Avifauna Assessment Report for the proposed Transalloys Solar Photovoltaic (PV) Facility

Emalahleni, Mpumalanga Province

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CLIENT

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1 Introduction

1.1 Background

The Biodiversity Company was appointed to undertake an avifauna assessment for the proposed 55 MW Solar Photovoltaics (PV) Energy Facility at Transalloys, Mpumalanga Province. The project area is located approximately 10 km west of Emalahleni, in the Mpumalanga Province.

The approach was informed by the Environmental Impact Assessment Regulations. 2014 (GNR 326, 7 April 2017) of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA). The approach has taken cognisance of the recently published Government Notices 320 (20 March 2020) in terms of NEMA, dated 20 March and 30 October 2020: "*Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of Sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, when applying for Environmental Authorisation*" (Reporting Criteria). The National Web based Environmental Screening Tool has characterised the terrestrial sensitivity of the project area as "Very High". The animal sensitivity was rated as "Highly" sensitive.

This report, after taking into consideration the findings and recommendations provided by the specialist herein, should inform and guide the Environmental Assessment Practitioner (EAP) and regulatory authorities, enabling informed decision making, as to the ecological viability of the proposed project.

1.2 Project Description

Transalloys (Pty) Ltd proposes to develop PV Energy Facility with a capacity of up to 55 MW and associated infrastructure on Portions 34 and 35 of the Farm Elandsfontein 309 JS and Portions 20 and 24 of the Farm Schoongezicht 308 JS within the Emalahleni Local Municipality. The subject property is located adjacent to the Transalloys existing smelter complex on Clewer Road 1034 in Emalahleni and the site is within the Emalahleni Renewable Energy Development Zone (REDZ 9). The purpose of this Solar PV Energy Facility is to partially meet Transalloys' current electricity demands and future expansion requirements. The plant will be a captive generating plant from which generated electricity will be fed directly into the existing Transalloys' smelter complex for direct consumption.

The Solar PV Energy Facility will include the following:

- Solar PV array comprising PV modules and mounting structures (Bifacial panels with single axis tracking system);
- Inverters and transformers;
- Cabling between the project components;
- 33 kV underground powerline;
- On-site facility substation and a power line to connect the solar PV facility to the existing Transalloys Substation;
- Security office, operations and control, and maintenance and storage laydown areas; and
- Access roads and internal distribution roads.

1.3 Project Area of Influence

A 777 ha Project Area of Influence (PAOI) is delineated to incorporate the proposed development footprint and represents the total area to be assessed. The proposed development footprint is approximately 67.9 ha and falls within a development area of 100 ha, which is situated on a 235 ha property. A map of the PAOI in relation to the local region is presented in Figure 1-1, and a detailed map of the PAOI and associated development area is presented in Figure 1-2.

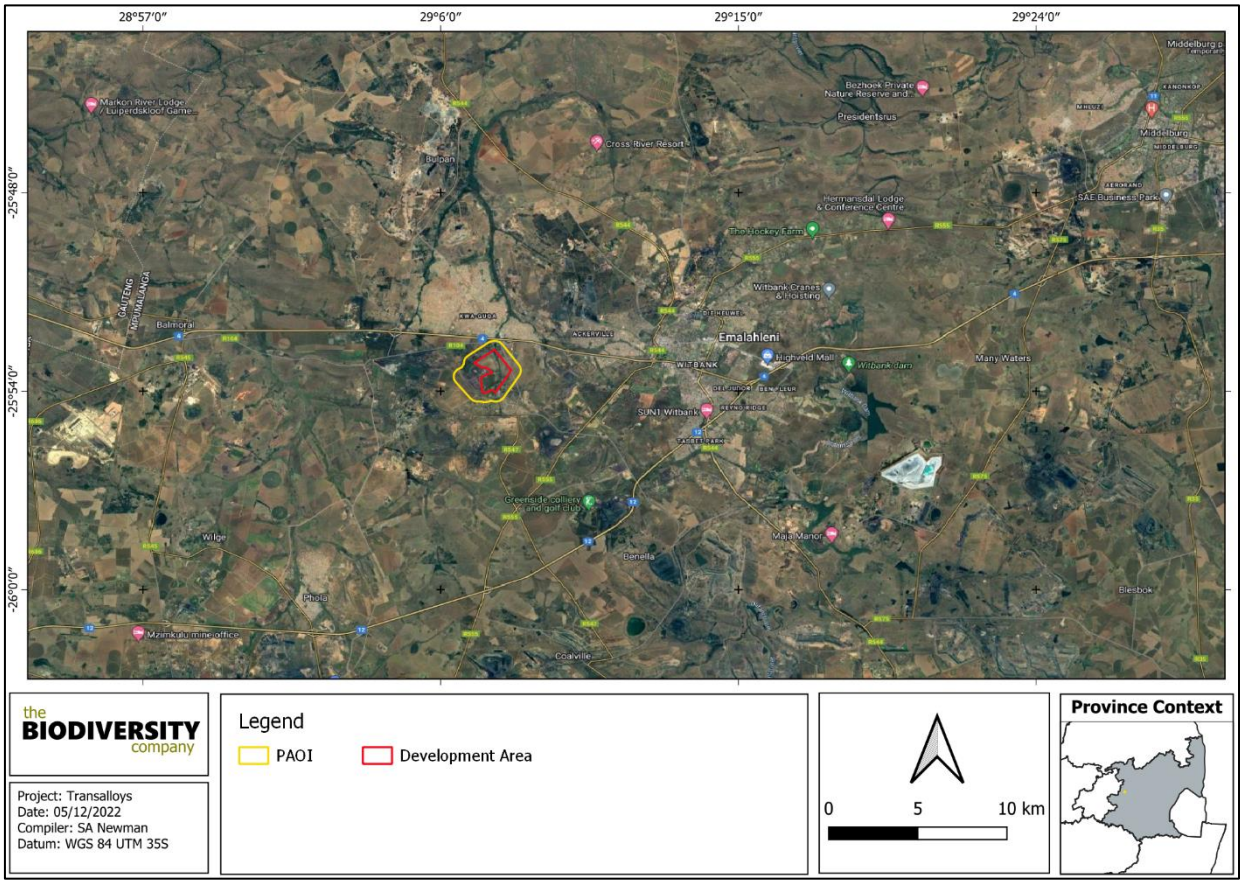


Figure 1-1 Proposed location of the project area in relation to the nearby towns

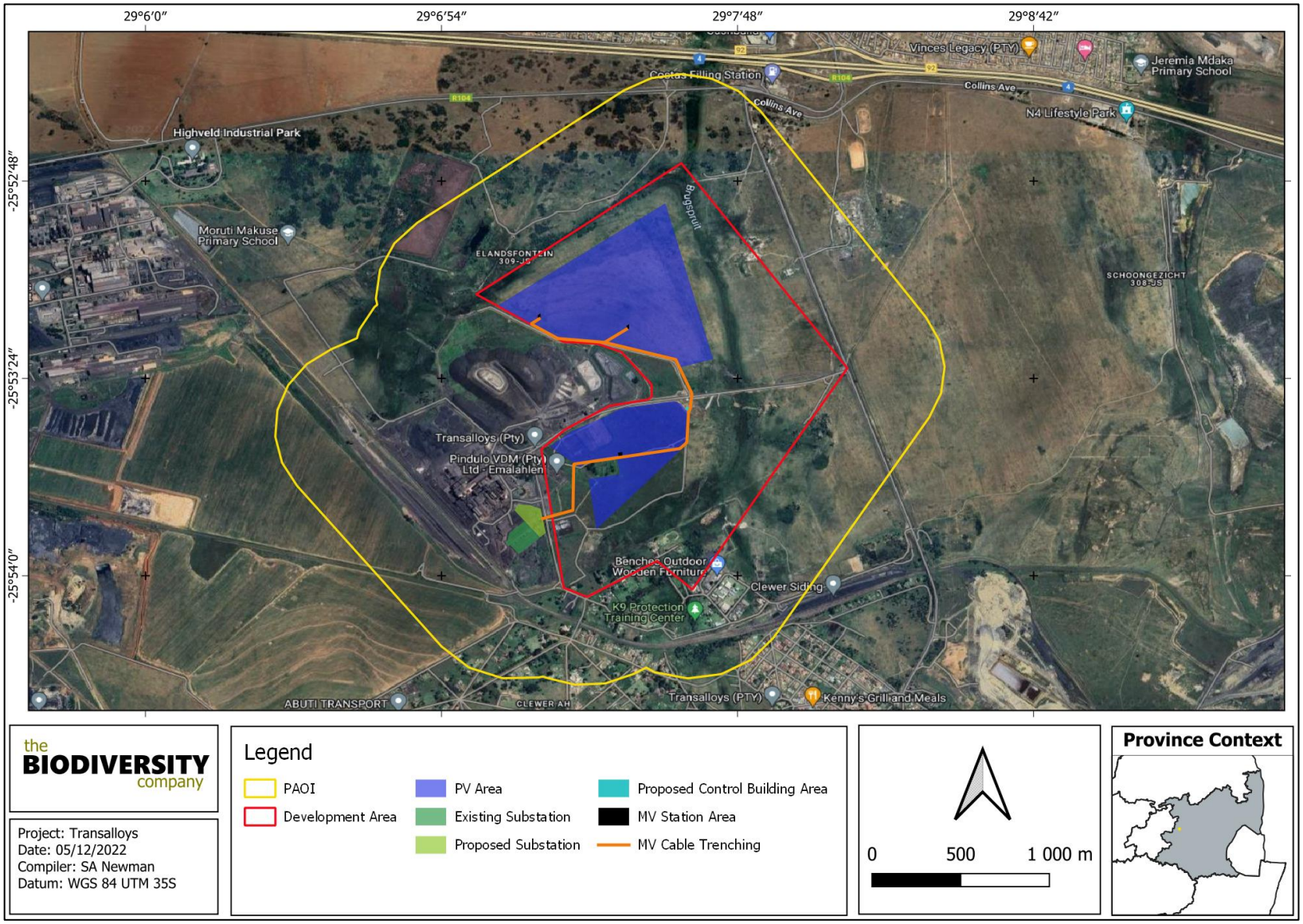


Figure 1-2 Map illustrating the details of the project area

1.4 Specialist Details

Report Name	**Avifauna Assessment Report for the proposed Transalloys Solar Photovoltaic (PV) Facility**
Reference	**Transalloys Photovoltaic (PV) facility**
Submitted to	savannah environmental
Field Work	**Anton Schultz** Anton has birding experience across Southern Africa (including South Africa and all of its provinces) where he has recorded the majority of naturally occurring bird species on his big year in 2019. He is a member of the President Ridge bird club and a Monitor for the Roodekrans Black eagle project. He has worked with Birdlife South Africa to raise funds for the White-Winged Flufftail project and is currently in the process of obtaining his FGASA NQF2.
Report Writer	**Lindi Steyn**  Dr Lindi Steyn has completed her PhD in Biodiversity and Conservation from the University of Johannesburg. Lindi is a terrestrial ecologist with a special interest in ornithology. She has completed numerous studies ranging from basic Assessments to Environmental Impact Assessments following IFC standards.
Reviewer	**Andrew Husted**  Andrew Husted is Pr Sci Nat registered (400213/11) in the following fields of practice: Ecological Science, Environmental Science and Aquatic Science. Andrew is an Aquatic, Wetland and Biodiversity Specialist with more than 13 years' experience in the environmental consulting field.
Declaration	The Biodiversity Company and its associates operate as independent consultants under the auspice of the South African Council for Natural Scientific Professions. We declare that we have no affiliation with or vested financial interests in the proponent, other than for work performed under the Environmental Impact Assessment Regulations, 2017. We have no conflicting interests in the undertaking of this activity and have no interests in secondary developments resulting from the authorisation of this project. We have no vested interest in the project, other than to provide a professional service within the constraints of the project (timing, time and budget) based on the principals of science.

1.5 Terms of Reference

The assessment was achieved according to the above-mentioned legislation and the best-practice guidelines and principles for avifaunal assessment within solar energy facilities as outlined by Birdlife South Africa.

The scope of the avifaunal assessment included the following:

- Description of the baseline avifaunal community;
- Identification of present or potentially occurring Species of Conservation Concern (SCC);
- Sensitivity assessment and map to identify sensitive areas in the project area; and
- Impact assessment, mitigation measures to prevent or reduce the possible impacts.

1.6 Assumptions and Limitations

The following assumptions and limitations are applicable for this assessment:

- The assessment area was based on the spatial data provided by the client and any alterations to the route and/or missing GIS information pertaining to the assessment area would have affected the area surveyed;
- The assessment area was only surveyed during a single winter site visit and therefore, this assessment does not consider temporal trends;
- It is assumed that all powerlines are underground;
- Portions of the project area has recently been burned based and as such would have influenced the findings; and
- The assessment was conducted in late winter; therefore, summer species and migratory species were absent.

1.7 Key Legislative Requirements

The legislation, policies and guidelines listed below in Table 1-1 are applicable to the current project. The list below, although extensive, may not be complete and other legislation, policies and guidelines may apply in addition to those listed below.

Table 1-1 A list of key legislative requirements relevant to biodiversity and conservation in the Mpumalanga Province

Region	Legislation
National	Constitution of the Republic of South Africa (Act No. 108 of 1996)
	The National Environmental Management Act (NEMA) (Act No. 107 of 1998)
	The National Environmental Management: Protected Areas Act (Act No. 57 of 2003)
	The National Environmental Management: Biodiversity Act (Act No. 10 of 2004), Threatened or Protected Species Regulations
	Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of Sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, GNR 320 of Government Gazette 43310 (March 2020)
	Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of Sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, GNR 1150 of Government Gazette 43855 (October 2020)
	The National Environmental Management: Waste Act, 2008 (Act 59 of 2008);
	The Environment Conservation Act (Act No. 73 of 1989)
	National Protected Areas Expansion Strategy (NPAES)

	Natural Scientific Professions Act (Act No. 27 of 2003)
	National Biodiversity Framework (NBF, 2009)
	National Forest Act (Act No. 84 of 1998)
	National Veld and Forest Fire Act (101 of 1998)
	National Water Act (NWA) (Act No. 36 of 1998)
	National Spatial Biodiversity Assessment (NSBA)
	World Heritage Convention Act (Act No. 49 of 1999)
	Municipal Systems Act (Act No. 32 of 2000)
	Alien and Invasive Species Regulations and, Alien and Invasive Species List 20142020, published under NEMBA
	South Africa's National Biodiversity Strategy and Action Plan (NBSAP)
	Conservation of Agricultural Resources Act, 1983 (Act 43 of 1983) (CARA)
	Sustainable Utilisation of Agricultural Resources (Draft Legislation).
	White Paper on Biodiversity
Provincial	Mpumalanga Parks Board Act 6 of 1995
	Mpumalanga Conservation Act, 1998 (Act 10 of 1998)
	Mpumalanga Tourism and Parks Agency Act, No 5 of 2005
	Mpumalanga Biodiversity Sector Plan

2 Methods

2.1 Desktop Assessment

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

2.1.1 Ecologically Important Landscape Features

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

- National Biodiversity Assessment 2018 (Skowno *et al*, 2019) (NBA) - The purpose of the NBA is to assess the state of South Africa's biodiversity based on best available science, with a view to understanding trends over time and informing policy and decision-making across a range of sectors. The NBA deals with all three components of biodiversity: genes, species, and ecosystems; and assesses biodiversity and ecosystems across terrestrial, freshwater, estuarine and marine environments. The two headline indicators assessed in the NBA are:
    - *Ecosystem Threat Status* – indicator of an ecosystem's wellbeing, based on the level of change in structure, function or composition. Ecosystem types are categorised as Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Near Threatened (NT) or Least Concern (LC), based on the proportion of the original extent of each ecosystem type that remains in good ecological condition.
    - *Ecosystem Protection Level* – indicator of the extent to which ecosystems are adequately protected or under-protected. Ecosystem types are categorised as Well Protected (WP), Moderately Protected (MP), Poorly Protected (PP), or Not Protected (NP), based on the proportion of the biodiversity target for each ecosystem type that is included within one

or more protected areas. NP, PP or MP ecosystem types are collectively referred to as under-protected ecosystems.

- Protected areas - South Africa Protected Areas Database (SAPAD) (DEA, 2021) – The SAPAD Database contains spatial data pertinent to the conservation of South African biodiversity. It includes spatial and attribute information for both formally protected areas and areas that have less formal protection. SAPAD is updated on a continuous basis and forms the basis for the Register of Protected Areas, which is a legislative requirement under the National Environmental Management: Protected Areas Act, Act 57 of 2003.
- National Protected Areas Expansion Strategy (NPAES) (SANBI, 2016) – The NPAES provides spatial information on areas that are suitable for terrestrial ecosystem protection. These focus areas are large, intact and unfragmented and therefore, of high importance for biodiversity, climate resilience and freshwater protection.
- Conservation/Biodiversity Sector Plan:

  The key output of this systematic biodiversity plan is a map of biodiversity priority areas (MTPA, 2014). The MBSP CBA map delineates Critical Biodiversity Areas, Ecological Support Areas, Other Natural Areas, Protected Areas, and areas that have been irreversibly modified from their natural state (MTPA, 2014). The MBSP uses the following terms to categorise the various land used types according to their biodiversity and environmental importance:

  - Critical Biodiversity Area (CBA);
  - Ecological Support Area (ESA);
  - Other Natural Area (ONA);
  - Protected Area (PA); and
  - Moderately or Heavily Modified Areas (MMA's or HMA's).

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

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

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

    - ONAs consist of all those areas in good or fair ecological condition that fall outside the protected area network and have not been identified as CBAs or ESAs. A biodiversity

sector plan or bioregional plan must not specify the desired state/management objectives for ONAs or provide land-use guidelines for ONAs (SANBI-BGIS, 2017).

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

- Important Bird and Biodiversity Areas (IBAs) (BirdLife South Africa, 2017) – IBAs constitute a global network of over 13 500 sites, of which 112 sites are found in South Africa. IBAs are sites of global significance for bird conservation, identified through multi-stakeholder processes using globally standardised, quantitative and scientifically agreed criteria; and

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

2.1.2 Desktop Faunal Assessment

The avifaunal desktop assessment comprised of the following, compiling an expected:

- Avifauna list, generated from the SABAP2 dataset by looking at pentads 2545_2900; 2545_2905; 2545_2910; 2550_2900; 2550_2905; 2550_2910; 2555_2900; 2555_2905; 2555_2910).

2.2 Field Assessment

The field survey was undertaken during 18-20 June 2022. Effort was made to cover all the different habitat types within the limits of time and access (Figure 2-1).

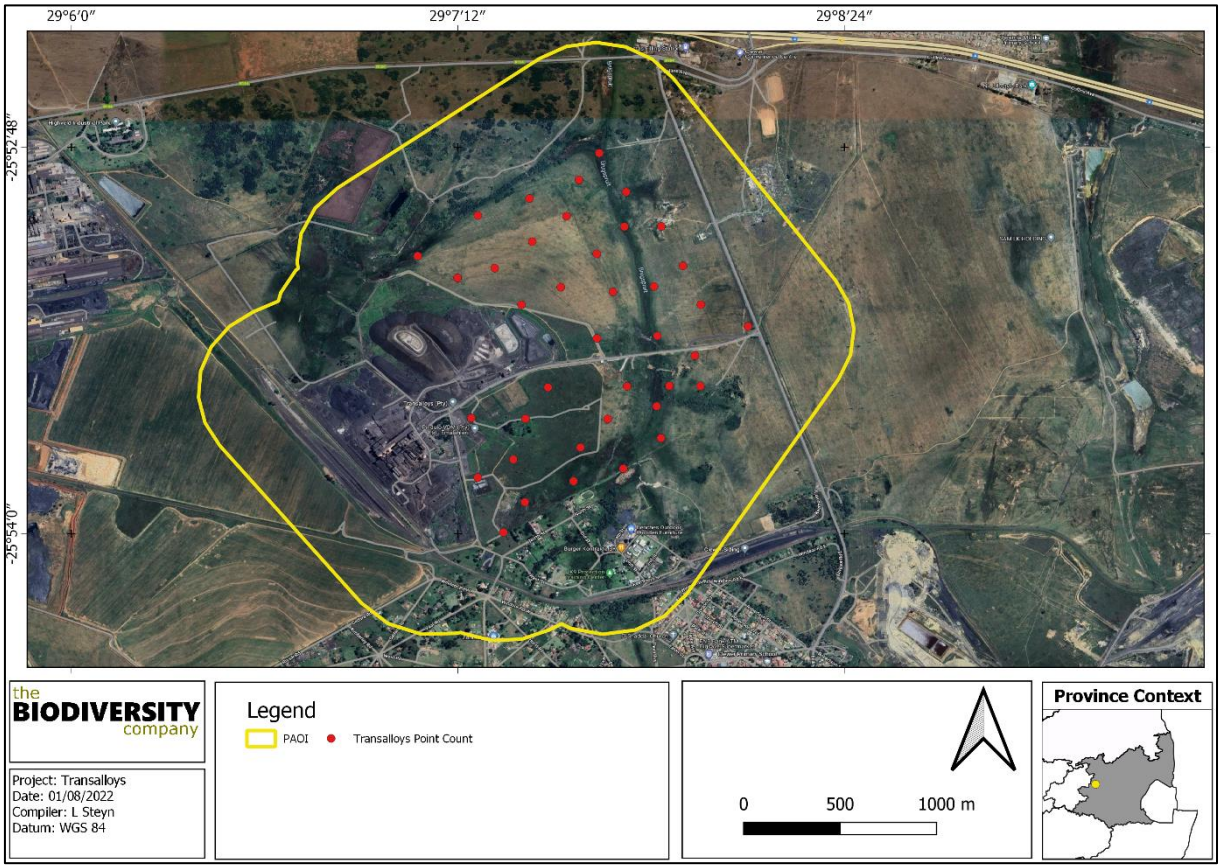


Figure 2-1 Map illustrating the field survey area

Sampling consisted of standardized point counts as well as random diurnal incidental surveys and vantage point surveys. Standardized point counts (following Buckland *et al.* 1993) were conducted to gather data on the species composition and relative abundance of species within the broad habitat types identified. Each point count was run over a 10 min period. The horizontal detection limit was set at 50 m. At each point the observer would document the date, start time, and end time, habitat, numbers of each species, detection method (seen or heard), behaviour (perched or flying) and general notes on habitat and nesting suitability for conservation important species. To supplement the species inventory with cryptic and illusive species that may not be detected during the rigid point count protocol, diurnal incidental searches were conducted. This involved the opportunistic sampling of species between point count periods, river scanning and road cruising.

2.2.1 Data analysis

Point count data was arranged into a matrix with point count samples in rows and species in columns. The table formed the basis of the various subsequent statistical analyses. This data was first used to distinguish similarities / differences in the species composition between the two identified avifaunal habitats, the matrix was converted into a Bray-Curtis dissimilarity matrix. The data was subject to fourth root transformation to downscale the contribution of very abundant species while upscaling the influence of less abundant species. However, the effect was negligible and ultimately the raw data proved more informative. Thirdly, raw count data was converted to relative abundance values and used to establish dominant species and calculate the diversity of each habitat. The Shannon Diversity Index (H') was the metric used to estimate diversity. Lastly, present, and potentially occurring species were assigned to 13 major trophic guilds loosely based on the classification system developed by González-Salazar *et al.* (2014). Species were first classified by their dominant diet (carnivore, herbivore, granivore, frugivore, nectarivore, omnivore), then by the medium upon / within which they most frequently forage (ground, water, foliage, air) and lastly by their activity period (nocturnal or diurnal).

2.3 Terrestrial Site Ecological Importance (SEI)

The different habitat types within the assessment area were delineated and identified based on observations during the field assessment as well as available satellite imagery. These habitat types were assigned Ecological Importance (EI) categories based on their ecological integrity, conservation value, the presence of species of conservation concern and their ecosystem processes.

Site Ecological Importance (SEI) is a function of the Biodiversity Importance (BI) of the receptor (e.g., SCC, the vegetation/fauna community or habitat type present on the site) and Receptor Resilience (RR) (its resilience to impacts) as follows.

BI is a function of Conservation Importance (CI) and the Functional Integrity (FI) of the receptor as follows. The criteria for the CI and FI ratings are provided in Table 2-1 and Table 2-2, respectively.

Table 2-1 Summary of Conservation Importance (CI) criteria

Conservation Importance	Fulfilling Criteria
Very High	Confirmed or highly likely occurrence of CR, EN, VU or Extremely Rare or Critically Rare species that have a global EOO of < 10 km^2. Any area of natural habitat of a CR ecosystem type or large area (> 0.1% of the total ecosystem type extent) of natural habitat of an EN ecosystem type. Globally significant populations of congregatory species (> 10% of global population).
High	Confirmed or highly likely occurrence of CR, EN, VU species that have a global EOO of > 10 km^2. IUCN threatened species (CR, EN, VU) must be listed under any criterion other than A. If listed as threatened only under Criterion A, include if there are less than 10 locations or < 10 000 mature individuals remaining. Small area (> 0.01% but < 0.1% of the total ecosystem type extent) of natural habitat of EN ecosystem type or large area (> 0.1%) of natural habitat of VU ecosystem type. Presence of Rare species. Globally significant populations of congregatory species (> 1% but < 10% of global population).
Medium	Confirmed or highly likely occurrence of populations of NT species, threatened species (CR, EN, VU) listed under Criterion A only and which have more than 10 locations or more than 10 000 mature individuals. Any area of natural habitat of threatened ecosystem type with status of VU. Presence of range-restricted species. > 50% of receptor contains natural habitat with potential to support SCC.
Low	No confirmed or highly likely populations of SCC. No confirmed or highly likely populations of range-restricted species. < 50% of receptor contains natural habitat with limited potential to support SCC.
Very Low	No confirmed and highly unlikely populations of SCC. No confirmed and highly unlikely populations of range-restricted species. No natural habitat remaining.

Table 2-2 Summary of Functional Integrity (FI) criteria

Functional Integrity	Fulfilling Criteria
Very High	Very large (> 100 ha) intact area for any conservation status of ecosystem type or > 5 ha for CR ecosystem types. High habitat connectivity serving as functional ecological corridors, limited road network between intact habitat patches. No or minimal current negative ecological impacts with no signs of major past disturbance.
High	Large (> 20 ha but < 100 ha) intact area for any conservation status of ecosystem type or > 10 ha for EN ecosystem types. Good habitat connectivity with potentially functional ecological corridors and a regularly used road network between intact habitat patches. Only minor current negative ecological impacts with no signs of major past disturbance and good rehabilitation potential.
Medium	Medium (> 5 ha but < 20 ha) semi-intact area for any conservation status of ecosystem type or > 20 ha for VU ecosystem types. Only narrow corridors of good habitat connectivity or larger areas of poor habitat connectivity and a busy used road network between intact habitat patches. Mostly minor current negative ecological impacts with some major impacts and a few signs of minor past disturbance. Moderate rehabilitation potential.
Low	Small (> 1 ha but < 5 ha) area. Almost no habitat connectivity but migrations still possible across some modified or degraded natural habitat

	and a very busy used road network surrounds the area. Low rehabilitation potential. Several minor and major current negative ecological impacts.
Very Low	Very small (< 1 ha) area. No habitat connectivity except for flying species or flora with wind-dispersed seeds. Several major current negative ecological impacts.

BI can be derived from a simple matrix of CI and FI as provided in Table 2-3

Table 2-3 Matrix used to derive Biodiversity Importance (BI) from Functional Integrity (FI) and Conservation Importance (CI)

Biodiversity Importance (BI)		**Conservation Importance (CI)**				
		Very high	**High**	**Medium**	**Low**	**Very low**
Functional Integrity (FI)	**Very high**	Very high	Very high	High	Medium	Low
	High	Very high	High	Medium	Medium	Low
	Medium	High	Medium	Medium	Low	Very low
	Low	Medium	Medium	Low	Low	Very low
	Very low	Medium	Low	Very low	Very low	Very low

The fulfilling criteria to evaluate RR are based on the estimated recovery time required to restore an appreciable portion of functionality to the receptor as summarised in Table 2-4.

Table 2-4 Summary of Resource Resilience (RR) criteria

Resilience	**Fulfilling Criteria**
Very High	Habitat that can recover rapidly (~ less than 5 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a very high likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a very high likelihood of returning to a site once the disturbance or impact has been removed.
High	Habitat that can recover relatively quickly (~ 5–10 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a high likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a high likelihood of returning to a site once the disturbance or impact has been removed.
Medium	Will recover slowly (~ more than 10 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a moderate likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a moderate likelihood of returning to a site once the disturbance or impact has been removed.
Low	Habitat that is unlikely to be able to recover fully after a relatively long period: > 15 years required to restore ~ less than 50% of the original species composition and functionality of the receptor functionality, or species that have a low likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a low likelihood of returning to a site once the disturbance or impact has been removed.
Very Low	Habitat that is unable to recover from major impacts, or species that are unlikely to remain at a site even when a disturbance or impact is occurring, or species that are unlikely to return to a site once the disturbance or impact has been removed.

Subsequent to the determination of the BI and RR, the SEI can be ascertained using the matrix as provided in Table 2-5.

Table 2-5 Matrix used to derive Site Ecological Importance (SEI) from Receptor Resilience (RR) and Biodiversity Importance (BI)

Site Ecological Importance (SEI)		**Biodiversity Importance (BI)**				
		Very high	**High**	**Medium**	**Low**	**Very low**
Receptor Resilience (RR)	Very Low	Very high	Very high	High	Medium	Low
	Low	Very high	Very high	High	Medium	Very low

Site Ecological Importance (SEI)		Biodiversity Importance (BI)				
		Very high	High	Medium	Low	Very low
	Medium	Very high	High	Medium	Low	Very low
	High	High	Medium	Low	Very low	Very low
	Very High	Medium	Low	Very low	Very low	Very low

Interpretation of the SEI in the context of the proposed development activities is provided in Table 2-6.

Table 2-6 Guidelines for interpreting Site Ecological Importance (SEI) in the context of the proposed development activities

Site Ecological Importance (SEI)	Interpretation in relation to proposed development activities
Very High	Avoidance mitigation – no destructive development activities should be considered. Offset mitigation not acceptable/not possible (i.e., last remaining populations of species, last remaining good condition patches of ecosystems/unique species assemblages). Destructive impacts for species/ecosystems where persistence target remains.
High	Avoidance mitigation wherever possible. Minimisation mitigation – changes to project infrastructure design to limit the amount of habitat impacted, limited development activities of low impact acceptable. Offset mitigation may be required for high impact activities.
Medium	Minimisation and restoration mitigation – development activities of medium impact acceptable followed by appropriate restoration activities.
Low	Minimisation and restoration mitigation – development activities of medium to high impact acceptable followed by appropriate restoration activities.
Very Low	Minimisation mitigation – development activities of medium to high impact acceptable and restoration activities may not be required.

The SEI evaluated for each taxon can be combined into a single multi-taxon evaluation of SEI for the assessment area. Either a combination of the maximum SEI for each receptor should be applied, or the SEI may be evaluated only once per receptor but for all necessary taxa simultaneously. For the latter, justification of the SEI for each receptor is based on the criteria that conforms to the highest CI and FI, and the lowest RR across all taxa.

3 Results & Discussion

3.1 Desktop Assessment

3.1.1 Ecologically Important Landscape Features

The GIS analysis pertaining to the relevance of the proposed project to ecologically important landscape features is summarised in Table 3-1.

Table 3-1 Summary of relevance of the proposed project to ecologically important landscape features.

Desktop Information Considered	Relevant/Irrelevant	Section
Ecosystem Threat Status	Relevant – Overlaps with a Vulnerable ecosystem.	3.1.1.1
Ecosystem Protection Level	Relevant – Overlaps with a Poorly Protected Ecosystem.	3.1.1.2
Protected Areas	Irrelevant – The project area is approximately 6.8 km from the John Cairns Private Nature Reserve	3.1.1.4
National Protected Areas Expansion Strategy	Relevant – The project area overlaps with a NPAES Priority Focus Area.	3.1.1.5
Mpumalanga Protected Areas Expansion Strategies	Relevant – The project area overlaps with a MPAES Area.	3.1.1.5.1
Critical Biodiversity Area	Relevant – The project area overlaps mainly with a heavily modified area but also does fall over a CBA: optimal and a CBA: Irreplaceable area.	3.1.1.3
Important Bird and Biodiversity Areas	Irrelevant – The project area is 37 km from the Loskop Dam Nature Reserve IBA.	3.1.1.6

Coordinated Avifaunal Count	Irrelevant – 22 km from the closest route	3.1.1.13
REDZ	Relevant – The project area falls within the phase 2 Emalahleni REDZ area.	3.1.1.11
Powerline Corridor	Relevant – The project area falls in the international corridor.	3.1.1.10
South African Inventory of Inland Aquatic Ecosystems	Relevant – The project area's 500 m regulated area overlaps with a CR river and a network of CR wetlands	3.1.1.7
National Freshwater Priority Area	Relevant – The project area's 500 m regulated zone overlaps with unclassified NFEPA wetlands and an unclassified FEPA river	3.1.1.8
Strategic Water Source Areas	Irrelevant – The project area is 101 km from the closest SWSA.	-

3.1.1.1 Ecosystem Threat Status

The Ecosystem Threat Status is an indicator of an ecosystem's wellbeing, based on the level of change in structure, function or composition. Ecosystem types are categorised as Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Near Threatened (NT) or Least Concern (LC), based on the proportion of the original extent of each ecosystem type that remains in good ecological condition. According to the spatial dataset the proposed project overlaps mainly with a VU ecosystem (Figure 3-1).

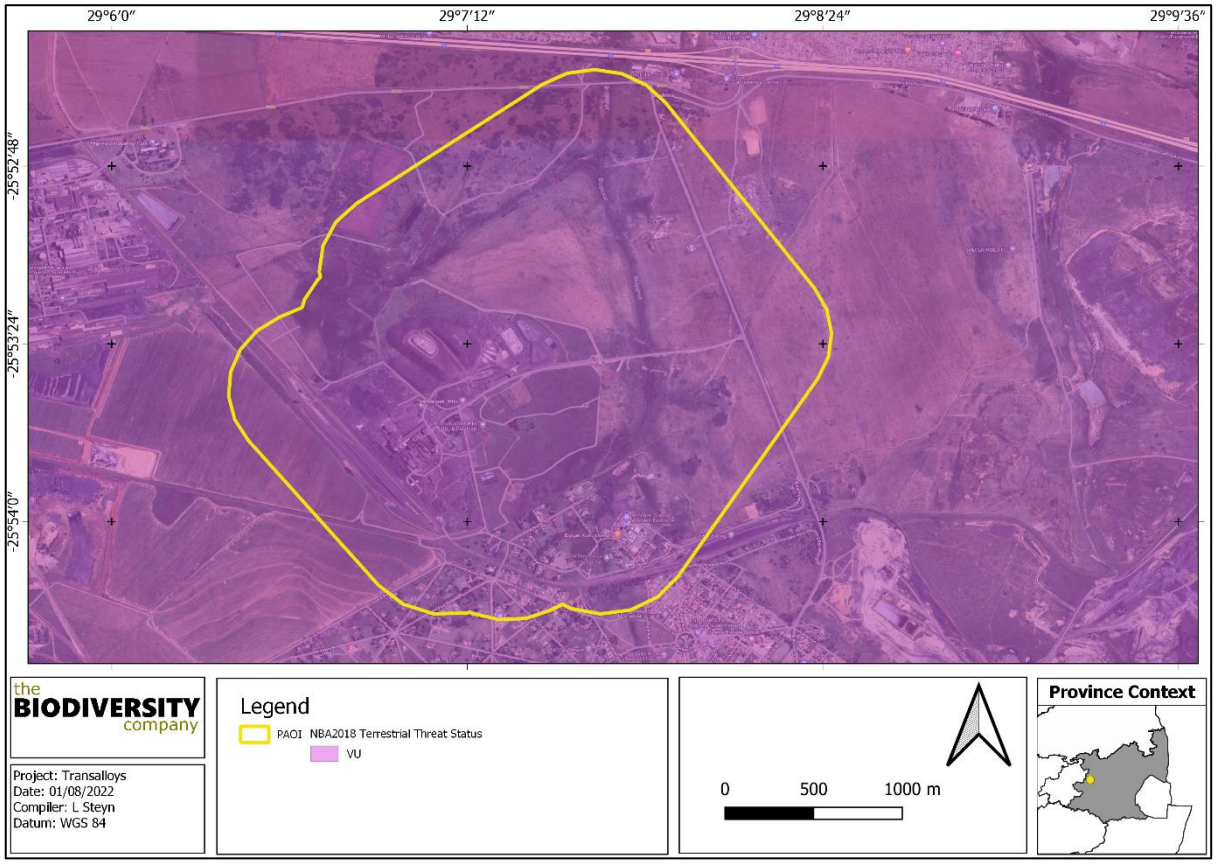


Figure 3-1 Map illustrating the ecosystem threat status associated with the project area

3.1.1.2 Ecosystem Protection Level

This is an indicator of the extent to which ecosystems are adequately protected or under-protected. Ecosystem types are categorised as Well Protected (WP), Moderately Protected (MP), Poorly Protected (PP), or Not Protected (NP), based on the proportion of the biodiversity target for each ecosystem type that is included within one or more protected areas. NP, PP or MP ecosystem types are collectively referred to as under-protected ecosystems. The proposed project overlaps with a PP ecosystem (Figure 3-2).

Figure 3-2 Map illustrating the ecosystem protection level associated with the project area

3.1.1.3 Critical Biodiversity Areas and Ecological Support Areas

The conservation of CBAs is crucial, in that if these areas are not maintained in a natural or near-natural state, biodiversity conservation targets cannot be met. Maintaining an area in a natural state can include a variety of biodiversity compatible land uses and resource uses (SANBI-BGIS, 2017).

The purpose of the North-West Biodiversity Sector Plan (NWBSP) (2015) is to inform land-use planning and development on a provincial scale and to aid in natural resource management. One of the outputs is a map of Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs). These are classified into different categories, namely CBA1 areas, CBA2 areas, ESA1 areas and ESA2 areas based on biodiversity characteristics, spatial configuration, and requirements for meeting targets for both biodiversity patterns and ecological processes.

Figure 3-3 shows the project area superimposed on the Terrestrial CBA maps. The project area overlaps mainly with a heavily modified area, a moderately modified -old lands area as well as fall over a CBA: optimal and a CBA: Irreplaceable area.

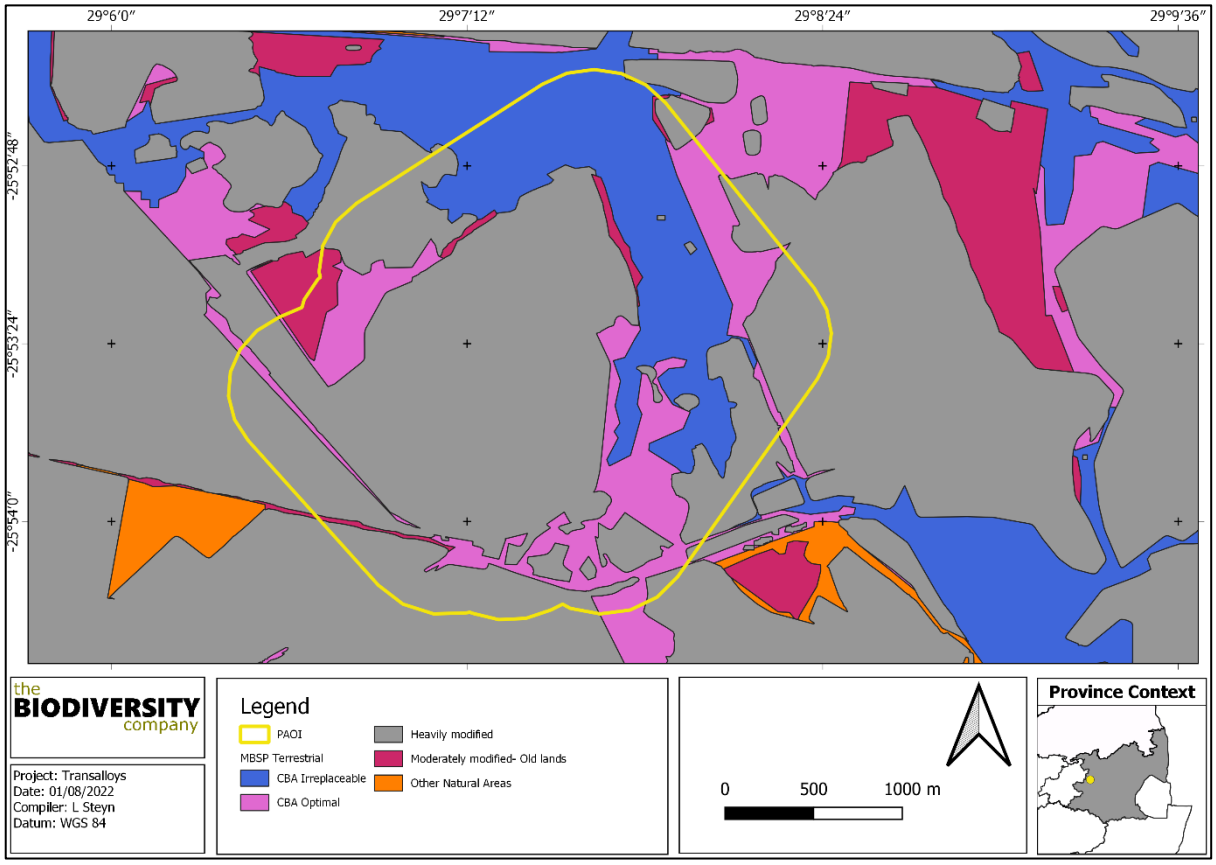


Figure 3-3 Map illustrating the locations of CBAs in the project area

3.1.1.4 Protected Areas

According to the protected area spatial datasets from SAPAD (2021) and SACAD (2021), the project area is approximately 6.8 km from the John Cairns Private Nature Reserve (Figure 3-4).

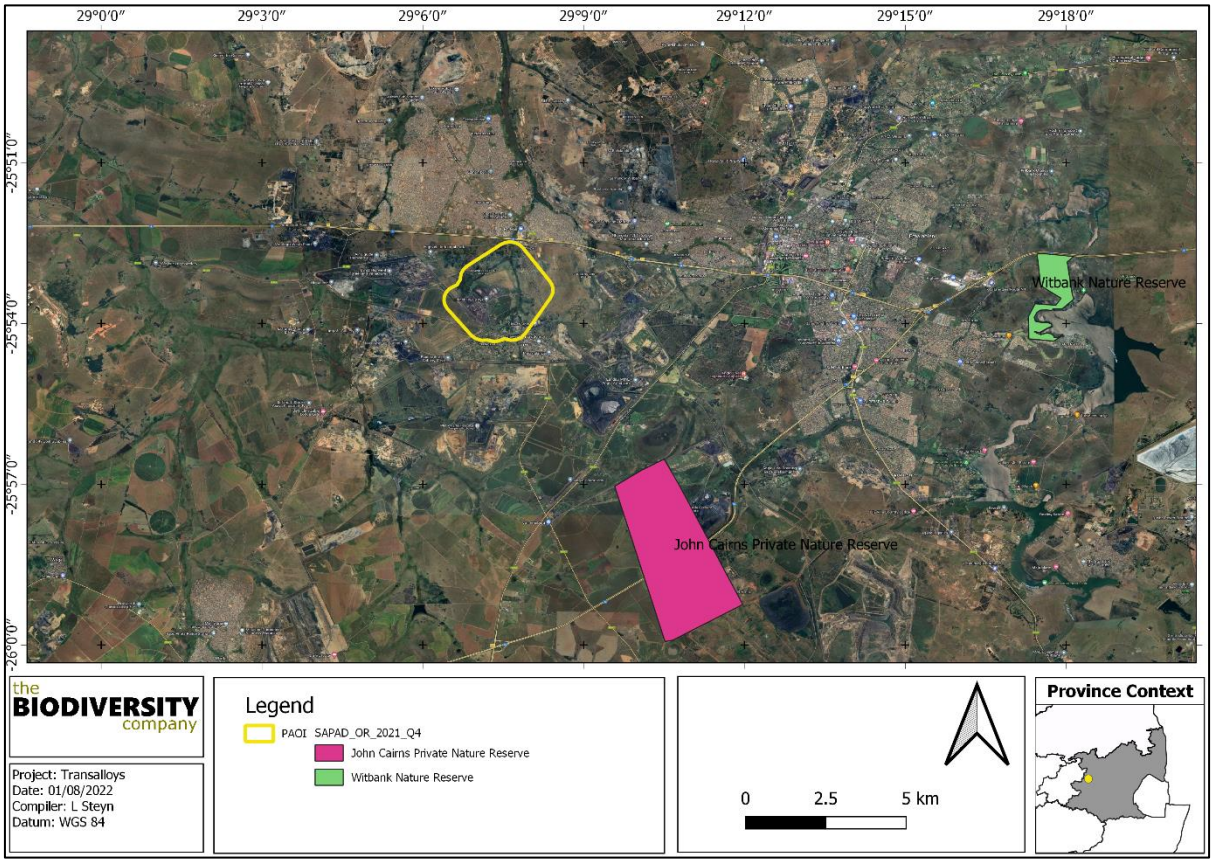


Figure 3-4 The project area in relation to the protected areas

3.1.1.5 National Protected Area Expansion Strategy

National Protected Area Expansion Strategy 2016 (NPAES) areas were identified through a systematic biodiversity planning process. They present the best opportunities for meeting the ecosystem-specific protected area targets set in the NPAES and were designed with a strong emphasis on climate change resilience and requirements for protecting freshwater ecosystems. These areas should not be seen as future boundaries of protected areas, as in many cases only a portion of a particular focus area would be required to meet the protected area targets set in the NPAES. They are also not a replacement for finescale planning which may identify a range of different priority sites based on local requirements, constraints and opportunities (NPAES, 2016).

The project area overlaps with a NPAES Priority Focus Area (Figure 3-5).

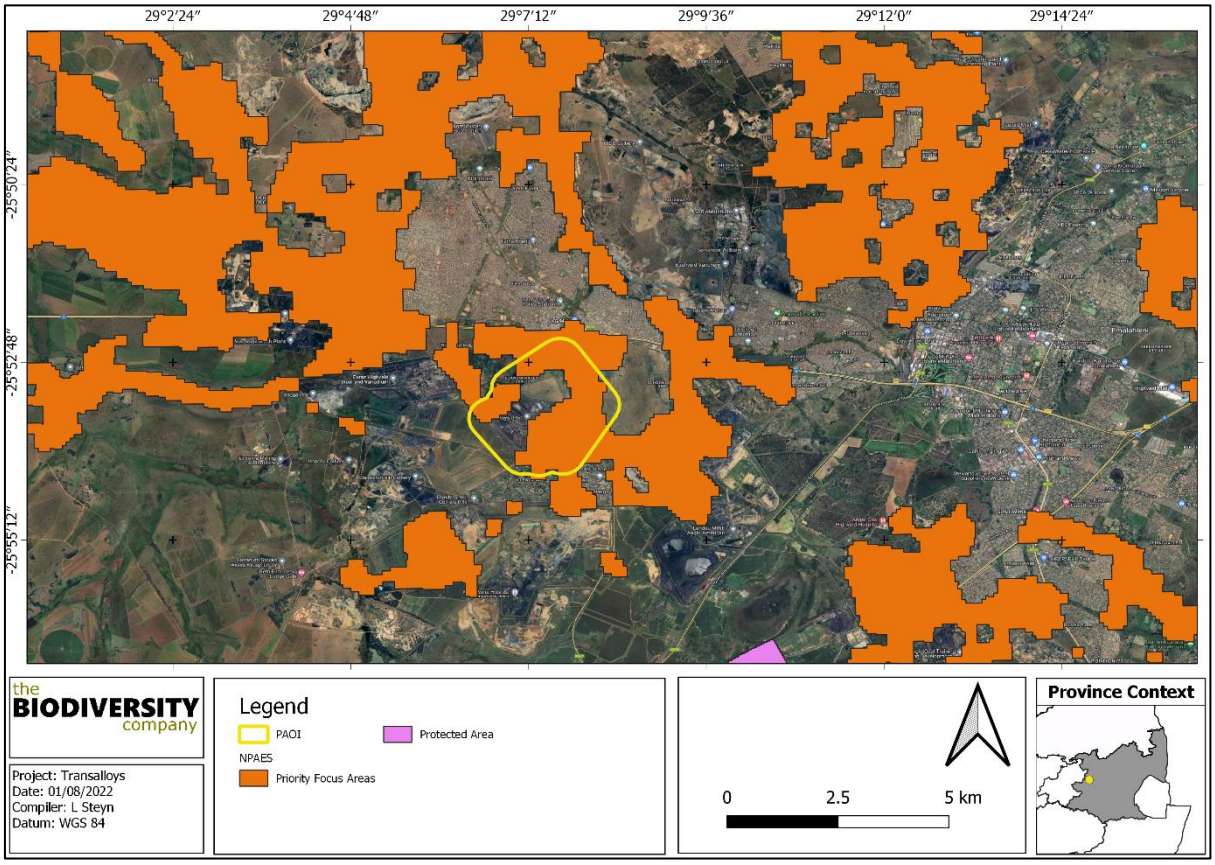


Figure 3-5 The project area in relation to the National Protected Area Expansion Strategy

3.1.1.5.1 Mpumalanga Protected Areas Expansion Strategy

The Mpumalanga Protected Area Expansion Strategy (MPAES, 2013), commissioned by the MTPA, serves to function as a provincial framework for an integrated, co-ordinated and uniform approach in the expansion and consolidation of the Provincial PAs, in line with the requirements of the NPAES.

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

Figure 3-6 shows the project area superimposed on the MPAES (2013) spatial data. As can be seen in this figure, the project area impacts on an area identified as part of the protected area expansion strategy.

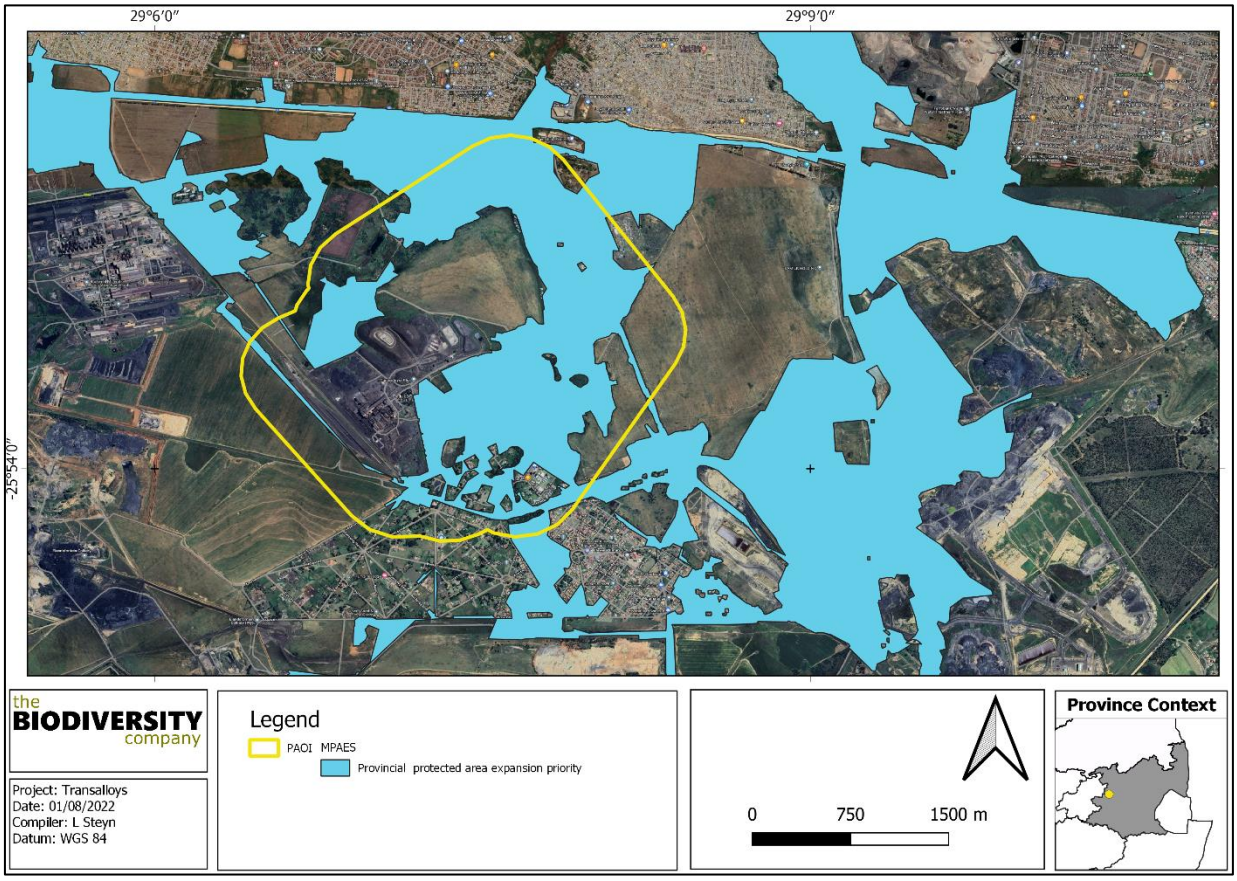


Figure 3-6 The project area in relation to the Mpumalanga Protected Area Expansion Strategy

3.1.1.6 Important Bird and Biodiversity Area

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

According to Birdlife South Africa (2017), the selection of IBAs is achieved through the application of quantitative ornithological criteria, grounded in up-to-date knowledge of the sizes and trends of bird populations. The criteria ensure that the sites selected as IBAs have true significance for the international conservation of bird populations and provide a common currency that all IBAs adhere to, thus creating consistency among, and enabling comparability between, sites at national, continental and global levels. Figure 3-7 shows that the project area is 37 km from the Loskop Dam Nature Reserve IBA.

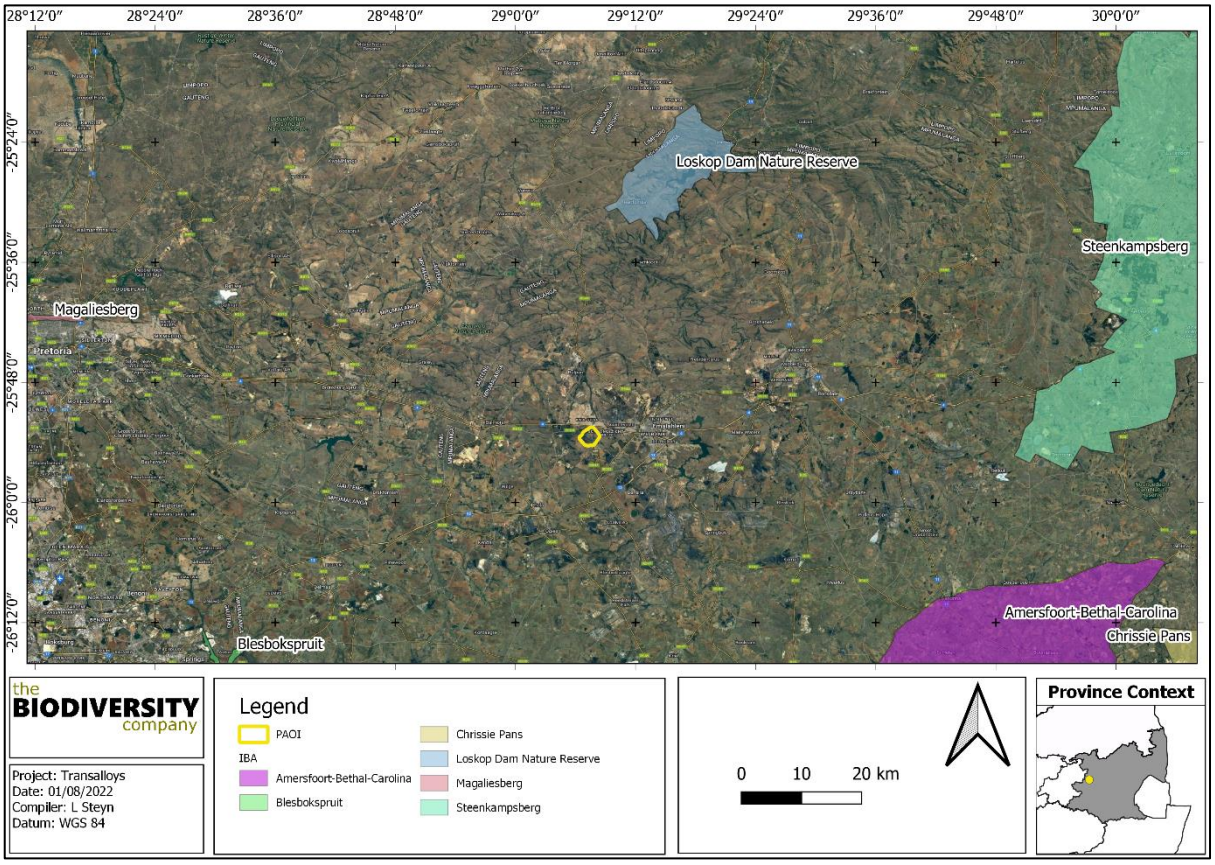


Figure 3-7 The project area in relation to the IBA

3.1.1.7 Hydrological Setting

The South African Inventory of Inland Aquatic Ecosystems (SAIIAE) was released with the NBA 2018. Ecosystem threat status (ETS) of river and wetland ecosystem types are based on the extent to which each river ecosystem type had been altered from its natural condition. Ecosystem types are categorised as CR, EN, VU or LT, with CR, EN and VU ecosystem types collectively referred to as 'threatened' (Van Deventer *et al.,* 2019; Skowno *et al.,* 2019). The project area's 500 m regulated area overlaps with a CR river and a CR wetland (Figure 3-8).

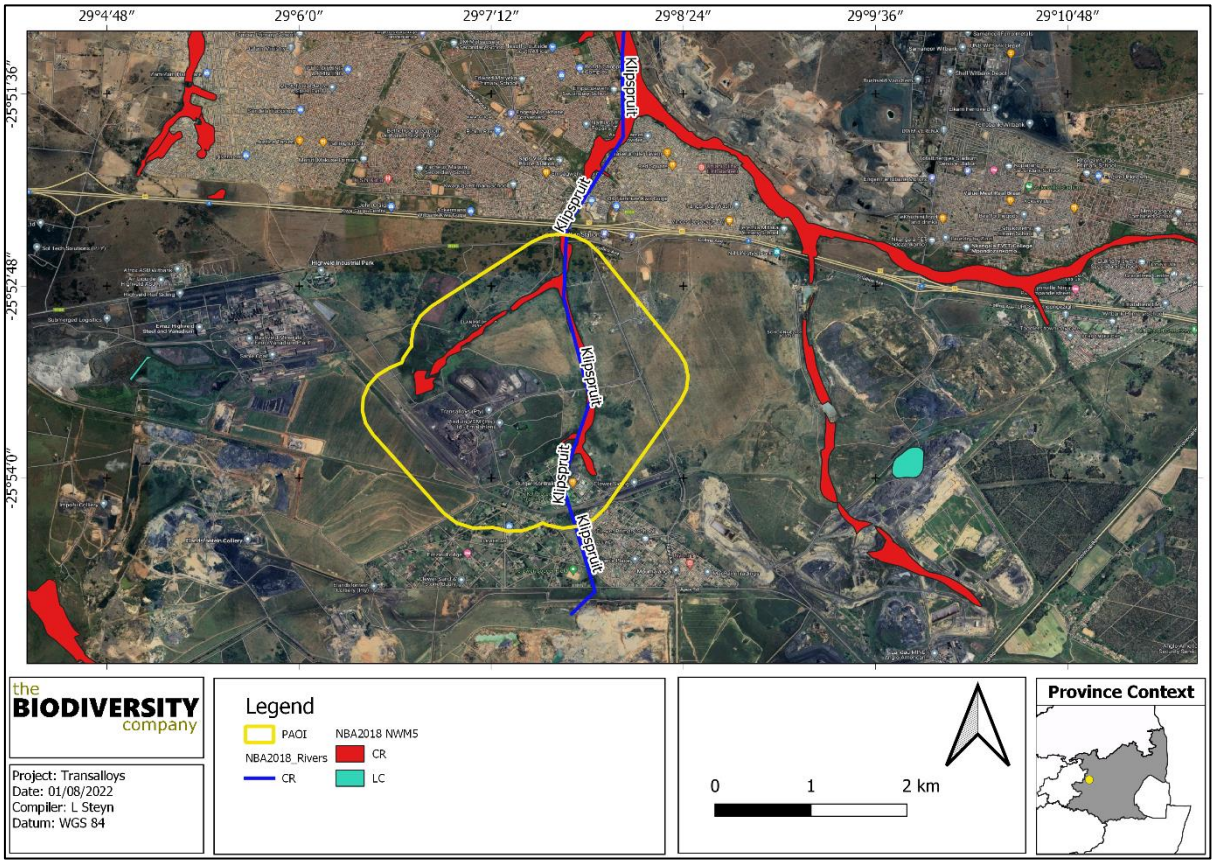


Figure 3-8 Map illustrating ecosystem threat status of rivers and wetland ecosystems in the project area

3.1.1.8 National Freshwater Ecosystem Priority Area Status

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

Figure 3-9 shows that the project area's 500 m regulated area overlaps with a non-FEPA river and a number of non FEPA wetlands.

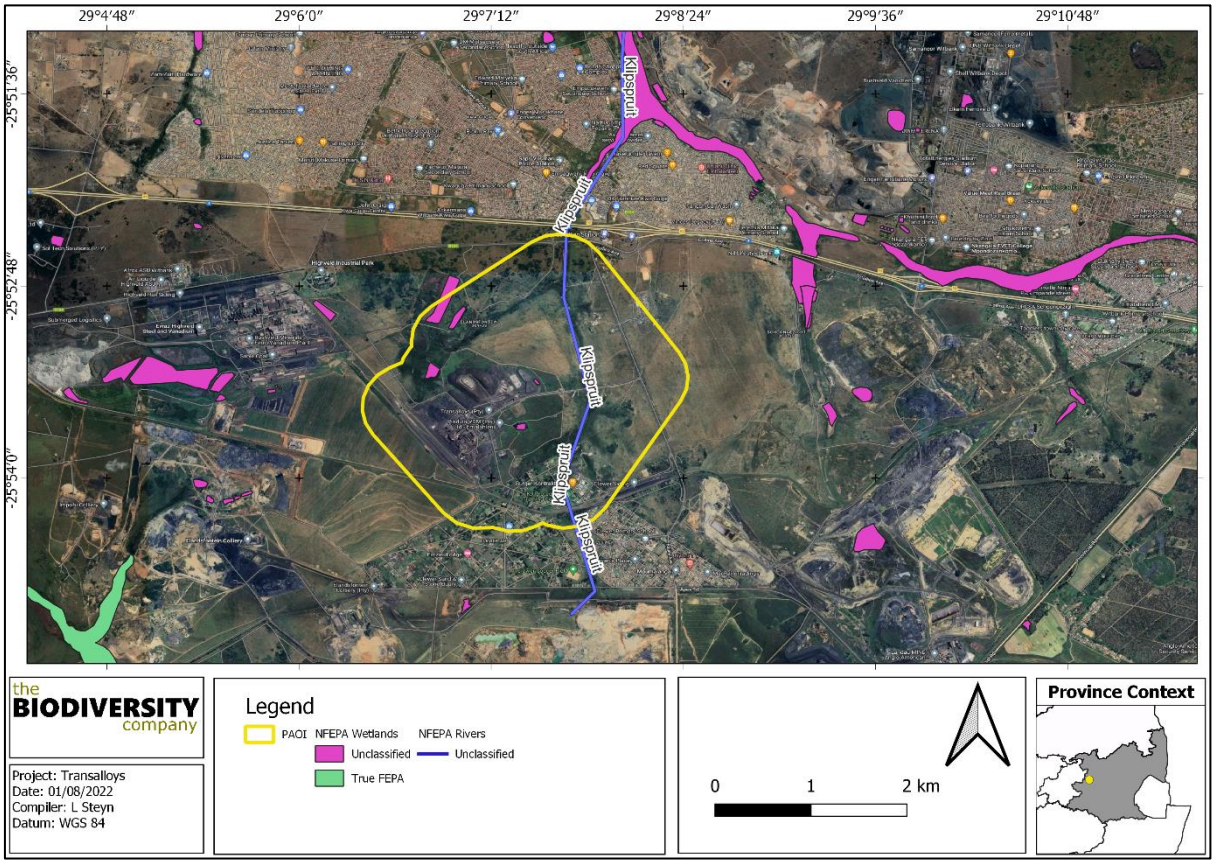


Figure 3-9 The project area in relation to the National Freshwater Ecosystem Priority Areas

3.1.1.9 Mpumalanga Highveld Grassland Wetlands

The purpose of the Mpumalanga Highveld Grasslands (MPHG) Wetlands project was to: Ground-truth and refine the current data layers of the extent, distribution, condition and type of freshwater ecosystems in the Mpumalanga Highveld coal belt, to support informed and consistent decision-making by regulators in relation to the water and biodiversity (SANBI, 2012). The MPHG dataset, has several classes.

The MPHG Wetlands data also classifies NFEPA land cover based on the defined condition of each area. These are known as the NFEPA wetland conditions categories. The categories are listed in Table 3-2 and are represented in relation to the project area in Figure 3-10.

Table 3-2 A breakdown of the NFEPA wetland condition categories as defined by the MPHG dataset

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

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

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

Figure 3-10 shows the project area in relation to the Mpumalanga Highveld Grasslands Wetlands data as provided by SANBI. This dataset also reveals that wetlands with a PES of D (largely modified) can be

found in the eastern part of the property. Class AB (natural or good) wetlands can be found mainly in the north-western section.

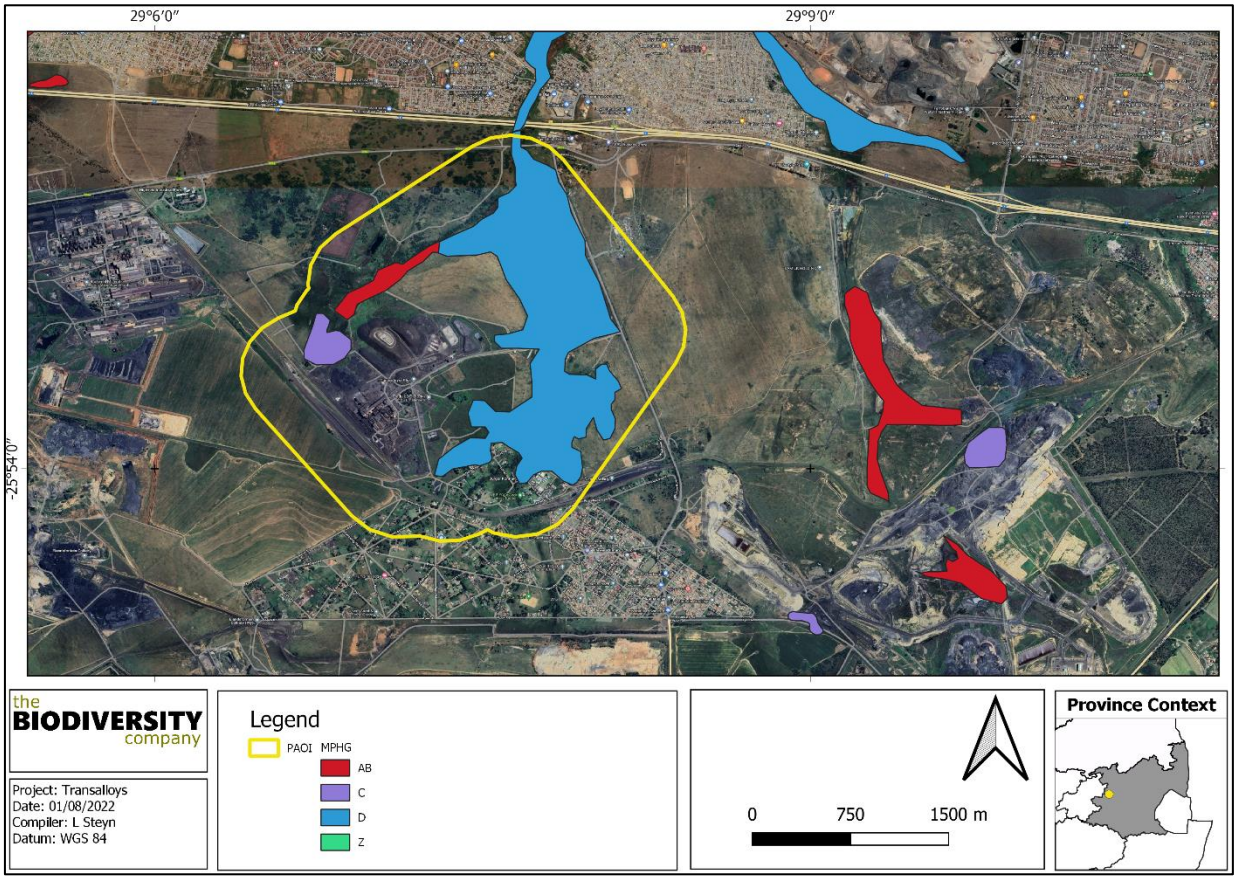


Figure 3-10 The project area in relation to the Mpumalanga Highveld Grassland Wetlands

3.1.1.10 Strategic Transmission Corridors (EGI)

On the 16 February 2018 minister Edna Molewa published Government Notice No. 113 in Government Gazette No. 41445 which identified 5 strategic transmission corridors important for the planning of electricity transmission and distribution infrastructure as well as procedure to be followed when applying for environmental authorisation for electricity transmission and distribution expansion when occurring in these corridors.

On 29 April 2021, Minister Barbara Dallas Creecy published Government Notice No. 383 in Government Gazette No. 44504, which expanded the eastern and western transmission corridors and gave notice of the applicability of the application procedures identified in Government Notice No. 113, to these expanded corridors. More information on this can be obtained from https://egis.environment.gov.za/egi.

Figure 3-11 shows the project area in relation to the international corridor.

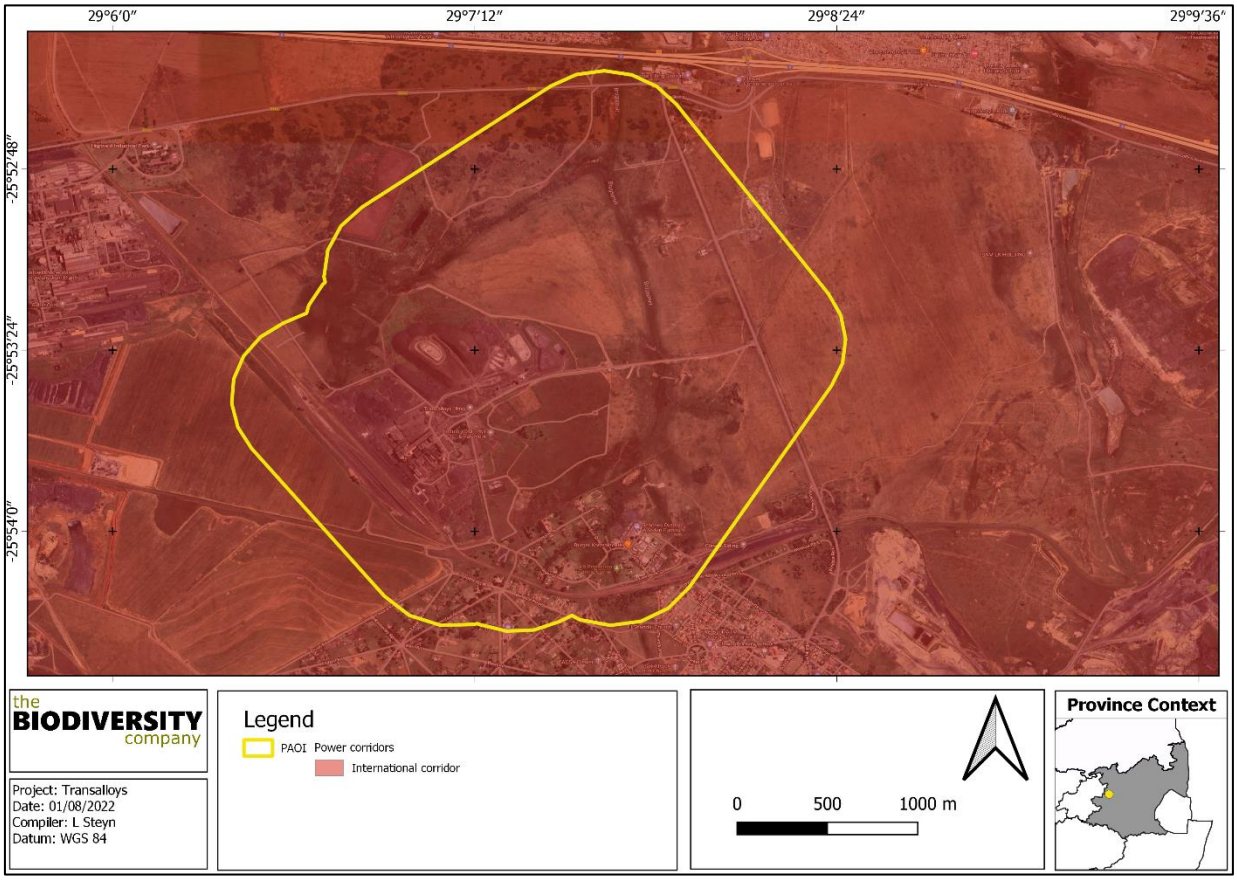


Figure 3-11 The project area in relation to the EGI corridors

3.1.1.11 Renewable Energy Development Zones (REDZ)

In 2018 the Government Notice No. 114 in Government Gazette No. 41445 was published where 8 renewable energy development zones important for the development of large scale wind and solar photovoltaic facilities were identified. In 2021 an additional 3 sites were included. The REDZs were identified through the undertaking of 2 Strategic Environmental Assessments.

More detailed information can be obtained from https://egis.environment.gov.za/redz. The project area falls within the phase 2 Emalahleni REDZ area (Figure 3-12).

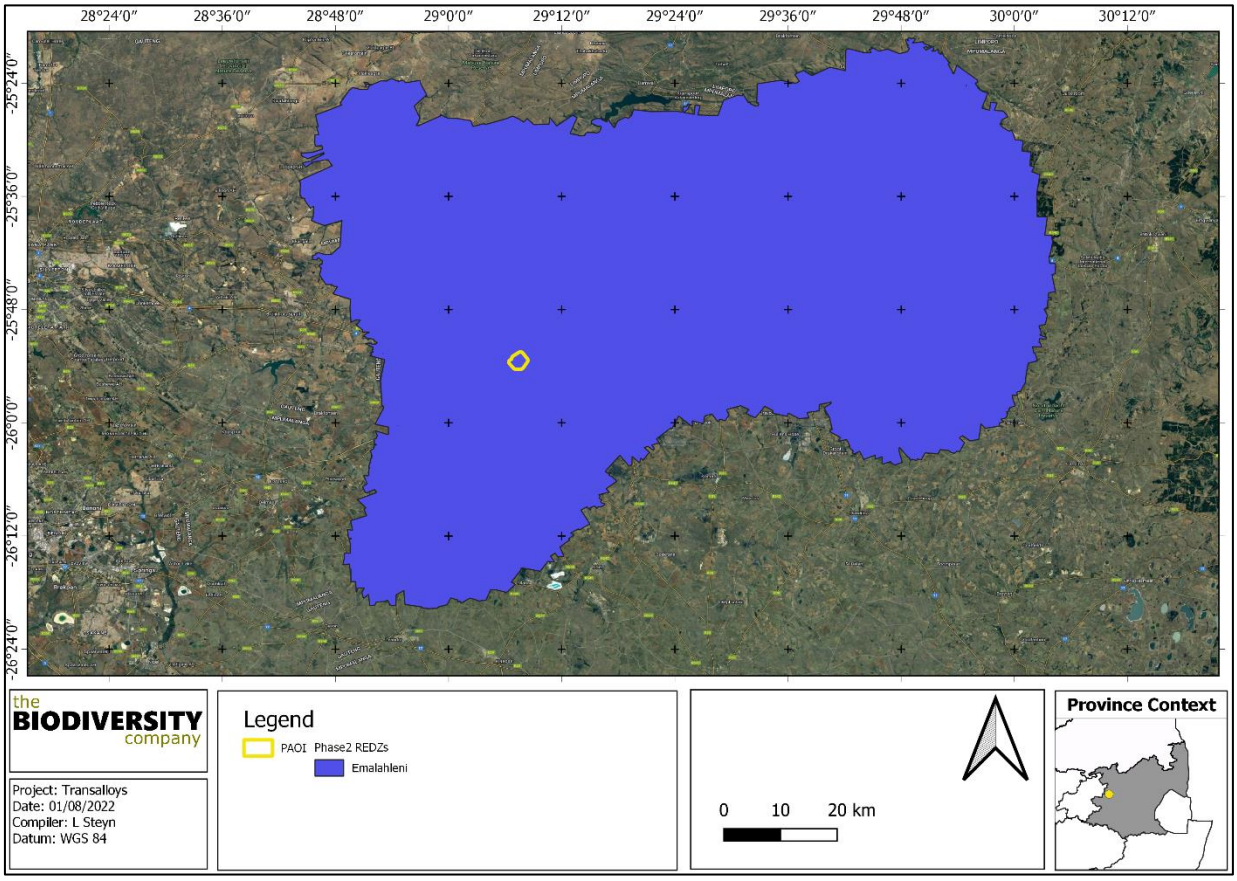


Figure 3-12 The project area in relation to the REDZ

3.1.1.12 Coordinated Waterbird Counts (CWAC)

The Animal demographic unit launched the Coordinated Waterbird Counts (CWAC) project in 1992 as part South Africa's commitment to international waterbird conservation. Regular mid-summer and mid-winter censuses are done to determine the various features of water birds including population size, how waterbirds utilise water sources and determining the heath of wetlands. For a full description of CWAC please refer to http://cwac.birdmap.africa/about.php. The project area is 15 km away from the Witbank Dam site. Eighty water birds are regularly observed here (Table 3-3).

Table 3-3 Coordinated water bird count for Witbank Dam

Common name	Taxonomic name	Average reporting rate.	Common name	Taxonomic name	Average reporting rate.
Sandpiper, Common	*Actitis hypoleucos*	13.48	**Moorhen, Common**	*Gallinula chloropus*	10.38
Jacana, African	*Actophilornis africanus*	1.93	**Eagle, African Fish**	*Haliaeetus vocifer*	1.29
Goose, Egyptian	*Alopochen aegyptiaca*	76.24	**Stilt, Black-winged**	*Himantopus*	8.56
Teal, Cape	*Anas capensis*	6.83	**Tern, Caspian**	*Hydroprogne caspia*	5.00
Teal, Red-billed	*Anas erythrorhyncha*	14.40	**Bittern, Little**	*Ixobrychus minutus*	1.50
Duck, Hybrid	*Anas hybrid*	3.00	**Bittern, Dwarf**	*Ixobrychus sturmii*	1.00
Mallard	*Anas platyrhynchos*	4.38	**Kingfisher, Giant**	*Megaceryle maxima*	1.68
Duck, Domestic	*Anas platyrhynchos*	6.80	**Cormorant, Reed**	*Microcarbo africanus*	56.79
Duck, African Black	*Anas sparsa*	4.73	**Wagtail, African Pied**	*Motacilla aguimp*	5.00

Duck, Yellow-billed	*Anas undulata*	74.12	**Wagtail, Cape**	*Motacilla capensis*	104.03
Darter, African	*Anhinga rufa*	21.03	**Wagtail, Western Yellow**	*Motacilla flava*	2.00
Goose, Domestic	*Anser*	4.67	**Stork, Yellow-billed**	*Mycteria ibis*	2.00
Egret, Great	*Ardea alba*	6.30	**Pochard, Southern**	*Netta erythrophthalma*	9.07
Heron, Grey	*Ardea cinerea*	8.61	**Heron, Black-crowned Night**	*Nycticorax*	2.50
Heron, Goliath	*Ardea goliath*	5.12	**Osprey, Western**	*Pandion haliaetus*	1.56
Egret, Intermediate	*Ardea intermedia*	3.00	**Cormorant, White-breasted**	*Phalacrocorax lucidus*	34.52
Heron, Black-headed	*Ardea melanocephala*	2.50	**Flamingo, Greater**	*Phoenicopterus roseus*	8.00
Heron, Purple	*Ardea purpurea*	2.30	**Spoonbill, African**	*Platalea alba*	5.64
Heron, Squacco	*Ardeola ralloides*	4.11	**Goose, Spur-winged**	*Plectropterus gambensis*	16.95
Owl, Marsh	*Asio capensis*	2.67	**Ibis, Glossy**	*Plegadis falcinellus*	5.90
Ibis, Hadada	*Bostrychia hagedash*	8.81	**Grebe, Great Crested**	*Podiceps cristatus*	6.50
Egret, Western Cattle	*Bubulcus ibis*	16.96	**Grebe, Black-necked**	*Podiceps nigricollis*	3.50
Thick-knee, Water	*Burhinus vermiculatus*	3.00	**Swamphen, African**	*Porphyrio madagascariensis*	3.50
Heron, Striated	*Butorides striata*	1.25	**Rail, African**	*Rallus caerulescens*	1.00
Sandpiper, Curlew	*Calidris ferruginea*	18.00	**Avocet, Pied**	*Recurvirostra avosetta*	7.50
Stint, Little	*Calidris minuta*	69.64	**Martin, Brown-throated**	*Riparia paludicola*	1.00
Ruff	*Calidris pugnax*	9.33	**Duck, Knob-billed**	*Sarkidiornis melanotos*	3.00
Kingfisher, Pied	*Ceryle rudis*	4.10	**Hamerkop**	*Scopus umbretta*	2.10
Plover, Kittlitz's	*Charadrius pecuarius*	48.56	**Teal, Blue-billed**	*Spatula hottentota*	4.00
Plover, Three-banded	*Charadrius tricollaris*	37.36	**Shoveler, Cape**	*Spatula smithii*	9.91
Tern, Whiskered	*Chlidonias hybrida*	45.90	**Grebe, Little**	*Tachybaptus ruficollis*	60.68
Tern, White-winged	*Chlidonias leucopterus*	55.44	**Duck, White-backed**	*Thalassornis leuconotus*	6.33
Gull, Grey-headed	*Chroicocephalus cirrocephalus*	37.94	**Ibis, African Sacred**	*Threskiornis aethiopicus*	12.33
Kingfisher, Malachite	*Corythornis cristatus*	3.90	**Sandpiper, Wood**	*Tringa glareola*	5.93
Duck, Fulvous Whistling	*Dendrocygna bicolor*	7.00	**Greenshank, Common**	*Tringa nebularia*	8.00
Duck, White-faced Whistling	*Dendrocygna viduata*	11.67	**Sandpiper, Marsh**	*Tringa stagnatilis*	9.33
Heron, Black	*Egretta ardesiaca*	5.94	**Owl, African Grass**	*Tyto capensis*	1.00
Egret, Little	*Egretta garzetta*	10.42	**Lapwing, Blacksmith**	*Vanellus armatus*	110.94
Coot, Red-knobbed	*Fulica cristata*	570.27	**Lapwing, African Wattled**	*Vanellus senegallus*	5.76
Snipe, African	*Gallinago nigripennis*	14.54	**Crake, Black**	*Zapornia flavirostra*	3.40

3.1.1.13 Coordinated Avifaunal Roadcount (CAR)

The ADU/Cape bird club pioneered avifaunal roadcount of larger birds in 1993 in South Africa. Originally it was started to monitor the Blue Crane *Anthropoides paradiseus* and Denham's/Stanley's Bustard *Neotis denhami*. Today it has been expanded to the monitoring of 36 species of large terrestrial birds (cranes, bustards, korhaans, storks, Secretarybird and Southern Bald Ibis) along 350 fixed routes covering over 19 000 km. Twice a year, in midsummer (the last Saturday in January) and midwinter (the last Saturday in July), roadcounts are carried out using this standardised method. These counts are important for the

conservation of these larger species that are under threat due to loss of habitat through changes in land use, increases in crop agriculture and human population densities, poisoning as well as man-made structures like power lines. With the prospect of wind and solar farms to increase the use of renewable energy sources monitoring of these species is most important (CAR, 2020). Figure 3-13 shows that the project area is ~20 km away from the closest route.

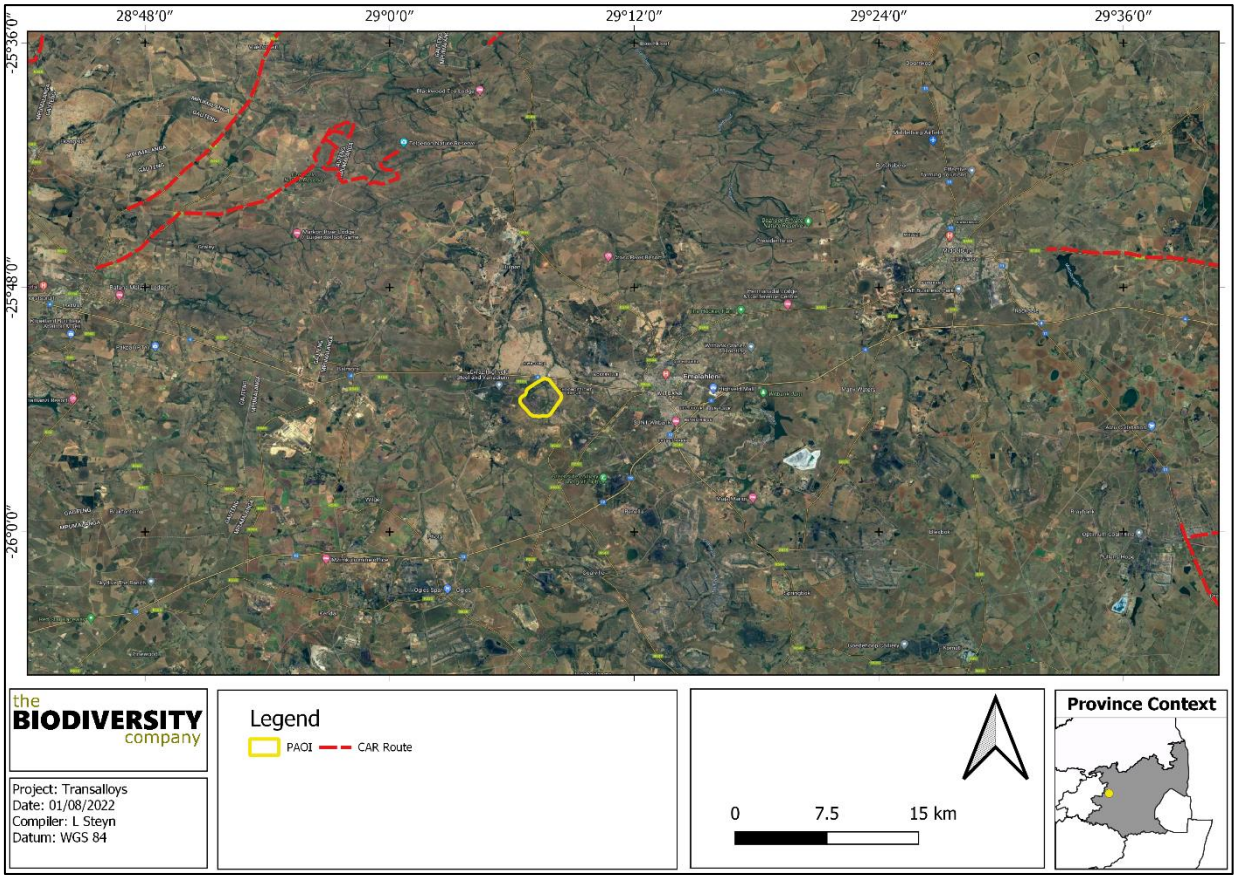


Figure 3-13 The project area in relation to the closest CAR route

3.1.1.14 Vegetation Type

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

a) Seasonal precipitation; and

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

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

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

On a fine-scale vegetation type, the project area overlaps with the Eastern Highveld Grassland vegetation type (Figure 3-14).

Figure 3-14 Map illustrating the vegetation type associated with the project area

3.1.1.14.1 Eastern Highveld Grassland

This vegetation type occurs on slightly to moderately undulating planes, including some low hills and pan depressions. The vegetation is a short dense grass land dominated by the usual highveld grass composition (*Aristida, Digitaria, Eragrostis, Themeda, Tristachya* etc.) with small scattered rocky outcrops with, wiry sour grasses and some woody species. Some 44% transformed primarily by cultivation, plantations, mines, urbanisation and by building of dams. No serious alien invasions are reported (Mucina & Rutherford, 2006).

3.1.2 Avifauna

The SABAP2 Data lists 246 avifauna species that could be expected to occur within the area (The full list will be provided in the final assessment). Ten of these expected species are regarded as threatened (Table 3-4). Four of the species have a low likelihood of occurrence due to lack of suitable habitat and food sources in the project area.

Table 3-4 Threatened avifauna species that are expected to occur within the project area.

Species	Common Name	Conservation Status		Likelihood of occurrence
		Regional (SANBI, 2016)	IUCN (2021)	
Calidris ferruginea	Sandpiper, Curlew	LC	NT	**Moderate**
Circus ranivorus	Marsh-harrier, African	EN	LC	**High**
Geronticus calvus	Ibis, Southern Bald	VU	VU	**Moderate**
Grus paradisea	Crane, Blue	NT	VU	**Low**
Mirafra cheniana	Lark, Melodious	LC	NT	**Low**
Oxyura maccoa	Duck, Maccoa	NT	VU	**Moderate**

Phoeniconaias minor	Flamingo, Lesser	NT	NT	**Low**
Phoenicopterus roseus	Flamingo, Greater	NT	LC	**Low**
Sagittarius serpentarius	Secretarybird	VU	EN	**High**
Tyto capensis	Grass-owl, African	VU	LC	**Moderate**

Calidris ferruginea (Curlew Sandpiper) is a resident of Africa which migrates to the Russian Federation during the breeding season (IUCN, 2017). During the winter, the Curlew Sandpiper prefers a wide variety of coastal habitats such as brackish lagoons, tidal mudflats and sandflats, estuaries, saltmarshes and rocky shores. Inland habitats include the muddy edges of marshes, large rivers and lakes (both saline and freshwater), irrigated land, flooded areas, dams and saltpans (IUCN, 2017). The presence of the river (although somewhat disturbed) in the project area creates a moderate likelihood of occurrence by this species.

Circus ranivorus (African Marsh Harrier) is listed as EN in South Africa (ESKOM, 2014). This species has an extremely large distributional range in sub-equatorial Africa. South African populations of this species are declining due to the degradation of wetland habitats, loss of habitat through over-grazing and human disturbance and possibly, poisoning owing to over-use of pesticides (IUCN, 2017). This species breeds in wetlands and forages primarily over reeds and lake margins. The wetlands and river in the project area has suitable habitat to support this species as such the likelihood of occurrence is rated as high.

Geronticus calvus (Southern Bald Ibis) is listed as VU on a regional basis and prefers high rainfall (>700 mm p.a.), sour and alpine grasslands, with an absence of trees and a short, dense grass sward and also occurs in lightly wooded and relatively arid country. It forages on recently burned ground, also using unburnt natural grassland, cultivated pastures, reaped maize fields and ploughed areas. It has a varied diet, mainly consisting of insects and other terrestrial invertebrates (IUCN, 2017). It has high nesting success on safe, undisturbed cliffs. The likelihood of the species foraging within the project area is good and there is a possibility of potential nesting sites downstream of the site. The likelihood of occurrence is rated as moderate.

Oxyura maccoa (Maccoa Duck) has a large northern and southern range, South Africa is part of its southern distribution. During the species' breeding season, it inhabits small temporary and permanent inland freshwater lakes, preferring those that are shallow and nutrient-rich with extensive emergent vegetation such as reeds (*Phragmites* spp.) and cattails (*Typha* spp.) on which it relies for nesting (IUCN, 2017). The likelihood of occurrence of this species in the project area was rated as moderate as suitable habitat although somewhat disturbed can be found.

Sagittarius serpentarius (Secretarybird) occurs in sub-Saharan Africa and inhabits grasslands, open plains, and lightly wooded savanna. It is also found in agricultural areas and sub-desert (IUCN, 2017). The likelihood of occurrence is rated as high due to the grasslands and wetland areas present in the project area, as well as the agricultural areas present in which this species may forage.

Tyto capensis (African Grass-owl) is rated as VU on a regional basis. The distribution of the species includes the eastern parts of South Africa. The species is generally solitary, but it does also occur in pairs, in moist grasslands where it roosts (IUCN, 2017). The species prefers thick grasses around wetlands and rivers which are not present in the project area. Furthermore, this species specifically has a preference for nesting in dense stands of the grass species *Imperata cylindrica*. As the habitat does not have large patches of *I. cylindrica* which is ideal breeding habitat for this species this species were given a moderate likelihood of occurrence.

3.2 Field Assessment

Sixty-six (66) bird species were recorded in the point counts of the survey, while 22 species were recorded during incidental observations. The full list of species recorded, their threat status, guild and location observed is shown in Appendix C. A list of the species incidentally recorded moving between point count locations are provided in Appendix D. One of the species recorded was a SCCs.

Table 3-5 provide lists of the dominant species for the first survey together with the frequency with which each species appeared in the point count samples. The data shows the Southern Red-Bishop, Red-billed Quelea, Cape Turtle Dove and Hadeda Ibis were the most abundant species during the survey. Figure 3-15 shows some of the birds that were recorded during the survey.

Table 3-5 Dominant avifaunal species within the project area during the survey as defined as those species whose relative abundances cumulatively account for more than 85% of the overall abundance shown alongside the frequency with which a species was detected among point counts.

Common Name	Scientific Name	Relative abundance	Frequency (%)
Southern Red Bishop	*Euplectes orix*	0,129	23,333
Red-billed Quelea	*Quelea*	0,117	6,667
Cape-Turtle Dove	*Streptopelia capicola*	0,079	46,667
Hadada Ibis	*Bostrychia hagedash*	0,067	30,000
Crowned Lapwing	*Vanellus coronatus*	0,064	46,667
Helmeted Guineafowl	*Numida meleagris*	0,058	3,333
Southern Masked Weaver	*Ploceus velatus*	0,041	40,000
Speckled Pigeon	*Columba guinea*	0,035	10,000
Levaillant's Cisticola	*Cisticola tinniens*	0,032	33,333
Blacksmith Lapwing	*Vanellus armatus*	0,032	33,333
Capped Wheatear	*Oenanthe pileata*	0,029	33,333
Cape Longclaw	*Macronyx capensis*	0,023	26,667
African Stonechat	*Saxicola torquatus*	0,023	26,667
African Pipit	*Anthus cinnamomeus*	0,020	23,333
Common Waxbill	*Estrilda astrild*	0,018	6,667
Long-tailed Widowbird	*Euplectes progne*	0,015	16,667
Rufous-naped Lark	*Mirafra africana*	0,012	13,333
African Snipe	*Gallinago nigripennis*	0,012	10,000
Cape Wagtail	*Motacilla capensis*	0,012	10,000
African Rail	*Rallus caerulescens*	0,012	3,333
Spike-heeled Lark	*Chersomanes albofasciata*	0,012	10,000
Cape Sparrow	*Passer melanurus*	0,012	10,000

Figure 3-15 ***Some of the birds recorded in the project site: A) African Snipe, B) African Stonechat, C) Orange-river Francolin, D) African Wattled Lapwing, E) Cape White-eye, F) Rufous-naped Lark, G) Cape Longclaw, H) Cape Sparrow and I) Crowned Lapwing***

3.2.1 Species of Conservation Concern

One species, the Lanner Falcon (*Falco biarmicus*) was observed in the project area (Table 3-6 and Figure 3-16). This species were observed circling above the project area, the location of the recording can be seen in Figure 3-19. The Lanner Falcon is fairly common in Southern Africa, where it favours open grassland, cleared woodlands and agricultural fields. They mainly breed on cliffs but has also been found to breed on electric pylons and in trees. This species is regarded as a partial migrant, with many juveniles depart from their breeding grounds around December-January in the eastern grasslands of South Africa,

heading west and south-west to the Kalahari, Karoo and the Western Cape. This species pray consist of more common bird species such as swifts, hornbills, kingfishers, doves, and passerines.

Table 3-6 The SCC recorded in the project area

Species	Common Name	Conservation Status	
		Regional (SANBI, 2016)	IUCN (2021)
Falco biarmicus	Lanner Falcon	VU	LC

Figure 3-16 Lanner Falcon observed flying over the project area.

3.2.2 Trophic Guilds

Trophic guilds are defined as a group of species that exploit the same class of environmental resources in a similar way (González-Salazar *et al,* 2014). The guild classification used in this assessment is as per González-Salazar *et al* (2014); they divided avifauna into 13 major groups based on their diet, habitat, and main area of activity. The analysis of the major avifaunal guilds reveals that the species composition during the survey was dominated by insectivorous birds that feed on the ground during the day (IGD). Followed by granivores (GGD) and Omnivores (OMD) (Figure 3-17). The species composition is spread throughout the various groups, it is however believed that during a summer survey the amount of water birds present would be significantly higher.

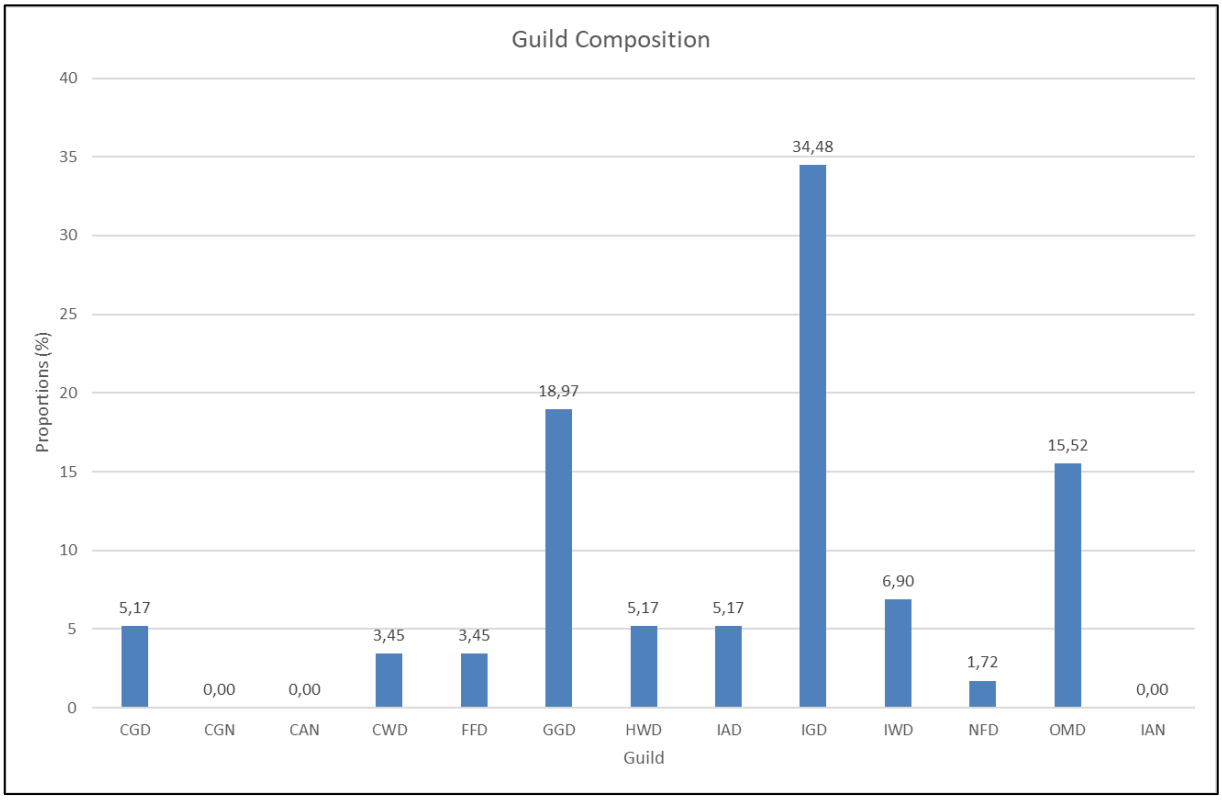


Figure 3-17 ***Avifaunal trophic guilds. CGD, carnivore ground diurnal; CGN, carnivore ground nocturnal, CAN, carnivore air nocturnal, CWD, carnivore water diurnal; FFD, frugivore foliage diurnal; GGD, granivore ground diurnal; HWD, herbivore water diurnal; IAD, insectivore air diurnal; IGD, insectivore ground diurnal; IWD, insectivore water diurnal; NFD, nectivore foliage diurnal; OMD, omnivore multiple diurnal; IAN, Insectivore air nocturnal.***

3.2.3 Risk Species

A number of species were found that would be considered as high risk species (Table 3-7, Figure 3-18, Figure 3-19). Risk species are species that would be regarded as collision prone species and species that would have a high electrocution risk. Even though the panels does not pose an extensive collision risk for larger birds, powerlines associated with the infrastructure, guidelines (anchor lines) and connection lines does pose a risk. The fence could also pose a collision risk for various species as described in section 5.

Table 3-7 ***At risk species found in the survey.***

Common Name	Scientific Name	Collisions	Electrocution	Habitat Loss
Black Sparrowhawk	*Accipiter melanoleucus*	X	X	
Egyptian Goose	*Alopochen aegyptiaca*	X	X	
African Black Duck	*Anas sparsa*	X		
Yellow-billed Duck	*Anas undulata*	X		
Black-headed Heron	*Ardea melanocephala*	X	X	
Purple Heron	*Ardea purpurea*	X	X	
Hadada Ibis	*Bostrychia hagedash*		X	
Grey-headed Gull	*Chroicocephalus cirrocephalus*		X	

Pied Crow	*Corvus albus*		X	
Lanner Falcon	*Falco biarmicus*			X
Helmeted Guineafowl	*Numida meleagris*		X	
Hamerkop	*Scopus umbretta*		X	
South African Shelduck	*Tadorna cana*	X		
African Sacred Ibis	*Threskiornis aethiopicus*		X	

Figure 3-18 ***Some of the high collision risk species recorded in the project area, A) Purple Heron, B) Black-headed Heron, C) Egyptian Goose, D) Helmeted Guineafowl, E) Hamerkop and F) Hadeda Ibis***

3.2.4 Flight and Net Analysis

Observing and monitoring flight paths and nesting sites are important in ascertaining habitat sensitivity and evaluating the impact risk significance of any proposed development. During the field survey recording flight-paths and nesting sites were undertaken for certain species. However, given the limited time available the results of this section must be interpreted with caution, as each species movement is likely to be more extensive. A nest of a Hamerkop (*Scopus umbretta*) (Figure 3-19 and Figure 3-20) was found in the project area, this species is protected under schedule 5 of the Mpumalanga Nature Conservation Act no 10 of 1998. As this schedule is more relevant to the trade and imprisonment of the species as appose to full protection only a 50 m buffer was placed around the nest to ensure the species does not get exposed to any nest disturbance. No nest of species of conservation concern were observed. A number of the risk species were observed flying around the site. The Vulnerable Lanner Falcon were observed in the project area.

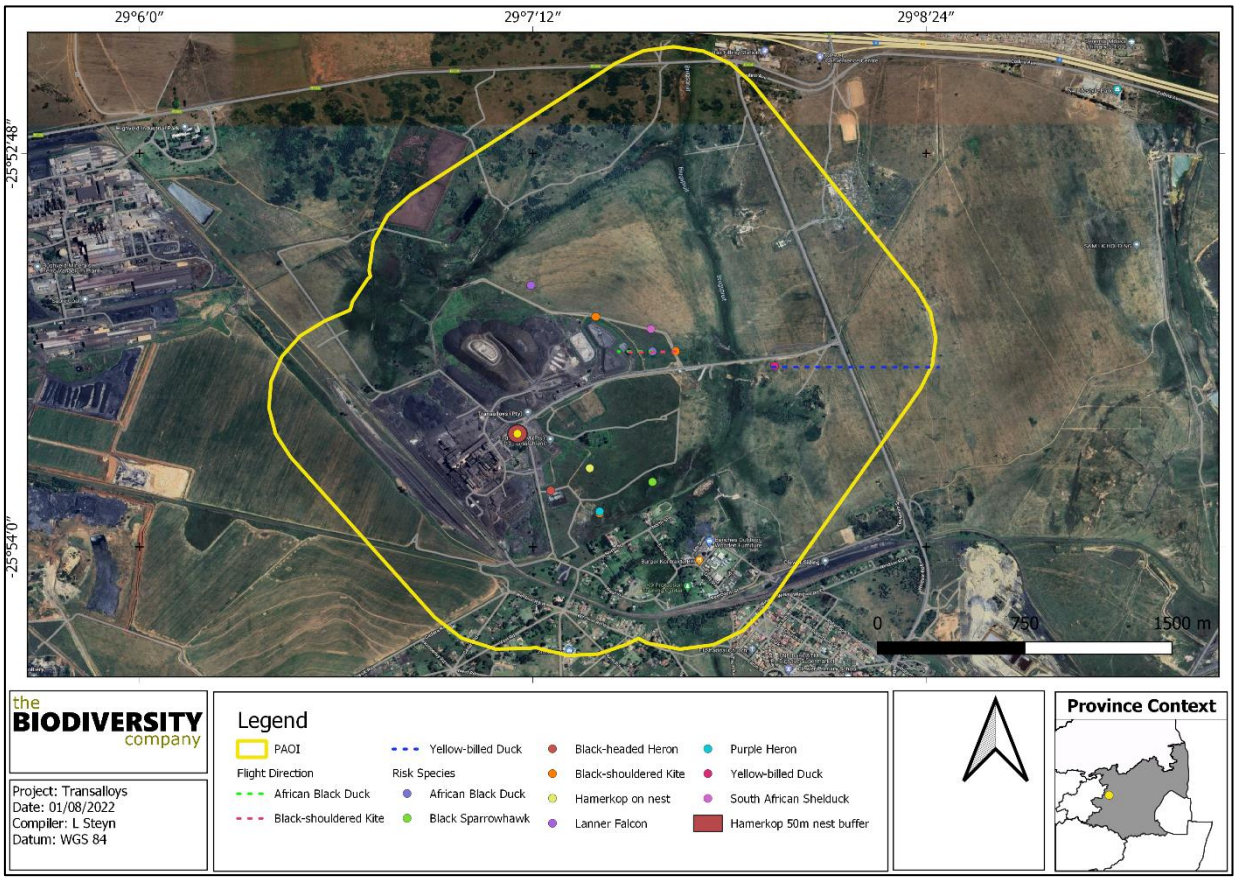


Figure 3-19 Flight paths of some of the risk species in the project area and surrounds

Figure 3-20 Hamerkop (Scopus umbretta) on the nest

3.3 Fine-Scale Habitat Use

Fine-scale habitats within the landscape are important in supporting a diverse avifauna community as they provide differing nesting, foraging and reproductive opportunities. The assessment area overlapped with four habitat types namely; Degraded Grassland, Secondary Grassland, Transformed as well as Water Resources (Wetlands and river). These habitats were based on the species compositions in the various areas (Figure 3-25).

Degraded Grassland

This habitat type is regarded as semi-natural grassland, but disturbed due to the mismanagement (overgrazing and fire) and also human infringement. This area was historically utilised as agricultural fields. The diversity of flora species in this area was low and were mainly made up of graminoid species. The area does however still offer ecological connectivity to the water resource areas. Avifauna species found here included Rufous-naped Lark, African Stonechat, Cape Longclaw and Red-capped Lark. An example of the habitat is shown in Figure 3-21.

Figure 3-21 A typical example of degraded grassland habitat from the project area.

Secondary Grassland

The habitat consist of a more diverse species composition to that of the degraded grassland. Several herbs and forbs were found spread in between the graminoid species (Figure 3-22). Overgrazing by mainly cattle has also taken place in this habitat resulting in some areas having gone bare and leading to erosion. The overall ecological state of the habitat is higher compared to the degraded grasslands. In some areas of this habitat unit alien tree clumps occured but the avifauna species composition did not differ therefore this area was not separated from the secondary grassland habitat type. As the flora species composition in higher, it also supports a higher number of avifauna species. Avifauna species recorded here were grassland type species such as Cape Longclaw, Zitting Cisticola, and Tawny-flanked Prinia. The Lanner Falcon was observed over this habitat type, most likely looking for a prey species.

Figure 3-22 A typical example of secondary grassland habitat from the project area.

Transformed

This habitat unit represents all areas of roads and buildings (Figure 3-23). The transformed areas have little to no remaining natural vegetation due to land transformation by the developments. These habitats exist in a constant disturbed state as it cannot recover to a more natural state unless through human intervention. Species recorded here included Common Myna, Southern Fiscal and Pied Crow.

Figure 3-23 Illustration of transformed habitat from the project area.

Water Resources

The water resources consisted of a river (Klipspruit) and numerous wetlands. Wetlands are identified in the wetland report (TBC, 2022). Even though somewhat disturbed, the ecological integrity, importance and functioning of these areas play a crucial role as a water resource system and an important habitat for various avifauna species (Figure 3-24). A number of water bird species were recorded around the project area as a result of the extensive water sources on site. The water sources also increases the risk of collisions should the development be built in between. Some of the avifauna species recorded were Yellow-billed Ducks, South African Shelduck, African Black Duck, Egyptian Goose and Three-banded Plover.

Figure 3-24 Illustration of water resource habitat from the project area

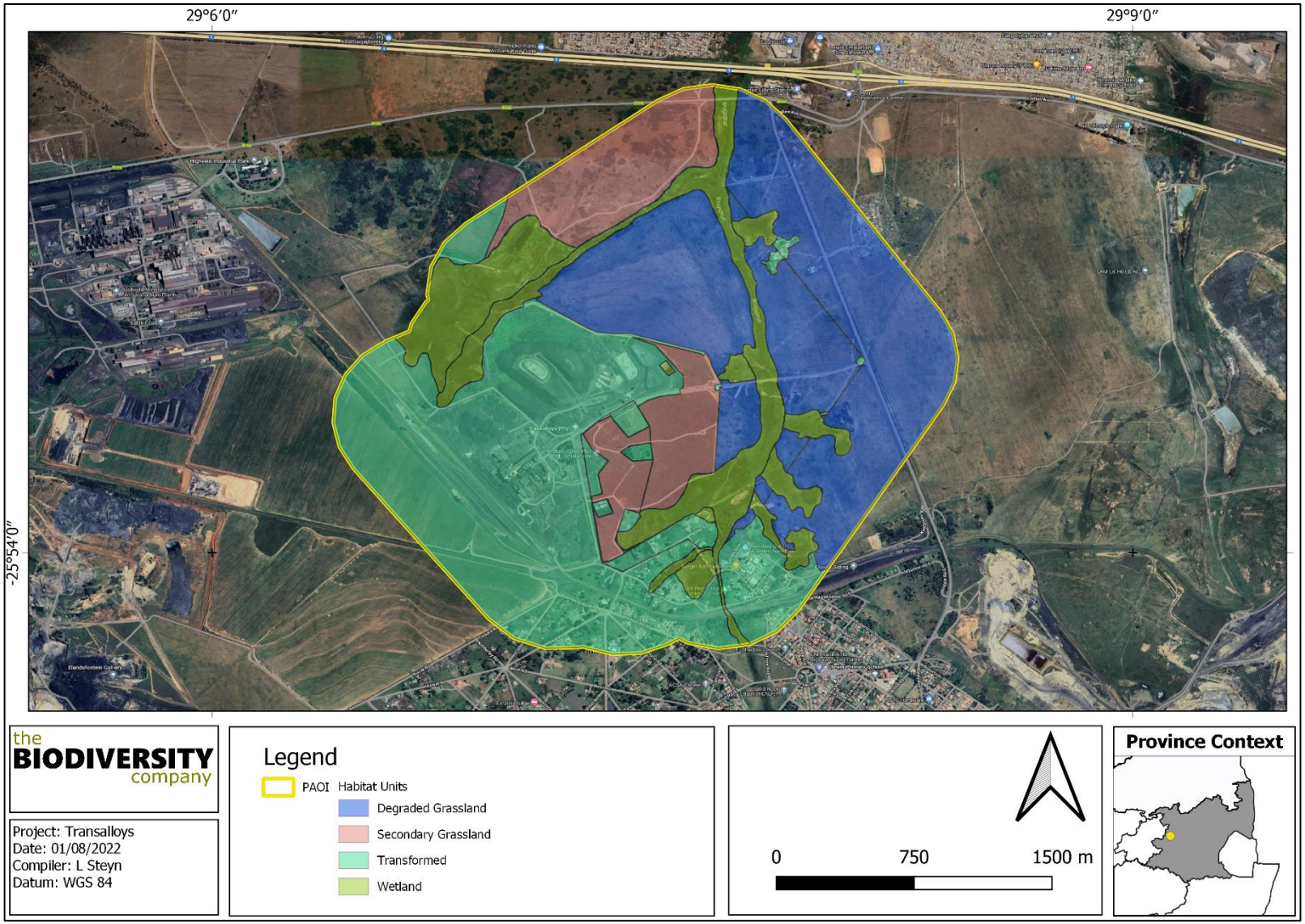
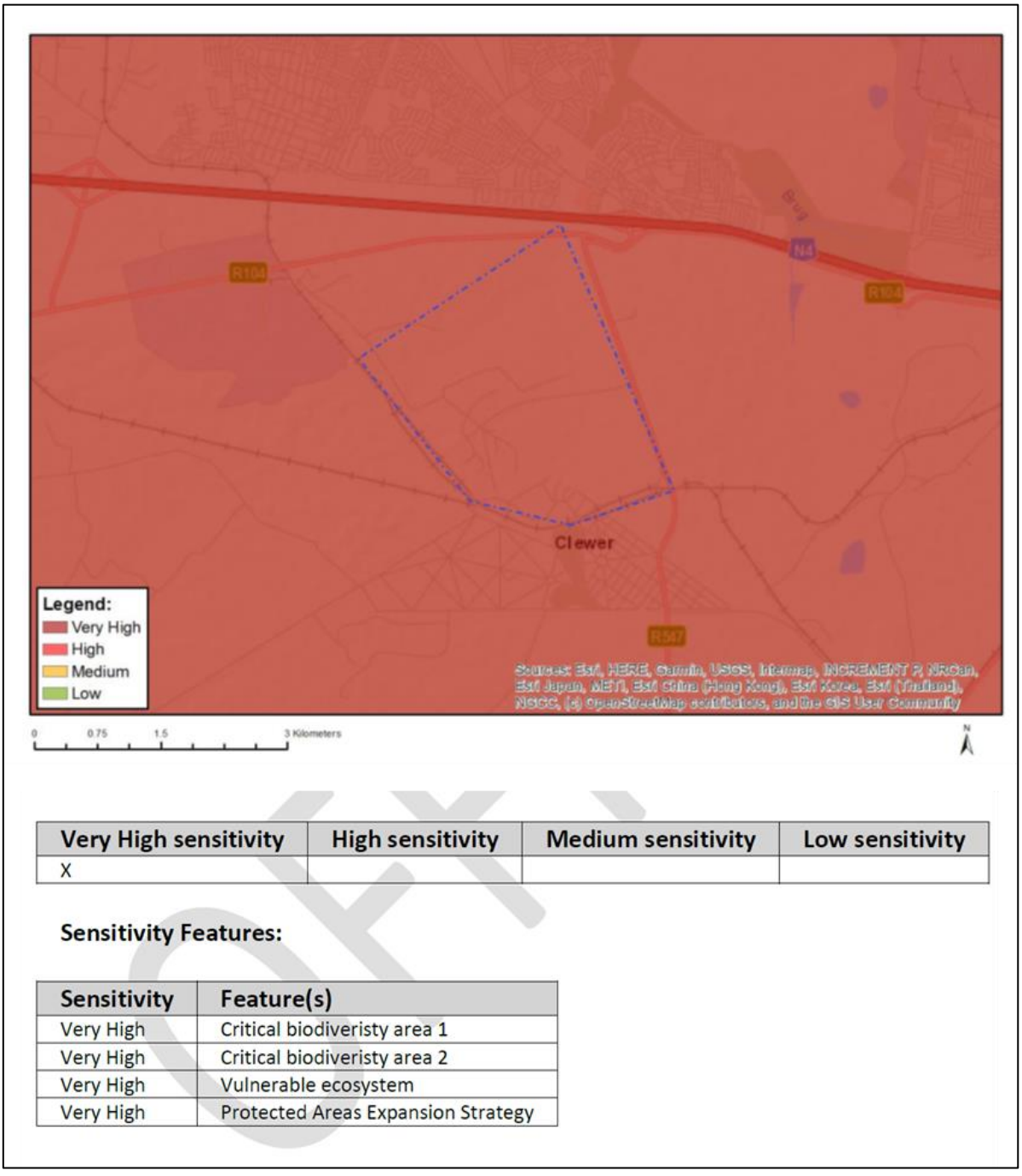


Figure 3-25 The avifauna habitats found in the project area.

4 Site Sensitivity

The biodiversity theme sensitivity, as indicated in the screening report, was derived to be Very High, mainly due to the project area being within a CBA1, CBA 2 and VU ecosystem as well as a NPAES area (Figure 4-1), while the animal species theme is classified as High sensitivity due to the known occurrence of Secretarybirds in the area (Figure 4-2).

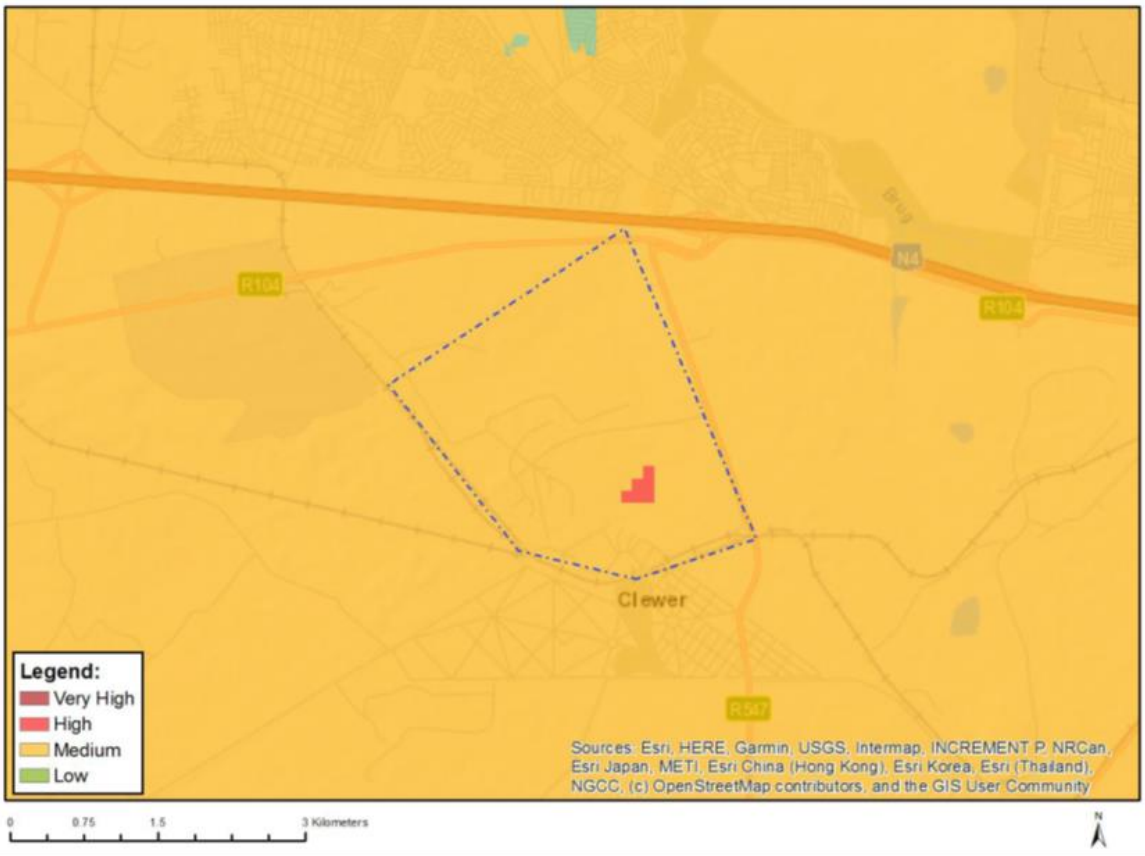


Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Very High	Critical biodiveristy area 1
Very High	Critical biodiveristy area 2
Very High	Vulnerable ecosystem
Very High	Protected Areas Expansion Strategy

Figure 4-1 Terrestrial Biodiversity Theme Sensitivity, National Web based Environmental Screening Tool.



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
	X		

Sensitivity Features:

Sensitivity	Feature(s)
High	Aves-Sagittarius serpentarius
Medium	Mammalia-Chrysospalax villosus
Medium	Mammalia-Crocidura maquassiensis
Medium	Mammalia-Dasymys robertsii
Medium	Mammalia-Hydrictis maculicollis
Medium	Mammalia-Ourebia ourebi ourebi

Figure 4-2 Fauna Theme Sensitivity, National Web based Environmental Screening Tool.

The sensitivities were compiled for the avifauna study based on the one survey. Based on the criteria provided in Section 2.3 of this report, all habitats within the assessment area of the proposed project were allocated a sensitivity category (Table 4-1). The sensitivities of the habitat types delineated are illustrated in Figure 4-3.

Table 4-1 SEI Summary of habitat types delineated within field assessment area of project area

Habitat	Conservation Importance		Functional Integrity		Biodiversity Importance	Receptor Resilience		Site Ecological Importance
Water Resources	High	The water resources (i.e., river and wetland) are rated as CR based on the SAIIAE dataset.	High	The CR wetland found on site is approximately 60Ha. The size combined with the somewhat disturbed nature this habitat it was given a High functional integrity.	High	Medium	Taking into account the current vegetation growth and state, the area will recover slowly, and it will take more than 10 years to reach the same state. If the vegetation growth in the area is altered, it will disturb the avifauna diversity as well which will take long to return to its pre-disturbance state.	High
Degraded Grassland	Medium	The VU listed Lanner Falcon were observed in this area	Medium	The area does still function as an ecological corridor especially between the water resource areas.	Medium	High	The area has been altered from its original state mainly by over grazing, therefore the flora species composition is low. As the area does not provide a large number of food sources especially for granivorous species the receptor resilience is rated as high.	Low
Secondary Grassland	Medium	The VU listed Lanner Falcon were observed in this area	Medium	The area does still function as an ecological corridor especially between the	Medium	High	This habitat has also been altered by overgrazing, however the flora species composition in this area is more	Low

				water resource areas.			diverse. As the habitat is mainly supporting graminoid species and therefore granivorous species if the area recovers the granivores will return.	
Transformed	Very Low	Unlikely to support any SCCs and no natural habitat remains in these areas anymore.	Very Low	Several major current negative ecological impacts found in the area and no ecological connectivity offered.	Very Low	Very High	The flora species composition surrounding the buildings for example is mainly garden species and therefore will support mainly generalist more adaptable species.	Very Low

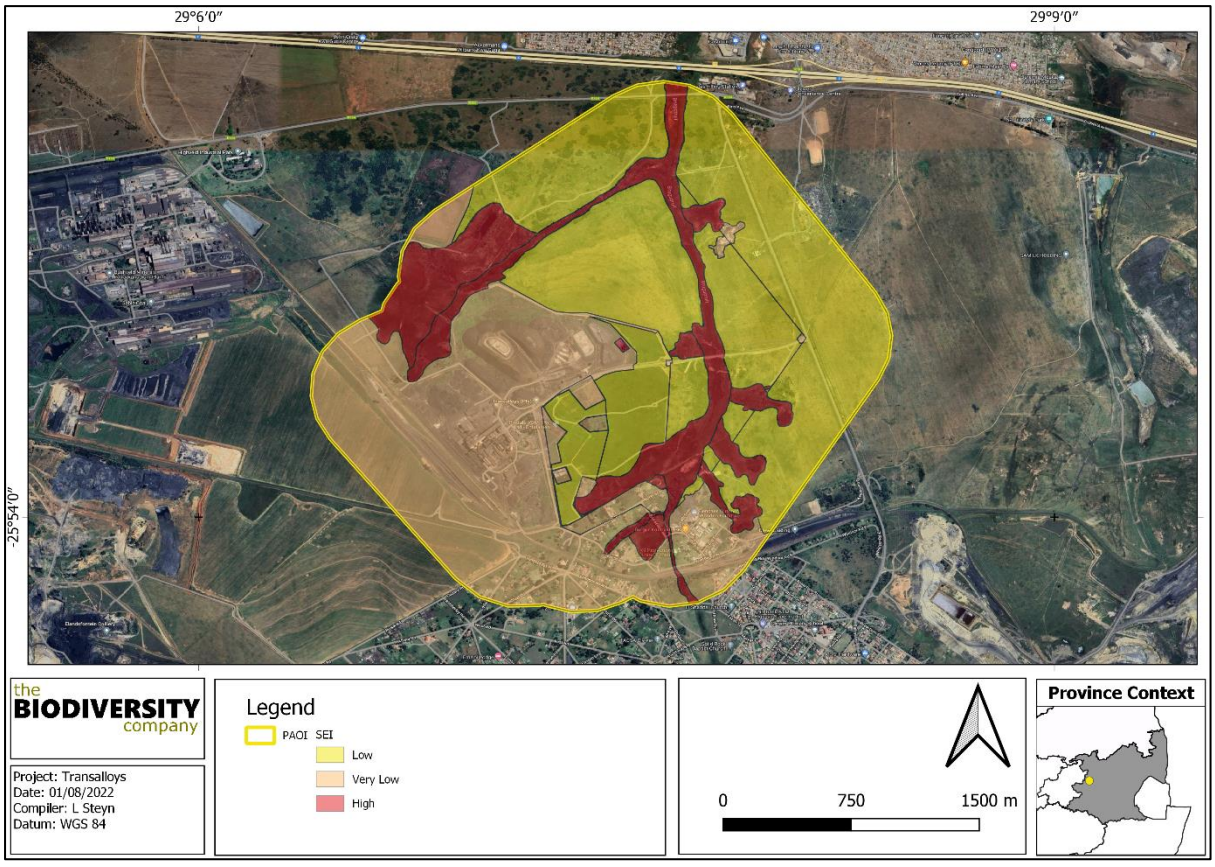


Figure 4-3 Sensitivities based on the avifauna assessment

Interpretation of the SEI in the context of the proposed project is provided in Table 4-2.

Table 4-2 Guidelines for interpreting Site Ecological Importance in the context of the proposed development activities

Site Ecological Importance	Interpretation in relation to proposed development activities
High	Avoidance mitigation wherever possible. Minimisation mitigation – changes to project infrastructure design to limit the amount of habitat impacted, limited development activities of low impact acceptable. Offset mitigation may be required for high impact activities.
Medium	Minimisation and restoration mitigation – development activities of medium impact acceptable followed by appropriate restoration activities.
Low	Minimisation and restoration mitigation – development activities of medium to high impact acceptable followed by appropriate restoration activities.
Very Low	Minimisation mitigation – development activities of medium to high impact acceptable and restoration activities may not be required.

5 Impact Assessment

Potential impacts were evaluated against the data captured during the fieldwork and from a desktop perspective to identify relevance to the project area, specifically the proposed development footprint area.

The assessment of the significance of direct, indirect and cumulative impacts was undertaken using the method as developed by Savannah Environmental (Pty) Ltd.

Bennun *et al* (2021) describes three broad types of impacts associated with solar energy development:

- Direct impacts – Impacts that result from project activities or operational decisions that can be predicted based on planned activities and knowledge of local biodiversity, such as habitat loss under the project footprint, habitat frag- mentation as a result of project infrastructure and species disturbance or mortality as a result of project operations.
- Indirect impacts – Impacts induced by, or 'by-products' of, project activities within a project's area of influence.
- Cumulative impacts – Impacts that result from the successive, incremental and/or combined effects of existing, planned and/or reasonably anticipated future human activities in combination with project development impacts.

The assessment of impact significance was undertaken in consideration of the following:

- Extent of impact;
- Duration of impact;
- Magnitude of impact;
- Probability of impact; and
- Reversibility.

The assessment of impact significance considers pre-mitigation as well as implemented post-mitigation scenarios. Three phases were considered for the impact assessment:

- Construction Phase;
- Operational Phase; and
- Closure/Rehabilitation Phase.

5.1 Current Impacts

The current impacts observed during the survey are listed below. Photographic evidence of a selection of these impacts is shown in Figure 5-1.

- Mining activities;
- Present energy distribution infrastructure, including powerlines;
- Historical land clearing and land-use;
- Invasive species;
- Roads and associated vehicle traffic and road kills; and
- Fences.

Figure 5-1 Some of the identified impacts within the project site; A) Mining Activities, B) Alien Invasive Plants, C) Powerlines and D) Fences

5.2 Avifauna Impact Assessment

This section describes the potential impacts on avifauna associated with the construction and operational phases of the proposed development and is only relevant to the PV site and associated infrastructure and does not consider the powerline grid system. During the construction phase vegetation clearing and brush cutting of vegetation for the associated infrastructure will lead to direct habitat loss. Vegetation clearing will create a disturbance and will therefore potentially lead to the displacement of avifaunal species. The operation of construction machinery on site will generate noise

and cause dust pollution. Should non-environmentally friendly dust suppressants be used, chemical pollution can take place. Increased human presence can lead to poaching and the increase in vehicle traffic will potentially lead to roadkill.

The principal impacts of the operational phase are electrocution, collisions, fencing, chemical pollution due to chemical for the cleaning of the PV panels and habitat loss. Solar panels have been implicated as a potential risk for bird collisions. Collisions are thought to arise when birds (particularly waterbirds) mistake the panels for waterbodies, known as the “lake effect” (Lovich & Ennen, 2011), or when migrating or dispersing birds become disorientated by the polarised light reflected by the panels. This “lake-effect” hypothesis has not been substantiated or refuted to date (Visser *et al.,* 2019). It can however be said that the combination of powerlines, fencing and large infrastructure will influence avifauna species. Visser *et al.* (2019) performed a study at a utility-scale photovoltaic solar energy facility in the Northern Cape and found that most of the species affected by the facility were passerine species. Larger species were said to be more influenced by the facilities when they were found foraging close by and were disturbed by predators which resulted in collisions.

Large passerines are particularly susceptible to electrocution because owing to their relatively large bodies, they are able to touch conductors and ground/earth wires or earthed devices simultaneously. The chances of electrocution are increased when feathers are wet, during periods of high humidity or during defecation. Prevailing wind direction also influences the rate of electrocution casualties.

Fencing of the PV site can influence birds in six ways (Birdlife SA, 2015);

1. Snagging: Occurs when a body part is impaled on one or more barbs or razor points of a fence.
2. Snaring: When a bird’s foot/leg becomes trapped between two overlapping wires.
3. Impact injuries: birds flying into a fence, the impact may kill or injure the bird
4. Snarling: When birds try and push through a mesh or wire stands, ultimately becoming trapped (uncommon).
5. Electrocution: Electrified fence can kill or severely injure birds.
6. Barrier effect: Fences may limit flightless birds (e.g., Moulting waterfowl) from resources.

Chemical pollution from PV cleaning, if not environmentally friendly will result in either long term or short-term poisoning. Should this chemical run into the water sources it would also impact the whole bird population and not just species found in and around the PV footprint.

PV sites require the overall removal of vegetation, this is a measure that is implemented to restrict the risk of fire (Birdlife, 2017). The removal of vegetation results in the loss of habitat for a number of species in this case it would be displacing grassland, tree dwellers from the alien clumps and waterfowl.

5.2.1 Alternatives considered

No alternative was provided.

5.2.2 Loss of Irreplaceable Resources

Possible loss of SCCs and further disturbance of CR wetlands and river.

5.3 Assessment of Impact Significance

The assessment of impact significance considers pre-mitigation as well as implemented of post-mitigation scenarios. Although different species and groups will react differently to the development, the risk assessment was undertaken bearing in mind the potential impacts to the priority species listed in this report. More mitigations can be seen in section 6.

5.3.1 Construction Phase

The construction of the PV site, Powerline and associated infrastructure has been assessed collectively as their impacts overlap.

The following potential impacts were considered (Table 5-1 till Table 5-4):

- Destruction, fragmentation and degradation of habitats;
- Displacement of avifaunal community (Including several SCC) due to disturbance such as noise, light, dust, vibration;
- Collection of eggs and poaching;
- Roadkill.

Table 5-1 Construction activities impacts on the avifauna

Nature:		
Destruction, fragmentation and degradation of habitats		
	Without mitigation	**With mitigation**
Extent	Regional (4)	Local area (3)
Duration	Short term (2)	Short term (2)
Magnitude	High (8)	Moderate (6)
Probability	Highly probable (4)	Highly probable (4)
Significance	**Medium (56)**	**Medium (44)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	To some extent, habitat will still be lost	

Mitigation:

- The loss of habitat in the project footprint cannot be negated but can be restricted to some extent. The loss of habitat will result in the loss of territory, feeding area, nesting sites and prey availability for numerous species.

The habitat outside the footprint can be protected by implementing the following mitigations:

- No construction is to take place in the wetland or wetland buffer area. These areas must be treated as “No-Go” areas;
- The 50 m Buffer surrounding the Hamerkop nest must be treated as a “No-Go” area;
- Construction activity to only be within the project footprint and the area is to be well demarcated;
- Areas where vegetation has been cleared must be re-vegetated within local indigenous plant species;
- The affected area must be monitored for invasive plant encroachment and erosion and must be controlled;
- The use of laydown areas within the development footprint must be used, to avoid habitat loss and disturbance to adjoining areas;
- All areas to be developed must be walked through prior to any activity to ensure no nests or avifauna species are found in the area; and
- Should any Species of Conservation Concern not move out of the area, or their nest be found in the area a suitably qualified specialist must be consulted to advise on the correct actions to be taken.

Residual Impacts:

The loss of habitat is a residual impact that is unavoidable. The disturbance may also cause some erosion and invasive alien plant encroachment. Movement corridors will be disrupted in the area.

Table 5-2 Construction activities impacts on the avifauna

Nature:		
Displacement of avifaunal community (Including a SCC) due to disturbance such as noise, light, dust, vibration		
	Without mitigation	**With mitigation**
Extent	Local area (3)	Footprint & surrounding areas (2)
Duration	Moderate term (3)	Short term (2)
Magnitude	Moderate (6)	Minor (2)
Probability	Probable (3)	Improbable (2)
Significance	**Medium (36)**	**Low (12)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes, but only to a limited extent. The mitigation of noise pollution during construction is difficult to mitigate against	
Mitigation:		
• Minimize disturbance impact by abbreviating construction time. Schedule the activities to avoid breeding and movement time; • Ensure lights are kept to a minimum, lights must be red or green and not white to reduce confusion for nocturnal migrants; and • Dust management need to be done in the areas where the vegetation will be removed, this includes wetting of the soil.		
Residual Impacts:		
Displacement of endemic and SCC avifauna species.		

Table 5-3 Construction activities impacts on the avifauna

Nature:		
Collection of eggs and poaching		
	Without mitigation	With mitigation
Extent	Footprint & surrounding areas (2)	Footprint & surrounding areas (2)
Duration	Short term (2)	Short term (2)
Magnitude	Moderate (6)	Minor (2)
Probability	Highly probable (4)	Improbable (2)
Significance	**Medium (40)**	**Low (12)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	High
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	
Mitigation:		
• All personnel should undergo environmental induction with regards to avifauna and in particular awareness about not harming, collecting or hunting terrestrial species (e.g., guineafowl and francolin), and owls, which are often persecuted out of superstition; and • Signs must be put up stating that should any person be found poaching any species they will be fined.		

Residual Impacts:
There is a possibility that the eggs to be poached could be that of an SCC with decreasing numbers

Table 5-4 Construction activities impacts on the avifauna

Nature:		
Roadkill		
	Without mitigation	With mitigation
Extent	Local area (3)	Footprint & surrounding areas (2)
Duration	Short term (2)	Short term (2)
Magnitude	Moderate (6)	Minor (2)
Probability	Highly probable (4)	Improbable (2)
Significance	**Medium (44)**	**Low (12)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	
Mitigation:		
• All construction vehicles should adhere to clearly defined and demarcated roads. No off-road driving to be allowed outside of the construction area; and • All vehicles (construction or other) accessing the site should adhere to a low speed limit on site (40 km/h max) to avoid collisions with susceptible avifauna, such as nocturnal and crepuscular species (e.g., nightjars and owls) which sometimes forage or rest on roads, especially at night.		
Residual Impacts:		
Roadkill could still occur		

5.3.2 Operational Phase

The operational phase of the impact of daily activities is anticipated to lead to collisions and electrocutions. Moving vehicles do not only cause sensory disturbances to avifauna, affecting their life cycles and movement, but will lead to direct mortalities due to collisions. The area surrounding the direct footprint will be maintained to prevent uncontrolled events such as fire, this practice will however result in the disturbance and displacement of breeding and non-breeding species.

The following potential impacts were considered (Table 5-5 to Table 5-8):

- Collisions with PV panels, associated powerlines and connection lines and fences;
- Electrocution with solar plant connections;
- Roadkill during maintenance procedures; and
- Habitat degradation and displacement of resident, visiting and breeding species (as well as SCCs).

Table 5-5 Operational activities impacts on the avifauna

Nature:

Collisions with PV panels, connection lines and fences		
	Without mitigation	With mitigation
Extent	Regional (4)	Local Area (3)
Duration	Long term (4)	Long term (4)
Magnitude	High (8)	High (8)
Probability	Highly probable (4)	Probable (3)
Significance	**High (64)**	**Medium (45)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	
Mitigation:		

- The design of the proposed solar plant must be of a type or similar structure as endorsed by the Eskom-Endangered Wildlife Trust (EWT) Strategic Partnership on Birds and Energy, considering the mitigation guidelines recommended by Birdlife South Africa;
- Infrastructure should be consolidated where possible in order to minimise the amount of ground and air space used. This would involve using existing/approved pylons and associated infrastructure for different lines;
- The powerlines must have bird diverters on at every 10 m due to the high collision risk as a result of the water resources in the project area. If it is a multiple line installation the diverters must be placed on interchangeable lines at every 5 m;
- White strips should be placed along the edges of the panels, to reduce similarity to water and deter birds and insects (Horvath *et al,* 2010). Consider the use of bird deterrent devices to limit collision risk;
- Fencing mitigations:
  - Top 2 strands must be smooth wire
  - Routinely retention loose wires
  - Minimum 30 cm between wires
  - Place markers on fences

Residual Impacts:

Some collisions of SCCs and risk species might still occur regardless of mitigations

Table 5-6 Operational activities impacts on the avifauna

Nature:		
Electrocution with solar plant connections		
	Without mitigation	With mitigation
Extent	Regional (4)	Regional (4)
Duration	Long term (4)	Long term (4)
Magnitude	High (8)	Moderate (6)
Probability	Highly probable (4)	Improbable (2)
Significance	**High (64)**	**Low (28)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	High
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	
Mitigation:		

- The design of the proposed solar plant and grid lines must be of a type or similar structure as endorsed by the Eskom-EWT Strategic Partnership on Birds and Energy, considering the mitigation guidelines recommended by Birdlife South Africa;
- Infrastructure should be consolidated where possible/practical in order to minimise the amount of ground and air space used. This would involve using the existing/approved pylons and associated infrastructure for different lines; and
- Ensure that monitoring is sufficiently frequent to detect electrocutions reliably and that any areas where electrocutions occurred are repaired as soon as possible.

Residual Impacts:

Electrocutions might still occur regardless of mitigations

Table 5-7 Operational activities impacts on the avifauna

Nature:		
Roadkill during maintenance procedures		
	Without mitigation	With mitigation
Extent	Local area (3)	Local area (3)
Duration	Long term (4)	Long term (4)
Magnitude	Moderate (6)	Low (4)
Probability	Probable (3)	Improbable (2)
Significance	**Medium (39)**	**Low (18)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	

Mitigation:

- All personnel should undergo environmental induction with regards to avifauna and their behaviour on roads;
- All vehicles should adhere to clearly defined and demarcated roads. No off-road driving to be allowed; and
- All vehicles accessing the site should adhere to a low speed limit on site (40 km/h max) to avoid collisions with susceptible avifauna, such as nocturnal and crepuscular species (e.g., nightjars and owls) which sometimes forage or rest on roads, especially at night.

Residual Impacts:

Road collisions can still occur regardless of mitigations

Table 5-8 Operational activities impacts on the avifauna

Nature:		
Habitat degradation and displacement of resident, visiting and breeding species (as well as SCCs).		
	Without mitigation	With mitigation
Extent	Regional (4)	Local area (3)
Duration	Long term (4)	Short term (2)
Magnitude	High (8)	Moderate (6)
Probability	Highly probable (4)	Probable (3)
Significance	**High (64)**	**Medium (33)**

Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	**No, the footprint has already been disturbed. The area surrounding the development can be mitigated to some extent**	
Mitigation:		
• Minimising habitat destruction caused by the maintenance by demarcating the footprint so that it does not increase yearly; and • All areas where maintenance must be for example grass cutting walked through prior to any activity to ensure no nests or avifauna species are found in the area. Should any Species of Conservation Concern not move out of the area, or their nest be found in the area a suitably qualified specialist must be consulted to advise on the correct actions to be taken.		
Residual Impacts:		
Migratory routes of avifauna species could change, and the species composition could also change regardless of mitigations		

5.3.3 Decommissioning Phase

This phase is when the scaling down of activities ahead of temporary or permanent closure is initiated. During this phase, the operational phase impacts will persist until of the activity reduces and the rehabilitation measures are implemented. Should the plant be decommissioned the associated powerlines must be removed to ensure the collision risk is successfully mitigated.

The following potential impacts were considered (Table 5-9 to Table 5-10):

- Continued fragmentation and degradation of habitats;
- Displacement of faunal community (including SCC) due disturbance (road collisions, noise, dust, vibration); and
- Collisions with the powerlines if not removed during decommissioning.

Table 5-9 Decommissioning activities impacts on the avifauna

Nature:		
Continued fragmentation and degradation of habitats		
	Without mitigation	With mitigation
Extent	Local area (3)	Footprint & surrounding areas (2)
Duration	Long term (4)	Very short term (1)
Magnitude	High (8)	Minor (2)
Probability	Highly probable (4)	Very improbable (1)
Significance	**Medium (60)**	**Low (5)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	
Mitigation:		
• Implementation of a rehabilitation plan; • Implementation of an alien invasive management plan and monitoring on an annual basis for 3 years post construction; and		

- There should be follow-up rehabilitation and revegetation of any remaining bare areas with indigenous flora.

Residual Impacts:

No significant residual risks are expected, although IAP encroachment and erosion might still occur but would have a negligible impact if effectively managed.

Table 5-10 Decommissioning activities impacts on the avifauna

Nature:

Displacement of faunal community (including SCC) due disturbance (road collisions, noise, dust, vibration).

	Without mitigation	**With mitigation**
Extent	Regional (4)	Local area (3)
Duration	Long term (4)	Moderate term (3)
Magnitude	High (8)	Moderate (6)
Probability	Highly probable (4)	Probable (3)
Significance	**High (64)**	**Medium (36)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	

Mitigation:

- Minimize disturbance impact by abbreviating construction time;
- Schedule the activities to avoid breeding and movement times report;
- Dust management need to be done in the areas where the vegetation will be removed, this includes wetting of the soil. This area must be rehabilitated as soon as possible;
- All construction vehicles should adhere to clearly defined and demarcated roads. No off-road driving to be allowed outside of the decommissioning area; and
- All vehicles (construction or other) accessing the site should adhere to a low speed limit on site (40 km/h max) to avoid collisions with susceptible avifauna, such as nocturnal and crepuscular species (e.g., nightjars and owls) which sometimes forage or rest on roads, especially at night.

Residual Impacts:

If this is mitigated and monitored correctly no residual impacts should be present

Table 5-11 Decommissioning activities impacts on the avifauna

Nature:

Collisions with the powerlines if not removed during decommissioning.

	Without mitigation	**With mitigation**
Extent	Regional (4)	Site specific (1)
Duration	Long term (4)	Very short term (1)
Magnitude	High (8)	None (0)
Probability	Highly probable (4)	Very improbable (1)
Significance	**High (64)**	**Low (2)**
Status (positive or negative)	Negative	Negative

Reversibility	Moderate	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation:		
If the line is removed after/if the plant is decommissioned, the risk of collisions will be absent.		
Residual Impacts:		
No residual impact will remain if the line is removed as part of the decommissioning		

5.4 Cumulative Impacts

The impacts of projects are often assessed by comparing the post-project situation to a pre-existing baseline. Where projects can be considered in isolation this provides a good method of assessing a project's impact. However, in areas where baselines have already been affected, or where future development will continue to add to the impacts in an area or region, it is appropriate to consider the cumulative effects of development. This is similar to the concept of shifting baselines, which describes how the environmental baseline at a point in time may represent a significant change from the original state of the system. This section describes the potential impacts of the project that are cumulative for avifauna.

Localised cumulative impacts include the cumulative effects from operations that are close enough to potentially cause additive effects on the environment or sensitive receivers (such as the nearby existing solar facility and the existing powerlines). These include dust deposition, noise and vibration, disruption of corridors or habitat, groundwater drawdown, groundwater and surface water quality, and transport.

Long-term cumulative impacts due to the large number of development close by can lead to the loss of endemic and threatened species, loss of habitat and even degradation of well conserved areas. An area of 30 km surrounding the PAOI was considered to determine the percentage of habitat loss that has already taken place in the three vegetation types (Loskop Mountain Bushveld, Rand Highveld Grassland and Eastern Highveld Grassland) in this area. This was achieved by using the Landcover (2019) dataset from which all natural areas were excluded. In addition to the areas disturbed the planned and approved solar development in the area (within the 30 km area) were also included in the calculation (Figure 5-2). Based on the aforementioned it can be said that 51.43% of the habitat has already been transformed by amongst others agriculture and mining activities (Table 5-12). Considering the project in isolation, after the mitigations have been implemented, it can be said that the impact would be Low, however when considering the total natural habitat lost in the 30 km area the cumulative impact is High.

Table 5-12 Cumulative impact of the solar facility

Nature:		
Loss of habitat and increase in bird collisions		
	Project in isolation	**Project with adjacent PV projects with associated infrastructure**
Extent	Footprint & surrounding areas (2)	Regional (4)
Duration	Long term (4)	Long term (4)
Magnitude	Low (4)	High (8)
Probability	Improbable (2)	Highly probable (4)
Significance	**Low (20)**	**High (64)**
Status (positive or negative)	Negative	Negative

Reversibility	None	None
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	No	

Mitigation:

The overall combined habitat loss is extensive and cannot be replaced. Even though collisions can be mitigated to some extent for individual lines/solar plants their combined densities will increase the rate of collisions.

Residual Impacts:

Loss of habitat for endemic and SCC. Loss of SCCs due to collisions.

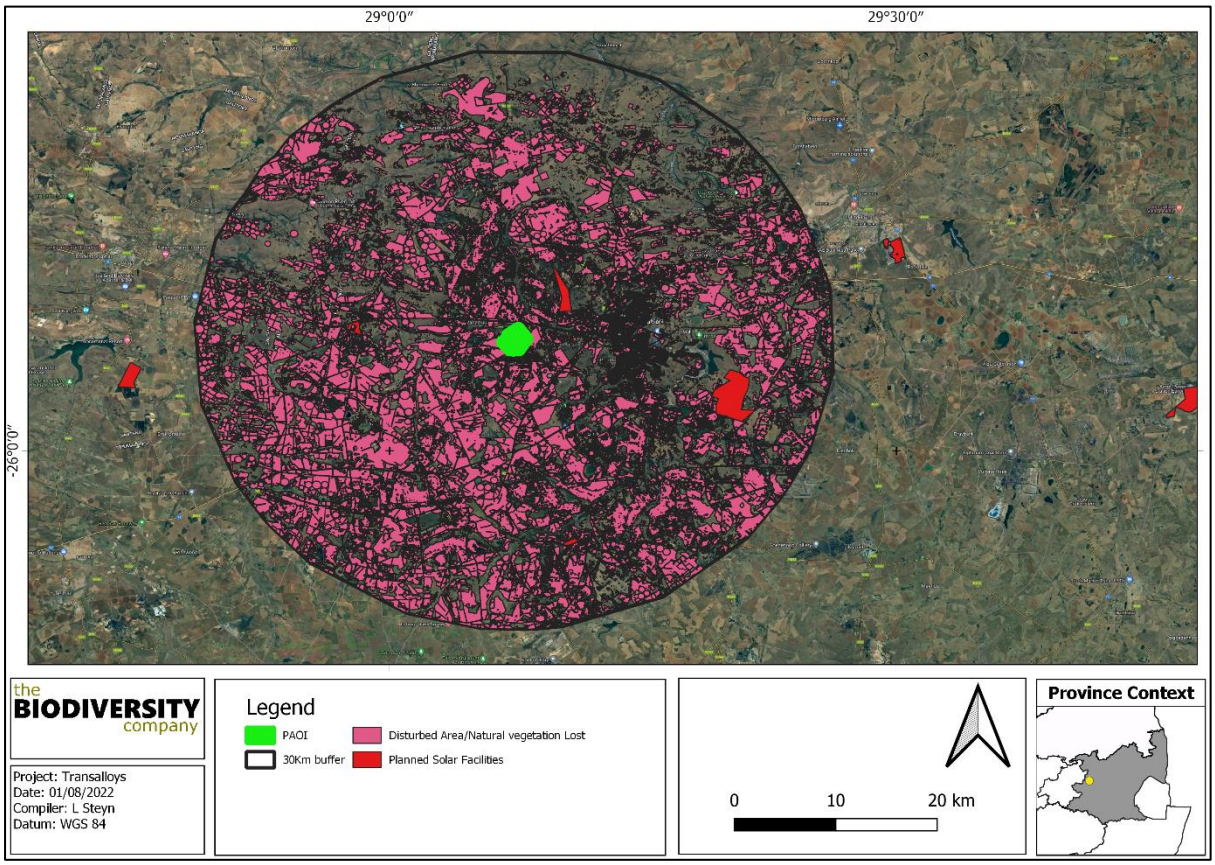


Figure 5-2 The Natural Area that has been disturbed or lost in the 30 km buffer area

6 Specialist Management Plan

The aim of the management outcomes is to present the mitigations in such a way that they can be incorporated into the Environmental Management Programme (EMPr), allowing for more successful implementation and auditing of the mitigations and monitoring guidelines.

Table 6-1 presents the recommended mitigation measures and the respective timeframes, targets, and performance indicators for the avifaunal study.

Table 6-1 Summary of management outcomes pertaining to impacts to avifauna and their habitats

Impact Management Actions	Implementation		Monitoring	
	Phase	Responsible Party	Aspect	Frequency
Management outcome: Habitats				
Areas outside of the direct project footprint, should under no circumstances be fragmented or disturbed further. Clearing of vegetation should be minimized and avoided where possible.	Life of operation	Project manager, Environmental Officer	Areas of indigenous vegetation	Ongoing
The wetland and buffer area must be treated as a "No-Go" area. No development is allowed to take place in these areas.	Life of operation	Project manager, Environmental Officer	Water resource area	Ongoing
The development footprint must be used for storage and the contractors' camps as well. This may not be outside the direct project area to ensure the disturbance area is as small as possible.	Construction	Project manager, Environmental Officer	Project footprint	During Stage
Where possible, existing access routes and walking paths must be made use of.	Construction/Operational Phase	Environmental Officer & Design Engineer	Roads and paths used	Ongoing
Areas that are denuded during construction need to be re-vegetated with indigenous vegetation to prevent erosion during flood and wind events. This will also reduce the likelihood of encroachment by alien invasive plant species.	Closure Phase/Rehabilitation phase	Environmental Officer & Contractor	Assess the state of rehabilitation and encroachment of alien vegetation	Quarterly for up to two years after the closure
Any woody material removed can be shredded and used in conjunction with the topsoil to augment soil moisture and prevent further erosion.	Closure Phase/ Post Closure Phase	Environmental Officer & Contractor	Road edges and project site footprint	During Phase
Rehabilitation of the disturbed areas existing in the project area must be made a priority. Topsoil must also be utilised, and any disturbed area must be re-vegetated with plant and grass species which are endemic to this vegetation type.	Operational/Closure Phase	Environmental Officer & Contractor	Road edges and footprint	During Phase
Erosion control and alien invasive management plan must be compiled.	Life of operation	Environmental Officer & Contractor	Erosion and alien invasive species	Ongoing
Environmentally friendly dust suppressants need to be utilised. This is especially pertinent due to the high number of water resources on site that can be polluted.	Operational phase	Environmental Officer & Contractor	Water pollution	During Phase
A fire management plan needs to be compiled and implemented to restrict	Life of operation	Environmental Officer & Contractor	Fire Management	During Phase

the impact fire might have on the surrounding areas.				
Management outcome: Avifauna				
Impact Management Actions	**Implementation**		**Monitoring**	
	Phase	Responsible Party	Aspect	Frequency
The areas to be developed must be specifically demarcated to prevent movement of staff or any individual into the surrounding environments. Signs must be put up to enforce this.	Construction/Operational Phase	Project manager, Environmental Officer	Infringement into these areas	Ongoing
A site walk through must be done in the summer season coinciding with the migratory season of avifauna (October - March) to ensure no additional SCCs are affected. If SCC are found appropriate mitigations must be added.	Pre-Construction/Construction Phase	Project manager, Environmental Officer	Occurrence of additional SCCs	During Phase
All personnel should undergo environmental induction with regards to avifauna and in particular awareness about not harming, collecting, or hunting terrestrial species (e.g., guineafowl and francolin), and owls, which are often persecuted out of superstition. Signs must be put up to enforce this.	Life of operation	Environmental Officer	Evidence of trapping etc	Ongoing
The duration of the construction should be kept to a minimum to avoid disturbing avifauna.	Construction/Operational Phase	Project manager, Environmental Officer & Design Engineer	Construction/Closure Phase	During Phase
Outside lighting should be designed and limited to minimize impacts on fauna. All outside lighting should be directed away from highly sensitive areas. Fluorescent and mercury vapor lighting should be avoided, and sodium vapor (red/green) lights should be used wherever possible.	Construction/Operational Phase	Project manager, Environmental Officer & Design Engineer	Light pollution and period of light.	During Phase
All construction and maintenance motor vehicle operators should undergo an environmental induction that includes instruction on the need to comply with speed limit (40km/h), to respect all forms of wildlife. Speed limits must still be enforced to ensure that road killings and erosion is limited.	Life of operation	Health and Safety Officer	Compliance to the training.	Ongoing
Schedule or limit (where feasible) activities and operations during least sensitive periods, to avoid migration, nesting and breeding seasons (June – August)	Construction/Operational Phase	Project manager, Environmental Officer & Design Engineer	Activities should take place during the day in winter.	During Phase
All project activities must be undertaken with appropriate noise mitigation measures to avoid disturbance to avifauna population in the region	Construction/Operational Phase	Project manager, Environmental Officer	Noise	During Phase
All areas to be developed must be walked through prior to any activity to ensure no nests or avifauna species are found in the area. Should any Species of Conservation Concern be found and not move out of the area, or their nest be found in the area a suitably qualified	Planning, Construction and Decommissioning	Project manager, Environmental Officer	Presence of Nests and faunal species	During Phase

specialist must be consulted to advise on the correct actions to be taken.				
The design of the proposed PV and grid lines must be of a type or similar structure as endorsed by the Eskom-EWT Strategic Partnership on Birds and Energy, considering the mitigation guidelines recommended by Birdlife South Africa (Jenkins *et al.,* 2015).	Planning and construction	Environmental Officer & Contractor, Engineer	Presence of electrocuted birds or bird strikes	During Phase
Infrastructure should be consolidated where possible in order to minimise the amount of ground and air space used.	Planning and construction	Environmental Officer & Contractor, Engineer	Presence of bird collisions	During phase
All the parts of the infrastructure must be nest proofed and anti-perch devices placed on areas that can lead to electrocution	Planning and construction	Environmental Officer & Contractor, Engineer	Presence of electrocuted birds	During phase
Use environmentally friendly cleaning and dust suppressant products this includes the cleaning of the panels	Construction and operation	Environmental Officer & Contractor, Engineer	Presence of chemicals in and around the project site	During phase
Fencing mitigations: • Top 2 strands must be smooth wire • Routinely retention loose wires • Minimum 30 cm between wires • Place markers on fences	Planning, construction, and operation	Environmental Officer & Contractor, Engineer	Presence of birds stuck /dead in fences Monitor fences for slack wires	During phase
As far as possible power cables within the project area should be thoroughly insulated and preferably buried.	Planning and construction	Environmental Officer & Contractor, Engineer	Exposed cables	During phase
The powerlines must have bird diverters on at every 10 m due to the high collision risk as a result of the water resources in the project area. If it is a multiple line installation the diverters must be placed on interchangeable lines at every 5 m.	Planning and construction	Environmental Officer & Contractor, Engineer	Exposed cables	During phase
Any exposed parts must be covered (insulated) to reduce electrocution risk	Planning and construction	Environmental Officer & Contractor, Engineer	Presence of electrocuted birds	During phase
White strips should be placed along the edges of the panels, to reduce similarity to water and deter birds and insects (Horvath *et al,* 2010). Consider the use of bird deterrent devices to limit collision risk.	Planning and construction	Environmental Officer & Contractor, Engineer	Presence of dead birds in the project site	During phase

6.1 Monitoring

- Should the development be authorised SCC monitoring must be done in the spring-summer season (September to March) to determine the effect of the development on these species, this would also allow for more available data for future projects;
- Monitoring must be done prior to the construction phase and for 3 consecutive years after construction. Standard methods as per the species protocols must be followed; and
- A site walk through must be done prior to the construction in the summer season coinciding with the migratory season of avifauna to ensure no additional SCCs are affected. If SCC are found appropriate mitigations and monitoring must be added.

7 Conclusion

From a desktop perspective the project area falls across a CBA: Optimal and across a CBA: Irreplaceable area, falls in a VU ecosystem and overlap with a CR river and a CR wetland. Based on the SABAP2 dataset 246 species were expected in the project area of which two has a high likelihood of occurrence and four a moderate likelihood of occurrence.

During the field assessment sixty-six (66) bird species were recorded in the point counts of the survey, while twenty-two (22) species were recorded during incidental observations. One of the species recorded was a SCC, the Lanner Falcon (*Falco biarmicus*), it was observed flying over the project area, no nest of this species was observed in the project area. A nest of a provincially protected Hamerkop (*Scopus umbretta*) was observed, based on its lower schedule 5 protection level only a 50 m buffer was placed around the nest, and this must be treated as a "No-Go" area. The feeding groups recorded in the project area were dominated by insectivores, followed by granivores and omnivores. It is believed a summer survey in the migratory season of avifauna would yield higher numbers of bird species, especially those of water birds due to the high numbers of water resources in the project area. The water resources and their buffers (as per the wetland report TBC, 2022) in the PAOI must be treated as "No-Go' areas. As a result of the high amount of water resources in the project area the collision risk is regarded as higher. This risk can be mitigated by the installation of white-strips on the edge of the PV panels and bird diverters along the whole length of the powerline.

Based on the current types of bird species recorded in the project area the development will not have a high residual impact should all the mitigations and recommendations be implemented.

8 Impact Statement

Based on the desktop and field findings it is the opinion of the specialist that the project, may be favourably considered, on condition that all prescribed mitigation measures and supporting monitoring are implemented.

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10 Appendix Items

10.1 Appendix A – Specialist Declaration of Independence

I, Lindi Steyn, declare that:

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

Lindi Steyn

Terrestrial Ecologist

The Biodiversity Company

August 2022

10.2 Appendix B- Expected species

Species	Common Name	Conservation Status	
		Regional (SANBI, 2016)	IUCN (2021)
Accipiter melanoleucus	Sparrowhawk, Black	Unlisted	LC
Acridotheres tristis	Myna, Common	Unlisted	LC
Acrocephalus arundinaceus	Reed-warbler, Great	Unlisted	LC
Acrocephalus baeticatus	Reed-warbler, African	Unlisted	Unlisted
Acrocephalus gracilirostris	Swamp-warbler, Lesser	Unlisted	LC
Acrocephalus palustris	Warbler, Marsh	Unlisted	LC
Actophilornis africanus	Jacana, African	Unlisted	LC
Afrotis afraoides	Korhaan, Northern Black	Unlisted	LC
Alopochen aegyptiaca	Goose, Egyptian	Unlisted	LC
Amadina erythrocephala	Finch, Red-headed	Unlisted	LC
Amandava subflava	Waxbill, Orange-breasted	Unlisted	Unlisted
Amblyospiza albifrons	Weaver, Thick-billed	Unlisted	LC
Anas capensis	Teal, Cape	Unlisted	LC
Anas erythrorhyncha	Teal, Red-billed	Unlisted	LC
Anas platyrhynchos	Duck, Mallard	Unlisted	LC
Anas sparsa	Duck, African Black	Unlisted	LC
Anas undulata	Duck, Yellow-billed	Unlisted	LC
Anhinga rufa	Darter, African	Unlisted	LC
Anthus cinnamomeus	Pipit, African	Unlisted	LC
Anthus leucophrys	Pipit, Plain-backed	Unlisted	LC
Anthus nicholsoni	Nicholson's pipit	Unlisted	LC
Anthus vaalensis	Pipit, Buffy	Unlisted	LC
Apalis thoracica	Apalis, Bar-throated	Unlisted	LC
Apus affinis	Swift, Little	Unlisted	LC
Apus apus	Swift, Common	Unlisted	LC
Apus caffer	Swift, White-rumped	Unlisted	LC
Apus horus	Swift, Horus	Unlisted	LC
Ardea alba	Egret, Great	Unlisted	LC
Ardea cinerea	Heron, Grey	Unlisted	LC
Ardea intermedia	Egret, Yellow-billed (Intermediate)	Unlisted	LC
Ardea melanocephala	Heron, Black-headed	Unlisted	LC
Ardea purpurea	Heron, Purple	Unlisted	LC
Ardeola ralloides	Heron, Squacco	Unlisted	LC
Asio capensis	Owl, Marsh	Unlisted	LC
Aviceda cuculoides	Hawk, African Cuckoo	Unlisted	LC
Bostrychia hagedash	Ibis, Hadeda	Unlisted	LC

Bradypterus baboecala	Rush-warbler, Little	Unlisted	LC
Bubo africanus	Eagle-owl, Spotted	Unlisted	LC
Bubulcus ibis	Egret, Cattle	Unlisted	LC
Burhinus capensis	Thick-knee, Spotted	Unlisted	LC
Buteo buteo	Buzzard, Common (Steppe)	Unlisted	LC
Buteo rufofuscus	Buzzard, Jackal	Unlisted	LC
Calandrella cinerea	Lark, Red-capped	Unlisted	LC
Calidris ferruginea	Sandpiper, Curlew	LC	NT
Calidris minuta	Stint, Little	LC	LC
Calidris pugnax	Ruff	Unlisted	LC
Caprimulgus pectoralis	Nightjar, Fiery-necked	Unlisted	LC
Caprimulgus tristigma	Nightjar, Freckled	Unlisted	LC
Cecropis abyssinica	Swallow, Lesser Striped	Unlisted	LC
Cecropis cucullata	Swallow, Greater Striped	Unlisted	LC
Cecropis semirufa	Swallow, Red-breasted	Unlisted	LC
Centropus burchellii	Coucal, Burchell's	Unlisted	Unlisted
Cercotrichas leucophrys	Scrub-robin, White-browed	Unlisted	LC
Ceryle rudis	Kingfisher, Pied	Unlisted	LC
Chalcomitra amethystina	Sunbird, Amethyst	Unlisted	LC
Charadrius pecuarius	Plover, Kittlitz's	Unlisted	LC
Charadrius tricollaris	Plover, Three-banded	Unlisted	LC
Chersomanes albofasciata	Lark, Spike-heeled	Unlisted	LC
Chlidonias hybrida	Tern, Whiskered	Unlisted	LC
Chlidonias leucopterus	Tern, White-winged	Unlisted	LC
Chroicocephalus cirrocephalus	Gull, Grey-headed	Unlisted	LC
Chrysococcyx caprius	Cuckoo, Diderick	Unlisted	LC
Ciconia ciconia	Stork, White	Unlisted	LC
Cinnyricinclus leucogaster	Starling, Violet-backed	Unlisted	LC
Cinnyris afer	Sunbird, Greater Double-collared	Unlisted	LC
Cinnyris talatala	Sunbird, White-bellied	Unlisted	LC
Circaetus cinereus	Snake-eagle, Brown	Unlisted	LC
Circaetus pectoralis	Snake-eagle, Black-chested	Unlisted	LC
Circus ranivorus	Marsh-harrier, African	EN	LC
Cisticola aridulus	Cisticola, Desert	Unlisted	LC
Cisticola ayresii	Cisticola, Wing-snapping	Unlisted	LC
Cisticola fulvicapilla	Neddicky, Neddicky	Unlisted	LC
Cisticola juncidis	Cisticola, Zitting	Unlisted	LC
Cisticola lais	Cisticola, Wailing	Unlisted	LC
Cisticola textrix	Cisticola, Cloud	Unlisted	LC

Cisticola tinniens	Cisticola, Levaillant's	Unlisted	LC
Clamator jacobinus	Cuckoo, Jacobin	Unlisted	LC
Colius striatus	Mousebird, Speckled	Unlisted	LC
Columba guinea	Pigeon, Speckled	Unlisted	LC
Columba livia	Dove, Rock	Unlisted	LC
Corvus albus	Crow, Pied	Unlisted	LC
Corvus capensis	Crow, Cape	Unlisted	LC
Corythornis cristatus	Kingfisher, Malachite	Unlisted	Unlisted
Cossypha caffra	Robin-chat, Cape	Unlisted	LC
Coturnix coturnix	Quail, Common	Unlisted	LC
Creatophora cinerea	Starling, Wattled	Unlisted	LC
Crinifer concolor	Go-away-bird, Grey	Unlisted	LC
Crithagra atrogularis	Canary, Black-throated	Unlisted	LC
Crithagra flaviventris	Canary, Yellow	Unlisted	LC
Crithagra gularis	Seedeater, Streaky-headed	Unlisted	LC
Crithagra mozambica	Canary, Yellow-fronted	Unlisted	LC
Cuculus clamosus	Cuckoo, Black	Unlisted	LC
Cuculus solitarius	Cuckoo, Red-chested	Unlisted	LC
Cypsiurus parvus	Palm-swift, African	Unlisted	LC
Delichon urbicum	House-martin, Common	Unlisted	LC
Dendrocygna bicolor	Duck, Fulvous	Unlisted	LC
Dendrocygna viduata	Duck, White-faced Whistling	Unlisted	LC
Dendropicos fuscescens	Woodpecker, Cardinal	Unlisted	LC
Dicrurus adsimilis	Drongo, Fork-tailed	Unlisted	LC
Egretta garzetta	Egret, Little	Unlisted	LC
Elanus caeruleus	Kite, Black-shouldered	Unlisted	LC
Emberiza tahapisi	Bunting, Cinnamon-breasted	Unlisted	LC
Eremopterix leucotis	Sparrowlark, Chestnut-backed	Unlisted	LC
Estrilda astrild	Waxbill, Common	Unlisted	LC
Euplectes afer	Bishop, Yellow-crowned	Unlisted	LC
Euplectes albonotatus	Widowbird, White-winged	Unlisted	LC
Euplectes ardens	Widowbird, Red-collared	Unlisted	LC
Euplectes axillaris	Widowbird, Fan-tailed	Unlisted	LC
Euplectes orix	Bishop, Southern Red	Unlisted	LC
Euplectes progne	Widowbird, Long-tailed	Unlisted	LC
Falco amurensis	Falcon, Amur	Unlisted	LC
Falco naumanni	Kestrel, Lesser	Unlisted	LC
Falco peregrinus	Falcon, Peregrine	Unlisted	LC
Falco rupicoloides	Kestrel, Greater	Unlisted	LC

Falco rupicolus	Kestrel, Rock	Unlisted	LC
Fulica cristata	Coot, Red-knobbed	Unlisted	LC
Gallinago nigripennis	Snipe, African	Unlisted	LC
Gallinula chloropus	Moorhen, Common	Unlisted	LC
Geronticus calvus	Ibis, Southern Bald	VU	VU
Grus paradisea	Crane, Blue	NT	VU
Halcyon senegalensis	Kingfisher, Woodland	Unlisted	LC
Haliaeetus vocifer	Fish-eagle, African	Unlisted	LC
Hieraaetus wahlbergi	Eagle, Wahlberg's	Unlisted	LC
Himantopus himantopus	Stilt, Black-winged	Unlisted	LC
Hirundo albigularis	Swallow, White-throated	Unlisted	LC
Hirundo dimidiata	Swallow, Pearl-breasted	Unlisted	LC
Hirundo rustica	Swallow, Barn	Unlisted	LC
Indicator minor	Honeyguide, Lesser	Unlisted	LC
Ixobrychus minutus	Bittern, Little	Unlisted	LC
Jynx ruficollis	Wryneck, Red-throated	Unlisted	LC
Lagonosticta senegala	Firefinch, Red-billed	Unlisted	LC
Lamprotornis bicolor	Starling, Pied	Unlisted	LC
Lamprotornis nitens	Starling, Cape Glossy	Unlisted	LC
Laniarius ferrugineus	Boubou, Southern	Unlisted	LC
Lanius collaris	Fiscal, Common (Southern)	Unlisted	LC
Lanius collurio	Shrike, Red-backed	Unlisted	LC
Lanius minor	Shrike, Lesser Grey	Unlisted	LC
Lophaetus occipitalis	Eagle, Long-crested	Unlisted	LC
Lybius torquatus	Barbet, Black-collared	Unlisted	LC
Macronyx capensis	Longclaw, Cape	Unlisted	LC
Megaceryle maxima	Kingfisher, Giant	Unlisted	Unlisted
Melaenornis silens	Flycatcher, Fiscal	Unlisted	LC
Merops apiaster	Bee-eater, European	Unlisted	LC
Merops bullockoides	Bee-eater, White-fronted	Unlisted	LC
Microcarbo africanus	Cormorant, Reed	Unlisted	LC
Micronisus gabar	Goshawk, Gabar	Unlisted	LC
Mirafra africana	Lark, Rufous-naped	Unlisted	LC
Mirafra cheniana	Lark, Melodious	LC	NT
Mirafra fasciolata	Lark, Eastern Clapper	Unlisted	LC
Motacilla capensis	Wagtail, Cape	Unlisted	LC
Muscicapa striata	Flycatcher, Spotted	Unlisted	LC
Myrmecocichla formicivora	Chat, Anteating	Unlisted	LC
Myrmecocichla monticola	Wheatear, Mountain	Unlisted	LC

Netta erythrophthalma	Pochard, Southern	Unlisted	LC
Nilaus afer	Brubru	Unlisted	LC
Numida meleagris	Guineafowl, Helmeted	Unlisted	LC
Oena capensis	Dove, Namaqua	Unlisted	LC
Oenanthe pileata	Wheatear, Capped	Unlisted	LC
Onychognathus morio	Starling, Red-winged	Unlisted	LC
Oriolus larvatus	Oriole, Black-headed	Unlisted	LC
Ortygospiza atricollis	Quailfinch, African	Unlisted	LC
Oxyura maccoa	Duck, Maccoa	NT	VU
Passer diffusus	Sparrow, Southern Grey-headed	Unlisted	LC
Passer domesticus	Sparrow, House	Unlisted	LC
Passer melanurus	Sparrow, Cape	Unlisted	LC
Pavo cristatus	Peacock, Common	Unlisted	LC
Peliperdix coqui	Francolin, Coqui	Unlisted	LC
Petrochelidon spilodera	Cliff-swallow, South African	Unlisted	LC
Phalacrocorax lucidus	Cormorant, White-breasted	Unlisted	LC
Phoeniconaias minor	Flamingo, Lesser	NT	NT
Phoenicopterus roseus	Flamingo, Greater	NT	LC
Phoeniculus purpureus	Wood-hoopoe, Green	Unlisted	LC
Phylloscopus trochilus	Warbler, Willow	Unlisted	LC
Platalea alba	Spoonbill, African	Unlisted	LC
Plectropterus gambensis	Goose, Spur-winged	Unlisted	LC
Plegadis falcinellus	Ibis, Glossy	Unlisted	LC
Plocepasser mahali	Sparrow-weaver, White-browed	Unlisted	LC
Ploceus capensis	Weaver, Cape	Unlisted	LC
Ploceus cucullatus	Weaver, Village	Unlisted	LC
Ploceus velatus	Masked-weaver, Southern	Unlisted	LC
Podiceps cristatus	Grebe, Great Crested	Unlisted	LC
Podiceps nigricollis	Grebe, Black-necked	Unlisted	LC
Pogoniulus chrysoconus	Tinkerbird, Yellow-fronted	Unlisted	LC
Polyboroides typus	Harrier-Hawk, African	Unlisted	LC
Porphyrio madagascariensis	Swamphen, African Purple	Unlisted	Unlisted
Prinia flavicans	Prinia, Black-chested	Unlisted	LC
Prinia subflava	Prinia, Tawny-flanked	Unlisted	LC
Prodotiscus regulus	Honeybird, Brown-backed	Unlisted	LC
Pternistis natalensis	Spurfowl, Natal	Unlisted	LC
Pternistis swainsonii	Spurfowl, Swainson's	Unlisted	LC
Ptyonoprogne fuligula	Martin, Rock	Unlisted	Unlisted
Pycnonotus tricolor	Bulbul, Dark-capped	Unlisted	Unlisted

Quelea quelea	Quelea, Red-billed	Unlisted	LC
Rallus caerulescens	Rail, African	Unlisted	LC
Recurvirostra avosetta	Avocet, Pied	Unlisted	LC
Riparia cincta	Martin, Banded	Unlisted	LC
Riparia paludicola	Martin, Brown-throated	Unlisted	LC
Riparia riparia	Martin, Sand	Unlisted	LC
Sagittarius serpentarius	Secretarybird	VU	EN
Sarkidiornis melanotos	Duck, Comb	Unlisted	LC
Sarothrura rufa	Flufftail, Red-chested	Unlisted	LC
Saxicola torquatus	Stonechat, African	Unlisted	LC
Scleroptila gutturalis	Francolin, Orange River	Unlisted	LC
Scleroptila levaillantii	Francolin, Red-winged	Unlisted	LC
Scopus umbretta	Hamerkop, Hamerkop	Unlisted	LC
Serinus canicollis	Canary, Cape	Unlisted	LC
Spatula hottentota	Teal, Hottentot	Unlisted	LC
Spatula smithii	Shoveler, Cape	Unlisted	LC
Spermestes cucullata	Mannikin, Bronze	Unlisted	LC
Sphenoeacus afer	Grassbird, Cape	Unlisted	LC
Spilopelia senegalensis	Dove, Laughing	Unlisted	LC
Spizocorys conirostris	Lark, Pink-billed	Unlisted	LC
Streptopelia capicola	Turtle-dove, Cape	Unlisted	LC
Streptopelia semitorquata	Dove, Red-eyed	Unlisted	LC
Struthio camelus	Ostrich, Common	Unlisted	LC
Tachybaptus ruficollis	Grebe, Little	Unlisted	LC
Tachymarptis melba	Swift, Alpine	Unlisted	LC
Tadorna cana	Shelduck, South African	Unlisted	LC
Tchagra senegalus	Tchagra, Black-crowned	Unlisted	LC
Telophorus zeylonus	Bokmakierie, Bokmakierie	Unlisted	LC
Terpsiphone viridis	Paradise-flycatcher, African	Unlisted	LC
Thalassornis leuconotus	Duck, White-backed	Unlisted	LC
Thamnolaea cinnamomeiventris	Cliff-chat, Mocking	Unlisted	LC
Threskiornis aethiopicus	Ibis, African Sacred	Unlisted	LC
Trachyphonus vaillantii	Barbet, Crested	Unlisted	LC
Tringa glareola	Sandpiper, Wood	Unlisted	LC
Tringa nebularia	Greenshank, Common	Unlisted	LC
Tringa stagnatilis	Sandpiper, Marsh	Unlisted	LC
Turdoides jardineii	Babbler, Arrow-marked	Unlisted	LC
Turdus libonyana	Thrush, Kurrichane	Unlisted	Unlisted
Turdus litsitsirupa	Thrush, Groundscraper	Unlisted	Unlisted

Turdus smithi	Thrush, Karoo	Unlisted	LC
Turnix sylvaticus	Buttonquail, Kurrichane	Unlisted	LC
Tyto alba	Owl, Barn	Unlisted	LC
Tyto capensis	Grass-owl, African	VU	LC
Upupa africana	Hoopoe, African	Unlisted	LC
Uraeginthus angolensis	Waxbill, Blue	Unlisted	LC
Urocolius indicus	Mousebird, Red-faced	Unlisted	LC
Vanellus armatus	Lapwing, Blacksmith	Unlisted	LC
Vanellus coronatus	Lapwing, Crowned	Unlisted	LC
Vanellus senegallus	Lapwing, African Wattled	Unlisted	LC
Vidua macroura	Whydah, Pin-tailed	Unlisted	LC
Zapornia flavirostra	Crake, Black	Unlisted	LC
Zosterops virens	White-eye, Cape	Unlisted	LC

10.3 Appendix C – Observed species during the point counts

Common Name	Scientific Name	Guild code	Relative abundance	Frequency (%)
Black Sparrowhawk	*Accipiter melanoleucus*	CGD	0,003	3,333
Common Myna	*Acridotheres tristis*	OMD	0,006	3,333
Lesser Swamp Warbler	*Acrocephalus gracilirostris*	IGD	0,003	3,333
Egyptian Goose	*Alopochen aegyptiaca*	HWD	0,006	3,333
African Black Duck	*Anas sparsa*	IWD	0,003	3,333
Yellow-billed Duck	*Anas undulata*	HWD	0,006	3,333
African Pipit	*Anthus cinnamomeus*	IGD	0,020	23,333
Hadada Ibis	*Bostrychia hagedash*	OMD	0,067	30,000
Little Rush Warbler	*Bradypterus baboecala*	IWD	0,006	6,667
Red-capped Lark	*Calandrella cinerea*	GGD	0,009	10,000
Three-banded Plover	*Charadrius tricollaris*	IWD	0,003	3,333
Spike-heeled Lark	*Chersomanes albofasciata*	IGD	0,012	10,000
Grey-headed Gull	*Chroicocephalus cirrocephalus*	IGD	0,009	10,000
White-bellied Sunbird	*Cinnyris talatala*	NFD	0,006	6,667
Zitting Cisticola	*Cisticola juncidis*	IGD	0,006	6,667
Cloud Cisticola	*Cisticola textrix*	IGD	0,006	6,667
Levaillant's Cisticola	*Cisticola tinniens*	IGD	0,032	33,333
Speckled Pigeon	*Columba guinea*	FFD	0,035	10,000
Pied Crow	*Corvus albus*	OMD	0,003	3,333
Cape Robin-Chat	*Cossypha caffra*	OMD	0,003	3,333
Black-winged Kite	*Elanus caeruleus*	CGD	0,006	6,667
Common Waxbill	*Estrilda astrild*	GGD	0,018	6,667

Southern Red Bishop	*Euplectes orix*	GGD	0,129	23,333
Long-tailed Widowbird	*Euplectes progne*	GGD	0,015	16,667
African Snipe	*Gallinago nigripennis*	IWD	0,012	10,000
Common Moorhen	*Gallinula chloropus*	HWD	0,009	10,000
Cape Longclaw	*Macronyx capensis*	IGD	0,023	26,667
Rufous-naped Lark	*Mirafra africana*	IGD	0,012	13,333
Cape Wagtail	*Motacilla capensis*	IGD	0,012	10,000
Mountain Wheatear	*Myrmecocichla monticola*	IGD	0,003	3,333
Helmeted Guineafowl	*Numida meleagris*	OMD	0,058	3,333
Capped Wheatear	*Oenanthe pileata*	IGD	0,029	33,333
Quailfinch	*Ortygospiza atricollis*	GGD	0,003	3,333
Cape Sparrow	*Passer melanurus*	GGD	0,012	10,000
Southern Masked Weaver	*Ploceus velatus*	GGD	0,041	40,000
Black-chested Prinia	*Prinia flavicans*	IGD	0,006	6,667
Swainson's Spurfowl	*Pternistis swainsonii*	OMD	0,009	6,667
Rock Martin	*Ptyonoprogne fuligula*	IAD	0,003	3,333
Dark-capped Bulbul	*Pycnonotus tricolor*	OMD	0,006	6,667
Red-billed Quelea	*Quelea quelea*	GGD	0,117	6,667
African Rail	*Rallus caerulescens*	IWD	0,012	3,333
Brown-throated Martin	*Riparia paludicola*	IAD	0,003	3,333
Red-chested Flufftail	*Sarothrura rufa*	IWD	0,003	3,333
African Stonechat	*Saxicola torquatus*	IGD	0,023	26,667
Hamerkop	*Scopus umbretta*	CWD	0,003	3,333
Ring-necked Dove	*Streptopelia capicola*	GGD	0,079	46,667
Red-eyed Dove	*Streptopelia semitorquata*	GGD	0,009	10,000
Blacksmith Lapwing	*Vanellus armatus*	IGD	0,032	33,333
Crowned Lapwing	*Vanellus coronatus*	IGD	0,064	46,667
African Wattled Lapwing	*Vanellus senegallus*	IGD	0,006	6,667
Cape White-eye	*Zosterops virens*	OMD	0,003	3,333

10.4 Appendix D - Incidental Observations

Species	Common Name	Conservation Status	
		Regional (SANBI, 2016)	IUCN (2021)
Acridotheres tristis	Myna, Common	Unlisted	LC
Ardea melanocephala	Heron, Black-headed	Unlisted	LC
Ardea purpurea	Heron, Purple	Unlisted	LC
Cisticola ayresii	Cisticola, Wing-snapping	Unlisted	LC
Cisticola textrix	Cisticola, Cloud	Unlisted	LC
Cossypha caffra	Robin-chat, Cape	Unlisted	LC
Cursorius temminckii	Courser, Temminck's	Unlisted	LC
Elanus caeruleus	Kite, Black-shouldered	Unlisted	LC
Euplectes orix	Bishop, Southern Red	Unlisted	LC
Falco biarmicus	Falcon, Lanner	VU	LC
Lanius collaris	Fiscal, Common (Southern)	Unlisted	LC
Macronyx capensis	Longclaw, Cape	Unlisted	LC
Melaenornis silens	Flycatcher, Fiscal	Unlisted	LC
Mirafra africana	Lark, Rufous-naped	Unlisted	LC
Passer domesticus	Sparrow, House	Unlisted	LC
Passer melanurus	Sparrow, Cape	Unlisted	LC
Ploceus velatus	Masked-weaver, Southern	Unlisted	LC
Prinia subflava	Prinia, Tawny-flanked	Unlisted	LC
Scleroptila gutturalis	Francolin, Orange River	Unlisted	LC
Streptopelia capicola	Turtle-dove, Cape	Unlisted	LC
Tadorna cana	Shelduck, South African	Unlisted	LC
Telophorus zeylonus	Bokmakierie, Bokmakierie	Unlisted	LC
Threskiornis aethiopicus	Ibis, African Sacred	Unlisted	LC
Turdoides jardineii	Babbler, Arrow-marked	Unlisted	LC
Urocolius indicus	Mousebird, Red-faced	Unlisted	LC
Vanellus coronatus	Lapwing, Crowned	Unlisted	LC
Zosterops virens	White-eye, Cape	Unlisted	LC