical and socio-economic functions and processes are highly impacted on in such a way as to cause them to permanently cease.*	*5*

Incidence (frequency + probability)

Table 9.1. Criteria by which impacts were assessed in the EIA Phase

ASPECT	***IMPACT RATING***

Frequency: *This provides a description of any repetitive, continuous or time-linked characteristics of the impact: Once Off (occurring any time during construction or operation); Intermittent (occurring from time to time, without specific periodicity); Periodic (occurring at more or less regular intervals); Continuous (without interruption).*

Once Off	*Once*	*1*
Rare	*1/5 to 1/10 years*	*2*
Frequent	*Once a year*	*3*
Very frequent	*Once a month*	*4*
Continuous	*≥ Once a day/ per shift*	*5*

Probability of occurrence*: A description of the chance that consequences of that selected level of severity could occur during the exposure.*

Highly unlikely	*The probability of the impact occurring is highly unlikely due to its design or historic experience.*	*1*
Improbable	*The probability of the impact occurring is low due to its design or historic experience.*	*2*
Probable	*There is a distinct probability of the impact occurring*	*3*
Almost certain	*It is most likely that the impact will occur*	*4*
Definite	*The impact will occur regardless of any prevention measures*	*5*

Risk rating

The risk rating is calculated based on input from the above assessments. The incidence of occurrence is calculated by adding the Extent of the impact to the duration of the impact. The Severity of the impact is calculated based on input from the extent of the impact, the duration and the intensity.

Risk *= Severity (extent +duration + intensity) x Incidence (frequency + probability)*

Significance*: The significance of the risk based on the identified impacts has been expressed qualitatively as follows:*

- ***low*** *– the impact is of little importance/insignificant, but may/may not require minimal management*
- ***medium*** *- the impact is important, management is required to reduce negative impacts to acceptable levels.*
- ***high*** *- the impact is of great importance, negative impacts could render development options or the entire project unacceptable if they cannot be reduced to acceptable levels and/or if they are not balanced by significant positive impacts, management of negative impacts is essential.*

Low risk	Medium risk	High risk	Medium positive	High positive
0-50	51-100	101 - 150	51-100	101 - 150

9.1. KEY ISSUES AND ASSESSMENT THEREOF

In terms of the identification of issues and associated impacts for the proposed activities, the following should be noted:

- A broad definition of the "environment" is considered, which includes the natural, social, cultural, economic and built environments.
- Certain issues and associated impacts have been identified as potentially occurring, but their occurrence is not definite. However, they need to be identified to inform decision-making and to enable the relevant parties to proactively address them should they occur or prevent them from occurring.
- Both negative and positive impacts[6] are identified and described.

9.2. Project Impact Assessment

Species of conservation concern with the potential to occur on site, have been assessed and the potential impact thereon has been rated. The site includes patches of alien and invasive species, which should be managed during the preparation, construction and operational phase of the proposed activities.

The site was assessed for its potential to be rehabilitated and/or its role as part of a landscape corridor and the potential presence of protected species. The PAOI has been disturbed over time through cultivation and existing infrastructure such as footpaths, buildings and trenching. The PAOI however does not fall within a CBA or ESA area hence this impact will thus not be assessed. The current vegetation is considered representative of the surrounding areas' vegetation types and consist of several alien invasive species and some indigenous species present of the area. The vegetation of the site has been subject to several disturbances such as alien invasive species, footpaths and previous cultivation activities.

Based on the NPAES database (SANBI, 2010) no protected and expansion areas occur within the site.

The aquifer classification map of South Africa classifies the site as a minor aquifer system. The water source in this area is surface water. The proposed change in land use will impact on the surface runoff and infiltration rate.

The following key issues have been identified and assessed during this biodiversity impact assessment:

Preparation and operational phase:

- Impact on the extent and integrity of Rand Highveld Grassland and Marikana Thornveld with reference to potential loss;
- Impact on species composition and structure of vegetation;
- Impact on ecosystem threat status;
- Impact on explicit subtypes in the vegetation;
- Impact on overall ecosystem diversity of the site;
- Impact on any changes to the threat status of ecosystems in the CBA;
- Impacts associated with the loss of the riparian area
- Direct, Indirect and cumulative impacts during Construction Phase; and
- Direct, Indirect and cumulative impacts during Operation Phase.

The key issues have been identified and assessed below.

[6] An environmental impact, whether adverse or beneficial, is defined as a change to the environment.

9.2.1.1. Impact on the extent and integrity of Rand Highveld Grassland and Marikana Thornveld with reference to potential loss.

Within the PAOI the vegetation structure is highly disturbed *Aristida transvaalensis – Cymbopogon validus* grassland. The current status of the PAOI does not reflect the Rand Highveld Grassland and Marikana Thornveld vegetation types. The presence of anthropogenic disturbances and historic clearing contributes to the loss of integrity of these vegetation types. Since the extent and integrity of the Rand Highveld Grassland and Marikana Thornveld with reference to potential loss is not represented in the PAOI due to the absence of these vegetation types of this impact will therefore not be assessed.

9.2.1.2. Impact on species composition and structure of vegetation

Within the PAOI the vegetation structure is described as a highly disturbed *Aristida transvaalensis – Cymbopogon validus* grassland. The proposed development site and PAOI is calculated to be 7.935 ha which will be require the clearance of vegetation. The site is severely transformed and displays high anthropogenic activities hence clearing the area classified as highly disturbed *Aristida transvaalensis – Cymbopogon validus* grassland will not cause a high impact to the existing vegetation. The species composition of the site is not indicative of the Rand Highveld Grassland and Marikana Thornveld vegetation types. Within the site approximately 100 % of the highly disturbed *Aristida transvaalensis – Cymbopogon validus* grassland area will be lost to transformation either due to concreting, landscaping and installation of services to accommodate the layout plan. This impact will therefore not be assessed.

9.2.1.3. Impact on ecosystem threat status

The ecosystem threat status is considered endangered and vulnerable and according to the NBA Vegetation layer (NBA, 2018) and as per the TSH Threatened Ecosystems (SANBI, 2006) the study site was considered critical. The footprint area with regard to the entire site is used to determine the loss of habitat. This site does not present a vegetation composition typical to the Rand Highveld Grassland and Marikana Thornveld vegetation types, hence leaving room for the re-evaluation of the threat status. The disturbed *Aristida transvaalensis – Cymbopogon validus* grassland habitat will experience a loss of 5.5 ha (69%). Please refer to Section 10.4; **Table 10.1** provides an evaluation of habitat suitability for IUCN, red data list and TOPS flagged for the area this impact is assessed below (Table 9.2).

Table 9.2. Impact on ecosystem threat status

Impact	Status	Extent	Duration	Severity	Frequency	Probability of occurrence	Significance without mitigation		Significance with mitigation
Ecosystem threat Status	Negative	1	5	2	1	1	16	Low	Low
Mitigation: • Any existing or new AIS within the proposed development site must be eradicated. • A monitoring program should be put in place to remove AIS and maintain areas free from new invasions during the construction and operational phase.									

- Indigenous vegetation to be used for landscaping purposes.

9.2.1.4. Impact on explicit subtypes in the vegetation

As per the databases, the vegetation within the PAOI is classified as the Rand Highveld Grassland and Marikana Thornveld vegetation types. However, upon site inspection the composition of vegetation on the site is dominated by highly disturbed *Aristida transvaalensis – Cymbopogon validus* grassland type species and not the associated with the Rand Highveld Grassland and Marikana Thornveld vegetation types. Within the proposed development area, none of the PAOI indicates a wetland vegetation type, whereas the remainder of the proposed development area is comprised of highly disturbed *Aristida transvaalensis – Cymbopogon validus* grassland with a small area scattered with alien trees which will be impacted upon (5.5 ha) the impact of this subtype is assessed below (Table 9.3).

Table 9.3. Impact on explicit subtypes in the vegetation.

Impact	Status	Extent	Duration	Severity	Frequency	Probability of occurrence	Significance without mitigation		Significance with mitigation
Explicit subtypes in the vegetation	Negative	1	4	3	1	5	48	Low	Low

Mitigation:

- Natural open spaces outside the development footprint should be left in their undeveloped state.
- Any existing or new AIS within the proposed development site must be eradicated.
- A monitoring program should be put in place to remove AIS and maintain areas free from new invasions during the construction and operational phase.
- Indigenous vegetation to be used for landscaping purposes.

9.2.1.5. Impact on overall ecosystem diversity of the site

The extent of loss within the Rand Highveld Grassland and Marikana Thornveld vegetation types is not calculated as the site represents no characteristics of these vegetation type. The partial extent of the highly disturbed *Aristida transvaalensis – Cymbopogon validus* grassland with some alien trees vegetation type, 5.5 ha will be impacted upon. This is surrounded by developments such as a main roads, and associated infrastructure. The PAOI is not flagged as a corridor, with no aquatic features. The overall ecosystem is assessed below (Table 9.4).

Table 9.4. Impact on overall ecosystem diversity of the site.

Impact	Status	Extent	Duration	Severity	Frequency	Probability of occurrence	Significance without mitigation		Significance with mitigation
Ecosystem diversity	Negative	1	5	2	1	1	16	Low	Low

Mitigation:

- Strict management during construction phase to limit the extent of the footprint of the impact.

- No areas outside the final footprint may be cleared.
- Indigenous vegetation to be used for landscaping purposes.
- Management of construction related impacts such as eating areas, concrete mixing areas, storage yard should only be allowed in designated areas.

9.2.1.6. Impact on any changes to the threat status of ecosystems in the CBA

The footprint area with regard to the entire site is used to determine the loss of habitat. This site does not present any CBA, ESA or PA's, nor vegetation representative of the Rand Highveld Grassland and Marikana Thornveld vegetation types, hence leaving room for the re-evaluation of the threat status. A loss of 5.5 ha (69 %). of the highly disturbed *Aristida transvaalensis – Cymbopogon validus grassland* vegetation will occur. Please refer to Section 10.4 for details regarding the IUCN, red data list and TOPs list prepared for the proposed development. The impact of ecosystem diversity is assessed below (Table 9.5)

Table 9.5. Impact on overall ecosystem diversity of the site.

Impact	Status	Extent	Duration	Severity	Frequency	Probability of occurrence	Significance without mitigation		Significance with mitigation
Ecosystem diversity	Negative	1	5	2	1	1	16	Low	Low

Mitigation:

- Strict management during construction phase to limit the extent of the footprint of the impact.
- No areas outside the final footprint may be cleared.
- Indigenous veg to be used for landscaping purposes.
- Management of construction related impacts such as eating areas, concrete mixing areas, storage yard should only be allowed in designated areas.

9.2.1.7. Impacts associated with the loss of the riparian area

Table 9.6. Impact associated with the loss of the riparian area.

Impact	Status	Extent	Duration	Severity	Frequency	Probability of occurrence	Significance without mitigation		Significance with mitigation
Riparian area	Negative	1	2	2	1	3	20	Low	Low

Mitigation:

- Strict management during construction phase to limit the extent of the footprint of the impact.
- No areas outside the final footprint may be cleared.
- Indigenous veg to be used for landscaping purposes.
- Management of construction related impacts such as eating areas, concrete mixing areas, storage yard should only be allowed in designated areas.

9.2.1.8. Direct, Indirect and cumulative impacts Construction

These impacts are described as impacts that generally impact the site at a construction phase. These impacts include, the natural environment in terms of the flora, fauna, hydrology, pollution of groundwater, alien vegetation infestation and erosion.

A cumulative impact of this project would be additional vegetation clearing and ultimately change in land use required to allow for residential development. However, proper urban designs, which accommodates the natural features of the study area, by means of design and layout, enhances the use of the open space in the proposed development within an urban environment. Below the cumulative impact is assessed (Table 9.7)

Table 9.7. Direct, Indirect and cumulative impacts: Construction

Impact	Status	Extent	Duration	Severity	Frequency	Probability of occurrence	Significance without mitigation		Significance with mitigation
Infestation of alien invasive species during construction	Negative	2	5	3	5	5	100	Medium	Medium
The disturbance of the highly disturbed *Aristida transvaalensis – Cymbopogon validus* grassland by the proposed activities may increase the spread of exotic species. AIS are already a problem in the project area and utmost care should be taken not to disperse and increase the colonisation of these species.									
Mitigation: • Any existing or new Alien Invasive Species within the proposed development site must be eradicated. • A monitoring program should be put in place to remove Alien Invasive Species and maintain areas free from new invasions during the construction and operational phase. • Indigenous veg to be used for landscaping purposes.									
Hydrological Impacts	Negative	2	3	3	3	5	64	Medium	Low
Although there are no delineated wetlands located within the PAOI, it is important to make sure no spills take place to prevent the contamination into the groundwater must be managed during the construction phase.									
Mitigation: • Silt traps must be installed on the development site boundary during construction; • Small-scale diversion berms should be constructed, to reduce the risk of the earthworks becoming a preferred surface flow path leading to erosion; • "Trench-breakers", which are in-trench barriers, should be installed within any trench excavations to intercept and minimise the accumulation of surface runoff water from upslope areas running down the trenches; • Erosion control structures must be put in place where soil may be prone to erosion; • Bare areas where vegetation has been removed pose a risk of becoming a sediment load during heavy rainfall, this must be managed by placing it on the upslope side of the development site; • Temporary stormwater management structures must be used during construction. Any areas damaged as a result of stormwater runoff from the construction site must be rehabilitated immediately; and • During rehabilitation, prompt and progressive reinstatement of bare areas is required. During reinstatement, the topsoil layer is to be replaced last, to simulate the pre-construction soil conditions.									
Pollution of surface and groundwater due to chemical, oil and fuel spills	Negative	2	3	5	2	2	40	Low	Low
Contaminants such as hydrocarbons, solids and pathogens will be generated from several potential sources (examples include petrol/diesel, oil/grease and other hazardous substances). These contaminants have the capacity to negatively affect ecosystems including sensitive or intolerant species of flora and fauna.									

Impact	Status	Extent	Duration	Severity	Frequency	Probability of occurrence	Significance without mitigation	Significance with mitigation
Mitigation: • Extra care must be taken to prevent any potentially hazardous substances from entering the groundwater during heavy rainfall events by implementing mitigation plans, such as the Stormwater Management Plan; • The use and handling of all chemicals and potentially hazardous substances must take place on an impermeable surface and bunded areas to prevent chemicals and potentially hazardous substances from infiltrating the soil; • All rubble and other types of waste must be appropriately stored and disposed of at a licensed waste disposal site; • Contingency plans must be compiled for possible spillages of dangerous goods and include details for decontamination and process to be followed; • Spill kits must be available in the event of a hydrocarbon or chemical spill.									
Erosion	Negative	2	5	3	3	3	60	Medium	Low
Vegetation clearance may result in sheet erosion. The clearance of vegetation will further reduce the capacity of the land surface to retard the flow of surface water, thus, decreasing infiltration, and increasing both the quantity and velocity of surface water runoff and erosion.									
Mitigation: • Topsoil and subsoil should be stockpiled separately, to not impact on areas outside the servitude; • Topsoil storage should not exceed a height of 2 m. • During rehabilitation, prompt and progressive reinstatement of bare areas is required. The topsoil layer is to be replaced on top during reinstatement. • Checks must be carried out at regular intervals to identify areas where erosion is occurring; • The control of soil erosion and siltation associated with construction is important at all locations on site, and particularly adjacent to riparian area. Both temporary and permanent soil erosion control measures must be used during the construction phase. Any earth-worked areas, which may lay bare for extended periods, should be temporarily grassed. • Remedial action, including the rehabilitation of eroded areas and, where necessary, the relocation of the erosion paths, is to be undertaken.									
Pollution of surface and groundwater due to sewer spills	Negative	2	3	5	2	2	40	Low	Low
Due to the nature of the proposed project, there is a likelihood of sewage spillages due to malfunction of infrastructure, polluting the groundwater system during the construction. The health risks associated with high *E. coli* levels are of serious concern.									
Mitigation: • Preventive measure must be undertaken during the construction of the infrastructures, securing all joints for minimum spillage occurrences. • Should a spillage occur, it must be reported to the relevant departments immediately. • Where contamination occurs, soil must be immediately removed to prevent further contamination. • Records must be kept of sewage spillages during all phases of the proposed residential development. • An emergency preparedness plan must be in place for instances where spills occur that can be harmful to people or the receiving environment.									
Potential loss of riparian area.	Negative	1	2	2	1	3	20	Low	Low

Impact	Status	Extent	Duration	Severity	Frequency	Probability of occurrence	Significance without mitigation	Significance with mitigation
Mitigation: • No stockpiling of any materials may take place adjacent to the river. • Erosion control measures must be implemented in areas sensitive to erosion such as edges of slopes, exposed soil etc. • These measures include but are not limited to - the use of sand bags, hessian sheets, silt fences, retention or replacement of vegetation and geotextiles such as soil cells which are used in the protection of slopes. • In addition, the condition of water that occurs in the river is to remain clear and no increase in turbidity is allowed as a result of increased sediment levels resulting from working on the banks or bed.								

9.2.2. Direct, Indirect and cumulative impacts during Operation

These impacts are described as impacts that generally impact the site in the operational phase. These impacts include, the natural environment in terms of the hydrology, cumulative vegetation clearance, alien vegetation and erosion.

The disturbance of the natural vegetation by the proposed activities may increase the spread of exotic species. Alien and invasive species are already a problem in the project area and utmost care should be taken not to disperse and increase the colonisation of these species.

Vegetation clearance is an ongoing impact during urban development, which is considered a cumulative impact. However proper urban designs, which accommodates the natural features by means of design and layout, enhances the use of the open space in the proposed development within an urban environment.

Table 9.8. Direct, Indirect and cumulative impacts: Operation

Impact	Status	Extent	Duration	Severity	Frequency	Probability of occurrence	Significance without mitigation		Significance with mitigation
Infestation of alien invasive species during operation	Negative	1	2	5	3	5	64	Medium	Medium
AIS are already a problem in the project area and utmost care should be taken not to disperse and increase the colonisation of these species.									
Mitigation: • Successful re-vegetation in all areas is crucial to stabilise soils and limit infestation by invasive alien plant species. Rehabilitation should be undertaken on a progressive basis in these areas. • A monitoring program should be put in place to remove Alien Invasive Species and maintain open space areas free from exotic invasions during operation.									
Hydrological Impacts	Negative	1	2	3	5	3	48	Low	Low

Impact	Status	Extent	Duration	Severity	Frequency	Probability of occurrence	Significance without mitigation		Significance with mitigation
Although there are no delineated wetlands is located within the PAOI, it is important to make sure no spills take place to prevent the contamination into the groundwater.									
Mitigation: • Bare areas where vegetation has been removed pose a risk of becoming a sediment load into river during heavy rainfall or windy conditions. Bare areas which have not recovered from the construction phase, should therefore be covered during such events. • Temporary stormwater management structures should be used during operational phase in areas which have not recovered fully from construction activities. • Any areas damaged as a result of stormwater runoff from the construction site must be rehabilitated.									
Pollution of surface and groundwater due to potential sewer spills	Negative	3	5	5	2	2	52	Medium	Low
During the operational phase of this project, there is a higher risk of sewer spills due to the possibility of infrastructure malfunction. The occurrence of sewer spills can be mitigated through precautionary applications as identified below.									
Mitigation: • Preventive measure must be undertaken during the construction of the infrastructures, securing all joints for minimum spillage occurrences. • Should a spillage occur, the EMP should be followed. • Where contamination occurs, soil must be immediately removed to prevent further contamination. • Should faulty infrastructure be identified, it must be replaced immediately after discovery. This must form part of a maintenance plan approved by the competent authority. • Records must be kept of sewage spillages during both phases, construction and operational. • An emergency preparedness plan must be in place for instances where spills occur that can be harmful to people or the receiving environment.									
Erosion	Negative	1	2	3	2	3	30	Low	Low
Sheet erosion may occur during the operational phase as a result of the construction activities that has taken place on site. Should rehabilitation and bank stabilising not yet taken place successfully by the end of the construction activities, there is a risk of sedimentation and erosion occurring during the operational phase.									
Mitigation: • Checks must be carried out at regular intervals to identify areas where erosion is occurring. • The control of soil erosion and siltation associated with operation is important at all locations on site, and particularly adjacent to riparian area. Both temporary and permanent soil erosion control measures must be used during the operation phase. • Remedial action, including the rehabilitation of eroded areas and, where necessary, the relocation of the paths causing erosion, is to be undertaken. • During rehabilitation, prompt and progressive reinstatement of bare areas is required. The topsoil layer is to be replaced on top during reinstatement.									
Potential loss of riparian area due to construction of Stormwater pipe	Negative	1	2	2	1	3	20	Low	Low
Mitigation:									

Impact	Status	Extent	Duration	Severity	Frequency	Probability of occurrence	Significance without mitigation	Significance with mitigation
• Rehabilitation of disturbed vegetation must be undertaken as soon as construction has been completed. This must be aimed at improving the status quo of the riparian zone, i.e. by removing alien invasive species and planting indigenous species. The following guidelines apply to re-vegetation: • Site preparation: • Utilise erosion and sediment control techniques where needed. • Grade the disturbed area to a stable uniform slope. Vegetative cover will not develop on an unstable slope. • Loosen the soil by hand. • Plant when the weather will permit e.g. suitable temperatures and moisture for plant growth. Spring plantings give the best results. • On unstable soils use a soil saver such as fibre netting or a fibre mat. • The sloped area is seeded and the mat placed on top to protect the bare soil before the planted vegetation has become established should the slope of the area be steep and could lead to erosion.								

10. RESULTS OF FAUNA AND FLORA ASSESSMENT

10.1. Site Sensitivity Verification – Vegetation Assessment

Due to the high levels of disturbance in the surrounding area, the likelihood of the study area presenting a CBA, ESA or PA priority focus area and a vulnerable ecosystem is low. The likelihood of encountering small animals was also low within the study area.

Based on the findings of the site visits conducted for the proposed development, the site has three predominant vegetation communities:

- The *Aristida transvaalensis - Cymbopogon validus* grassland;
- The *Aristida transvaalensis - Cymbopogon validus* grassland with exotic woodland
- Riparian area where stormwater outlet will be constructed

The *Aristida transvaalensis - Cymbopogon validus grassland*

The *Aristida transvaalensis - Cymbopogon validus* grassland vegetation community is located along the Northern boundary of the proposed development site. The anthropogenic activities impacted upon the vegetation community includes main roads bordering the site, the dilapidated remnants of previous infrastructure located on site, dumping areas, footpaths, localised areas of clearance and alien invasive species encroachment in the soccer field area. An active construction site is situated on the northern edge of the proposed project area against the R513. The eastern edge consists of a small unnamed tar road. The western edge of the proposed project area runs along the M15. Currently, the proposed development area is vacant, and a few isolated tents used as informal shelters are present the site is not fenced and is accessible via Wonderboom Street. The extent of this vegetation community is approximately 2.95 ha. The vegetation is containing numerous species, including but

not limited to key grass species located on site include *Digitaria eriantha, Aristida transvaalensis* and *Hyparrhenia anamesa.*

This vegetation community has a sensitivity of low.

The *Aristida transvaalensis - Cymbopogon validus* grassland with exotic woodland

This vegetation community has numerous impacts exercised upon it, these impacts include footpaths and localized clearance of vegetation. The extent of this vegetation community is approximately 2.55 ha. The *Aristida transvaalensis – Cymbopogon validus* grassland with trees vegetation is dominated by grasses, trees and alien invasive plant species. The observed various vegetation species within the study area includes: *Hyperrhenia hirta, Searsia lancea, Bidens pilosa, Cynodon dactylon, Datura stramonium, Pennisetum clandestinum, Melia azedarach, Morus (Mullberries), Imperata cylindrical, Aristida congesta, Hyphaene petersiana* and *Verbena bonariensis.*

Due to location of the project and the number of impacts exercised upon it, this vegetation type has a low sensitivity. A search and rescue mission must be undertaken in order to confirm the absence of *Hypoxis hemerocallidea* within the development footprint. If identified, adaptive measures would however be required in order to ensure the effective removal and relocation of these individuals within the grassland community.

Riparian area

The riparian areas is located across the M15 where a stormwater pipeline will pass through. This community has species identified within this area mostly includes *Arundo donax* (Spanish Reed) along with alien invasive species *Eucalyptus globulus* (blue gum) and some woody vegetation. This impacted area is approximately 1372 m^2 in extent.

Due to the existing impacts and the location of the riparian area this vegetation community has a sensitivity of low-medium. A search and rescue should be conducted to confirm the presence of any protected species.

10.2. Species of Provincial concern Site Sensitivity Verification – Faunal Assessment

During the site visit, no common bird species, small mammals, amphibians or reptiles were observed whilst walking the study area. An evaluation of the suitability of the study area in terms of habitat provision has been detailed in Section 8.2.1.3 and Table 10.2.

10.3. Species of Provincial concern

As per the C-Plan (3.3), the PAOI within the study area is not located in areas defined as CBAs. Hence no red listed flora species (among others) have the potential to occur within the POAI. The Botanical Database of Southern Africa (BODATSA) site provides plant species for the area covered by the PAOI. No species were identified in the BODATSA search area neither were any species of conservation concern recorded (Figure 10-1). PPlants of Southern Southern Africa (POSA) was also consulted and returned no data for the site (Figure 10-2). The nearest record was located across the street which included *Amaryllidaceae Boophone disticha (L.f.)* and *Hyacinthaceae Drimia altissima (L.f.)*.

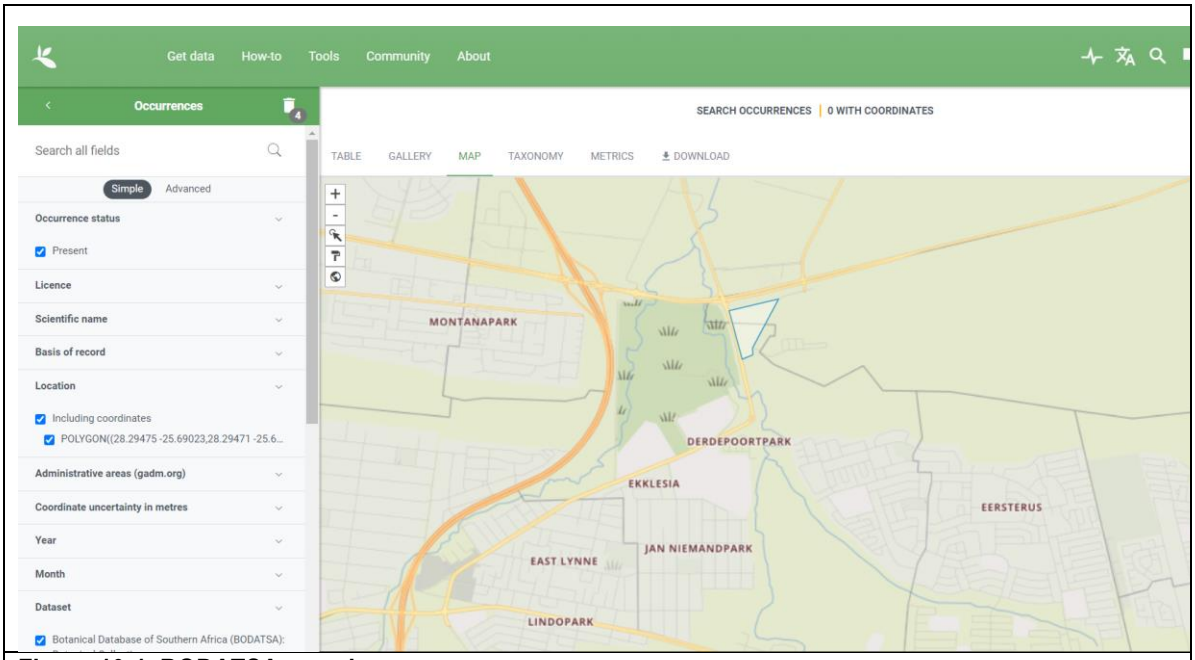

Figure 10-1. BODATSA search area.

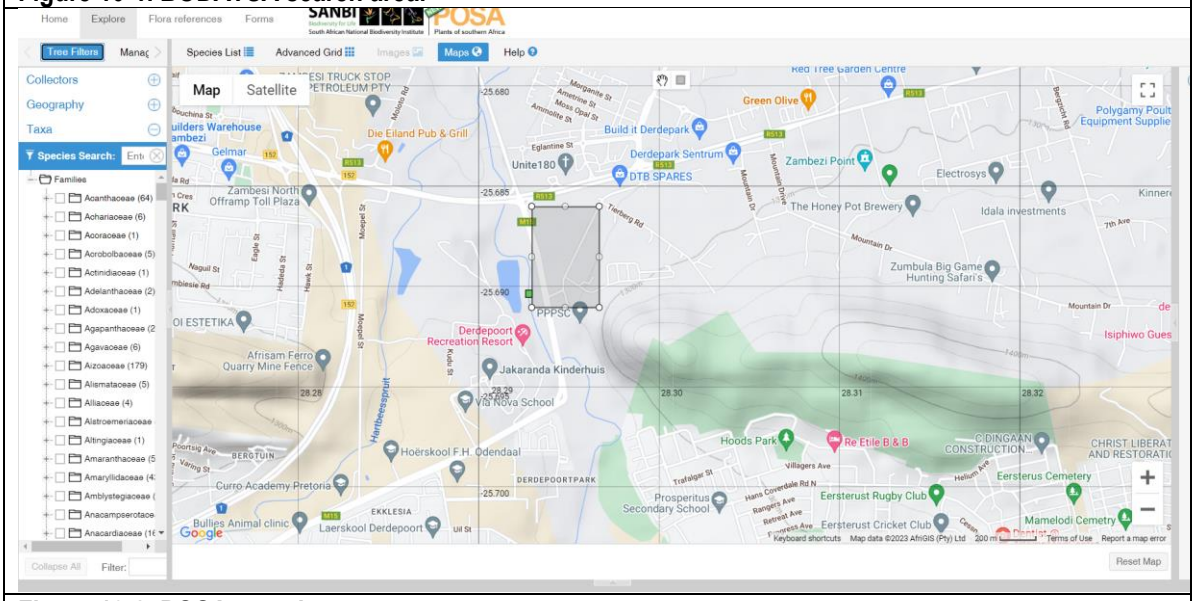

Figure 10-2. POSA search area.

A search of the online Virtual Museum of African Mammals provided 81 records for mammal species, 329 bird species have been recorded in pentad 2540_2815 and 201 records for Aves species, 246 records for lepidoptera, 24 records for frog species, 39 records for Odonata species 67 records for reptile species, 24 records for a spider species, 4 records for scorpions and 7 records for mushrooms, 6 records for Orchids spotted in the 2528CB quaternary degree square. Of the records 5 bird, 9 mammal, 1 amphibian and 3 reptile species were classified as endangered, vulnerable or near threatened no other species identified were of conservation concern (**Table 10.2**).

For the Mammals, the occurrences of the SCC listed in **Table 10.2** were checked for their potential occurrence utilizing the following databases along with a site visit to confirm if the SCC are present in the study area.

- iNatualist;
- Virtual Museum of African Mammals (MammalMAP, 2020); and
- The African Chiroptera Report (for bats).

For the Avifauna the occurrences of the SCC listed in **Table 10.2** were checked for their potential occurrence utilizing the following databases along with a site visit to confirm if the SCC are present in the study area.

- iNatualist;
- Southern African Bird Atlas Project 2 (SABAP2, 2020);
- Co-ordinated Avifaunal Road Counts; and
- Birds in Nature Reserve Projects.

For the Herpetofauna the occurrences of the SCC listed in **Table 10.2** were checked for their potential occurrence utilizing the following databases along with a site visit to confirm if the SCC are present in the study area.

- iNatualist;
- Reptile Atlas of Southern Africa (Reptile Map, 2020); and
- Frog Atlas of Southern Africa (FrogMap, 2020).

For the Terrestrial Inverterbrates the occurrences of the SCC listed in **Table 10.2** were checked for their potential occurrence utilizing the following databases along with a site visit to confirm if the SCC are present in the study area.

- iNatualist;
- Atlas of Lepidoptera (LepiMAP, 2020);
- Atlas of Dung Beetles in southern Africa (Dung BeetleMAP, 2020); and
- Atlas of southern African Spiders (SpiderMAP, 2020).

For the plant theme the occurrences of the SCC listed in **Table 10.1** were checked for their potential occurrence utilizing the following databases along with a site visit to confirm if the SCC are present in the study area.

- iNatualist;
- Botanical Database of Southern Africa (NEWPOSA);
- Global Biodiversity Information Facility (GBIF); and
- Atlas of African Orchids (OrchidMap).

During the site visit, it was determined that the mammal, avifauna, amphibians and reptiles (herpetofauna), terrestrial invertebrates and plant SCC had a low potential for occurrence within the proposed development area.

10.4. Species of Special Concern and Red data Species

Table 10.1. Flora species of special concern.

Family	Scientific Name	Common Name	TOPS Status	IUCN Status	Habitat range (Ha)	Likelihood of occurrence	Motivation
Plants							
*Sensitive species 1252				VU	8/7301*100= 0.12%	Low	Habitat type: A species of a twining tuberous vine that is native to Africa. It is common and widespread in forest and thicket, throughout the summer rainfall areas of East and Southern Africa. Motivation: There are no desirable habitat areas for this plant to be located within the study area. However, should this species be observed within close proximity of the proposed conservation activities on site the plant will be relocated.
**Aizoaceae*	*Delosperma gautengense*	Ice Plants		VU	2.7/424= 0.64%	Low	Habitat type: Terrestrial. Major habitats Gold Reef Mountain Bushveld, Gauteng Shale Mountain Bushveld, Amongst rocks on south-facing slopes. Motivation: There are no desirable habitat areas for this plant to be located within the study area. However, should this species be observed within close proximity of the proposed conservation activities on site the plant will be relocated.
*Sensitive species 733					2.7/3127= 0.09%	Low	Habitat type: Terrestrial. Major habitats Gold Reef Mountain Bushveld, Rand Highveld Grassland. It occurs in shallow, gravely quartzitic soils on rocky, north-facing slopes or summits of ridges. Motivation: There are no desirable habitat areas for this plant to be located within the study area. However, should this species be observed within close proximity of the proposed conservation activities on site the plant will be relocated.
*Sensitive species 430					2.7/110= 2.45%	Low	Habitat type: Terrestrial. Major habitats Gold Reef Mountain Bushveld, Marikana Thornveld, Andesite Mountain Bushveld, Carletonville Dolomite Grassland, Associated with ridges and quartzitic rocky outcrops in pockets of soil among rocks in direct sunshine or shaded areas. Motivation: There are no desirable habitat areas for this plant to be located within the study area.
**Acanthaceae*	*Dicliptera magaliesbergensis*	Two closed wings		VU	2.7/1533 = 0.18%		Habitat type: Terrestrial. Major habitats Carletonville Dolomite Grassland, Gold Reef Mountain Bushveld, Rand Highveld Grassland, Norite Koppies Bushveld, Gauteng Shale Mountain Bushveld, Amongst Riverine Forest and bush. Motivation: There are no desirable habitat areas for this plant to be located within the study area. However, should this species be observed within close proximity of the proposed conservation activities on site the plant will be relocated.
**Orchidaceae*	*Brachycorythis conica subsp. transvaalensis*	Albertina Sisulu Orchid		CR	2.7/2675 = 0.10%	Low	Habitat type: Terrestrial. Major habitats Gold Reef Mountain Bushveld, Waterberg Mountain Bushveld, Loskop Mountain Bushveld, Andesite Mountain Bushveld, Waterberg-Magaliesberg Summit Sourveld, Eastern

Family	Scientific Name	Common Name	TOPS Status	IUCN Status	Habitat range (Ha)	Likelihood of occurrence	Motivation
							Highveld Grassland, Rand Highveld Grassland, Carletonville Dolomite Grassland, Short, open grassland and wooded grassland, on sandy gravel overlying dolomite, sometimes also on quartzite, 1 000-1 705 m. Motivation: There are no desirable habitat areas for this plant to be located within the study area. However, should this species be observed within close proximity of the proposed conservation activities on site the plant will be relocated.
*Sensitive species 1248					2.7/3070 = 0.09%	Low	Habitat type: Terrestrial. Major habitats Drakensberg Foothill Moist Grassland, Fish Valley Thicket, Sundays Valley Thicket, Pondoland-Ugu Sandstone Coastal Sourveld, Southern Afrotemperate Forest, Northern Afrotemperate Forest, Southern Mistbelt Forest, Northern Mistbelt Forest, Scarp Forest, Amathole Montane Grassland, Carletonville Dolomite Grassland, Zastron Moist Grassland, Egoli Granite Grassland, Baviaans Valley Thicket, Tsakane Clay Grassland, Eastern Valley Bushveld, East Griqualand Grassland, Queenstown Thornveld, KwaZulu-Natal Highland Thornveld, Midlands Mistbelt Grassland, Gauteng Shale Mountain Bushveld, Andesite Mountain Bushveld, Loskop Mountain Bushveld, Soutpansberg Mountain Bushveld, Mamabolo Mountain Bushveld, Marikana Thornveld, Gold Reef Mountain Bushveld, Malelane Mountain Bushveld, Soutpansberg Summit Sourveld, Low and medium altitudes, usually along mountain ranges and in thickly vegetated river valleys, often under bush clumps and in boulder screes, sometimes found scrambling at the margins of karroid, succulent bush in the Eastern Cape. Occurs in bushy kloofs at the coast and inland in KwaZulu-Natal. In Gauteng, Mpumalanga and Northwest Province it is often found in open woodland or on steep rocky hills usually in well-shaded situations. Tolerates wet and dry conditions, growing predominantly in summer rainfall areas with an annual rainfall of 200-800 mm. Motivation: There are no desirable habitat areas for this plant to be located within the study area. However, should this species be observed within close proximity of the proposed conservation activities on site the plant will be relocated.
**Rosaceae*	*Prunus africana*	red stinkwood		CR	2.7/4058 = 0.07%	Low	Habitat type: Terrestrial. Major habitats Eastern Valley Bushveld, Gold Reef Mountain Bushveld, Ohrigstad Mountain Bushveld, Poung Dolomite Mountain Bushveld, Mamabolo Mountain Bushveld, Soutpansberg Mountain Bushveld, Northern Coastal Forest, Scarp Forest, Northern Mistbelt Forest, Southern Mistbelt Forest, Northern Afrotemperate Forest, Evergreen forests

Family	Scientific Name	Common Name	TOPS Status	IUCN Status	Habitat range (Ha)	Likelihood of occurrence	Motivation
							near the coast, inland mistbelt forests and afromontane forests up to 2100 m. Motivation: There are no desirable habitat areas for this plant to be located within the study area. However, should this species be observed within close proximity of the proposed conservation activities on site the plant will be relocated.

* These species were identified as species of concern by the DEA Screening tool

Table 10.2. Faunal species of special concern.

Family	Scientific Name	Common Name	TOPS Status	IUCN Status	Habitat range (Ha)	Likelihood of occurrence	Motivation
Reptiles							
**Testudinidae*	*Kinixys lobatsiana*	Lobatse hinged-back tortoise		VU		Low	Habitat type: Savanna bushveld and thornveld habitats. Absent from grassland and subtropical lowveld. However, is known from small, wooded rocky ridges in certain grassland areas of Gauteng. Motivation: Should this species be within close proximity of the construction activities; it will move away. The proposed construction will not impact on the species' distribution, habitat or survival.
Cordylidae	*Chamaesaura aenea*	Coppery Grass Lizard		Near Threatened (SARCA 2014)		Low	Habitat type: It widely found in southern Africa, inhabiting grasslands. In one of the countries it lives in, Eswatini. Motivation: Should this species be within close proximity of the construction activities; it will move away. The proposed construction will not impact on the species' distribution, habitat or survival.
Lamprophiidae	*Homoroselaps dorsalis*	Striped Harlequin Snake		Near Threatened (SARCA 2014)		Low	Habitat type: This Harlequin snake species in found in the following provinces; Free State, Gauteng, Mpumalanga and Limpopo. The favoured habitats of this snake are moist savanna and grasslands. Motivation: Should this species be within close proximity of the construction activities; it will move away. The proposed construction will not impact on the species' distribution, habitat or survival.
Mammals							
**Soricidae*	*Crocidura maquassiensis*	Maquassie musk shrew		VU	8/71.58*100 = 11.17%	Low	Habitat Type: A species of mammal in the family *Soricidae*. It is found in South Africa, Eswatini, and Zimbabwe. Its natural habitat is rocky areas. Motivation: Should this species be within close proximity of the construction activities; it will move away. The proposed construction will not impact on the species' distribution, habitat or survival.
**Muridae*	*Dasymys robertsii*	Robert's marsh rat		VU	8/62.62=12.77%	Low	Habitat Type: Terrestrial, Freshwater, Inland waters. Wide variety of habitats, including forest and savannah, swampland, and grasslands, but they rely on intact wetlands in these areas. They have not been recorded from agricultural landscapes or dam areas. They occur specifically in reed beds and among semi-aquatic grasses in wetlands or swampy areas or along rivers and streams, as well as in grassy areas close to water.

Family	Scientific Name	Common Name	TOPS Status	IUCN Status	Habitat range (Ha)	Likelihood of occurrence	Motivation
							Motivation: Should this species be within close proximity of the construction activities; it will move away. The proposed construction will not impact on the species' distribution, habitat or survival.
*Chrysochloridae	*Neamblysomus julianae*	Juliana's golden mole		EN	8/778.86= 1.02%	Low	Habitat type: A species of the mammal are fossorial in bushveld regions of South Africa, and are often found near large ridges (Jackson 2008). They have a patch distribution and small range due to their habitat specificity, only occurring in areas where the soil is sandy and of different particle sizes. These properties give less resistance for tunnelling and reduce susceptibility of compaction.
Nesomyidae	*Mystromys albicaudatus*	African White-tailed Rat		Vu		Low	Habitat type: endemic to South Africa and Lesotho where it is found in grasslands and shrubby areas. It tends to inhabit burrows of meerkats and cracks in the soil during the day and venture out at night. It eats vegetable matter such as seeds and has been known to take insects.
Equidae	*Equus quagga*	Plains Zebra		Near Threatened (IUCN, 2016)		Low	Habitat type: They usually live in treeless grasslands and savanna woodlands and are absent from deserts, rainforests, and wetlands. This species' habitat is shrinking, however, and they are now extinct in Burundi and Lesotho. Motivation: Should this species be within close proximity of the construction activities; it will move away. The proposed construction will not impact on the species' distribution, habitat or survival.
Erinaceidae	*Atelerix frontalis*	Southern African Hedgehog		Near Threatened (2016)		Low	Habitat type: can be found in most environments, however, they prefer grass and Bushveld (sub-tropical woodland ecoregion of Southern Africa) that is not too damp and with a good covering of leaves and other debris. Many of these hedgehogs also live in suburban gardens. Motivation: Should this species be within close proximity of the construction activities; it will move away. The proposed construction will not impact on the species' distribution, habitat or survival.
Muridae	*Dasymys incomtus*	Common Dasymys		Near Threatened (2016)		Low	Habitat type: They swim well. They are nocturnal and solitary. Species are more common in the northern regions of Sub-Saharan Africa, likely because their wetland habitat

Family	Scientific Name	Common Name	TOPS Status	IUCN Status	Habitat range (Ha)	Likelihood of occurrence	Motivation
							Motivation: Should this species be within close proximity of the construction activities; it will move away. The proposed construction will not impact on the species' distribution, habitat or survival.
Soricidae	*Crocidura mariquensis*	Swamp Musk Shrew		Near Threatened (2016)		Low	Habitat type: wetland habitat and occurs in reed beds and semi-aquatic vegetation, in the vicinity of rivers and lakes and in seasonally flooded areas, with a marked preference for marshes and swamps. Motivation: Should this species be within close proximity of the construction activities; it will move away. The proposed construction will not impact on the species' distribution, habitat or survival.
Vespertilionidae	*Pipistrellus (Pipistrellus) rusticus*	Rusty Pipistrelle		Near Threatened		Low	Habitat type:found in Angola, Botswana, Burkina Faso, Central African Republic, Chad, Ethiopia, Ghana, Kenya, Malawi, Mozambique, Namibia, Nigeria, Senegal, South Africa, Sudan, Tanzania, Uganda, Zambia, and Zimbabwe. Its natural habitats are dry and moist savanna. Motivation: Should this species be within close proximity of the construction activities; it will move away. The proposed construction will not impact on the species' distribution, habitat or survival.
Invertebrates							
**Tettigoniidae*	*Clonia uvarovi*	Uvarov's clonia		VU	8/952676.13= 8.34%	Low	Habitat type: Inhabits tall woodland savannah Motivation: Should this species be within close proximity of the construction activities; it will move away. The proposed construction will not impact on the species' distribution, habitat or survival.
Lestidae	*Lestes dissimulans*	Cryptic Spreadwing		LC (Global); VU (RSA)		Low	Habitat type: native to central Africa, where it is widespread. It occurs in swampy habitat at pools and streams. Motivation: Should this species be within close proximity of the construction activities; it will move away. The proposed construction will not impact on the species' distribution, habitat or survival.
Amphibians							
Pyxicephalidae	*Pyxicephalus adspersus*	Giant Bull Frog		Near Threatened		Low	Habitat type:moist to dry savanna, subtropical to tropical dry shrubland, intermittent freshwater lakes, Motivation: Should this species be within close proximity of the construction activities; it will move away. The proposed construction will not impact on the species' distribution, habitat or survival.

Family	Scientific Name	Common Name	TOPS Status	IUCN Status	Habitat range (Ha)	Likelihood of occurrence	Motivation
Avifauna							
Pelecanidae	*Pelecanus rufescens*	Pink-backed Pelican		Global: LC; BLSA: VU		Low	Habitat type: Occurs from south-west Arabia to much of sub-Saharan Africa. In southern Africa, it is locally fairly common in central and southern Mozambique, south-western Zimbabwe, northern Botswana, the Caprivi Strip and north-eastern South Africa. Motivation: Should this species be within close proximity of the construction activities; it will move away. The proposed construction will not impact on the species' distribution, habitat or survival.
Gruidae	*Anthropoides paradiseus*	Blue Crane		Global: VU; BLSA: NT		Low	Habitat type:open grasslands and other upland habitats. They are mostly found in natural vegetation in the eastern parts of their distribution (e.g. Mpumalanga and KwaZulu-Natal), but also utilises cultivated pastures and crop lands. Motivation: Should this species be within close proximity of the construction activities; it will move away. The proposed construction will not impact on the species' distribution, habitat or survival.
Gruidae	*Balearica regulorum*	Grey Crowned-(Crowned) Crane		Global: EN; BLSA: EN		Low	Habitat type: mixed wetland/grassland habitats in eastern and southern Africa, with the largest remaining populations in Kenya, Uganda, Zambia, and South Africa. They forage for grass seeds, small toads, insects, and other invertebrates Motivation: Should this species be within close proximity of the construction activities; it will move away. The proposed construction will not impact on the species' distribution, habitat or survival.
Ciconiidae	*Ephippiorhynchus senegalensis*	Saddle-billed Stork		Global: LC; BLSA: EN		Low	Habitat type: resident breeder in sub-Saharan Africa from Sudan, Ethiopia and Kenya south to South Africa, and in The Gambia, Senegal, Côte d'Ivoire and Chad in west Africa. It is considered endangered in South Africa. Motivation: Should this species be within close proximity of the construction activities; it will move away. The proposed construction will not impact on the species' distribution, habitat or survival.
Accipitridae	*Aquila verreauxii*	Verreaux's (Black) Eagle		Global: LC; BLSA: VU		Low	Habitat type: occur in hilly and mountainous terrain with cliffs, rocks ledges and caves. They are known to occur in dry savannah, woodland, desert and high rainfall areas and wherever rocky outcrops, gorges or mountain ranges provide nesting sites and prey.

Family	Scientific Name	Common Name	TOPS Status	IUCN Status	Habitat range (Ha)	Likelihood of occurrence	Motivation
							Motivation: Should this species be within close proximity of the construction activities; it will move away. The proposed construction will not impact on the species' distribution, habitat or survival.

* These species were identified as species of concern by the DEA Screening tool

10.4.1.1. Impacts on the Species of Conservation Concern

The nature and extent of the potential impact of the proposed development on the population of the SCC located within the study area is low as the habitat of these species are not located within the study area.

There is no conservation concern of these species within the study area as these species are not located within this area. Neither their habitats nor their surrounding landscape and ecological processes will be impacted during this proposed construction.

Table 10.3 Impacts on the Species of Conservation Concern.

Family	Scientific Name	Common Name	Geographical scale or spatial scope	Duration temporal scope	Frequency or re-occurrence	Magnitude or severity	Justification for magnitude/severity
Mammals							
Nesomyidae	*Mystromys albicaudatus*	African White-tailed Rat	Local or project footprint	Long term (>20 year)	Highly irregular	Very Low	Low intensity disturbance as species does not occur within the study area.
**Chrysochloridae*	*Neamblysomus julianae*	Juliana's golden mole	Local or project footprint	Long term (>20 year)	Possible	Low	Low intensity disturbance as species has a low possibility of occurring on site and was not identified during the site visits.
Soricidae	*Crocidura maquassiensis*	Makwassie Musk Shrew	Local or project footprint	Long term (>20 year)	Highly irregular	Very Low	Low intensity disturbance as species does not occur within the study area.
Equidae	*Equus quagga*	Plains Zebra	Local or project footprint	Long term (>20 year)	Highly irregular	Very Low	Low intensity disturbance as species does not occur within the study area.
Erinaceidae	*Atelerix frontalis*	Southern African Hedgehog	Local or project footprint	Long term (>20 year)	Highly irregular	Very Low	Low intensity disturbance as species does not occur within the study area.
Murids	*Dasymys incomtus*	Common dasymys	Local or project footprint	Long term (>20 year)	Probable	Low	Low intensity disturbance as species has a probability of occurring on site but was not identified during the site visits.
**Muridae*	*Dasymys robertsii*	Robert's marsh rat	Local or project footprint	Long term (>20 year)	Probable	Low	Low intensity disturbance as species has a probability of occurring on site but was not identified during the site visits.
Soricidae	*Crocidura mariquensis*	Swamp Musk Shrew	Local or project footprint	Long term (>20 year)	Highly irregular	Very Low	Low intensity disturbance as species does not occur within the study area.
Vespertilionidae	*Pipistrellus (Pipistrellus) rusticus*	Rusty Pipistrelle	Local or project footprint	Long term (>20 year)	Highly irregular	Very Low	Low intensity disturbance as species does not occur within the study area.
Invertebrates							

Family	Scientific Name	Common Name	Geographical scale or spatial scope	Duration temporal scope	Frequency or re-occurrence	Magnitude or severity	Justification for magnitude/severity
**Tettigoniidae*	*Clonia uvarovi*	Uvarov's clonia	Local or project footprint	Long term (>20 year)	Highly irregular	Very Low	Low intensity disturbance as species does not occur within the study area.
Lestidae	*Lestes dissimulans*	Cryptic Spreadwing	Local or project footprint	Long term (>20 year)	Highly irregular	Very Low	Low intensity disturbance as species does not occur within the study area.
Reptiles							
**Testudinidae*	*Kinixys lobatsiana*	Lobatse	Local or project footprint	Long term (>20 year)	Highly irregular	Very Low	Low intensity disturbance as species does not occur within the study area.
Cordylidae	*Chamaesaura aenea*	Coppery Grass Lizard	Local or project footprint	Long term (>20 year)	Highly irregular	Very Low	Low intensity disturbance as species does not occur within the study area.
Lamprophiidae	*Homoroselaps dorsalis*	Striped Harlequin Snake	Local or project footprint	Long term (>20 year)	Highly irregular	Very Low	Low intensity disturbance as species does not occur within the study area.
Amphibian							
Pyxicephalidae	*Pyxicephalus adspersus*	Giant Bull Frog	Local or project footprint	Long term (>20 year)	Highly irregular	Very Low	Low intensity disturbance as species does not occur within the study area.
Avifauna							
Pelecanidae	*Pelecanus rufescens*	Pink-backed Pelican	Local or project footprint	Long term (>20 year)	Highly irregular	Very Low	Low intensity disturbance as species does not occur within the study area.
Gruidae	*Anthropoides paradiseus*	Blue Crane	Local or project footprint	Long term (>20 year)	Highly irregular	Very Low	Low intensity disturbance as species does not occur within the study area.
Gruidae	*Balearica regulorum*	Grey Crowned-(Crowned) Crane	Local or project footprint	Long term (>20 year)	Highly irregular	Very Low	Low intensity disturbance as species does not occur within the study area.
Ciconiidae	*Ephippiorhynchus senegalensis*	Saddle-billed Stork	Local or project footprint	Long term (>20 year)	Highly irregular	Very Low	Low intensity disturbance as species does not occur within the study area.
Accipitridae	*Aquila verreauxii*	Verreaux's (Black) Eagle	Local or project footprint	Long term (>20 year)	Highly irregular	Very Low	Low intensity disturbance as species does not occur within the study area.

Family	Scientific Name	Common Name	Geographical scale or spatial scope	Duration temporal scope	Frequency or re-occurrence	Magnitude or severity	Justification for magnitude/severity
Floral							
**Sensitive species 1252*			Local or project footprint	Long term (>20 year)	Highly irregular	Very Low	Low intensity disturbance as species does not occur within the study area.
**Aizoaceae*	*Delosperma gautengense*	Ice Plants	Local or project footprint	Long term (>20 year)	Highly irregular	Very Low	Low intensity disturbance as species does not occur within the study area.
**Sensitive species 733*			Local or project footprint	Long term (>20 year)	Highly irregular	Very Low	Low intensity disturbance as species does not occur within the study area.
**Sensitive species 430*			Local or project footprint	Long term (>20 year)	Highly irregular	Very Low	Low intensity disturbance as species does not occur within the study area.
**Acanthaceae*	*Dicliptera magaliesbergensis*	Two closed wings	Local or project footprint	Long term (>20 year)	Highly irregular	Very Low	Low intensity disturbance as species does not occur within the study area.
**Orchidaceae*	*Brachycorythis conica subsp. transvaalensis*	Albertina Sisulu Orchid	Local or project footprint	Long term (>20 year)	Highly irregular	Very Low	Low intensity disturbance as species does not occur within the study area.
**Sensitive species 1248*			Local or project footprint	Long term (>20 year)	Highly irregular	Very Low	Low intensity disturbance as species does not occur within the study area.
**Rosaceae*	*Prunus africana*	red stinkwood	Local or project footprint	Long term (>20 year)	Highly irregular	Very Low	Low intensity disturbance as species does not occur within the study area.

11. RESULTS OF THE ENVIRONMENTAL SCREENING TOOL

11.1. Animal species theme sensitivity

As per the DEA screening tool, the following species were expected to occur within the extents of the study area, However, based on the level of disturbance and the habitat type identified on site and within proximity to the proposed development, the following probabilities were assigned per species:

- *Kinixys lobatsiana* (VU): Low probability – Savanna bushveld and thornveld habitats.
- *Crocidura maquassiensis* (LC) Low probability – Rocky habitats
- *Dasymys robertsii* (VU): Low probability – Terrestrial, Freshwater, Inland waters
- *Neamblysomus julianae (*NT): Low probability – Confined to sandy soils, often pockets along weathered rocky ridges of quartzite or granite.
- *Clonia uvarovi* (VU): Low probability – Woodland Savannah

None of these species were identified on site during the site visits conducted for the proposed development.

11.2. Plant species theme sensitivity

As per the DEA screening tool, the following species were expected to occur within the extents of the study area, However, based on the level of disturbance and the habitat type identified on site and within proximity to the proposed development, the following probabilities were assigned per species:

- Sensitive species 1252 (VU): Low probability – Widespread in forest and thicket habitats.
- *Delosperma gautengense* (VU) Medium probability – Rocky habitats
- Sensitive species 733 (VU): Low probability – shallow, gravely quartzitic soils on rocky, north-facing slopes or summits of ridges.
- Sensitive species 430 (NT): Medium probability – Ridges and quartzitic rocky outcrops in pockets of soil among rocks in direct sunshine or shaded areas
- *Dicliptera magaliesbergensis* (VU): Low probability – Shale Mountain Bushveld, Amongst Riverine Forest and bush
- *Brachycorythis conica subsp. Transvaalensis* (CR): Open grassland and wooded grassland, on sandy gravel overlying dolomite, sometimes also on quartzite
- Sensitive species 1248: Open woodland or on steep rocky hills usually in well-shaded situations
- *Prunus Africana* (CR): Inland mistbelt forests and afromontane forests up to 2100 m

None of these species were identified on site during the site visits conducted for the proposed development, hence the sensitivity indicated below in Figure 12.1.

12. CONCLUSION

According to GN. 960 which was published in GG No. 42561 of 05 July 2019, it is a requirement to submit a report generated by the national web-based environmental screening tool in terms of section 24(5)(h) of the NEMA, 1998 (Act No 107 of 1998) and regulation 16(1)(b)(v) of the EIA regulations, 2014, as amended. According to the results from the environmental screening assessment, the site falls within very high Terrestrial Biodiversity theme, high palaeontology and medium animal species theme.

Based on the findings of the original desktop assessment conducted for the proposed development, the site is located in:

- The NEMBA listed Endangered Ecosystem: Rand Highveld Grassland and Marikana Thornveld vegetation types – No vegetation remnant to the Rand Highveld Grassland and Marikana Thornveld vegetation types of vegetation types is present on site.
- No part within a CBA and ESA
- The site contains areas with scattered trees which from the site verification provides a low likelihood of occurrence for the species of concern (animals) as identified by the DEA Screening tool due to habitat avalibility.

A search of the online Virtual Museum of African Mammals provided 81 records for mammal species, 329 records for aves species, 24 records for frog species, 246 records for odonata species, 67 records for reptile species, 24 records for a spider species spotted in the 2528CB quaternary degree square. Of the records 2 invertebrates, 5 mammal, 1 amphibian and 2 reptile species were classified as endangered, vulnerable or near threatened no other species identified were of conservation concern.

The concluding findings of the Ecological Impact Statement indicated that the *Aristida transvaalensis – Cymbopogon validus* grassland vegetation community was determined to have a **low** sensitivity and the *Aristida transvaalensis – Cymbopogon validus* grassland with trees vegetation community was determined to have a **low-medium** sensitivity due to the sensitive species that has a probability of occurrence. Similarly, the riparian area presents a medium sensitivity due to the sensitivity of the watercourse. Various mitigation measures have been proposed in order to ensure these species are relocated prior to the commencement of construction activities.

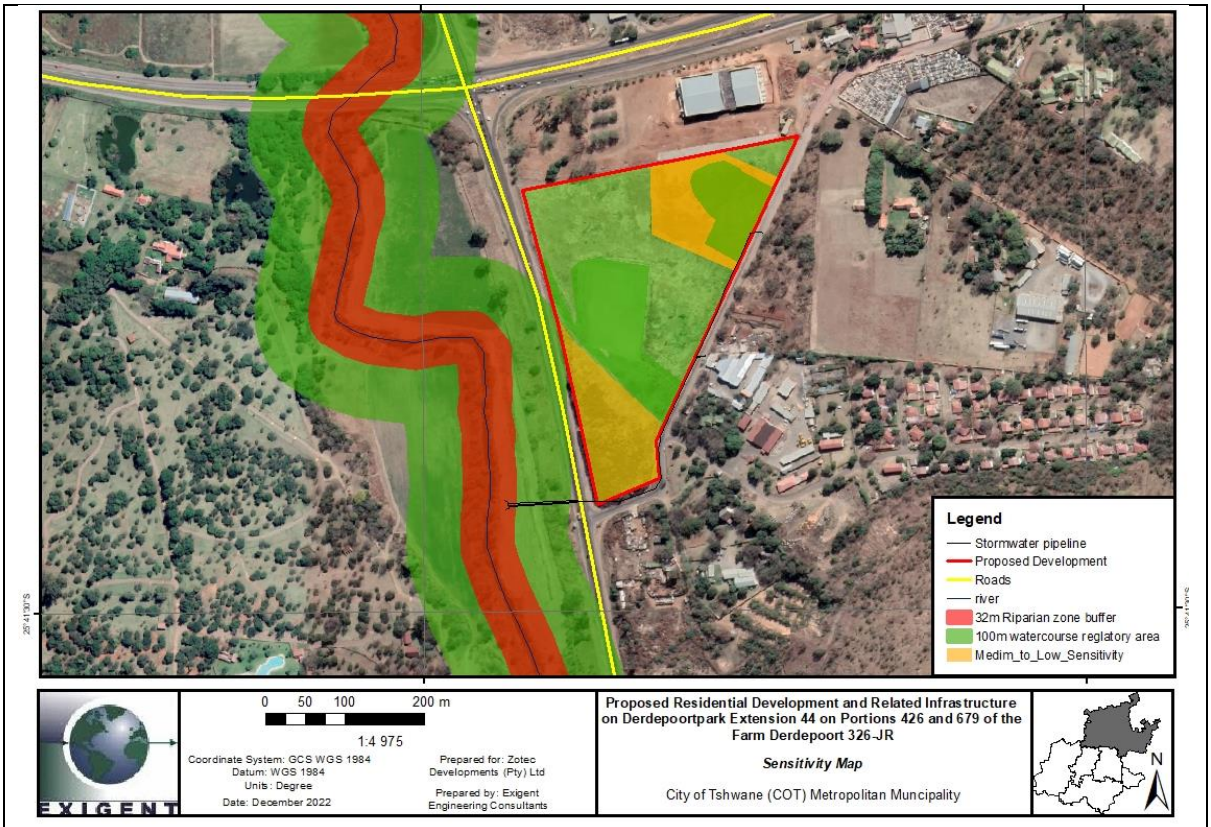

Figure 12.1 Sensitivity Map

The current use of the land and environmental sensitivity as identified by the national web based environmental screening tool is herewith disputed.

The site has been transformed and contains no species representative of the natural vegetation of the area within the grassland vegetation community The specialist is of the opinion that this specialist study was conducted independently and based on our expertise, sufficient evidence is provided in support of the **low** environmental sensitivity of the proposed development site.

The riparian community is across the R573 where the stormwater pipeline will discharge. This 32 m buffer area has been classified as of **high** significance due to the location in close proximity of the watercourse.

13. REFERENCES

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Annexure A: Curriculum Vitae of Specialists