December 2024

TERRESTRIAL BIODIVERSITY (FLORA & FAUNA) ASSESSMENT FOR: Lanseria_Portion 32 of the Farm Botesdal 529 JQ and Portions of Erf 183 Lanseria Airport Extension 1, Gauteng

A report commissioned by

INDEX (PTY) LTD

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CONTENTS OF THE SPECIALIST REPORT

The contents of this specialist report comply with the legislated requirements as described in the Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Biodiversity (GN R. 320 of 2020).

SPECIALIST REPORT REQUIREMENTS ACCORDING TO GN R. 320			Section/s or pages
3.1	**The Terrestrial Biodiversity Specialist Assessment Report must contain, as a minimum, the following information:**		
	3.1.1	Contact details of the specialist, their SACNASP registration number, their field of expertise and a curriculum vitae;	Annexure 2; P 4 & 5
	3.1.2	A signed statement of independence by the specialist	P 4-7
	3.1.3	A statement of the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment;	P 5 & 6
	3.1.4	A description of the methodology used to undertake the site verification and impact assessment and site inspection, including equipment and modelling used, where relevant;	Section 2 Section 5
	3.1.5	A description of the assumptions made and any uncertainties or gaps in knowledge or data as well as a statement of the timing and intensity of site inspection observations;	P 6 Section 5
	3.1.6	A location of the areas not suitable for development, which are to be avoided during construction and operation (where relevant);	Section 6 Section 7 Figure 14
	3.1.7	Additional environmental impacts expected from the proposed development;	Section 8
	3.1.8	Any direct, indirect and cumulative impacts of the proposed development;	Section 8
	3.1.9	The degree to which the impacts and risks can be mitigated;	Section 8
	3.1.10	The degree to which the impacts and risks can be reversed;	Section 8
	3.1.11	The degree to which the impacts and risks can cause loss of irreplaceable resources;	Section 8
	3.1.12	Proposed impact management actions and impact management outcomes proposed by the specialist for inclusion in the Environmental Management Programme (EMPr);	Section 8
	3.1.13	A motivation must be provided if there were development footprints identified as per paragraph 2.3.6 above that were identified as having a “low” terrestrial biodiversity sensitivity and that were not considered appropriate;	N/A
	3.1.14	A substantiated statement, based on the findings of the specialist assessment, regarding the acceptability, or not, of the proposed development, if it should receive approval or not; and	Section 9
	3.1.15	Any conditions to which this statement is subjected.	Section 9
3.2	**The findings of the Terrestrial Biodiversity Specialist Assessment must be incorporated into the Basic Assessment Report or the Environmental Impact Assessment Report, including the mitigation and monitoring measures as identified, which must be incorporated into the EMPr where relevant.**		✓
3.3	**A signed copy of the assessment must be appended to the Basic Assessment Report or Environmental Impact Assessment Report.**		✓

CONDITIONS RELATING TO THIS REPORT

Declaration of interest

Enviroguard Ecological Services cc and its members/co-workers:

- Have no vested interest in the property studied nor is it affiliated with any other person/body involved with the property and/or proposed development.
- Is not a subsidiary, legally or financially of the proponent.
- Do not have any financial interest in the undertaking of the activity, other than remuneration for the work performed in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA).
- Declare that remuneration for services provided by Enviroguard Ecological Services cc and its members/co-workers is not subjected to or based on approval of the proposed project by the relevant authorities responsible for authorising this proposed project.
- Undertake to disclose, to the competent authority, any material information that has or may have the potential to influence the decision of the competent authority or the objectivity of any report, plan or document required in terms of the NEMA.
- Reserve the right to modify aspects pertaining to the present investigation should additional information become available through ongoing research and/or further work in this field.
- Is committed to biodiversity conservation but concomitantly recognize the need for economic development. We reserve the right to form and hold our own opinions within the constraints of our specialities and experience, and therefore will not submit willingly to the interests of other parties or change our statements to appease them.

The study was undertaken by Prof. LR Brown (PhD UP) & Mr C Cook (MSc UP). Both are registered as a Professional Natural Scientists with the following details:

Prof LR Brown: Reg. No. 400075/98 (Botanical Science and Ecological Science).
Mr C Cook: Reg. No. 400084/08 (Zoological Science).

They have the following qualifications:

SPECIALIST	QUALIFICATION
Prof. L.R. Brown	PhD Terrestrial plant ecology MSc. Water ecology BSc Hons (Botany) BSc (Ed) (Botany, Zoology, Education) Wetland and Riparian Delineation *(DWAF Accredited Course)* Soil Classification and Wetland Delineation Short Course – TERRASOIL Science Wetland Legislation Course - Wetrest

Mr C Cook	MSc Zoology (Aquatic Science) BSc Hons Zoology BSc Botany & Zoology Wetland and Riparian Delineation *(DWAF Accredited Course)*

Indemnity

Although Enviroguard Ecological Services cc exercises due care and diligence in rendering services and preparing documents, the client takes full responsibility for this report and its implementation in terms of the National Environmental Management Act of 1998, and exempt Enviroguard Ecological Services cc and its associates and their sub-contractors from any legal responsibility based on the timing of the assessment, the result and the duration thereof, which has an influence on the credibility and accuracy of this report. Enviroguard Ecological Services cc accepts no liability, and the client, by receiving this document, indemnifies Enviroguard Ecological Services cc and its directors, managers, agents and employees against all actions, claims, demands, losses, liabilities, costs, damages and expenses arising from or in connection with services rendered, directly or indirectly by Enviroguard Ecological Services cc and by the use of the information contained in this report.

Factors limiting the quality of this study

Flora: Once off surveys were conducted on 16 October 2024. Large sections of the site were burned due to a runaway veld fire. Thus only those flowering plants that flowered at the time of the visit could be identified with high levels of confidence. Some of the more rare and cryptic species may have been overlooked due to their inconspicuous growth forms. Many of the rare and endangered succulent species can only be distinguished (in the veld) from their very similar relatives on the basis of their reproductive parts. These plants flower during different times of the year. Multiple visits to any site during the different seasons of the year could therefore increase the chances to record a larger portion of the total species complex associated with the area. The survey of the study site is however considered as successful with a correct identification of the different vegetation units.

Fauna: It must be stressed that no comprehensive faunal surveys or specialised sampling techniques of animal species occurring on the study site were conducted; but merely an assessment of the current available and specialised habitats. By surveying the site for specialised habitats, as well as the remaining vegetation and specific habitats, one can

make an assumption of the possible presence or absence of threatened animal species. In order to ascertain actual species lists more intensive surveys are required over several seasons. Limitation to a faunal screening exercise or habitat assessment; based on a single site visitation (6 hours) conducted during the late summer/autumnal months on 16 October 2024.

Large sections of the site were burned due to a runaway veld fire. All animals (mammals, birds, reptiles and amphibians) seen or heard; were recorded. Use was also made of indirect evidence such as animal tracks (footprints, droppings) to identify animals. The majority of threatened or protected species are extremely secretive and difficult to observe even during intensive field surveys conducted over several years this is especially pertinent to the highly elusive and secretive Serval, South African Hedgehog, Vlei Rat (Grassland type), Maquassie Musk Shrew, Rough-haired Golden Mole, Juliana's Golden Mole, Striped Harlequin Snake, Coppery Grass Lizard and Giant Bullfrog. There is a limitation of historic data and available databases for the majority of threatened or protected species within the immediate study area. The presence of threatened species on site is assessed mainly on habitat availability and suitability as well as desk research (literature, personal records and previous surveys conducted in similar habitats within the Lanseria area between 1999-2024.

General assumptions

This report is a combination of desktop based and field data collected on the site. Although the surrounding areas were observed and important features noted, no formal survey of any kind was conducted in such areas. Thus, the descriptions of the various ecosystems are based on limited fieldwork as specified above and available literature. However, the data collected, and time spent in the field were sufficient and provided enough information to make a decision on the status of the study area.

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- Recommendations delivered to the Client.

Approach

Conclusions reached, and recommendations made are based not only on occurrence of individual species, but more appropriately on habitats and ecosystem processes. Planning must therefore allow for the maintenance of species, habitats and ecosystem processes, even if Red Data or endemic plant or animal species are absent.

Prof LR Brown *Pr.Sci.Nat*; MGSSA
Enviroguard Ecological Services cc

Mr C Cook *Pr.Sci.Nat.*

1. INTRODUCTION

The natural resources of South Africa, with its highly complex and diversified society, are continually under threat from development especially in and close to areas richly endowed with natural resources. The natural environment and assets such as soil, water, indigenous vegetation, biodiversity, endemic and rare species and indigenous wildlife should be part of planning any new developments. New development plans should be based on scientific, ecological principles to prevent destruction or the deterioration of the environment and consequently the loss of valuable natural assets - also the loss of plant and animal species (biodiversity) and natural open spaces within the urban environment. This does not only have economic consequences, but from a conservation viewpoint, may have enormous advantages to the natural ecosystems. Development should, therefore, be planned to make the best possible use of natural resources and to avoid degradation, and therefore attention must be paid to environmental factors in the decision-making process. During the last years development became complicated and sophisticated, scientifically based, enterprises where environmental and nature systems are (or should be) accounted for in the planning stages. Modern development planning is intended to improve the way in which South African environmental resources are utilised. This provides a cost-effective procedure for ensuring that environmental concerns are carefully considered in the project development process. This procedure aims at guiding and facilitating the development process of a project. **An ecological evaluation of any area to be developed is presently considered a necessity.**

Vegetation it is the most physical representation of the environment on which all animals are ultimately dependent. As primary producers it is a major component in the environment and as such it is of immense practical importance that it be conserved. Not only does it play a major role in humankind's existence as primary producers, but it also forms a protecting layer covering the soil thereby protecting it against the onslaught of wind and water. When the vegetation is damaged or removed, there is no more protection, thus enhancing erosion and negatively affecting the faunal communities present on the area.

2. SITE SENSITIVITY VERIFICATION AND MINIMUM REPORT CONTENT REQUIREMENTS

In terms of the Protocol for the Specialist Assessment and Minimum Reporting Content Requirements for Environmental Impacts on Terrestrial Biodiversity (GN R. 320 of 2020), prior to the commencement of a specialist assessment, the current use of the land and the potential environmental sensitivity of the study site must be determined using the Department of Forestry, Fisheries & the Environment (DFFE) screening tool. The results obtained from the screening tool and the site sensitivity verification are used to determine the minimum content requirements for the assessment report.

It must be noted that the screening tool is based on a mixture of broad-scale and local-scale (site-specific) data of an area. It is not known how often new research data is incorporated into the screening tool, meaning that it is possible that the site ecological sensitivity and its conservation status could differ from that of the DFFE screening tool. Thus, it is important that a physical site visit is conducted to determine whether the results of the screening tool are indeed accurate or not.

According to the results of the Screening Report generated for the study site, the relative terrestrial biodiversity theme sensitivity is classified as VERY HIGH with vegetation sensitivity listed as LOW-MEDIUM and faunal sensitivity as MEDIUM-HIGH.

According to Section 3 (1) of GN R. 320, 'an applicant intending to undertake an activity identified in the scope of this protocol, on a site identified on the screening tool as being of "very high sensitivity" for terrestrial biodiversity, must submit a Terrestrial Biodiversity Specialist Assessment' report and an area identified as low must submit a "Terrestrial Biodiversity Compliance Statement report".

Due to the VERY HIGH sensitivity rating of the site, a Terrestrial Biodiversity Specialist Assessment has been undertaken as part of the Basic Assessment Process for the study area.

3. AIMS OF THE STUDY

This report aims to present ecological information on the flora and fauna of Portion 32 of the Farm Botesdal 529 JQ, and Portions of Erf 183 Lanseria Airport Extension 1, Gauteng (hereafter referred to as the study area).

The objectives of this study were to:

- Identify, describe, and delineate the different vegetation units present on the study site.
- Provide a description of the fauna (**mammals, reptiles, amphibians**) occurring within the study area.
- Identify species of conservation importance that could possibly occur on the proposed site.
- To provide a sensitivity map of the study area (where applicable).
- To provide management recommendations to mitigate negative and enhance positive impacts of the proposed development.

4. STUDY AREA

4.1 Location

The study area is located directly south of the central part of the Lanseria International Airport and includes one of the smaller runways. The areas towards the north, west and east are all developed with roads forming the southern boundary. A smaller site outside the airport area is located south-east of the larger section.

Figure 1. Locality the study area (Red area) (Source: SANBI GIS, 2024)

Existing impacts

- The area is open land.
- The largest section has been degraded due to previous and current human activities.
- The smaller site has been transformed due to human influences.

5. METHODS

Prior to the site visits a desktop study was undertaken using literature, satellite imagery and other information available on the internet. Thereafter a site visit was undertaken to verify the findings and detailed floral and faunal surveys were conducted as described below:

5.1 Vegetation

The vegetation map of South Africa, Lesotho and Swaziland (Mucina & Rutherford, 2006) was used to determine the biome and Vegetation type within which the study site is located. Additional information on the site sensitivity was obtained from South African National Biodiversity Institute's website (SANBI GIS) as well as the screening tool of DFFE.

The Braun-Blanquet survey principles to survey and describe plant communities as ecological units were used for this study. This vegetation survey method has been used as the basis of a national vegetation survey of South Africa (Mucina et al. 2000) and is an efficient method of classifying and describing vegetation (Brown et al. 2013). The study is based on the floristic composition of the different vegetation units. An overview of the vegetation was first obtained from relevant literature. The vegetation was stratified into relative homogeneous units using Google Earth images and topographic maps. All these units were verified on foot and vegetation sample plots placed in each. The different vegetation units (ecosystems) are not only described in terms of their plant species composition, but also evaluated in terms of the potential habitat for sensitive/red data plant species. Ecological sensitivity and conservation value of the plant communities were assessed and categorised according to habitat and plant species assemblages (even though red data species or suitable habitat for such species could be absent an area could still have pristine habitat comprising a high diversity of climax species giving it a high conservation value).

Floristic data

Data pertaining to the vegetation physiognomy and floristic composition (species richness and canopy cover of each species) was gathered. A list of all plant species present, including trees, shrubs, grasses, forbs, geophytes and succulents were compiled. All

identifiable plant species were listed. Notes were additionally made of any other features that might have an ecological influence.

Red data species

An investigation was also carried out on rare and protected plants that might possibly occur in the region. For this investigation the National Red List of Threatened Plants of South Africa, Lesotho & Swaziland, compiled by the Threatened Species Programme, South African National Biodiversity Institute (SANBI) was used. Internet sources were also consulted on the distribution and habitat of these species in the area as well as available literature.

Other information used included:

- The International Union for Conservation of Nature (IUCN) conservation status categories on which the Threatened Species Programme, Red List of South African Plants (Raimondo et al. 2009) is based, was also obtained.

The presence of rare and protected species or suitable habitat was recorded during the field visit.

Quarter Degree Grid Cells (QDGC) data as well as other red data lists are used as guidelines to assist when conducting the field work. Unless a specific species was recorded previously on the specific site under investigation, the QDGC lists cannot be used as meaning that the species listed do occur on the site. These lists are not comprehensive and continually change as people find and record new habitats and red data species. It could therefore mean that a red data species found in an adjacent QDGC or one even further away, could potentially occur in another QDGC. However, since no study has been done in that grid it will result in it not being listed for that QDGC. The fact that it is not listed does however, not mean that the species or suitable habitat is not present. It is therefore imperative that a **physical site visit is conducted** to determine firstly, the presence of the listed red data species or suitable habitat on the site, and secondly, and most importantly the suitability of the site for the presence other red data species also.

Data processing

A classification of vegetation data was done to identify, describe and map vegetation types. The descriptions of the vegetation units include the tree, shrub and herbaceous layers. The conservation priority of each vegetation unit was assessed by evaluating the plant species

composition in terms of the present knowledge of the vegetation of the Grassland and Savanna biomes of South Africa.

Site Ecological Importance (SEI)

For the SEI the criteria as specified in the South African National Biodiversity Institute (2020) Species Environmental Assessment Guideline document was used and is listed below. The SEI allows for rapid spatial inspection and the evaluation of the envisaged impacts of the study area to be developed. It has been set up within the context of on-site habitat and Species of Conservation Concern (SCC). Where the site-specific assessment produces a lower or higher classification than the "environmental sensitivity" as produced by the DFFE screening tool a justification for the difference must be provided by the specialist. The SEI is considered to be a function of the Biodiversity Importance (BI) of the ecosystem and its resilience to impacts. The BI is in turn a function of Conservation Importance (CI) and the Functional Integrity (FI) of the study area/ecosystem (South African National Biodiversity Institute 2020) (Tables 1, 2 & 3). According to South African National Biodiversity Institute (2020) CI is defined as "*The importance of a site for supporting biodiversity features of conservation concern present e.g. populations of IUCN Threatened and Near-Threatened species (CR, EN, VU & NT), Rare, range-restricted species, globally significant populations of congregatory species, and areas of threatened ecosystem types, through predominantly natural processes*" and FI as "*A measure of the 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*".

Table 1. Conservation Importance Criteria (adapted from the South African National Biodiversity Institute, 2020).

Conservation Importance	Criteria (Definition)
Very High	Area with natural vegetation with a high species richness and habitat diversity. Presence of viable populations of red data plant species OR confirmed or highly likely occurrence of CR, EN, VU, Extremely Rare or Critically Rare species that have a global Extent of Occurrence of < 10 km^2. Presence of unique habitats (CR or EN ecosystem in natural condition); less than 1% pioneer/alien plant species present. Globally significant populations of congregatory species (>10% of global population).
High	Natural area with a relatively high species richness and diversity. Confirmed or highly likely occurrence of CR, EN, VU species that have a global Extent of Occurrence of > 10 km^2. IUCN threatened species (CR, EN, VU) must be listed under any criterion other than A. If listed as threatened only under Criterion A, include if there are less than 10 locations or < 10 000 mature individuals remaining. Small area (>0.01% but < 0.1 % of the total ecosystem type extent) of natural habitat of EN ecosystem type or large area (> 0.1 %) of natural habitat of VU ecosystem type. Presence of Rare species. Globally significant populations of congregatory species (>1% but <10% of global population).
Medium	An area with a relatively natural species composition; not a threatened or unique ecosystem; moderate species diversity; between 11-20% pioneer/alien plant species present; that would need moderate to major financial input to rehabilitate to an improved condition. Highly likely occurrence of populations of NT and LC species,

	unlikely occurrence of threatened species (CR, EN,). Single individuals of VU species. 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 populations of Species of Conservation Concern and no suitable habitat for such species. Area with relatively natural vegetation, though a common vegetation type; moderate to low species richness and habitat diversity; previously or currently degraded or in secondary successional phase; between 20-40% pioneer and/or alien plant species; low ecosystem functioning; low rehabilitation potential. No confirmed or highly likely populations of range-restricted species < 50 % of receptor contains natural habitat with limited potential to support SCC.
Very Low	A totally degraded and transformed area with a low habitat diversity and ecosystem functioning; no viable populations of natural vegetation of the original ecosystem; >40% pioneer and/or alien plant species present; very low habitat uniqueness; whose recovery potential is extremely low. No confirmed and highly unlikely populations of SCC No confirmed and highly unlikely populations of range-restricted species No natural habitat remaining

Table 2. Functional Integrity Criteria (adapted from the South African National Biodiversity Institute, 2020).

Conservation Importance	Criteria (Definition)
Very High	Very large (>100 ha) intact area for any conservation status of ecosystem type or >5 ha for CR ecosystem types. High habitat connectivity serving as functional ecological corridors, limited road network between intact habitat patches No or minimal current negative ecological impacts with no signs of major past disturbance (e.g. ploughing)
High	Large (>20 ha but <100 ha) intact area for any conservation status of ecosystem type or >10 ha for EN ecosystem types. Good habitat connectivity with potentially functional ecological corridors and a regularly used road network between intact habitat patches Only minor current negative ecological impacts (e.g. few livestock utilising area) with no signs of major past disturbance (e.g. ploughing) and good rehabilitation potential
Medium	Medium (>5 ha but <20 ha OR connected to a larger natural ecosystem) semi-intact area for any conservation status of ecosystem type or > 20 ha for VU ecosystem types Only narrow corridors of good habitat connectivity or larger areas of poor habitat connectivity and a busy used road network between intact habitat patches Mostly minor current negative ecological impacts with some major impacts (e.g. established population of alien and invasive flora) and a few signs of minor past disturbance; moderate rehabilitation potential.
Low	Small (>1 ha but <5 ha) area Almost no habitat connectivity but migrations still possible across some 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 (<1 ha) area No habitat connectivity except for flying species or flora with wind-dispersed seeds. Several major current negative ecological impacts

Table 3. Biodiversity Matrix (South African National Biodiversity Institute, 2020).

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

Ecological sensitivity

A sensitivity analysis was done for the vegetation of the site. This was achieved by evaluating the different vegetation units against a set of habitat criteria (Table 1).

Table 4. Ecological sensitivity criteria (Single scores range between 1 and 10 (the higher the score the more important the criterion).

Criteria
Presence of protected / red data species
Species richness and composition
Dominant/prominent species ecological status
Sensitivity to disturbance
Conservation status and ecological functioning
Area fragmentation
Medicinal plants
Wetland presence (artificial or natural)
Important topographical features (steep slopes, cliffs etc.)

Based on the total scores obtained, the following four **ecological sensitivity** categories were used for each vegetation unit:

High (>80%): Ecologically sensitive and valuable land with high species richness that should be conserved and no developed allowed.

Medium (50-79%): Land that should be conserved but on which low impact development could be considered under exceptional circumstances.

Medium-low (30-49%): Land that has some conservation value but on which development could be considered with limited impact on the vegetation / ecosystem.

Low (0-29%): Land that has little conservation value and that could be considered for developed with little to no impact on the vegetation / ecosystem

5.2 Fauna

This faunal screening exercise or habitat assessment focused on mammals, birds, reptiles and amphibians within the Lanseria International Airport site. The survey focused on the current status of threatened faunal species occurring, or likely to occur within the site and providing mitigation measures for the identified impacts of the proposed development, if approved by the relevant authorities.

Predictive methods

Satellite imagery of the area was obtained from Google Earth™ was studied in order to get a three-dimensional impression of the topography and current land use.

Literature Survey

A detailed literature search was undertaken to assess the current status of threatened fauna that have been historically known to occur within the 2527 DD Quarter Degree Grid Cell (QDGC) in which the Lanseria International Airport site is situated. The literature search was undertaken utilising The Vegetation of South Africa, Lesotho and Swaziland (Mucina & Rutherford 2006) for the vegetation description as well as National Red List of Threatened Plants of South Africa (Raimondo *et al*, 2009). The Mammals of the Southern African Subregion (Skinner & Chimimba 2005) and The Red List of Mammals of South Africa, Swaziland and Lesotho (Taylor et al. 2016) as well as ADU's MammalMAP (http://vmus.adu.org.za/vm_sp_list.php) for mammals. Hockey, P.A.R., Dean, W.R.J., Ryan, P.G. (eds). 2005. *Roberts- Birds of Southern Africa VIIth ed*. And BARNES, K.N. (ed.) (2000) *The Updated* Red Data List of Birds (Taylor *et al.* 2015) for avifauna (birds) as well as the internet SABAP2 (http://sabap2.adu.org.za). A Complete Guide to the Frogs of Southern Africa (du Preez & Carruthers (Revised edition) 2017) and The Atlas and Red Data Book of the frogs of South Africa, Lesotho and Swaziland (Minter *et al*. 2004) for amphibians as well as SAFAP FrogMAP (http://vmus.adu.org.za). The Field Guide to the Snakes and other Reptiles of Southern Africa (Branch 2001) and Atlas and Red List of the Reptiles of South Africa, Lesotho and Swaziland (Bates *et. al.* 2014) as well as SARCA (http://sarca.adu.org.za) for reptiles.

Site Investigation Methodology

A preliminary faunal habitat assessment of the status, spatial requirements and habitat preferences of all priority faunal species (mammals, birds, reptiles and amphibians) likely to occur within or surrounding the Lanseria International Airport site was undertaken. For certain species, an estimate of the expected or historical distribution for the area could be extrapolated from published information and unpublished reports, while habitat and spatial requirements were generally derived from the literature. Species assessments will be updated when additional data becomes available and where appropriate, proposed conservation targets will be revised.

A field verification survey of the site was carried out on foot during daylight hours on the 16 October 2024. The temperatures were mild ranging between 14-21° C. Large sections of the site had been recently burned due to un-controlled veld fires. Transects were walked-through the transformed (*Cynodon dactylon* lawns) and degraded *Hyparrhenia hirta-Heteropogon contortus* grasslands, Eucalyptus woodland as well as lower-lying artificially created drainage lines and secondary seasonal wetlands. No surveys were conducted within the existing developed areas.

All animals (mammals (larger), birds, reptiles and amphibians) seen or heard; were recorded. Use was also made of indirect evidence such as nests, feathers and animal tracks (footprints, droppings) to identify animals. The majority of mammals were identified by visual observations as well as droppings and various burrow types. Reptiles were actively searched for under suitable refuges such as loosely embedded rocks, logs, stumps, dumped building rubble and identified by actual specimens observed. Amphibian species were identified by male breeding calls and visual observations of adults, juveniles or tadpoles. The faunal habitat assessment was heavily augmented with previous faunal surveys conducted in the adjacent Lanseria area between 1999 and 2024.

No specialist survey techniques including camera trapping, pitfall and funnel trapping, soil penetration (golden moles), UV surveys for shrews were used during the brief field verification of the mammals, birds, reptiles and amphibians on the site. **No specialist small mammal (shrews, water rat, golden moles, bats), avifaunal, herpeto-faunal or nocturnal surveys were undertaken during the faunal screening exercise. No Juliana's or Rough-haired Golden Mole habitat assessments were undertaken as they require golden mole specialists to assess.**

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6. RESULTS

6.1 Vegetation units

The study area comprises five (5) vegetation units and a Developed area comprising buildings, roads and parking area (Figure 2) namely:

1) Degraded grassland
2) Lawn grassland
3) Artificial wetland
4) *Eucalyptus* woodland
5) Transformed area

1. Degraded grassland

Vegetation structure:	Short-medium tall grassland (0.5 – 1.0 m)		
Topography:	2^0 eastern slope	**Soil**	Shallow gravelly
Unit size	8.93 ha		
Need for rehabilitation	High		

	Trees	Shrubs	Grasses	Forbs
Cover (%)	<1	1	55-65	12
Ave height (m)	0	1.0	0.5-1.0	0.3

This vegetation unit occurs in the western boundary of the study area with smaller sections in the north-east. The vegetation is dominated by grasses and forbs (see table above). There soil is shallow gravelly with few rocks that covers 5% of the area.

This vegetation is characterised by the prominence of the grasses *Eragrostis rigidior, Heteropogon contortus, Hyparrhenia hirta* and the forb *Gomphocarpus fruticosus.* Other species prominent include the grasses *Melinis repens, Pogonarthria squarrosa,* and the forbs *Schkuhria pinnata* and *Pollichia campestris.*

Red data species

No species of conservation concern were noted.

Alien plant species

Melia azedarach; Eucalyptus camaldulensis; Mirabilis jalapa; Argemone ochroleuca.

Table 5. Biodiversity Matrix for vegetation unit 1 (South African National Biodiversity Institute, 2020).

BIODIVERSITY IMPORTANCE		Conservation Importance				
		Very High	**High**	**Medium**	**Low**	**Very Low**
Functional Integrity	**Very High**	Very High	Very High	High	Medium	Low
	High	Very High	High	Medium	Medium	Low
	Medium	High	Medium	Medium	Low	Very Low
	Low	Medium	Medium	Low	Low	Very Low
	Very Low	Medium	Low	Very Low	Very Low	Very Low

The following is a list of plant species identified in this unit during the survey (=alien invasive species; =medicinal value; =Protected species; =Garden hybrid/cultivated; =pioneer/encroacher) (W=woody; G=grass; F=forb):

Cat	Species	Class
	Argemone ochroleuca	F
	Aristida congesta subsp. barbicollis	G
	Cynodon dactylon	G
	Eragrostis chloromelas	G
	Eragrostis rigidior	G
	Eucalyptus camaldulensis	W
	Gomphocarpus fruticosus	F

	Heteropogon contortus	G
	Hyparrhenia hirta	G
	Hypoxis argentea	F
	Imperata cylindrica	G
	Melia azedarach	W
	Melinis repens	G
	Mirabilis jalapa	F
	Pogonarthria squarrosa	G
	Pollichia campestris	F
	Schkuhria pinnata	F
	Sporobolus africanus	G
	Urochloa panicoides	G
	Vernonia oligocephala	F

Figure 2. Vegetation units of the study area (D=Developed area) (Image obtained from Google Earth 2024).

2. Lawn grassland

Vegetation structure:	Short (0.3 m) grass & forbland		
Topography:	Mostly level	**Soil**	Shallow gravelly
Unit size	8.34 ha		
Need for rehabilitation	High		

	Trees	Shrubs	Grasses	Forbs
Cover (%)	0	0	85	15
Ave height (m)	0	0	0.2-0.3	0.3

This vegetation unit is the second largest unit identified on the study area and i occurs on shallow gravelly soil. The herbaceous layer is dominant together with the forb layer (see table above).

The vegetation is dominated by the pioneer grass *Cynodon dactylon.* Other species present include the grasses *Melinis repens, Hyparrhenia hirta, Eragrostis chloromelas* and the forbs *Verbena tenuisecta, Bidens pilosa, Richardia brasiliensis* and *Gomphocarpus fruticosus.* A few small woody shrubs are present along the edges of this vegetation unit that include *Searsia pyroides* and the declared alien invasive tree *Melia azedarach.*

Red data species

No red data was found to be present in this unit with no suitable habitat remaining.

Alien plant species

Melia azedarach.

Table 6. Biodiversity Matrix for vegetation unit 2 (South African National Biodiversity Institute, 2020).

BIODIVERSITY IMPORTANCE		Conservation Importance				
		Very High	**High**	**Medium**	**Low**	**Very Low**
Functional Integrity	**Very High**	Very High	Very High	High	Medium	Low
	High	Very High	High	Medium	Medium	Low
	Medium	High	Medium	Medium	Low	Very Low
	Low	Medium	Medium	Low	Low	Very Low
	Very Low	Medium	Low	Very Low	Very Low	Very Low

The following is a list of plant species identified in this unit during the survey (=alien invasive species; =medicinal value; =Protected species; =Garden hybrid/cultivated; =pioneer/encroacher) (W=woody; G=grass; F=forb):

Cat	Species	Class
	Aristida congesta	G
	Bidens pilosa	
	Conyza bonariensis	F
	Cynodon dactylon	
	Eragrostis chloromelas	G
	Gomphocarpus fruticosus	
	Hermannia depressa	
	Hyparrhenia hirta	
	Melia azedarach	
	Melinis repens	
	Plantago lanceolata	
	Pogonarthria squarrosa	G
	Pseudognaphalium luteo-album	F
	Richardia brasiliensis	
	Searsia lancea	
	Verbena tenuisecta	

3. Artificial wetland areas

Vegetation structure:	Grassland (medium tall –1.2m)		
Topography:	2^0 eastern slope	**Soil**	Shallow clayey and mottled loam
Unit size	2.41 ha		
Need for rehabilitation	Low		

	Trees	Shrubs	Grasses	Forbs
Cover (%)	0	0	65	15
Ave height (m)	0	0	1.2	0.8

This vegetation unit is located in the southern section of the study area and occurs on loamy soil with a rock layer approximately 20cm underneath. The soil is loamy-clayey and gravelly with no large surface rocks visible.

The vegetation comprises a mixture of moist-loving and terrestrial species and includes the grasses *Hyparrhenia hirta, Eragrostis curvula, Imperata cylindrica, Paspalum urvillei, Paspalum dilatatum* and the forbs *Gomphocarpus fruticosus, Amaranthus hybridus, Sida alba, Berkheya radula* and *Cyperus* spp. The highly invasive category 1 weeds *Campuloclinium macrocephalum* (Pom-pom) and *Cirsium vulgare* (Scotch thistle) are prominent throughout this unit.

Red data species

Except for the Orange Listed geophyte *Hypoxis hemerocallidea* present next to the artificial stream in the eastern part of this unit, no red data species were noted within this unit.

Alien plant species

Verbena bonariensis; Arundo donax; Campuloclinium macrocephalum; Cirsium vulgare.

Table 7. Biodiversity Matrix for vegetation unit 3 (South African National Biodiversity Institute, 2020).

BIODIVERSITY IMPORTANCE		Conservation Importance				
		Very High	**High**	**Medium**	**Low**	**Very Low**
Functional Integrity	**Very High**	Very High	Very High	High	Medium	Low
	High	Very High	High	Medium	Medium	Low
	Medium	High	Medium	Medium	Low	Very Low
	Low	Medium	Medium	Low	Low	Very Low
	Very Low	Medium	Low	Very Low	Very Low	Very Low

The following is a list of plant species identified in this unit during the survey (=alien invasive species; =medicinal value; =Protected species; =Garden hybrid/cultivated; =pioneer/encroacher) (W=woody; G=grass; F=forb):

Cat	Species	Class
	Aloe transvaalensis	F
	Amaranthus hybridus	F
	Arundo donax	F
	Berkheya radula	F
	Campuloclinium macrocephalum	F
	Chamaecrista mimosoides	F
	Cirsium vulgare	F

	Cynodon dactylon	G
	Cyperus esculentus	F
	Cyperus spp	F
	Eragrostis curvula	G
	Gomphocarpus fruticosus	F
	Hyparrhenia hirta	G
	Hypoxis hemerocallidea	F
	Imperata cylindrica	G
	Lobelia erinus	F
	Oenothera rosea	F
	Paspalum dilatatum	G
	Paspalum urvillei	G
	Senecio spp	F
	Sida alba	F
	Sonchus nanus	F
	Taraxacum officinale	F
	Verbena bonariensis	F

4. *Eucalyptus* woodland

Vegetation structure:	Open woodland		
Topography:	n/a	**Soil**	Sandy gravelly soil
Unit size	1.28 ha		
Need for rehabilitation	High		

	Trees	Shrubs	Grasses	Forbs
Cover (%)	20	5	5	10
Ave height (m)	>10	1.5	0.2	0.5

This vegetation unit is located in the eastern section of the study area on sandy loam soil. The terrain is undulating due to landfill and excavations.

The vegetation is characterised by tall *Eucalyptus camaldulensis* trees while the herbaceous layer is sparse. Common species include the pioneer grass *Cynodon dactylon* and the declared alien invasive forb *Campuloclinium macrocephalum.*

Red data species

No red data species were noted within this unit and no suitable habitat exists.

Alien plant species

Eucalyptus camaldulensis; Melia azedarach, Arundo donax; Agave americana; Verbena bonariensis.

Table 8. Biodiversity Matrix for vegetation unit 4 (South African National Biodiversity Institute, 2020).

BIODIVERSITY IMPORTANCE		Conservation Importance				
		Very High	**High**	**Medium**	**Low**	**Very Low**
Functional Integrity	**Very High**	Very High	Very High	High	Medium	Low
	High	Very High	High	Medium	Medium	Low
	Medium	High	Medium	Medium	Low	Very Low
	Low	Medium	Medium	Low	Low	Very Low
	Very Low	Medium	Low	Very Low	Very Low	Very Low

The following is a list of plant species identified in this unit during the survey (=alien invasive species; =medicinal value; =Protected species; =Garden hybrid/cultivated; =pioneer/encroacher) (W=woody; G=grass; F=forb):

Cat	Species	Class
	Agave americana	F
	Arundo donax	F
	Asparagus suaveolens	W
	Campuloclinium macrocephalum	F
	Corchorus asplenifolius	F
	Cynodon dactylon	G
	Eucalyptus camaldulensis	W
	Hyparrhenia hirta	G
	Melia azedarach	W
	Verbena bonariensis	F

5. Transformed area

Vegetation structure:	Short grasses/forbs with tall ornamental trees		
Topography:	Slight western slope (1-2^0)	**Soil**	Loamy-clay
Unit size	4.39 ha		
Need for rehabilitation	High		

	Trees	Shrubs	Grasses	Forbs
Cover (%)	2-10	1	55-85	15-20
Ave height (m)	>10	1.5	0.2	0.5

This vegetation unit is located in the smaller site south-east of the larger site. The soil is loam-clay and the whole area has been transformed due to anthropogenic activities.

The vegetation is characterised by tall, planted ornamental, alien invasive and a few indigenous trees such as *Populus nigra, Melia azedarach, Morus alba, Pinus pinaster,* and *Searsia lancea. T*he herbaceous layer comprises a mixture of grass and forb species and is dominated by the highly invasive alien grass *Pennisetum clandestinum.* Other species present include *Cynodon dactylon, Eragrostis chloromelas, Aristida congesta* subsp. *barbicollis* and the forbs *Solanum sisymbriifolium, Chenopodium album, Tagetes minuta, Datbonariensis.m* and *Verbena bonariensis..*

Red data species

No red data species were noted within this unit and no suitable habitat exists.

Alien plant species

Pinus pinaster, Morus alba, Melia azedarach, Solanum sisymbriifolium, Datura stramonium, Pennisetum clandestinum; Campuloclinium macrocephalum; Cirsium vulgare; Verbena bonariensis.

Table 8. Biodiversity Matrix for vegetation unit 4 (South African National Biodiversity Institute, 2020).

BIODIVERSITY IMPORTANCE		Conservation Importance				
		Very High	**High**	**Medium**	**Low**	**Very Low**
Functional Integrity	**Very High**	Very High	Very High	High	Medium	Low
	High	Very High	High	Medium	Medium	Low
	Medium	High	Medium	Medium	Low	Very Low
	Low	Medium	Medium	Low	Low	Very Low
	Very Low	Medium	Low	Very Low	Very Low	Very Low

The following is a list of plant species identified in this unit during the survey (=alien invasive species; =medicinal value; =Protected species; =Garden hybrid/cultivated; =pioneer/encroacher) (W=woody; G=grass; F=forb):

Cat	Species	Class
	Alternanthera pungens	F
	Aristida congesta subsp barbicollis	G
	Asparagus laricinus	W
	Bidens pilosa	F
	Campuloclinium macrocephalum	F
	Chenopodium album	F
	Cirsium vulgare	F
	Cucumis zeyheri	F
	Cynodon dactylon	G
	Datura stramonium	F
	Eragrostis chloromelas	G
	Eragrostis curvula	G
	Felicia muricata	F
	Gomphocarpus fruticosus	F
	Hydrocotyle americana	F
	Hyparrhenia hirta	G
	Lepidium bonariense	F
	Melia azedarach	W
	Morus alba	W
	Pennisetum clandestinum	W
	Pinus pinaster	W
	Populus nigra	W
	Richardia brasiliensis	F
	Schkuhria pinnata	F
	Solanum sisymbriifolium	F
	Tagetes minuta	F
	Verbena bonariensis	F

6.2 Results of faunal survey

The faunal assessment focused on the rocky highveld or **Egoli Granite Grassland (Gm 10)** in various stages of transformation and degradation. These comprised of remnant patches of degraded *Hyparrhenia hirta-Heteropogon contortus* grasslands as well as homogenous transformed and regularly maintained lawns comprising of *Cynodon dactylon* as well as pioneer grass and forb species. Situated on the lower-lying eastern and western portions of the site are artificially created stormwater drainage lines/canals as well as secondary seasonally inundated depressions. No surveys were conducted within the existing buildings and airport infrastructure.

EXISTING IMPACTS ON FAUNA AND VEGETATION ON THE SITE INCLUDE:

- Change in land use: natural **Egoli Granite Grassland (Gm 10)** containing a diversity of vertebrate and invertebrate fauna are converted into previous agricultural lands and more recent residential areas; leading to considerable loss of faunal biodiversity. The grasslands on the site have been heavily degraded due to high levels of anthropogenic disturbances and frequently cut or burned.
  - Small tracts of indigenous grassland become surrounded by major road networks (R114, R512) and commercial developments causing fragmentation of previously intact natural habitats.
  - The remaining remnants of natural are more susceptible to exotic invasion and degradation due to increased edge effects.
  - Habitat fragmentation also eliminates corridors between similar undisturbed habitats.
  - The fragmentation of interconnected valley bottom wetlands, hillslope seepage wetlands and drainage lines from each other and their surrounding terrestrial environment threatens species that move between palustrine wetlands and those that require intact terrestrial habitats in close proximity to valley bottom wetlands or streams (e.g., Giant Bullfrog, Cook 2003). Major road networks (R114, R512) to the south and east can be considered as migratory or dispersal barriers for numerous faunal species including Giant Bullfrogs, Hedgehogs and Owls.
  - Fences and walls restrict the natural dispersal movements of several animal species (Giant Bullfrog, South African Hedgehog). A concrete barrier (>50cm) has been placed above the R512 road reserve which prevents dispersal movements from the

east and the N14 is a migratory barrier to the south. The residential properties are fenced off.

- Alien vegetation invasion of the artificially created drainage lines as well as seasonal wetland with the highly invasive Pom-pom Weed (*Campuloclinium macrocephalum, Verbena bonariensis*).
- Alien vegetation observed in the area included Mexican Poppy (*Argemone ochroleuca*), Syringa (*Melia azedarach*), Red River Gum (*Eucalyptus camaldulensis*), American Agave (*Agave americana*), Kikuyu (*Pennisetum clandestinum*); Giant Reed (*Arundo donax*), Scotch Thistle (*Cirsium vulgare*), Pom-pom Weed (*Campuloclinium macrocephalum*), and Purple Top (*Verbena bonariensis*).

Amphibians

Amphibians are an important component of South Africa's exceptional biodiversity (Siegfried 1989) and are such worthy of both research and conservation effort. This is made additionally relevant by international concern over globally declining amphibian populations, a phenomenon currently undergoing intensive investigation but as yet is poorly understood (Wyman 1990; Wake 1991). Frog populations throughout the world have crashed dramatically in the last twenty years. Deforestation, wetland draining, and pollution are immediately obvious causes. But other, more fundamental, man-made impacts are causing population declines in 'pristine' habitats such as national parks and remote rainforests. Reductions in atmospheric ozone levels are allowing increased UV-radiation, pollutants are accumulating in natural systems and bacterial and virus distribution is accelerating across the globe (Carruthers 2001).

Most frogs have a biphasic life cycle, where eggs laid in water develop into tadpoles and these live in the water until they metamorphose into juvenile fogs living on the land. This fact coupled with being covered by a semi-permeable skin makes frogs particularly vulnerable to pollutants and other environmental stresses.

Consequently, frogs are useful environmental bio-monitors (bio-indicators) and may acts as an early warning system for the quality of the environment. The Giant Bullfrog (*Pyxicephalus adspersus*) has been chosen as a flagship species for the grassland ecoregion (Cook in le Roux 2002)

Breeding in African frogs is strongly dependent on rain, especially in the drier parts of the country where surface water only remains for a short duration. The majority of frog species in Gauteng Province can be classified as explosive breeders. Explosive breeding frogs utilise ephemeral pans or inundated grasslands for their short duration reproductive cycles.

As the survey was undertaken during daylight hours during the early summer months (October 2024), only a few species of frogs were likely to be active or recorded. The majority of frog species would have completed their short-duration breeding events. Ideally, a herpetological survey should be undertaken throughout the duration of the wet season (November-March). It is only during this period accurate frog lists can be compiled. During this survey; fieldwork was augmented with species lists compiled from personal records; data from the South African Frog Atlas Project (SAFAP) and published data, and the list provided in Table below is therefore regarded as likely to be fairly comprehensive.

Figure 3. A conglomerate of photographs displaying the frog species recorded by the consultant within the Greater Lanseria area. A: Boettger's Caco (C*acosternum boettgeri*), **B:** Tremelo Sand Frog (*Tomopterna cryptotis*), **C:** Red Toad (*Schismaderma carens*), **D:** Olive Toad (*Sclerophys garmani*), **F:** Delalande's River Frog (*Amietia delalandii*), **G:** Giant Bullfrog (*Pyxicephalus adspersus*), **H:** Bubbling Kassina (*Kassina senegalensis*) and **I:** Banded Rubber Frog (*Phrynomantis bifasciatus*).

Table 9. Frog species recorded by the consultant in the Greater Lanseria area. Species highlighted in yellow were recorded during current survey.

COMMON NAME	SCIENTIFIC NAME	BREEDING HABITAT
Olive Toad	*Sclerophrys garmani*	Seasonal and permanent wetlands and artificial dams
Guttural Toad	*Sclerophrys gutturalis*	Seasonal and permanent wetlands and artificial dams. Adult collected from wooded non-perennial drainage line.
Raucous Toad	*Sclerophrys capensis*	Seasonal and permanent pans, dams
Red Toad	*Schismaderma carens*	Deeper (>1m) Typha capensis-Phragmites australis seasonal and permanent dams.
Common Platanna	*Xenopus laevis*	Seasonal and permanent pans and dams.
Boettger's or Common Caco	*Cacosternum boettgeri*	Seasonal pans and inundated grassland. Calling from seasonal depression adjacent to stormwater drainage line.
Bubbling Kassina	*Kassina senegalensis*	Seasonal pans and inundated grassland
Tremelo Sand Frog	*Tomopterna cryptotis*	Seasonal pans and inundated grassland
Banded Rubber Frog	*Phrynomantis bifasciatus*	Seasonal pans and pools
Natal Sand Frog	*Tomopterna natalensis*	Seasonal pans and inundated grassland
Giant Bullfrog	*Pyxicephalus adspersus*	Seasonal pans and pools/ inundated grassland
Delalande's River Frog	*Amietia delalandii*	Seasonal and permanent wetlands.

The site offers suitable foraging and restricted dispersal habitat for three toad species namely Guttural Toad (*Sclerophrys gutturalis*), Eastern Olive Toad (*Sclerophrys garmani*) and Raucous Toad (*Sclerophrys capensis*). The seasonally inundated depressions (artificially excavated areas/sand mining) as well as stormwater drains from surface run-off from the hardened surfaces (roads, roofs, and runways) offer marginally favourable breeding habitat; especially during high-rainfall years for Delalande's River Frog (*Amietia delalandii*), Bubbling Kassina (*Kassina senegalensis*), Tremelo Sand Frogs (*Tomopterna cryptotis*), Common Caco (*Cacosternum boettgeri*) and Guttural Toads (*Sclerophrys gutturalis*). One frog species were recorded during the single site visitation namely several calling Common Caco (*Cacosternum boettgeri*) males from the seasonal pools adjacent to the stormwater drain on the eastern portion of the site.

Reptiles

Most knowledge of the reptiles of Gauteng is based on the extensive survey done by N.H.G. Jacobsen (1989), providing a detailed account of all reptiles in the then Transvaal province. This survey resulted in descriptions of life histories, habitat requirements and conservation status and maps of the known distributions. More recent surveys have revealed that 92 reptile species (Whittington-Jones *et al.* 2008) occur in Gauteng Province and of these, 2 species are threatened mainly due to habitat destruction as well as habitat fragmentation.

Comprehensive reptile species lists are impossible to determine without extensive fieldwork over a number of months or even years. No pitfall or funnel trapping was conducted due to time constraints and the survey was based primarily on visual encounters.

This method entails active searching in suitable habitat components such as searching in the different vegetation communities, turning over objects such as logs and loosely embedded rocks, searching in crevices in rocks and bark and replacing all surface objects after examining the ground beneath. Logs, termite mounds and other substrates are not torn apart to minimize disturbance to important habitat elements in the sample unit. Observers note only presence of individuals or sign and identify the detection to the most specific taxonomic level possible. Specimens are only captured when necessary to confirm identification especially of difficult to distinguish species.

The majority reptile species are sensitive to severe habitat alteration and fragmentation. Due to previous agricultural activities as well as recent increased habitat destruction for expansion of the airport and adjacent commercial and residential developments to the south, east and west, degradation (alien plant invasion) and disturbances are all causal factors in the alteration of reptile species occurring in these areas. The indiscriminate killing of all snake species as well as the illegal collecting of certain species for private and the commercial pet industry reduces reptile populations especially snake populations drastically. No evidence of any recent reptile collecting. The frequent burning of the remnant patches of degraded and secondary succession *Hyparrhenia hirta* grasslands on the site and adjacent areas will have a high impact on remaining reptiles. Fires during the winter months will severely impact on species undergoing brumation (hibernation) and are extremely sluggish. Fires during the early summer months destroy the emerging reptiles as well as refuge areas increasing predation risks. The frequent mowing and cutting of the

Cynodon dactylon lawns can result in injuries as well as limiting potential refugial habitat and increasing potential predation risks.

Because of human presence in the area, coupled with habitat destruction and disturbances with historic agricultural activities as well as increased urban sprawl in the Greater Lanseria area, alterations to the original reptilian fauna are expected to have already occurred within and adjacent to the proposed Lanseria International Airport site. The majority reptile species are sensitive to severe habitat alteration and fragmentation. The consultant has personally observed the decline in several reptile species within the greater Lanseria study area especially along the Roodekrans Ridge, open Egoli Granite Grasslands and Carletonville Dolomite Grasslands to the north of the N14. These include Aurora House Snake (*Lamprophis* aurora), Brown House Snake (*Boaedon capensis*), Rhombic Egg-Eater (*Dasypeltis scabra*), Black-headed Centipede Eater (*Aparallactus capensis),* Flap-necked Chamaeleon (*Chamaeleo dilepis*), Transvaal Gecko (*Pachydactylus affinis*), Cape Gecko (*Pachydactylus capensis*) and Leopard Tortoise (*Stigmochelys pardalis*).

Limited termite mounds were observed within the degraded *Hyparrhenia hirta-Heteropogon contortus* grasslands as well as artificial wetland areas. Moribund (old abandoned or dead mounds) termite mounds offer important refuges for certain frog, lizard and snake species (Striped Harlequin Snake). Large number of species of mammal, birds, reptiles and amphibians feed on the emerging alates (winged termites). These mass emergences coincide with the first heavy summer rains and the emergence of the majority of herpetofauna. A single reptile species was observed during the brief site visitation namely a Speckled Rock Skink (*Trachylepis punctatissima*) thermo-regulating on a Eucalyptus trunk.

Reptile species recorded from the adjacent open grassland areas to the south of the site during previous surveys included Common Ground Agama (*Agama aculeata*), Yellow-Throated Plated Lizard (*Gerrhosaurus flavigularis*) and the urban exploiters Speckled Rock Skink (*Trachylepis punctatissima*), Variable Skink (*Trachylepis varia*) as well as Common Day Gecko (*Lygodactylus capensis*).

Snake species that are most-likely to occur on and around the site include Rinkals (*Haemachatus haemachatus*), Mole Snake (*Pseudaspis cana*), (Red-lipped Snake (*Crotaphopeltis hotamboeia*), Aurora House Snake (*Lamprophis* aurora), Brown House Snake (*Boaedon capensis*), Spotted Grass Snake (*Psammophylax rhombeatus*), Striped Grass Snake (*Psammophylax tritaeniatus*), Puff Adder (*Bitis arietans*), Rhombic Night Adder (*Causus rhombeatus*).

The high levels of anthropogenic activities as well as extensive habitat degradation and fragmentation severely restricts the likelihood of any significant populations remaining on the site. No snake species were observed during the brief site visitation.

Figure 4. **A collage of photographs displaying reptile species recorded by the consultant within the Greater Lanseria area. A:** Common Night Adder (*Causus rhombeatus*) feeding on a Raucous Toad (*Sclerophrys capensis*)**, B:** White-throated or Rock Monitor (*Varanus albigularis albigularis*) **C:** Black-headed Centipede Eater (*Aparallactus capensis*)**, D:** Flap Necked-Chameleon (*Chamaeleo dilepis*), **E:** Transvaal or Thick-toed Gecko (*Pachydactylus affinis*)*,* **F:** Leopard Tortoise (*Stigmochelys pardalis*)**, G:** Herald or Red Lipped Snake (*Crotaphopeltis hotamboeia*), **H:** Water Monitor (*Varanus niloticus*) and **I:** Mole Snake (*Pseudaspis cana*).

Table 10. Reptile species recorded from the site (*) and within the Greater Lanseria area by the consultant during previous surveys (1999-2024). Actual species lists for the site will most likely contain far fewer species due to extensive habitat destruction and degradation and high levels of anthropogenic disturbances on and surrounding the site.

Common Name	Scientific Name	Habitat Requirements
Marsh or helmeted Terrapin	*Pelomedusa subrufa*	Artificially created dams.
Peter's Thread Snake	*Leptotyphlops scutifrons*	Fossorial found in soil under rocks or
Incognito Worm Snake	*Leptotyphlops incognitus*	Logs, in moribund termite mounds.
Jacobsen's Worm Snake	*Leptotyphlops jacobseni*	Fossorial found in soil under rocks
Cape Skink	*Trachylepis capensis*	Terrestrial digging tunnels in loose sand at the base of bushes or boulders, also favours dead trees and fallen Aloes.
* Speckled Rock Skink	*Trachylepis punctatissima*	A mostly rock-living diurnal skink the Spotted Skink often occurs in association with man-made structures where it is able to find refuge and food and may be unwittingly translocated in boxes, firewood and other items where it has taken refuge
Wahlberg's Snake-eyed skink	*Panapsis wahlbergii*	Amongst grass roots under rotting logs and around stones and old termitaria (Moribund) on broken ground. Eats termites and other small insects.
Rainbow Skink	*Trachylepis margatifer*	Rupicolous species on exposed granite domes and other hard rock faces (quartzite and some diabase and slate). Very active and males are territorial.
Variable Skink	*Trachylepis varia*	Another terrestrial and diurnal skink, the Variable Skink is widespread although not very frequently recorded from disturbed habitats. It occupies a wide variety of habitats where there is sufficient vegetative cover. It takes refuge in a wide range of shelters including under rocks on soil, in crevices, under building rubble and in the burrows of other animals.
Common Rough-scaled Lizard	*Ichnotropis squamulosa*	Active hunters on sandy flat clearings and dig branching burrows in soft sand, usually at the base of *Vachellia* and *Senegalia* trees as well as grass tussocks.
Spotted Sand Lizard	*Pedioplanis lineoocellata*	Prefer flat rocky veld. Shelter is small burrows dug underneath a flat rock.
Transvaal Thick-toed gecko	*Pachydactylus affinis*	Rocky outcrops and old termite mounds.
Cape Thick-toed Gecko	*Pachydactylus capensis*	Rocky outcrops, under logs and old termite mounds as well as houses.
Cape Dwarf Gecko	*Lygodactylus capensis*	Well-wooded savanna but also thrives in urban areas.

Yellow-throated Plated Lizard	*Gerrhosaurus flavigularis*	A common and widespread terrestrial lizard, usually associated with a dense ground cover. They dig burrows at the base of bushes, under boulders and also under rubbish piles. The often take refuge in the burrows of other animals
Transvaal Girdled Lizard	*Cordylus vittifer*	The Transvaal Girdled Lizard is rupicolus and restricted to rocky outcrops, inhabiting fissures between rocks and under rocks.
Common Ground Agama	*Agama aculeata*	Terrestrial but will often climb in a low shrub to bask. A short hole dug at the base of a bush or under a rock serves as a retreat.
Distant's Ground Agama	*Agama aculeata distanti*	Terrestrial but will often climb in a low shrub to bask. A short hole dug at the base of a bush or under a rock serves as a retreat.
Southern Rock Agama	*Agama atra*	Rupicolous living on rocky outcrops and even shelter under the bark of a tree.
Rock Monitor	*Varanus albigularis*	Terrestrial but will often climb trees and may spend a large proportion of their time on rocky outcrops. They usually have a retreat in a rock fissure, a hole in a tree, animal burrows or in a termitarium.
Water Monitor	*Varanus niloticus*	Terrestrial semi-aquatic lizards usually found close to water.
Flap-necked Chameleon	*Chamaeleo dilepis*	Arboreal species found in moist and dry savannah and woodlands
Southern Stiletto Snake or Bibron's Burrowing Asp	*Atractaspis bibronii*	A burrowing (fossorial) species usually found in deserted (moribund) termite mounds, under rotting logs or beneath sun-warmed rocks.
Herald or red-lipped Snake	*Crotaphopeltis hotamboeia*	A common and widespread nocturnal snake, the Herald Snake feeds on frogs and toads which it finds around houses and in moister areas. Takes refuge under rocks and in moribund termitaria and in building rubble but may rest up by day in a variety of cover.
Rinkhals	*Haemachatus Haemachatus*	The Rinkhals is a widespread snake primarily inhabiting moister areas in Highveld grassland. Although formerly common in parts of its range, its habitat has been depleted by urban expansion. It tends to inhabit the burrows of other animals and is mostly nocturnal although basking in the sun during the day. Feeds mostly on amphibians and rodents
Mole Snake	*Pseudaspis cana*	Adults may reach 2m in length but are mostly smaller in this area. A

		diurnal snake they feed on mice and rats and also African Molerats which are widespread. It takes refuge within the burrows of other animals.
Rhombic Night Adder	*Causus rhombeatus*	Favours damp environments in moist savanna where it seeks refuge in old termite mounds, under logs and large flat stones as well as amongst building rubble.
Common Egg Eater	*Dasypeltis scabra*	A common and widespread nocturnal snake, the Common Egg-eater is largely dependent on dead termitaria on the Highveld where little other cover is available. It will also shelter under rocks, in crevices, under building rubble and in a variety of other refuges when available. The snake is dependent on bird's eggs as a source of food which they locate by means of a fine sense of smell.
Brown House Snake	*Lamprophis fuliginosus*	Frequents human habitation as well as under loosely embedded rocks.
Aurora House Snake	*Lamprophis aurora*	Favours moist grassland habitat adjacent to wetlands/valley bottom; often use moribund termite mounds in grassland; loosely embedded rocks
Spotted Grass Snake/ Skaapsteker	*Psammophylax rhombeatus*	A common and widespread diurnal snake mostly in highveld grassland it feeds on lizards and small rodents. It is often seen foraging in rocky and moist areas but takes refuge under rocks, in dead termitaria, old building rubble and animal burrows sometimes in the company of other snakes. Feeds mostly on frogs, lizards and rodents
Striped Grass Snake/ Skaapsteker	*Psammophylax tritaeniatus*	A common and widespread diurnal snake mostly in highveld grassland it feeds on lizards and small rodents. It is often seen foraging in rocky and moist areas but takes refuge under rocks, in dead termitaria, old building rubble and animal burrows sometimes in the company of other snakes. Feeds mostly on frogs, lizards and rodents
Cape or Black-Headed Centipede Eater	*Aparallactus capensis*	A burrowing (fossorial) species usually found in deserted (moribund) termite mounds, under rotting logs or beneath sun-warmed rocks.
Spotted Bush-Snake	*Philothamnus semivariegatus*	Moist savannah, forests, urban areas
Short-snouted Whip Snake	*Psammophis brevirostris*	Grassland and moist savanna that

		dashes for cover when disturbed. May also venture into low shrubs to bask.
Crossed Whip Snake	*Psammophis crucifer*	Moist savanna seeking refuge under stones or disused termitaria.
Common Brown Water Snake	*Lycodonomorphus rufulus*	A nocturnal, aquatic snake confined to damp localities near streams and rivers.
Sundevall's Shovel-snout	*Prosymna sundevalli*	Found in old termite mounds and under rocks
Common Slug-eater	*Duberria lutrix*	Grassland species that favours damp localities often found under rocks, logs, grass tufts and vegetation.
Common or Cape Wolf Snake	*Lycophidion capense*	Moist savanna and grassland and are fond of damp localities and is often found under stones, logs, piles of thatch grass, rubbish heaps or in deserted termite mounds.
Puff Adder	*Bitis arietans*	Rocky areas within grasslands/savanna.
Southern African Python	*Python natalensis*	Widespread in bushveld, savanna and forest. Some evidence suggests that the species has recently extended its range southwards in Gauteng and in the Northern Cape, possibly as a result of climatic warming (Alexander 2007).
Leopard Tortoise	*Stigmochelys pardalis*	Semi-arid savannas to grassland
Spekes' Hinged Tortoise	*Kinixys spekii*	*Vachellia* and *Combretum* woodlands as well as bushveld
Lobatse Hinged Tortoise	*Kinixys lobatsiana*	Savannahs and dry bush with rocky areas.

Avifauna/Birds

A comprehensive bird species list requires intensive surveys compiled over several years. Numbers of bird species in the Nooitgedacht-Lanseria-Cosmo-City-Lion Park areas have declined mainly due to increased levels of human disturbances; extensive habitat transformation due to increased urban sprawl and agricultural activities; as well as severe habitat degradation of the wetlands as well as rivers (especially the tributaries of the Crocodile River). Human activity has transformed grasslands in South Africa to a point where few pristine examples exist (Low & Rebelo 1996; Barnes 1998). Factors such as agricultural intensification, increased pasture management (overgrazing), decrease in grassland management due to frequent fires and extensive land-use alteration (urbanisation and land invasion).

Continuing pressure as well as high levels of anthropogenic disturbances on remaining fragmented open grasslands and sensitive wetlands are largely responsible for the decline of the threatened avifaunal species in the area.

Three-hundred and fifty-six (356) bird species have been recorded from the 2555_2755 pentad in which the Lanseria International Airport site is situated. Species recorded during the field survey are common, widespread and typical of fairly uniform transformed and degraded grassland and wetland habitat.

Working in partnership with the Environmental Management teams, Airports Company South Africa's Bird Strike Avoidance Programme has made significant progress in minimising incidents at airports nationally. This was achieved through managing grass length adjacent to runways and using deterrents such as dogs posing as natural predators to discourage species from nesting in the airfield environment. Bird species observed within the degraded grasslands on the site and to the south included Zitting Cisticola, African Stonechat, Cape Turtle Dove, Laughing Dove, House Sparrow, Common Mynah and Southern Masked Weaver. No owls were flushed from the incised macro-channel embankments of the artificially excavated stormwater drains and adjacent seasonal pools. The rank hygrophilous vegetation had been recently burned due to a run-away veld fire.

Mammals

The mammal survey was based primarily from a desktop screening perspective and field verification (6 hours) assessing the habitat availability during daylight hours. No small mammal trapping or camera trapping was conducted during the site visitations. No soil penetration or sampling or habitat assessment were conducted for Rough-haired Golden Moles and Juliana's Golden Moles or nocturnal UV surveys for shrews' urine trails. Fieldwork was augmented with previous surveys in similar habitats within the Greater Lanseria area as well as published data. The area was initially traversed on foot to ascertain the presence of available refuges, spoors or droppings within degraded *Hyparrhenia hirta* grasslands as well as margins of the artificial stormwater drainage lines and seasonal wetlands. For medium and large mammals, visual encounters of the actual animal as well as spoor or tracks, scat, foraging marks were noted and used for species identification.

Antelope species recorded from the Greater Lanseria area include Bush or Common Duiker (*Sylvicapra grimmia)* and Steenbok (*Raphicerus campestris*). The population sizes will depend on the current levels of anthropogenic disturbances as well as illegal poaching within the site. No evidence of any antelopes was observed during the brief site visitation.

The Degraded grassland (vegetation unit 1) on the site offer suitable habitat for smaller rodents including Striped Mouse (*Rhabdomys pumilio*), Multimammate Mouse (*Mastomys coucha*), Bushveld Gerbil (*Gerbilliscus leucogaster*), Highveld Gerbil (*Gerbilliscus brantsii)*, Grey Climbing Mouse (*Dendromus melanotus*) and Fat Mouse (*Steatomys pratensis*). The Degraded grassland offers marginally suitable habitat for Yellow Mongoose (*Cynictis penicillata*), Slender Mongoose (*Herpestes sanguineus*) Scrub Hares (*Lepus saxatilis*), Striped Polecats (*Ictonyx striatus*) and Black-backed Jackal (*Canis mesomelas*). Due to the use of dogs as well as loud noises to deter any birds and mammals from the runways and airport areas as well as the fact that the whole area is fenced off as part of the airport, it is highly unlikely that any large mammal species remain on the site.

The site was also surveyed for the following wetland associated mammals:

Cape Clawless Otters (*Aonyx capensis*)

The artificially created stormwater drains as well as adjacent secondary seasonal wetlands provide limited suitable refuge and dispersal habitat for any remaining Cape Clawless Otters. The artificially created stormwater drains/canals and storm-water attenuation ponds/depressions offer limited prey items including crabs, frogs and other aquatic. High levels of anthropogenic disturbances (noises), dogs as well as adjacent major road networks are immediate threat to any remaining Cape Clawless Otters in the area. No evidence (scats or spoor) of otters were observed along the artificially created stormwater drains and adjacent secondary seasonal wetlands.

Spotted-necked Otter (*Lutra maculicollis*)

Spotted-necked otters are adapted ideally to an aquatic life and are confined to the larger river systems, dams, lakes and swamps which have extensive areas of open water. Spotted-necked Otter have been recorded within heavily degraded river systems including the Jukskei River and Blesbokspruit. The artificially created stormwater drains and adjacent and storm-water attenuation ponds/depressions provide limited suitable refuge and dispersal habitat for any remaining Otters. The artificially created stormwater drains offer limited prey items including crabs, frogs and other aquatic. High levels of anthropogenic disturbances, dogs as well as major road networks are immediate threat to remaining

Otters. No evidence (scats or spoor) of otters were observed along the artificially created stormwater drains and adjacent seasonal wetlands.

Water or Marsh Mongoose (*Atilax paludinosus*)

The artificially created stormwater drains and adjacent seasonal wetlands on the eastern and western portions of the site provides limited suitable for Water/ Marsh Mongoose. The lack of any significant rank hygrophilous vegetation due to regular veld fires restricts suitable refuge habitat for Water Mongooses. Suitable prey items include crabs, frogs and other aquatic life. High levels of anthropogenic disturbances as well as major road networks are immediate threat to remaining Marsh Mongoose in the area. No evidence (scats or spoor) of otters were observed along the accessible areas along the artificially created stormwater drains and adjacent seepage wetlands.

Rough-haired Golden Mole (*Chrysospalax villosus*)

No Golden Mole habitat assessments or surveys were undertaken as they require golden mole specialists.

African Marsh Rat or Water Rat (*Dasymys incomtus*)

Extremely limited suitable habitat occurs within the artificially created stormwater drains and seasonal wetlands for Water Rats.

Vlei Rat (*Otomys irroratus*)

Marginally suitable habitat exists on the site within the mesic grasses and sedges within the secondary seasonal seepage wetlands on the eastern and western portions of the site. No runs or saucer shaped nests were observed on higher lying ground or in clumps of grass. No feeding areas were noted (short discarded grass stems) on the site.

No evidence of any wetland or riverine associated mammals were observed within the artificially created stormwater drains and adjacent seasonal pools during the brief site visitation.

Bat species recorded from the area include Egyptian Free-tailed Bat (*Tadarida aegyptiaca*), Rusty Bat (*Pipistrellus rusticus*), Cape serotine bat (*Eptesicus capensis*), Yellow-bellied House Bat (*Scotophilus dinganii*), Common Slit-faced Bat (*Nycteris thebaica*)**. No specialist mammal surveys were undertaken during the current faunal habitat assessment.**

Table 11. Mammal species recorded, or likely to occur, on site and surrounding area using alternative habitats as indicators of possible species present. Actual species lists will most likely contain far fewer species due to extensive habitat destruction and degradation as well as current high levels of anthropogenic activities on and surrounding the site.

COMMON NAME	SCIENTIFIC NAME
Tomb Bat	*Taphozous mauritianus*
Transvaal free-tailed Bat	*Tadarida ventralis*
Egyptian free-tailed Bat	*Tadarida aegyptiaca*
Cape Serotine Bat	*Eptesicus capensis*
Yellow House Bat	*Scotophilus dinganii*
Lesser Yellow House Bat	*Scotophilus borbonicus*
Reddish-grey Musk Shrew	*Crocidura cyanea*
Tiny Musk Shrew	*Crocidura fuscomurina*
Swamp Musk Shrew	*Crocidura mariquensis*
Least Dwarf Shrew	*Suncus infinitesimus*
South African Hedgehog	*Atelerix frontalis*
Scrub Hare	*Lepus saxatilis*
****House Mouse**	***Mus musculus***
*Common Molerat	*Cryptomys hottentotus*
Angoni Vlei Rat	*Otomys angoniensis*
Vlei Rat	*Otomys irroratus*
Striped Mouse	*Rhabdomys pumilio*
Water Rat	*Dasyymys incomtus*
Pygmy Mouse	*Mus minutoides*
*Multimammate Mouse	*Mastomys coucha*
Red Veld Rat	*Aethomys chrysophilus*
****House Rat**	*Rattus rattus*
Highveld Gerbil	*Gerbilliscus brantsii*
Grey Climbing Mouse	*Dendromus melanotis*
Brant's Climbing Mouse	*Dendromus mesomelas*
Chestnut Climbing Mouse	*Dendromus mystacalis*

Fat Mouse	*Steatomys pratensis*
Porcupine	*Hystrix africaeaustralis*
African Weasel	*Poecilogale albinucha*
Striped Polecat	*Ictonyx striatus*
Large-spotted Genet	*Genetta tigrina*
Yellow Mongoose	*Cynictis penicillata*
Slender Mongoose	*Galerella sanguinea*
Water or Marsh Mongoose	*Atilax paludinosus*
Black-backed Jackal	*Canis mesomelas*
Common Duiker	*Sylvicapra grimmia*
**Dog	*Canis familiaris*
**Cat	*Felis catus*

***** Field observations of mammal species recorded on the site and surrounding vicinity during the brief site visit (October 2024). Identification was determined by visual observation and animal tracks (footprints and droppings).

**** introduced species**

7. DISCUSSION

7.1 Vegetation

7.1.1 Vegetation type

The vegetation of the study is a classified as belonging to the endangered Egoli Granite vegetation type (Gm10) (Mucina & Rutherford 2006). Egoli Granite Grasslands in the Gauteng Province are highly threatened and are listed as Endangered. Only a small fraction (3%) of this vital habitat has been formerly conserved within Gauteng. These grassland areas form vital habitats for numerous animal and plant species. The vegetation of this endangered ecosystem is characterized by the dominance of the grass *Hyparrhenia hirta* but has a high species richness and diversity with some rocky outcrops in-between (Bredenkamp, Brown & Phab 2006; Mucina & Rutherford 2006). Species common for this vegetation type include *Aristida canescens, Digitaria monodactyla, Themeda triandra, Setaria sphacelata, Eragrostis curvula, Eragrostis chloromelas, Heteropogon contortus, Melinis repens, Monocymbium ceresiiforme, Becium obovatum, Helichrysum rugulosum, Nidorella hottentotica, Berkheya insignis, Crabbea hirsuta, Cyanotis speciosa* and *Kohautia amatymbica.*

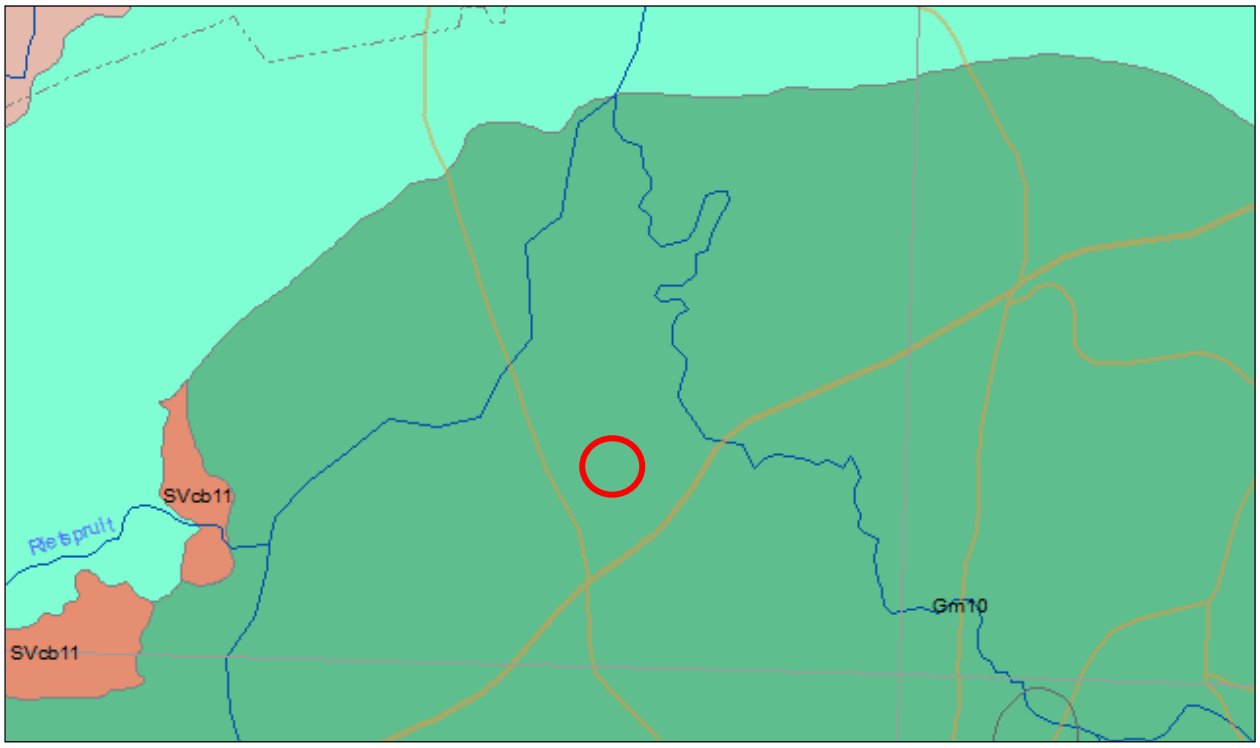

Figure 5. Approximate location (red circle) of the study area within the Egoli Granite Grassland (Gm10) vegetation type (image obtained Mucina & Rutherford, 2006).

Of the target of 24% to be conserved only 3% is statutorily conserved. Several private conservation areas and the Walter Sisulu Botanical Garden contribute to the protection of this vegetation type. It is estimated that more than two thirds of this unit have been transformed by urbanization, cultivation and roads.

Although vegetation unit 1 has affinity with this vegetation type and is in a natural condition, the vegetation of the larger study area is degraded and shows little resemblance with the original vegetation type due to various anthropogenic influences.

7.1.2 Ecosystem classification

According to GDARD's C-Plan 3.3, the north-eastern and the south-western sections are classified as Critical Biodiversity Areas (CBA's) with a narrow section along the western boundary classified as an Ecological Support Area (ESA). Critical Biodiversity Areas are regarded as pristine or near natural ecosystems consisting of a high biodiversity and that are needed to meet biodiversity targets. An ESA is an area that has been subjected to some degradation and although no longer intact, it is largely natural and important to support CBA's and to maintain landscape connectivity (Desmond *et al.,* 2013).

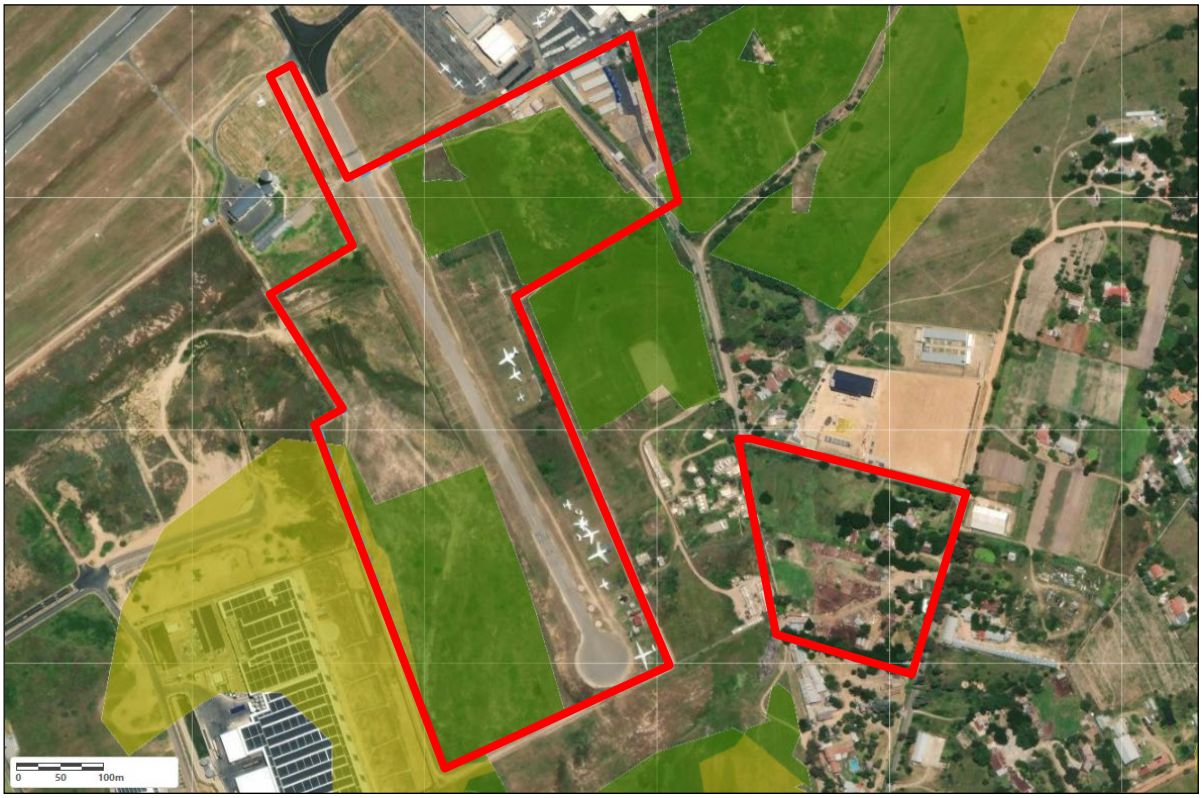

Figure 6. Ecosystem classification of the site according to GDARD C-Plan 3.3 (source: SANBI GIS, 2021).

The vegetation of the study area is however degraded (with the south-eastern site transformed) due to the various anthropogenic influences and has little resemblance to the natural vegetation that originally occurred in the area.

7.1.3 Department of Forestry, Fishery & the Environment (DFFE)

Fauna

According to the DFFE screening tool the largest part of the study area has a MEDIUM faunal sensitivity with the north-eastern section having a HIGH faunal sensitivity.

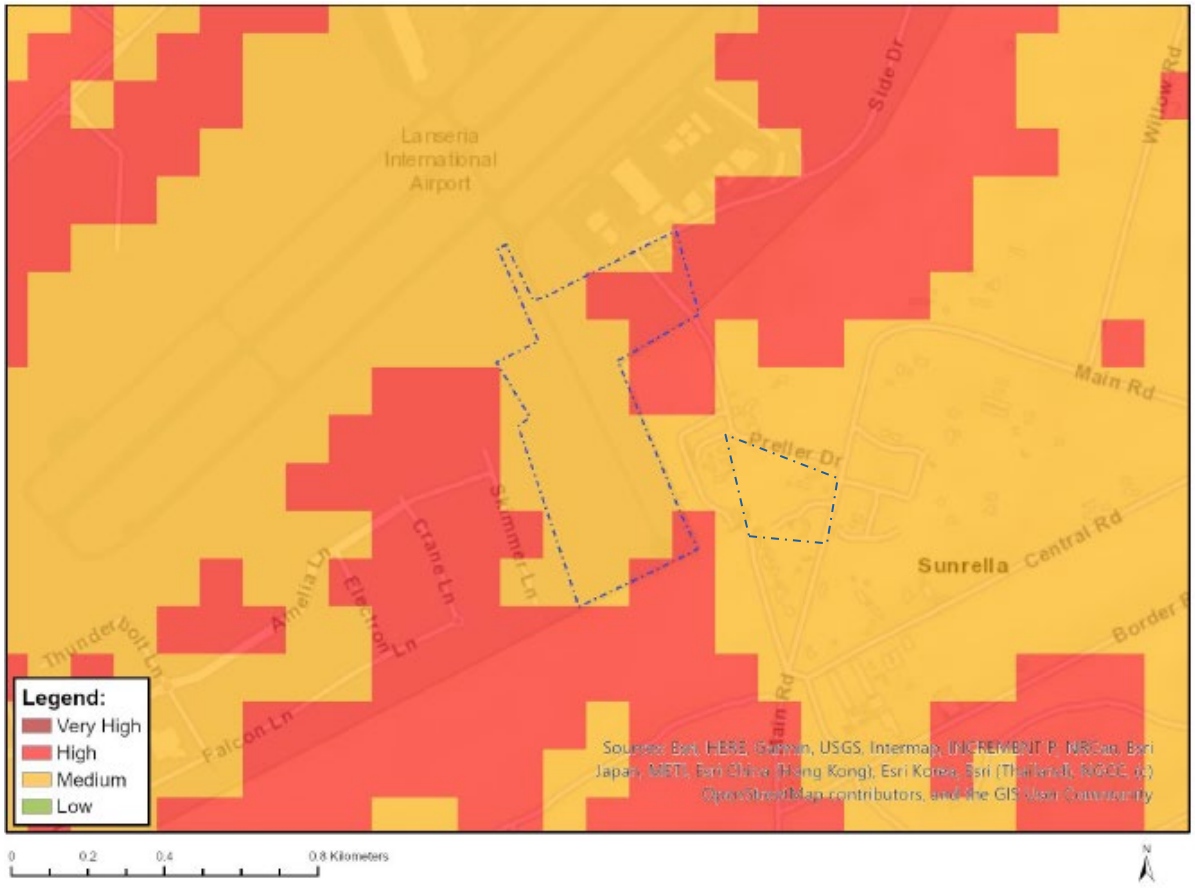

Figure 7. Map of relative faunal sensitivity (Source: Department of Forestry Fishery & Environment, 2024).

Flora

According to the DFFE screening tool the vegetation of the north-eastern section and the western sections have a MEDIUM sensitivity with the rest of the site having a LOW sensitivity.

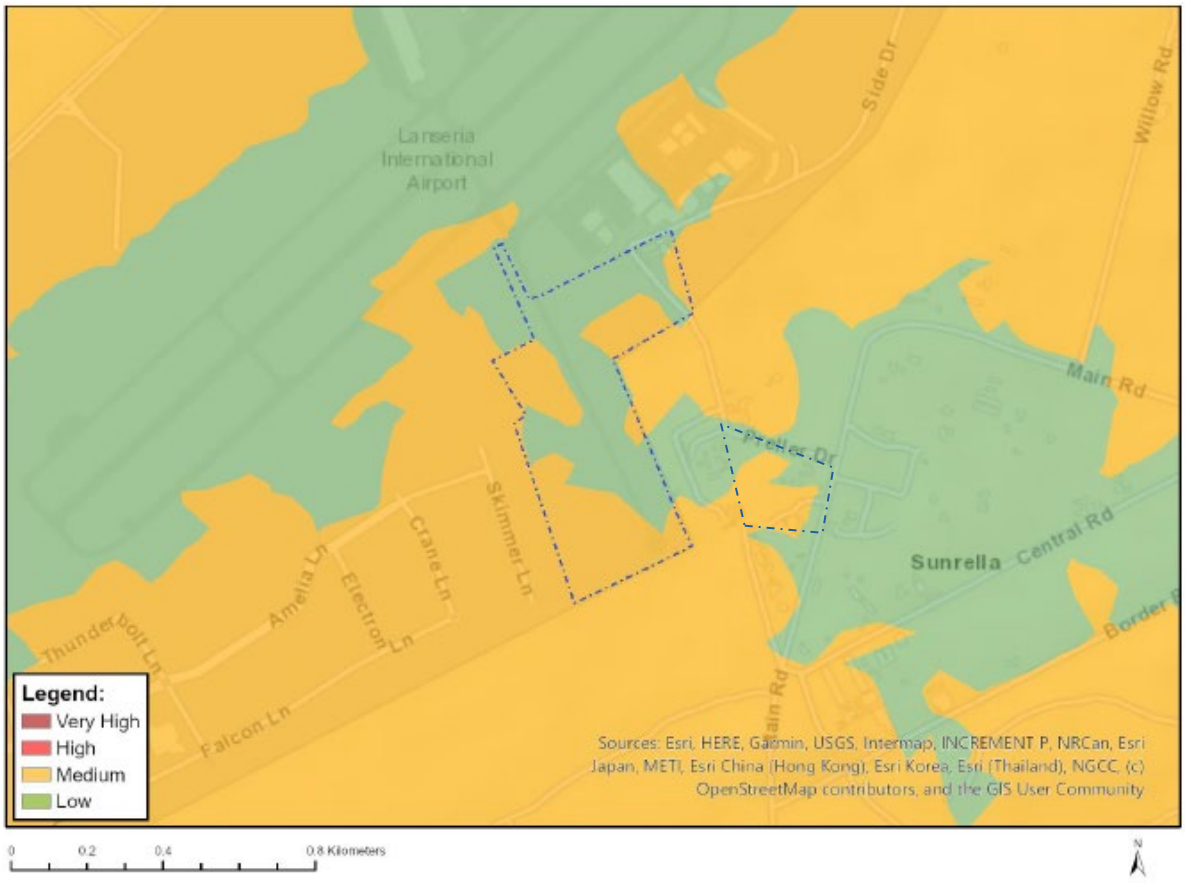

Figure 8. Map of relative plant sensitivity (Source: Department of Forestry Fishery & Environment, 2024).

Terrestrial biodiversity

According to the DFFE screening tool the study area has a VERY HIGH terrestrial biodiversity sensitivity. This is based on the area being regarded as a CBA, belonging to the Critically Endangered Egoli Granite Grassland, and lastly forming part of the National Protected Area Expansion Strategy (NPAES).

Figure 9. Map of relative terrestrial biodiversity sensitivity (Source: Department of Forestry Fishery & Environment, 2023).

7.1.4 Land use history

According to old Aerial imagery the largest part of the study area was cleared of vegetation in 2014 and has been left unattended since then (Figure 11).

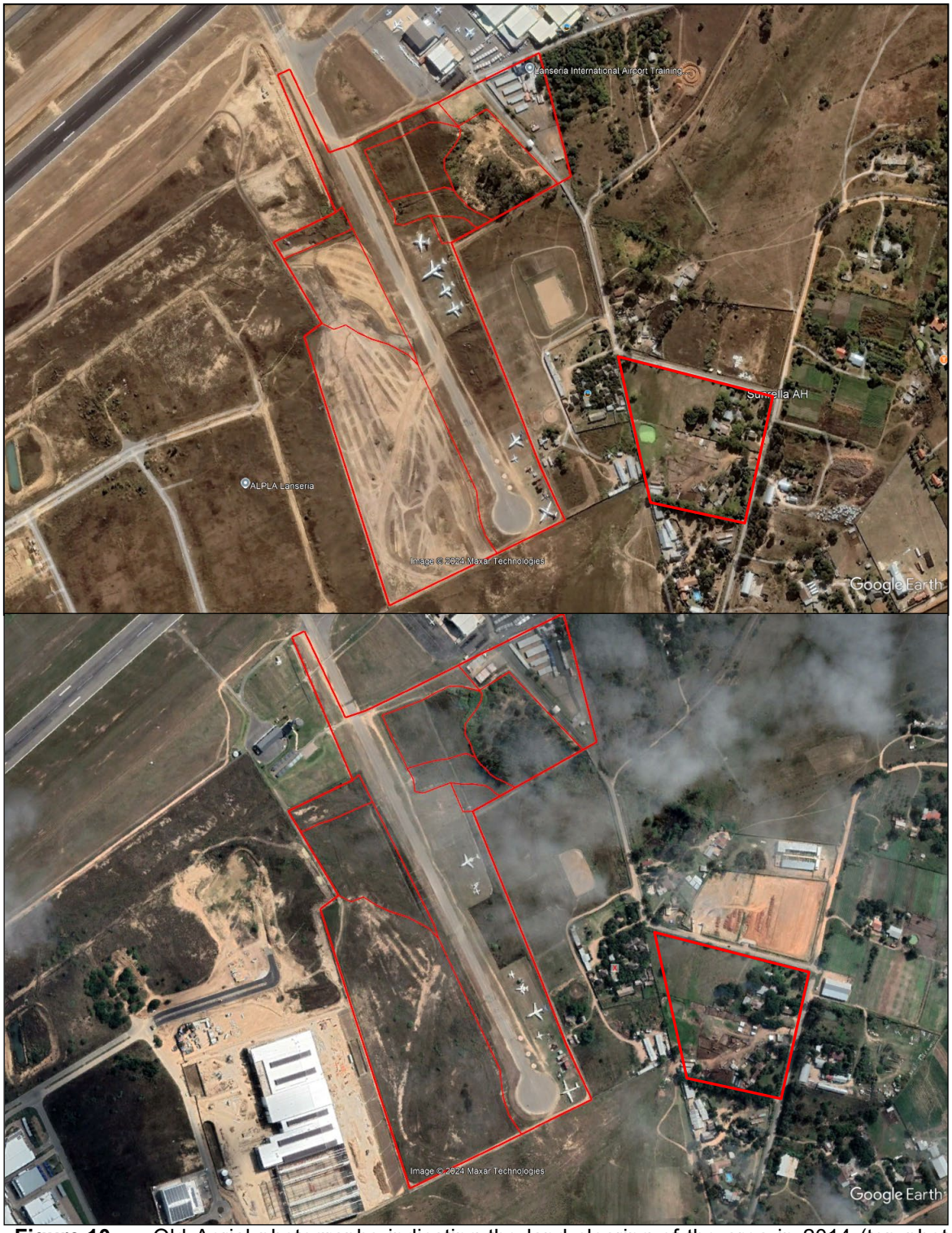

Figure 10. Old Aerial photographs indicating the land clearing of the area in 2014 (top photo) and the area left unattended and influenced by adjacent developments (bottom photo – 2020) (Source: Google Earth 2024).

7.1.5 Vegetation units

Degraded grassland (vegetation unit 1) comprises the largest part of the study area. This vegetation unit occurs in the western section of the study area with three smaller sections towards the north and east. The area was cleared of most vegetation some years ago for construction purposes. This has resulted in pioneer and secondary successional species establishing together with a few alien invasive trees. The prominence of the grasses *Eragrostis rigidior, Hyparrhenia hirta* and *Heteropogon contortus* together with various pioneer grasses and forbs are indicative of the previous degradation. Large areas consist of bare soil patches where the A-horizon has been eroded (see top photo right) and a solid impenetrable surface remaining. Patches where rubble has been dumped occur and are characterised by the dominance declared alien invader tree *Melia azedarach* occur (see middle photo right) within this vegetation unit while smaller patches where soil excavation took place in the past exist where the grass *Imperata cylindrica i*s prominent (see bottom photo right). This vegetation unit achieved a **Low biodiversity importance.**

The **Lawn grass area (vegetation unit 2)** is the second largest unit within the study area and includes a secondary runway while various old, decommissioned airplanes are parked on sections of this unit. The area is mowed on a weekly basis and maintained as a lawn due to it having the secondary runway within its center. The vegetation has become

homogeneous and is dominated by the pioneer grass *Cynodon dactylon* that flourishes in degraded and disturbed conditions. The regular mowing also benefits the growth of this grass and is partly responsible for it dominating the area. This vegetation unit has a low species richness and consists mostly of pioneer and secondary successional species. The vegetation has no resemblance to the original natural; vegetation that occurred in the area. This vegetation unit achieved a **Very low biodiversity importance.**

The Artificial wetland area (vegetation unit 3) is located in the western and eastern sections of the study area. The vegetation includes a mixture of terrestrial and moist-loving plants. These areas were originally terrestrial land but with the construction of the secondary runway stormwater from the main runway as well as the surrounding areas were diverted towards this section. Furthermore, the area is artificially fed with water from attenuation ponds further west outside the study area. Based on the general topography of this area surface water would under normal conditions when there was no development have evenly been spread over the entire study site and not just this section. With the various developments on and outside the study area stormwater was directed to this section and enters it via a number of stormwater pipes and artificially dug canals from inside and outside the study site along the western section of the study site (see top two photos right) from where it is channeled towards the berm (see bottom photo at wetland unit description) and then flows onto the larger section west of the secondary runway. The runway and a large berm across the width of the runway dams the water which then flows into a channel that directs the water underneath the runway through stormwater pipes to the eastern section of the runway (see top photo at wetland unit description) where it is released onto the eastern section of this unit. The constant release of water has created a narrow channel from where the water flows outside the study area. Due to the constant water release and

the damming of the water, artificial wetland conditions have developed. This area used to be terrestrial land that was excavated and degraded during the various construction activities on and around the site. Due to it being an artificial wetland with a low plant species richness this unit has a **Medium-Low Biodiversity Importance.**

Vegetation unit 4 (*Eucalyptus* woodland) occurs in the eastern section of the study area. This area has been affected by land infill, dumping of rubble and litter and alien plant invasion. The area has been transformed with no natural vegetation remaining and this vegetation unit therefore has a **Very low Biodiversity Importance.**

Vegetation unit 5 (Transformed area) occurs in the south-eastern section outside the larger study area. This area has been completely developed in the past and all the buildings demolished with only rubble and litter remaining. The western section of the site was used as a piggery in the past and an old dam excavated to provide water to the animals. The dam area is completely dry due to no more water being pumped into the system. Both areas of this unit are dominated by alien invasive species while the area is used for grazing by cattle. Rubble and litter are present throughout the site. The vegetation of this area has no natural species remaining and is not representative of any natural ecosystem. As a result, this unit achieved a **Very Low Biodiversity Importance** score and has no conservation value.

7.1.6 Connectivity

The study site is mostly surrounded by development and the Lanseria International Airport and its infrastructure. The area directly south of the study site is open land which has been affected by various anthropogenic activities. Towards the east outside the study area there is a stream/wetland system (Figure 12).

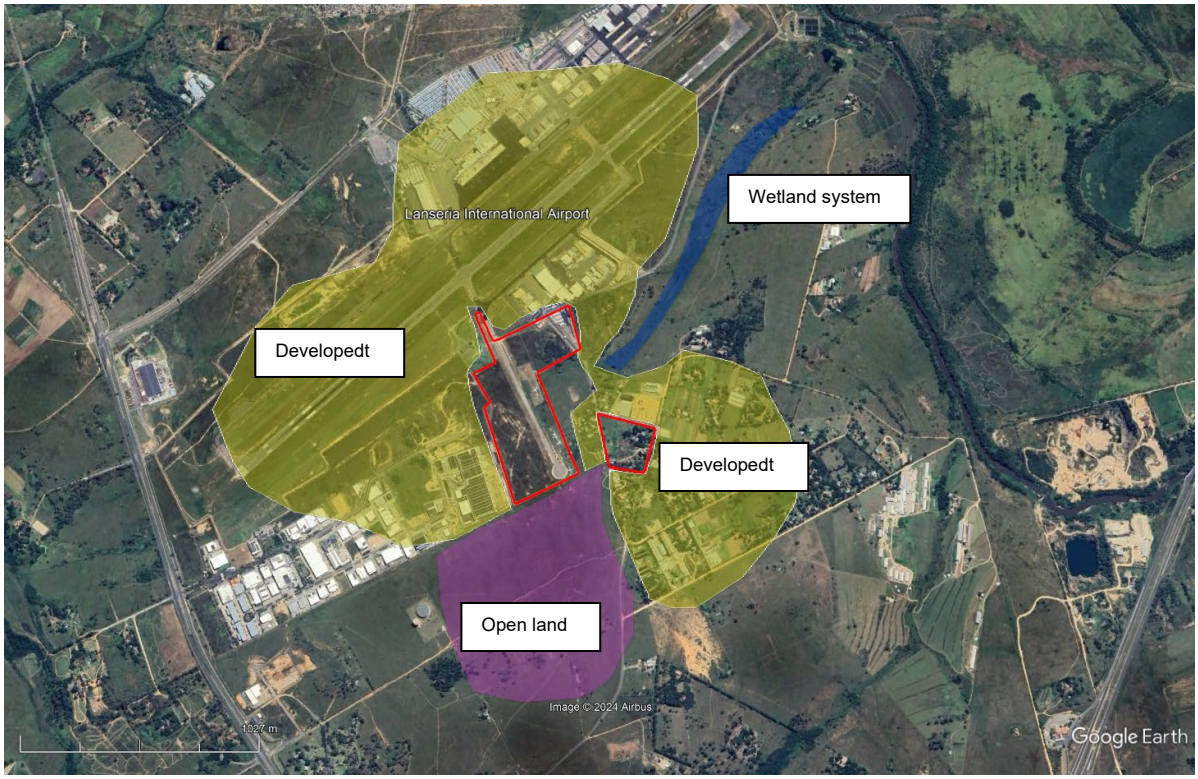

Figure 11. Connectivity of the study site (red lines = study area) (Source: Google Earth 2023)

7.1.7 Sensitivity analysis

An ecological sensitivity analysis was done for the four vegetation units identified. This was achieved by evaluating the different vegetation units against a set of habitat criteria (Table 4). The results (Table 12) indicate that units 1, 2 and 4 to have **low ecological sensitivity**, while vegetation unit 3 has **low-medium ecological sensitivity**.

Table 12. Sensitivity analysis for the vegetation units identified within the study area (Single scores range between 1 and 10 (the higher the score the more important the criterion).

	Unit 1	Unit 2	Unit 3	Unit 4	Unit 4
Criteria	Degraded grassland	Lawn grassland	Artificial wetland	*Eucalyptus* woodland	Transformed area
Presence of protected / red data species	1	1	2	1	1
Species richness and composition	4	2	4	1	1
Dominant/prominent species ecological status	4	1	5	1	1
Sensitivity to disturbance	1	1	2	1	1
Conservation status and ecological functioning	5	3	5	2	1
Area fragmentation	3	1	3	1	1
Medicinal plants	3	2	2	1	1
Watercourse/wetland	1	1	3	1	1
Important topographical features (steep slopes, cliffs etc.)	1	1	5	1	1
TOTAL SCORE	**26**	**14**	**35**	**11**	**10**
Sensitivity rating	**Low**	**Low**	**Low-medium**	**Low**	**Low**

7.1.8 Red data species

The presence of a subpopulation of a species of conservation concern on a site is used as an indicator amongst other, of the sensitivity of the vegetation ecosystem. If such a species is found to be present, the competent authority may refuse authorisation for the proposed activity or require mitigation measures to be implemented. Lists of red data species are normally acquired via various resources and if no specific recording was made/confirmed on the site, lists obtained from the Quarter Degree Grid Cells (QDGC) are used as a broad guideline. At this broad scale, the list will include species that may not necessarily be found on the proposed site since no suitable habitat exists. These lists therefore provide broad guidelines only but are nonetheless useful tools to assess the habitat suitability of the site for these species.

According to the lists obtained from SANBI supplemented by literature and previous studies in the QDGC there is a total of 20 possible red data species that could be found within the larger QDGC. The confidential list is included as Annexure 1. Except for the geophyte *Hypoxis hemerocallidea,* none were found within the study area due to the degraded condition thereof.

7.1.9 Protected species

No protected plant species were observed during the field surveys.

7.1.10 Medicinal plants

Only five (5) medicinal plant species were recorded on the study site and are listed in the table below.

Table 13. List of medicinal plant species identified in the study area.

Plant name	Plant part used	Medicinal use	Vegetation unit
Aloe transvaalensis	Leaf sap	Treat skin irritations, bruises and burns.	3
Datura stramonium	Leaves & green fruit	Asthma, rheumatism, abscesses, bronchitis, tonsillitis	5
Gomphocarpus fruticosus	Leaves, sometimes roots	Headache, stomach pain, tuberculosis.	1; 2, 5
Hypoxis hemerocallidea	Corm	Infusions of corm used to treat dizziness, bladder disorders and insanity. Are given to children as a tonic	3
Vernonia oligocephala	Leaves and twigs, rarely roots.	Stomach bitters, rheumatism Treat abdominal pain, colic, dysentery and diabetes. Roots treat ulcerative colitis.	1

None of the medicinal plant species (except *Hypoxis hemerocallidea* that is regarded as declining) present are threatened and occur abundantly within the province, while *Datura stramonium* is a declared category 1 weed.

7.1.11 Alien plant species

The following table indicate the alien invasive species that were noted in the various vegetation units:

Table 14. List of alien plant species identified in the study area.

			Vegetation units				
Species	**CARA**	**NEMBA**	**1**	**2**	**3**	**4**	**5**
Agave americana	2	Not listed				●	
Argemone ochroleuca	1	1b	●				
Arundo donax L.	1	1b			●	●	
Campuloclinium macrocephalum (Less.) DC.	1	1			●	●	●
Cirsium vulgare (Savi) Ten.	1	1b			●		●
Datura stramonium	1	1b					●
Eucalyptus camaldulensis Dehnh.	1	2	●			●	
Melia azedarach L.	1b	3	●	●		●	●
Mirabilis jalapa L.	1b	1	●				
Morus alba	3	3					●
Pennisetum clandestinum	1b	not listed					●
Pinus pinaster	1b	2					●
Solanum sisymbriifolium	1b	1					●
Verbena bonariensis L.		1b			●	●	●

7.2 Fauna

7.2.1 Amphibians

Figure 12. The Giant Bullfrog (*Pyxicephalus adspersus*) has been recorded by the consultant within the Nooitgedacht, Muldersdrift, Diepsloot and Lanseria areas. Remaining populations are threatened due to extensive habitat transformation due to increased urban sprawl and degradation to the breeding habitats (endorheic pans) within the area. Large numbers are killed annually after heavy summer downpours migrating towards suitable breeding habitats on the adjacent major road networks (R114, R511, R512 and N14).

Threatened species

The Giant Bullfrog (*Pyxicephalus adspersus*) is a protected frog species whose conservation status has been revised and was previously included as a Red Data Species under the category 'Lower Risk near threatened' (Minter *et al.* 2004). The Giant Bullfrog has been down-graded to 'Least-Concern' (Measey *et. al.* 2010). Giant Bullfrogs historically occurred throughout the Diepsloot, Nietgedacht, Honeydew, Krugersdorp, Muldersdrift, Lanseria areas.

A major causal factor in the decline in Giant Bullfrog populations in this area is massive habitat destruction by previous agricultural activities (draining wetlands, ploughing of grasslands) and within the past twenty-five years by extensive urban sprawl due to residential and commercial developments as well as several large informal settlements.

Major (R511, R114, R540, N14) and adjacent road networks bisect suitable breeding and foraging areas resulting in mass road fatalities of migrating adult and juvenile bullfrogs. The consultant has observed several road fatalities (adult males) along the R511, N14, M47, R540, R114, R512 and M5.

Fences and walls also prevent the natural migration of adult and juveniles from foraging areas and suitable breeding sites (habitat fragmentation). This has become especially prevalent within the small-holdings and plots due to high levels of crime; especially within the Muldersdrift-Nooitgedacht area. Habitat deterioration due to changes in the seasonality of wetland sites (damming), deterioration of water quality due to surface water contamination with pesticides and pollutants and White Poplar and reed invasion lead to the disappearance of bullfrog populations. Human predation of adult bullfrogs is another causal factor in population declines. This is especially prevalent in the rural parts of Southern Africa (Hammanskraal, Seshego) as well as around larger informal settlements such as Diepsloot (*pers.obs*. 2008, 2009) as well as Zandspruit (pers. obs. 2005). Bullfrogs are also caught illegally for the local and international pet industry. Removal of large adult males has a detrimental effect on the reproductive success of the small relic populations. The recent increase in the exotic pet trade; especially snakes; results in juvenile bullfrogs been captured for feeding certain captive snakes.

Bullfrog populations have declined dramatically over the past twenty years especially in the Fourways, Diepsloot, Dainfern, Chartwell AH, Nietgedacht, Nooitgedacht, Muldersdrift, Lanseria and Krugersdorp area. Continual destruction of the open Egoli Granite and secondary *Hyparrhenia hirta* grasslands for increased urban development and deterioration of suitable breeding and foraging areas (illegal dumping and alien vegetation invasion) have resulted in the disappearance of several smaller Giant Bullfrog populations. The majority of records (post 2000) of Giant Bullfrogs from the area are of migrating adult males usually found dead on the major road networks. There are several smaller breeding populations (<50 adults) within the Old Diepsloot Nature Reserve, Dainfern, Chartwell AH, Nooitgedacht, Muldersdrift and Krugersdorp area. A large population (>500) occurs in Diepsloot.

Extremely limited suitable breeding habitat occurs within the secondary seasonal pools and depressions fed by the artificially created stormwater drainage lines/canals. The adjacent grasslands are heavily degraded or completely transformed and offer limited suitable foraging and dispersal habitat.

GDARD's Minimum Requirements for Biodiversity Studies: Amphibians

Under C-Plan version 3 (latest version i.e., version 3.3), no specialist studies for any species of amphibian are requested for consideration in the review of a development application. The Giant Bullfrog (*Pyxicephalus adspersus*) has been removed following re-assessment of the species' status in South Africa. The species is not truly Near-Threatened in South Africa (no quantitative analysis of the Giant Bullfrog distribution against the IUCN criteria can consider them as such) and the most recent evaluation of the status of the Giant Bullfrog in December 2009 did not consider the species sufficiently threatened to be listed as Near Threatened (G. Masterson pers. comm. with Prof. Louis du Preez)*. Given the current objectives of Gauteng's C-plan i.e., to be used to protect representative habitat and generate specialist studies for threatened faunal species, the Giant Bullfrog does not qualify for inclusion as a species-specific layer requiring specialist assessments. Records of *P. adspersus* are known for five of the six provincial protected areas, but the best habitat for *P. adspersus* is found in Abe Bailey Nature Reserve, Merafong City Municipality and Leeuwfontein Collaborative Nature Reserve, Nokeng tsa Taemane Local Municipality (Masterson 2011).

As per the C-Plan approach, the conservation of the Giant Bullfrog and of amphibians in general will be met by the protected area network as well as the designation of priority habitats i.e., pans or quaternary catchments, with associated restrictions on land use.

It is therefore considered the study site contains limited suitable breeding habitat and foraging, migratory/dispersal and burrowing habitat of **low** conservation importance for any remaining Giant Bullfrogs. Due to high levels of anthropogenic disturbances in the general area it is highly unlikely that significant Giant bullfrog populations remain on the site and adjacent degraded *Hyparrhenia hirta* grasslands outside the site.

* It is the opinion of the specialist consultant that dramatic population declines have occurred within Gauteng Province over the past 30 years and Giant Bullfrogs are worthy of conservation efforts and listing of 'near-threatened'.

7.2.2 Reptiles

Threatened species

Continual destruction of suitable habitats has resulted in the disappearance of numerous reptile species on the Highveld. No snake species was recorded during the brief field survey. One threatened reptile species have been recorded within the 2527 DD QDGC according to ReptiMAP. A historic record (1922) of the Striped Harlequin Snake (*Homoroselaps dorsalis*), which is categorised as Rare in the out-dated Red Data List (Branch 1988) and is currently listed as Near-Threatened (NT) (Bates et al. 2014) has been recorded from the QDGC. Prefers grassland and are endemic to the highveld of the Free State, Kwazulu-Natal, Swaziland, Limpopo and Gauteng. These snakes are very secretive and are only known from a few specimens. They burrow in loose soil and forage underground in tunnels and cracks, and are usually exposed in abandoned termitaria or under stones. They feed exclusively on thread snakes (*Leptotyphlops*) which they catch underground (Branch 1998).

Gauteng represents approximately 10% of the total extent of occurrence for the species, meaning 10 % of 11 populations need to be protected in Gauteng in order to prevent *H. dorsalis* from becoming listed as 'Vulnerable", which is effectively 1 population. *Homoroselaps dorsalis* occurs in close proximity to the Egoli Granite Grassland (EGG) Nature Reserve, and if it is found there during surveys or by chance encounters, the local population should also be protected but the recommended minimum target is the protection and conservation of the Suikerbosrand Nature Reserve population. Four Harlequin Snakes (2 *H. dorsalis* and 2 *H. lacteus*) have been recorded in Suikerbosrand since 2006. All of the records have occurred on land type Ib43 (Land Type Survey Staff,2006) and all records were associated with ridges or ridge slopes with a soil-rock mix and low clay content (< 35 %). The protection of *H. dorsalis* in Suikerbosrand Nature Reserve, Sedibeng District Municipality will meet the conservation targets for the species in Gauteng (Masterson 2011).

Under C-Plan version 3.3, no specialist studies for any species of reptile are requested for consideration in the review of a development application within Gauteng Province (GDARD Requirements for Biodiversity Assessments: Version 3.3). No suitable habitat occurs on the Lanseria International Airport site for Striped Harlequin Snakes.

7.2.3 Avifauna

Threatened species

Table 15. Red Data List bird species previously recorded from the 2555_2755 pentad within which the study area is situated, and that occur or could possibly within or in the vicinity of the study area due to the presence of suitable habitat.

Species	Conservation status (Taylor 2014/15)	Reporting rate SABAP2 %	Habitat requirements (Chittenden 2005; Hockey *et al* 2005)	Likelihood of occurrence
Martial Eagle	Endangered	0.1		**Low:** Rare vagrants with marginally suitable habitat for occasional foraging arrays
African Marsh-harrier *Circus ranivorus*	Endangered	0.6	Large permanent wetlands with dense reed beds. Sometimes forages over smaller wetlands and grassland.	**Low:** Marginally suitable habitat for occasional foraging arrays within the adjacent seasonal wetlands. No suitable breeding habitat
Cape Vulture *Gyps coprotheres*	Endangered	0.8	Linked to cliff breeding sites in mountainous areas but ranges widely in surrounding areas.	**Low:** Breeding colonies are situated in the Magaliesberg. Recorded throughout the area most likely as vagrants flying over.
Yellow-Billed Stork	Endangered	0.2	Shoreline of most inland freshwater bodies.	**Low:** Nomadic and the wetlands in the area offer extremely limited suitable habitat for occasional foraging arrays but no suitable breeding habitat.
Black Stork *Ciconia nigra*	Vulnerable	0.1	Associated with mountainous areas but not restricted to them. Nomadic during the non-breeding season.	**Low:** Nomadic and the degraded open grasslands and wetlands offer limited suitable habitat occasional foraging arrays but no suitable breeding habitat.

White-Bellied Korhaan *Eupodotis sengalensis*	Vulnerable	0 (no records)	Open grassland with scattered trees, numerous termite mounds and rocky ground. Forages in burned areas.	**Low:** No suitable habitat occurs within the degraded grasslands. The high levels of anthropogenic disturbances restrict the likelihood of any extended periods or breeding on the site. Suitable habitat towards north-east and north-west towards Mogales gate (Cradle of Humankind), Skurweberge and Magaliesberg.
Secretarybird *Sagittarius serpentarius*	Vulnerable	0.1	Favours open habitat and breeds within *Vachellia* trees.	**Low:** Limited records based mainly on single observations within the open grasslands to the north and north-west of the N14. The degraded grasslands offer limited suitable foraging habitat but the high levels of anthropogenic disturbances restrict the likelihood of any extended periods on the site.
African Grass-Owl *Tyto capensis*	Vulnerable	1.2	Normally associated with pristine, well managed grasslands usually in close proximity of water, but also in alien vegetation structurally resembling tall or rank grassland, and	**Medium-Low**: Suitable habitat for nocturnal foraging arrays within the shorter *Cynodon dactylon* grasslands on the site and marginally suitable nesting habitat within the drainage

			hydrophilic sedges.	lines. High levels of anthropogenic disturbances and ACSA's bird-collision management with the use of dogs to deter birds within the airport grounds restricts the likelihood of any extended periods. Frequent burning and cutting of grasslands adjacent to runways restrict vegetative cover.
Lanner Flacon *Flacon biarmicus*	Vulnerable	2.9	Favours open grasslands and woodlands near rocky cliffs or electricity poles for nesting.	**Low:** Suitable habitat for occasional foraging arrays.
Verraux's Eagle *Aquila verreauxi*	Near-Threatened	0.3	Mountainous and rocky areas with large cliffs.	**Low:** Resident breeding pair at Walter Sisulu Botanical gardens. Forages in the adjacent open grasslands, alien woodlands and Andesite Mountain Bushveld.
Blue Crane *Anthropoides paradiseus*	Near-Threatened	0 (no records)		**Low:** No suitable habitat for occasional foraging arrays within the degraded grasslands due to high levels of anthropogenic disturbances and ACSA's bird-collision management.
Greater Flamingo *Phoenicopterus ruber*	Near-Threatened	0.2	Greater and Lesser Flamingos are only non-breeding visitors to the former Transvaal (Tarboton *et al.*	**Low**: The artificial drainage lines and stormwater attenuation ponds offer limited suitable habitat for

			1987), but flocks may spend extended periods on the Highveld where they utilize shallow, eutrophic wetlands and temporary pans.	occasional foraging arrays as well as dispersal habitat but the high levels of anthropogenic disturbances and ACSA's bird-collision management restrict the likelihood of any extended periods.
Abdim's Stork	Near-Threatened	0.9	Non-breeding intra-African migrant. Occurs in large flocks in grasslands, savanna, woodland and cultivated lands.	**Low:** The degraded grasslands offer limited suitable habitat for occasional foraging arrays. The high levels of anthropogenic disturbances and ACSA's bird-collision management restrict the likelihood of any extended periods on the site.
African Finfoot *Podica senegalensis*	Vulnerable	0.1	Mostly along well-vegetated, perennial rivers and dams	**Low:** The degraded stormwater drainage lines and wetlands offer no suitable habitat.
Half-collared Kingfisher *Alcedo semitorquata*	Near-Threatened	1.9	Mostly along clean, well-vegetated, fast-flowing streams. Recorded around dams.	**Low:** The degraded stormwater drainage lines and wetlands offer no suitable habitat.
European Roller	Near-Threatened	0.5	Non-breeding migrants. Open woodland perching on open dead branches, telephone and powerlines	**Low:** Suitable habitat for occasional foraging arrays (grasshoppers and termites) within the degraded grasslands.

The site offers no suitable habitat for occasional foraging arrays for the larger raptors such as Cape Vulture and Verraux's Eagle as well as limited for the smaller raptors such as Lanner Falcon and Red-footed Falcon due to ACSA's bird-collision management

programme. No actual evidence of any threatened avifaunal species were observed during the brief field survey.

The high levels of anthropogenic disturbances on the site and adjacent open grasslands, rocky ridges and drainage lines significantly reduces the likelihood of any secretive bird species remaining on the site for any extended periods. The annual harvesting of grass as well as human presence on the site will impact on the secretive bird species. These include Blue Crane, Secretary bird, White-bellied Korhaan and African Grass Owls. The frequent burning of the grasslands and adjacent wetlands on and surrounding the site significantly reduces the likelihood of African Grass Owls utilising the seasonal wetlands and adjacent valley bottom wetlands (north-east and west) for roosting and nesting activities.

7.2.4 Mammals

Threatened species

Table 16. Red Data List mammal species with confirmed records from the 2527DD QDGC and for which suitable habitat is present, and which may therefore occur within the study area

TAXONOMIC INFORMATION				RED LISTING INFORMATION				
Order	**Family**	**Scientific name**	**Common name**	**2016 Regional Listing**	**2016 Regional listing Criteria**	**Current global listing**	**Global listing criteria**	**TOPS 2007**
Artiodactyla	Bovidae	*Pelea capreolus*	Grey Rhebok	Near Threatened	A2bd	Least Concern	None	None
Artiodactyla	Bovidae	*Redunca fulvorufula fulvorufula*	Mountain Reedbuck	Endangered	A2b	Least Concern	None	None
Carnivora	Felidae	*Leptailurus serval*	Serval	Near Threatened	A2c; C2a(i)	Least Concern	None	Protected
Carnivora	Felidae	*Panthera pardus*	Leopard	Vulnerable	C1	Vulnerable	A2cd	Vulnerable
Carnivora	Hyaenidae	*Parahyaena brunnea*	Brown Hyaena	Near Threatened	C2a(i)+D1	Near Threatened	C1	Protected
Carnivora	Mustelidae	*Aonyx capensis*	Cape Clawless Otter	Near Threatened	C2a(i)	Near Threatened	A2cde+3cde	Protected
Chiroptera	Vespertilionidae	*Pipistrellus rusticus*	Rusty Pipistrelle	Near-threatened	Not Given	Least Concern	None	None
Erinaceomorpha	Erinaceidae	*Atelerix frontalis*	South African Hedgehog	Near Threatened	A4cde	Least Concern	None	Protected

Several red listed mammal species have been recorded from the Walter Sisulu National Botanical Gardens and Roodekrans Ridge to the west of the site including the 'Endangered' Mountain Reed Buck (*Redunca fulvorufula fulvorufula*), "'Vulnerable" Leopard (*Panthera pardus*), Near-Threatened Serval (*Leptailurus serval*), Brown Hyaena (*Parahyaena brunnea*), Cape Clawless Otter (*Aonyx capensis*), Grey Rhebok (*Pelea capreolus*), Rusty Pipistrelle (*Pipistrellus rusticus*) and South African Hedgehog (*Atelerix frontalis*).

No evidence of any threatened mammal species was recorded during the brief one-day site visitation (6 hours). This can be expected due to the short-duration of the field work as well as secretive nature of the threatened mammal species, including Servals, White-tailed Rats, Veli Rats and Swamp Musk Shrews. The majority of threatened mammal species occurring in the area are extremely difficult to observe even during intensive field surveys conducted for extended periods.

Mountain Reed Buck (*Redunca fulvorufula fulvorufula*)

Formerly widespread in South Africa, they occur in suitable habitat in Limpopo Province, the eastern North-West Province, Gauteng, parts of Mpumalanga, central and southern Free State, western Kwazulu-Natal, the Eastern Cape and narrowly into the Western Cape. Mountain Reedbuck inhabit the dry, grass-covered, stony slopes of hills and mountains, where these provide cover in the form of bushes or scattered trees. They are found infrequently on more open mountainous grassland and tend avoid the bleak open conditions associated with summits of mountainous areas, preferring the lower slopes and occurring in many areas on low stony hills. They move onto flats adjacent to their stony habitat to feed and drink, the availability of water being an essential habitat requirement (Skinner & Chimimba 2005). Mountain Reed Buck have been recorded in the Walter Sisulu National Botanical Gardens and Roodekrans ridge system. The population size within the Walter Sisulu National Botanical Gardens is estimated between 20-30 individuals (pers. comm. T. De Castro 2017). It **is highly unlikely** that Mountain Reed Buck will occur within the Lanseria International Airport site or adjacent grasslands due to high levels of anthropogenic disturbances (vagrants, illegal hunting and poaching). Major road networks (N14, R512) border the site which severely restricts dispersal movements.

Leopard (*Panthera pardalis*)

In Kwazulu-Natal they occur primarily in the north-east and are sparsely distributed elsewhere in the central and western parts of the province. They are found throughout Limpopo Province, Mpumalanga, North West and Gauteng, except on the highveld

grassland areas in the southern parts of these provinces. They occur sporadically in the Free State. In the Eastern Cape they occur in the mountainous areas along the south coast from about King William's Town district westwards into the Western Cape and then in the northern and north-eastern parts of the Northern Cape. Leopards have a wide habitat tolerance and are generally associated with areas of rocky Koppies and hills, mountain ranges and forest. While they are independent on water supplies, relying on their prey for their moisture requirements, they drink regularly when water is available. Cover to lie up in safety during the daylight hours and from which to hunt is an important requirement. They manage to persist in areas of concentrated development provided they have adequate cover in rocky ridges and forest (Skinner & Chimimba 2005). Personal communication with local ecologist Mr Tony De Castro confirmed that a female leopard and two cubs were photographed in 2015 during a camera trapping survey within the Walter Sisulu National Botanical Garden. The degraded grasslands, secondary succession grassland as well as alien invaded woodland offers extremely limited marginally suitable habitat for nocturnal foraging arrays as well as exploratory/dispersal activities for the highly secretive and elusive Leopard. The high levels of anthropogenic activities on and surrounding the site significantly reduce the likelihood. Major road networks (N14, R512) border the site as well as fences and walls which severely restricts dispersal movements.

Brown Hyaena (*Parahyaena brunnea*)

They are widely, though discontinuously and sparsely, distributed in Limpopo Province, North West Province, Mpumalanga and Gauteng especially in small nature reserves. Brown Hyaena are associated particularly with the Nama-Karoo and Succulent Karoo Biomes and the drier parts of the Grassland and Savanna biomes. In Gauteng they prefer rocky mountainous areas with bush cover. Cover to lie up during the day is an essential requirement. Water is not a requirement, although they drink when its available. Brown Hyaena have been recorded within the Walter Sisulu National Botanical Garden as well as within Mogale's Gate (pers. obs.) and Magaliesberg to the north and north-west of the study area. The degraded grasslands, secondary succession grassland as well as alien invaded woodland offers limited suitable habitat for nocturnal foraging arrays as well as exploratory/dispersal activities for the highly secretive and elusive Brown Hyaena. The high levels of anthropogenic activities on and surrounding the site significantly reduce the likelihood. Major road networks (N14, R512) border the site as well as fences and walls which severely restricts dispersal movements.

Serval (*Leptailurus serval*)

Serval occur in dense, well-watered grassland and reed beds and are always associated with water. In South Africa they occur from the Eastern Cape northwards into Mpumalanga lowveld and Limpopo Valley. Servals have been recorded in the Drakensberg highlands and inland mountain highlands (Magaliesberg, Soutpansberg, Waterberg). Servals have shown a range expansion along the watercourses of the western and eastern Free State Province. Servals are predominantly nocturnal; with limited activity during the early morning and late afternoon. Diurnal activity is unusual and adequate cover is required during periods of inactivity. Servals have been displaced mainly due to habitat loss through agricultural and forestry activities. Populations are secure within protected areas. A local ecologist Mr Tony De Castro has recorded serval in camera traps within the Walter Sisulu National Botanical Garden. The artificially created stormwater drainage lines and wetlands on the site offers extremely limited suitable habitat for occasional foraging arrays as well as exploratory/dispersal activities for the highly secretive and elusive Serval. The high levels of anthropogenic activities on and surrounding the site significantly reduce the likelihood. Major road networks (N14, R512) border the site as well as fences and walls which severely restricts dispersal movements.

Grey Rhebok (*Pelea capreolus*)

Grey Rhebok are endemic to the sub region and as they only occur where there is suitable habitat their distribution is discontinuous and patchy. They occur in southern North West Province, Gauteng, southern Limpopo Province, western Mpumalanga, the eastern Free State, western and central Kwazulu-Natal, the western Northern Cape, the Western Cape and the Eastern Cape. Throughout the greater part of their distributional range Grey Rhebok are associated with Rocky ridges, rocky mountainous slopes and mountain plateau grassland with good grass cover. Short, burnt veld is favoured for feeding and long grass for cover. They are independent of a water supply, but drink in the dry winter months if water is available (Skinner & Chimimba 2005.). Grey Rhebok occur within the Walter Sisulu National Botanical Gardens. The degraded grasslands and secondary succession grassland offer extremely limited suitable habitat for foraging arrays as well as exploratory/dispersal activities for Grey Rhebok. The high levels of anthropogenic activities on and surrounding the site significantly reduce the likelihood. Major road networks (N14, R512) border the site as well as fences and walls which severely restricts dispersal movements.

African Clawless Otter (*Aonyx capensis*)

The African or Cape Clawless Otter is distributed widely in sub-Saharan Africa where there is suitable aquatic habitat. They occur in Limpopo, Mpumalanga, Gauteng, North West, Kwazulu-Natal, Eastern Cape, Western Cape and Northern Cape provinces. Being predominantly aquatic they don't wander widely from water and throughout their range they occur in rivers, lakes, swamps and dams and up the tributaries of rivers into small streams. The otters feed on crabs, fish, frogs and other aquatic life. As the small streams desiccate, they move to more permanent water sources. If they wander away from water, they invariably return to it as it is an essential requirement. The association in which the terrestrial aquatic habitat occurs can range from forest to woodland to open grassland and otter's occurrence bears no relation to surrounding terrain provided that the aquatic conditions are suitable and there is adequate cover which to rest. African Clawless Otters have been recorded within the Walter Sisulu National Botanical Garden; especially at the Sasol's artificially created wetland and bird hide (pers. obs.). The artificially crated drainage liens and wetlands offer marginally suitable foraging and dispersal habitat for African Clawless Otters. The suitability is reduced due to the high levels of anthropogenic disturbances on and surrounding the site. Major road networks (N14, R512) border the site as well as fences and walls which severely restricts dispersal movements.

Figure13. The South African Hedgehog has been recorded by the consultant in the adjacent open Egoli Granite during previous surveys. They have also been recorded from Fourways-Dainfern area, Old Diepsloot Nature Reserve, Walter Sisulu National Botanical Gardens, Muldersdrift-Krugersdorp areas. They still persist in some well-established suburban gardens and residential plots.

South African Hedgehog (Atelerix *frontalis*)

South African Hedgehogs occur in such a wide variety of habitats that it is difficult to assess its habitat requirements. The one factor that is common to all the habitats in which they occur is dry cover, which they require for resting places and breeding purposes. Habitat must provide a plentiful supply of insects and other foods. Suburban gardens provide these requirements and this may explain their occurrence in this type of habitat. South African Hedgehogs are predominantly nocturnal, becoming active after sundown, although, after light rains at the commencement of the wet season, they may be active during daylight hours (Skinner and Smithers, 1991). South African Hedgehogs have been recorded within the Walter Sisulu National Botanical Gardens, Muldersdrift, Fourways, North-riding, Dainfern, Krugersdorp, Diepsloot areas.

Extremely limited habitat remains within the site and mesic grasslands along the valley bottom wetland outside the eastern and western boundaries and well-established residential gardens for South African Hedgehogs. The presence of dogs and cats in the residential gardens could impact on any remaining hedgehogs. Major road networks (N14, R512) border the site as well as fences and walls which severely restricts dispersal movements.

Southern African Vlei Rat *Otomys auratus*

Where *Otomys auratus* and *O. angoniensis* co-occur at the same site, the former is associated with sedges and grasses adapted to densely vegetated wetlands with wet soils, while the latter is associated with plant species that typically grow in the drier margins of wetlands (Davis 1973). Vlei rats are exclusively herbivorous, with a diet mainly comprised of grasses. The artificially created drainage lines and adjacent secondary seasonal wetlands offer extremely limited suitable habitat for Vlei Rats (Wetland and Grassland type), typically occurring in dense vegetation in close proximity to the water's edge.

Maquassie Musk Shrew (*Crocidura maquassiensis*)

This is a rare species, recorded only from disparate localities in Zimbabwe, Mantenga Falls in the middleveld region of Swaziland (Monadjem 1998), Limpopo (Motlateng and Blouberg, and more recently in the Soutpansberg Mountains; P. Taylor unpubl. data), North West (Makwassie), Gauteng (Krugersdorp, Roodeplaat Dam and Heuningklip), KwaZulu-Natal (Kosi Lake, Lake Sibaya, Gaint's Castle, Royal Natal and Chase Valley Heights) and Mpumalanga (Loskop Dam) (Skinner & Chimimba 2005). The species may be considered near-endemic or endemic if molecular work reveals a species complex existing across regions and biomes. Little is known about the habitats and ecology of this species. The type

specimen was collected in a house and the Motlateng specimen from a grassy mountainside beneath a rock at 1,580 m asl (Skinner & Chimimba 2005). Other specimens have also been found on rocky or montane grassland, such as recently in the Soutpansberg Mountains (Taylor et al. 2015). The Chase Valley Heights specimen was brought in by a cat from the garden (P. Taylor pers. comm. 2016), which demonstrates the importance of cataloguing what the cat brings in. The Royal Natal specimen was collected in mixed bracken and grasslands along the Tugela River and a single specimen has been collected from coastal forest (Taylor 1998). Thus, it may tolerate a wide range of habitats, including urban and rural landscapes.

The site offers no suitable rocky grassland habitat for Maquassie Musk Shrew (*Crocidura maquassiensis*) but due to lack of records it is impossible to assess the habitat requirements of this species properly.

Two near-threatened bat species have previously been recorded from the study area namely the Rusty Pipistrelle (*Pipistrellus rusticus*) and Schreiber's Long-fingered Bat (*Miniopterus schreibersii*).

Rusty Pipistrelle (*Pipistrellus rusticus*)

Rusty Pipistrelle occurs in parts of Gauteng, Limpopo Province and Mpumalanga Province. They occur in savanna woodland and often with riverine associations. The Rusty Pipistrelle has been recorded at the Walter Sisulu Botanical Gardens and Roodekrans Ridge. Limited suitable habitat occurs for occasional nocturnal foraging arrays within the study area.

Schreiber's or Natal Long-fingered Bat (*Miniopterus schreibersii*)

Schreiber's or Natal Long-fingered Bat occurs in parts of Gauteng, North West, eastern half of Kwazulu-Natal, Mpumalanga and Free State Province. Schreiber's Long-fingered Bats are cave-dwellers and the availability of caves or other similar substantial shelter, such as mine audits is an essential habitat requirement. Annual migrations take place between the caves situated on the southern Highveld of Gauteng and in the Limpopo Province Bushveld (Van Der Merwe 1975). No major caves of mine audits occur within the study area.

More intensive specialist mammal surveys will be required in order to ascertain the current conservation status of the above-mentioned threatened mammal species on the site and adjacent grasslands. The surrounding degraded *Hyparrhenia hirta* grasslands are all transformed and degraded due to high levels of anthropogenic disturbances as well as ACSA.s animal management programme which will significantly reduce the likelihood of any threatened mammal species occurring on the site and adjacent open areas. Major road

networks (N14, R512) border the site as well as fences and walls which severely restricts dispersal movements.

8. POTENTIAL IMPACTS OF THE PROPOSED DEVELOPMENT ON THE ASSOCIATED FAUNA & FLORA

The following assessment of impacts was done and was guided by the requirements of the NEMA EIA Regulations (2014) and is presented in the tables below:

DESIGN AND PRE-CONSTRUCTION PHASE

IMPACT DESCRIPTION

Site clearing and preparation

Certain areas of the site will need to be cleared of vegetation and some areas may need to be levelled. Envisaged impacts:

- Loss of plant species
- Loss of rare/medicinal species
- Loss of animal species
- Loss of biodiversity
- Increased soil erosion
- Alien plant invasion

Cumulative impact description

Based on the proposed development as well as the known developments planned in the region as well as the areas surrounding the site, the cumulative impact on biodiversity (as listed above) should be low if all mitigation as recommended is implemented.

Mitigation

- To minimise the effect on the vegetation, insects, small mammals, and environment it is recommended that the construction be done within the winter period as far as practically possible, when most plants are dormant and animals less active.
- Planning must be done to ensure that the *Hypoxis hemerocallidea* individuals present within unit 3 are removed and replanted in garden areas or natural habitat nearby under the supervision of a qualified Botanist/Ecologist.
- Where vegetation of areas not to be developed needs to be "opened" to gain access it is recommended that the herbaceous species are cut short rather than removing them.
- Vegetation clearance should be restricted to the approved development areas allowing remaining animals the opportunity to move away from the disturbance.
- Any disturbed or eroded areas not to be developed within the site should be appropriately revegetated. Only indigenous (to the area) grass species are recommended.
- Storage of equipment, fuel and other materials should be limited to demarcated areas. They should be established at least away from the no-go areas previously mentioned.

- No animals should be intentionally killed or destroyed and poaching and hunting should not be permitted on the site.
- A Re-vegetation and Rehabilitation Manual should be prepared for the use of contractors, landscape architects and groundsmen to rehabilitate areas that became degraded due to construction activities.
- Alien invasive plants present within the various vegetation units must be removed and eradicated throughout all stages of the project.
- All stormwater and runoff generated by the development activities must be appropriately managed.
- Monitoring of all these activities must be done on at least a weekly basis by the ECO during the construction phase of the development to ensure that minimal impact is caused to the fauna and flora of the area. Any transgressing of rules must be reported to and by the ECO.

Impact Assessment

Name of Impact	Extent	Duration	Probability	Reversibility of impact	Significance without mitigation	Significance after mitigation
Loss of plant and animal species	Site	Medium term	Probable	Medium	Moderate-high	Low
Impact on Irreplaceable Resources (*after* mitigation) If yes, please explain					YES	NO
Cumulative impact rating (*after* mitigation) If high, please explain				Low	Medium	High

CONSTRUCTION PHASE

IMPACT DESCRIPTION

Loss of Fauna & Flora

Envisaged impacts:

Vegetation clearance/habitat destruction
Soil erosion and pollution
Spread and establishment of alien invasive plant species
Negative effect of human activities on fauna and road mortalities
Loss of biodiversity

Cumulative impact description

Based on the proposed development the cumulative impact on biodiversity (as listed above) would be low if all mitigation as recommended is implemented.

Mitigation

- Any faunal species encountered during the construction phase should be allowed to move freely away from the construction areas or alternatively re-located by a suitably qualified person (especially pertinent to any snakes).
- All temporary stockpile areas, litter and dumped material and rubble must be removed and

disposed of at a licensed land fill facility. Proof of safe disposal must be obtained and kept on record for monitoring purposes.

- The *Hypoxis hemerocallidea* individuals present within unit 3 must be removed and replanted in garden areas or natural habitat nearby under the supervision of a qualified Botanist/Ecologist.
- The careful position of soil piles, and runoff control, during all phases of development, and planting of some vegetative cover after completion (indigenous groundcover, grasses etc.) will limit the extent of erosion occurring on the site.
- Undeveloped areas that were degraded due to human activities must be rehabilitated using indigenous to the area vegetation.
- Hazardous chemicals must be stored on an impervious surface accompanied by Safety Data Sheets (SDS) and protected from the elements. These chemicals must be strictly controlled, and records kept of when it was used and by whom.
- Limit human activity in the no-development areas to the minimum required for ongoing operation.
- Any alien plant observed should be reported to the environmental manager and should be removed as soon as possible.
- Regular monitoring (monthly) for damage to the environment as well as establishment of alien plant species must be conducted.

Impact Assessment

Name of Impact	Extent	Duration	Probability	Reversibility of impact	Significance without mitigation	Significance after mitigation
Loss of fauna & flora	Site	Medium term	Probable	Medium	Moderate	Low
Impact on Irreplaceable Resources (*after* mitigation) If yes, please explain					YES	NO
Cumulative impact rating (*after* mitigation) If high, please explain				Low	Medium	High

POST-CONSTRUCTION AND OPERATIONAL PHASE

IMPACT DESCRIPTION

Loss of Fauna & Flora

Envisaged impacts:

- Habitat destruction caused by clearance of vegetation
- Soil and water pollution
- Spread and establishment of alien invasive species
- Negative effect of human activities on fauna and road mortalities
- Negative effect of fences on dispersal movements of fauna
- Negative effect of light pollution on nocturnal fauna

Cumulative impact description

Based on the implementation of the recommended mitigation measures, it is not thought that the continued maintenance of the sites would have a negative cumulative effect on biodiversity if the mitigation measures as recommended are implemented.

Mitigation

- Any faunal species encountered during the construction phase should be allowed to move freely away from the construction areas or alternatively re-located by a suitably qualified person (especially pertinent to any snakes).
- All temporary stockpile areas, litter and dumped material and rubble must be removed and discarded in an environmentally friendly way.
- Undeveloped areas that were degraded due to human activities must be rehabilitated with indigenous vegetation.
- Hazardous chemicals must be stored on an impervious surface and protected from the elements. These chemicals must be strictly controlled, and records kept of when it was used and by whom.
- During the post-construction phase, artificial lighting must be restricted to security areas and not directed towards the conserved areas (seasonally inundated seepage wetlands and seasonal stream) in order to minimize the potential negative effects of the lights on the natural nocturnal activities.
- Regular monitoring must be undertaken to determine and degradation of the vegetation and or animal habitat.

Impact Assessment

Name of Impact	Extent	Duration	Probability	Reversibility of impact	Significance without mitigation	Significance after mitigation
Degradation of ecosystem	Site	Medium term	Unlikely	Medium	Moderate	Low
Impact on Irreplaceable Resources (*after* mitigation) If yes, please explain					YES	NO
Cumulative impact rating (*after* mitigation) If high, please explain				Low	Medium	High

Environmental Control Officer (ECO)

A suitably qualified ECO should be appointed to monitor all activities and to report any actions that could or potentially could have a negative effect on the environment. It is recommended that photographic records are kept before, during and after construction of the various activities.

9. IMPACT STATEMENT

9.1 Conclusion & recommendations

The study area is slightly undulating with the area sloping both towards the south and east. The site is vacant land that surrounds a secondary runway of the airport and is fenced with strict security.

The Degraded grassland (vegetation unit 1) located mainly within the western section of the site is degraded due to previous land clearing, construction and dumping of rubble. Various two-spoor roads are present in this vegetation unit. The vegetation is subjected to regular runaway fires which further adds to land degradation. The plant species present are mainly secondary successional and pioneer species while large bare soil patches where sheet erosion has taken place, is present. Alien invasive species have also become established and are slowly colonising some areas. This unit is regarded as degraded with a low species richness and does not resemble the original natural vegetation that occurred in the area. This vegetation unit has a low ecosystem functioning and regarded as having a **Low ecological sensitivity** (Figure 15)**.**

The Lawn grassland and the *Eucalyptus* woodland (vegetation units 2 & 4) are both transformed with vegetation unit 2 being regularly mowed and kept short due to the adjacent runway while vegetation unit 4 has been exposed to excavation, land fill and dumping of rubble and litter. These areas have no natural vegetation and is dominated by pioneer weedy, secondary successional, and alien invasive species. These vegetation units therefore have a **Low ecological sensitivity** (Figure 15).

The Artificial wetland sections (vegetation unit 3) has resulted due to human actions namely the channelling of surface and storm water onto the area from the primary runway area, developments outside the stud area, as well as old attenuation dams from the adjacent developments. Various canals have been built over the years to channel the water into a natural wetland system in the east outside the study area (see figure 12). The berm along the edge of the runway dams the water received and with an artificially dug channel directs the water underneath the runway which has resulted in a channel forming with water permanently flowing out of the property. This area has over the years (due to the damming and water) developed wetland conditions (with wetland and terrestrial plant species

present), however should the water management to the area be rectified, redirected, and the berm removed, the area would become dry again. No permanent bird nests were observed due to the continued management of chasing all animals and birds away from the area as well as the runway due to safety concerns. Based on these results and the low species richness this area is regarded as having a **Medium ecological sensitivity.**

Vegetation unit 5 (Transformed area) is a transformed area where no natural species remain. The natural vegetation that used to occur within this area has been destroyed due to development, agriculture and the demolition of the area. As a result the area has a low species richness and id dominated by pioneer weedy and alien invasive species. This vegetation unit has a **Low (none) ecological sensitivity.**

The alien plants present in the different vegetation units must be controlled as a high priority since they pose a huge risk to ecosystems further away. Apart from one Orange listed plant species, no threatened/red data plant species were found to be present on the study area with no suitable habitat remaining. None of the medicinal plants are threatened and occur abundantly in the province.

Figure 14. Sensitivity map of the different vegetation units Orange=Medium; Yellow=Very Low) (Source: Google Earth, 2024).

9.2 Ecological statement and opinion of the specialists

Based on the site verification and detailed survey visit, the ecological impacts of the proposed development of the area were assessed and is not thought that development of the study site would have a large negative impact on the environment provided that the mitigation measures as indicated in this report are incorporated into the management plan and adhered to. According to the DFFE screening tool the **vegetation** of the south-western and eastern section of study site has a medium sensitivity with the rest having a low sensitivity. The results of this study indicate the vegetation of the study site to have a **low sensitivity** with only the artificial wetland (vegetation unit 3) having a **medium sensitivity** mainly due to its ecosystem functioning and not the vegetation component. The **faunal** component of the largest part of the site has a medium sensitivity with the eastern section (vegetation units 1 & 3) having a high sensitivity. The **high sensitivity** for African Grass Owl (*Tyto capensis*) is disputed due to habitat transformation and degradation as well as high levels of anthropogenic disturbances on and adjacent to the site. The frequent burning of the vegetation as well as high-levels of anthropogenic activities including ACSA'S bird management programme using dogs and loud noises result in a **Medium sensitivity** for the artificially created wetlands and a Low likelihood of extended periods on the site. The **Medium sensitivity** is disputed for White-bellied or Denham's Bustard (*Eupodotis senegalensis*), Maquassie Musk Shrew (*Crocidura maquassiensis*) and Spotted-necked Otter (*Hydrictis maculicollis*) due to extensive habitat transformation and degradation as well as high levels of anthropogenic disturbances on and adjacent to the site (ACSA'S bird management programme). There is a **Low sensitivity** for Denham's Bustard (*Eupodotis senegalensis*), Maquassie Musk Shrew (*Crocidura maquassiensis*) and Spotted-necked Otter (*Hydrictis maculicollis*) due to lack of suitable habitat as well as high levels of anthropogenic disturbances on and adjacent to the site.

Overall, the DFFE **terrestrial biodiversity** is regarded as **high**. According to GDARD the largest part of the study site is regarded as a CBA. Based on the results of this study, the vegetation of these areas is degraded/transformed with no resemblance to Egoli Granite Grassland with mainly pioneer, secondary successional and alien invasive plant species remaining. Due to continued management, aeroplanes and active management (loud noises, regular patrolling, active chasing of birds, developments along the boundary of the study site etc.) limited faunal diversity has remained. Species recorded during the brief site visit were all common and widespread (ubiquitous) species.

The artificial wetland has obtained a medium Biodiversity Importance and ecological sensitivity. Due to the active management to prevent avifaunal species utilising the area this vegetation unit has a low plant and animal species diversity. This human-made system

would revert back to the original terrestrial vegetation once the waterflow to the area is correctly managed and the stormwater pipes channelling water towards the area is diverted. As a result, development of this area could be supported on the basis that the conservation authorities provide final approval.

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ANNEXURE 1 Red data plant species previously recorded in the region

CONFIDENTIAL

The data in the table below is confidential and may not be made available in any document available for public perusal. This annexure must be removed from any document that is published or made available to public or any third party.

Species	Family	Found	Comments
CRITICALLY ENDANGERED			
Lotononis adpressa subsp. leptantha	FABACEAE	×	No suitable habitat
NEAR THREATENED			
Cleome conrathii	CAPPARACEAE	×	No suitable habitat
Delosperma leendertziae	MESMBRYANTHEMACEAE	×	No suitable habitat
Habenaria barbertoni	ORCHIDACEAE	×	No suitable habitat
Habenaria kraenzliniana	ORCHIDACEAE	×	No suitable habitat
Holothrix randii	ORCHIDACEAE	×	No suitable habitat
Pearsonia bracteata	FABACEAE	×	No suitable habitat
Drimia sanguinea	HYACINTHACEAE	×	No suitable habitat
ENDANGERED			
Habenaria mossii		×	No suitable habitat
DECLINING			
Boophone disticha	AMARYLLIDACEAE	×	No suitable habitat
Callilepis leptophylla	ASTERACEAE	×	No suitable habitat
Drima altissima	LILIACEAE	×	No suitable habitat
Gunnera perpensa	GUNNERACEAE	×	No suitable habitat
Hypoxis hemerocallidea	HYPOXIDAE	✓	Unit 2
Ilex mitis (L.) Radlk.	AQUIFOLIACEAE	×	No suitable habitat
VULNERABLE			
Bowiea volubilis	HYACINTHACEAE	×	No suitable habitat
Cheilanthes deltoidea subsp. silicola	PTERIDACEAE	×	No suitable habitat
Melolobium subspicatum	FABACEAE	×	No suitable habitat
Prunus africana	ROSACEAE	×	No suitable habitat
Xerophyta adendorfii	VELLOZIACEAE		No suitable habitat

ANNEXURE 2 Additional specialist info

LR BROWN

Personal details

Title: Professor
Nationality: South African
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Personal profile

He is and an applied ecologist with a particular interest in plant communities. His research focuses on the classification and description of southern African ecosystems as the basis for the appropriate management of natural areas. His research is directed at long-term studies of plant communities and wetlands (classification, description and assessment of conservation status) in relation to local climate, the identification of different environmental gradients within and between communities, and the reaction of communities to different patterns of land use and management practices. He is the main author of a publication setting the guidelines for vegetation phytosociological (classification) surveys in southern Africa. He was on the editorial board of the *South African Journal of Botany* and is currently on the editorial board of the international journal *Vegetation Classification & Description*, while also serving as a section editor for *Koedoe, CABI* & *Royal Society Open Science*. He has collaborative research projects with various organisations/institutions nationally and internationally. He is a member of both the Quality Assurance Committee of SACNASP and the International Association of Vegetation Scientists Vegetation Classification Working Group. He has served as an evaluator of qualifications in the botanical sciences for the South African Council for Scientific Professions, been an advisory committee member of the African Vegetation and Plant Diversity Research Centre at the University of Pretoria, an executive board member of the Institute of Environment and Recreation Management of SA, and secretary of the SAASA (2002-2004), chairperson of the Professional Affairs Committee for the Grassland Society of southern Africa and also the past President of the Grassland Society of southern Africa. He is also a board member of Elephants Alive: South Africa, the chairperson of the evaluating committee of the Senior Captain Scott Memorial Medal for Biology for the SAASA.

Specialisation

- Vegetation impact assessments (Grassland, Savanna & Nama-karoo Biomes)
- Botanical surveying
- Vegetation mapping
- Wetland delineation
- Veld management & restoration
- Veld condition & grazing capacity
- Bush encroachment/ densification monitoring
- Game farm planning & vegetation management

Scientific involvement

Author of:

- 240+ impact assessment reports on natural resources and utilisation.
- 68 scientific papers published in accredited and non-accredited scientific/other journals.
- 72 papers/posters at national and international congresses
- 11 invited talks as workshops, interest groups, societies etc.
- 2 Scientific reports published by WRC.
- 12 commissioned research projects
- Co-author of the book titled "The story of Life and the Environment: and African perspective"
- 5 chapters in scientific books

C COOK

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Specialisation

- Faunal & Ecological surveys
- Herpetological Surveys
- Wetland delineations

Scientific involvement

- Registered professional member of The South African Council for Natural Scientific Professions (Zoological Science), registration number 400084/04.
- Faunal and Specialist Herpetological consultant since 1997.
- Conducted over 250 preliminary faunal surveys and over 150 specialist surveys as a faunal consultant.
- Regional Organiser for Gauteng Province for the South African Frog Atlas Project 1999-2003.
- Published a scientific paper on *Pyxicephalus adspersus*, 8 scientific conference presentations, co-wrote the species accounts for the genus *Pyxicephalus* for the Atlas and Red Data Book of the Frogs of South Africa, Lesotho and Swaziland South African as well as W.R.C Report No. 1258/1/06 on "A Biophysical framework for The Sustainable Management of Wetlands in Limpopo Province with Nylsvley as a Reference Model". WRC PROJECT K5/1928: "Assessment of the Current Biodiversity of The Wetland Amphibians Associated With Major River Systems Of The Kruger National Park (And The Physical And Chemical Factors Affecting Their Distribution)". VLOK, W[1], Fouche, P[2,] Cook, C.L.[3] and Pieterson, I[4].
- Attended 5 national and international herpetological congresses & 4 expert workshops, 6 Zoological Conferences as well as 4 South African Aquatic Sciences conferences lectured zoology and botanical science at University of Limpopo (2001-2004).
- Participant and author in the State of the Rivers project for the upper reaches of the Letaba River System.
- Participant in the South African Reptile Conservation Assessment (SARCA).
- Participant in the EWT Giant Bullfrog species survival programme as well as African Grass Owl Workshops.