TERRESTRIAL FAUNAL AND AVIFAUNAL SPECIES IMPACT ASSESSMENT REPORT FOR THE PROPOSED MIXED-USE HOUSING DEVELOPMENT ON PORTIONS 7 AND 8 OF THE FARM KRANSHOEK NO. 432, PLETTENBERG BAY, BITOU MUNICIPALITY

October 2023

Prepared for:

Sharples Environmental Services cc (SES)

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Appendix E Species list of the faunal species recovered within the study area during the field survey. For each, the taxonomic Order, Family, species binomial name and species common name are shown, along with the current IUCN Red List classification of the species, and the number of records of the species during the surveying period. 129

Specialist details and expertise

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- 27 years of in-the-field naturalist experience involving all faunal groups
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- Involved in the Southern African Bird Atlas Project 2 (SABAP2)
- Contributor on the National Biodiversity Assessment 2018: The status of South Africa's ecosystems and biodiversity. Synthesis Report. South African National Biodiversity Institute, an entity of the Department of Environment, Forestry and Fisheries, Pretoria.

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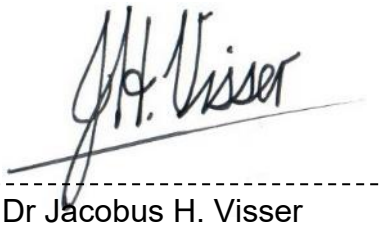
Declaration of independence by the independent person who compiled a specialist report or undertook a specialist process

I, Dr Jacobus Hendrik Visser, as the appointed independent specialist hereby declare that I:

• act/ed as the independent specialist in this application;
• regard the information contained in this report as it relates to my specialist input/study to be true and correct, and
• do not have and will not have any financial interest in the undertaking of the activity, other than remuneration for work performed in terms of the NEMA, the Environmental Impact Assessment Regulations and any specific environmental management Act;
• have no and will not have any vested interest in the proposed activity proceeding;
• have disclosed, to the applicant, EAP and competent authority, any material information that have or may have the potential to influence the decision of the competent authority or the objectivity of any report, plan or document required in terms of the NEMA, the Environmental Impact Assessment Regulations and any specific environmental management Act;
• am fully aware of and meet the responsibilities in terms of NEMA, the Environmental Impact Assessment Regulations and any specific environmental management Act, and that failure to comply with these requirements may constitute and result in disqualification;
• have ensured that information containing all relevant facts in respect of the specialist input/study was distributed or made available to interested and affected parties and the public and that participation by interested and affected parties was facilitated in such a manner that all interested and affected parties were provided with a reasonable opportunity to participate and to provide comments on the specialist input/study;
• have ensured that the comments of all interested and affected parties on the specialist input/study were considered, recorded and submitted to the competent authority in respect of the application;

• have ensured that the names of all interested and affected parties that participated in terms of the specialist input/study were recorded in the register of interested and affected parties who participated in the public participation process;
• have provided the competent authority with access to all information at my disposal regarding the application, whether such information is favourable to the applicant or not; and
• am aware that a false declaration is an offence.



09 October 2023

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Executive summary

Background

The applicant is proposing a mixed-use housing development on Portions 7 and 8 of the Farm Kranshoek No. 432, Plettenberg Bay, Bitou Municipality, Western Cape (hereafter referred to as the "study area" or "site"). Portion 7 of the Farm Kranshoek No. 432 is located directly adjacent to, and east of the Kranshoek settlement, and appears to comprise a previous agricultural area (Figures 2 and 3). Portion 8 of the Farm Kranshoek No. 432 is located directly north of Portion 7, and is approximately 250m east of the Kranshoek settlement and 600m south of the Robberg Road. In total, these two farm portions comprise a study area of around 40.2 hectares in size. Blue Skies Research was appointed by Sharples Environmental Services cc (SES) on behalf of the applicant to perform the required terrestrial faunal and avifaunal assessment of the study area. The current report forms part of the Environmental Impact Assessment (EIA) for the proposed development. Within the study area three development alternatives have been identified. Alternative 1 constitutes the initial development layout which was assessed during the scoping phase of the current assessment and is therefore represented throughout the initial sections of this report. Alternatives 2 and 3 represent development layouts which were selected subsequent to the scoping phase, and following the inputs from this report, as well as those from

the botanical and freshwater specialists. These alternatives are considered in during the impact assessment section of this report.

The DFFE Screening Tool Report generated for the proposed project footprint identifies the site as being of an overall “High” sensitivity under the “Relative Animal Species Sensitivity Theme”, with Portion 8 largely corresponding to an area of “High” sensitivity and Portion 7 being of “Medium” sensitivity (owing to past agricultural land-use here). These sensitivities follow from the projected and possible occurrence of two mammal, one amphibian, three avifaunal and two invertebrate Species of Conservation Concern (SCC). The current report therefore assesses the presence or likely presence of these mammal, amphibian, avifaunal and invertebrate SCC within the study area in accordance with the protocols outlined in the Species Environmental Assessment Guideline (SANBI, 2020)

As such, the aims of this investigation were to:

1.) Assess, define and create a spatial rendering of available faunal habitats across the study area landscape based on information gathered during the field survey as well as through a desktop assessment using the latest satellite imagery,

2.) compile a complete faunal desktop species list (including mammals, amphibians, avifauna and butterflies) for the study area based on a thorough desktop assessment so as to assess the presence of any of the listed SCC (Table 1) as well as any additional SCC within these faunal groups,

3.) compile a faunal species list (including mammals, amphibians, avifauna butterflies and grasshoppers) within the study area through field surveying so as to assess the possibility of occurrence of the SCC retrieved in the desktop assessment (based on appropriate sampling methods, as well as the presence of suitable habitat for these species), or any additional SCC which are present on the site, and

4.) generate spatial occurrence maps for the recovered faunal species within the study area to assess the spatial extent of areas supporting higher levels of diversity, and SCC subpopulations and habitats which may be of conservation concern.

Study methodology

To assess the possible occurrence of the listed as well as any additional mammal, amphibian, avifaunal and butterfly SCC, a desktop assessment was performed to create a representative desktop species list for these faunal groups. To assess the possible occurrence of the recovered terrestrial faunal or avifaunal SCC, as well as sensitive habitats, the study area was surveyed on foot over two consecutive days on the 13th and 14th of July 2023, during the Winter season. Surveying included unconstrained point sampling through search meanders, as well active searching under rocks and debris. All tracks surveyed were recorded by GPS (Garmin eTrex® 10, Garmin International Inc, USA) and are represented in Figure 18. Terrestrial faunal species (mammals) were identified by direct visual observation, or by their tracks, burrows, remains or scat. Amphibian species were identified by direct visual observation or by auditory means, supplemented by diurnal sound recordings. Avifaunal species were identified by visual observation, using a 180x zoom lens, or by auditory means. While no butterfly species were observed in the study area (likely owing to the Winter season), the presence or absence of the Yellow-winged Agile Grasshopper was evaluated based on suitable habitat (recently burnt Schlerophyll on south-facing slopes) for this species. All observations were recorded by GPS and the species or evidence of species' presence or activity were photographed using a digital camera (Canon PowerShot SX430 IS, Canon Inc, USA). During surveying, faunal habitats were broadly identified in the field, and thereafter delineated through a desktop assessment of the study area using satellite imagery.

Habitat types

The study area is comprised of eight broadly identified habitat types based on habitat composition and habitat integrity, with a distinct difference in habitat composition between Portions 7 and 8. Portion 7 has previously been subjected to agriculture, and therefore large parts comprises either fallow lands and old fields with little

remaining natural vegetation, or cleared areas harbouring no natural vegetation and only common pioneer grasses. Even so, sections within Portion 7 harbour a more intact shrubland habitat structure of South Outeniqua Sandstone Fynbos vegetation. Also noticeable in this portion is a recently burnt area, however it is doubtful that this area will be able to recover, given constant daily grazing pressures by cattle. Portion 8 is indicative of a more degraded habitat structure with a high incidence of alien and invasive vegetation such as Bluegum, Port Jackson and Pine trees with little remaining Fynbos vegetation. A non-perennial stream and associated wetland is also located in the northern section.

Faunal and avifaunal components

The distributions of 63 mammal, 16 amphibian and 188 avifaunal and 47 butterfly species currently overlap with the study area landscape. Among these, the majority are currently listed as “Least Concern” by the IUCN, with the remaining 18 species representing SCC. These SCC include the following:

1. The Duthie's Golden Mole (*Chlorotalpa duthieae*) classified as “Vulnerable”,
2. Fynbos Golden Mole (*Amblysomus corriae*) classified as “Near-Threatened”,
3. Leopard (*Panthera pardus*) classified as “Vulnerable”,
4. African Clawless Otter (*Aonyx capensis*) classified as “Near-Threatened”,
5. Grey Rhebok (*Pelea capreolus*) classified as “Near-Threatened”,
6. Long-tailed Forest Shrew (*Myosorex longicaudatus*) classified as “Endangered”,
7. White-tailed Rat (*Mystromys albicaudatus*) classified as “Vulnerable”,
8. Knysna Leaf-folding Frog (*Afrixalus knysnae*), classified as “Endangered”
9. Forest Buzzard (*Buteo trizonatus*) classified as “Near-Threatened”,
10. African Marsh Harrier (*Circus ranivorus*) classified as “Least Concern”,
11. Secretarybird (*Sagittarius serpentarius*) classified as “Endangered”,
12. Maccoa Duck (*Oxyura maccoa*) classified as “Endangered”,
13. Blue Crane (*Anthropoides paradiseus*) classified as “Vulnerable”,
14. Denham's Bustard (*Neotis denhami*) classified as “Near-Threatened”,
15. Knysna Warbler (*Bradypterus sylvaticus*) classified as “Vulnerable”,

16. Knysna Woodpecker (*Campethera notate*) classified as “Near-Threatened”,.
17. Cape Cormorant (*Phalacrocorax capensis*) classified as “Endangered”, and
18. Cape Gannet (*Morus capensis*) classified as “Endangered” by the IUCN.

During the field survey, six mammal, three amphibian and 35 avifaunal species were recorded within the study area. While the majority of species are currently classified as “Least Concern” by the IUCN, the study area harbours a large confirmed subpopulation of the Duthie's Golden Mole (*Chlorotalpa duthieae*) classified as “Vulnerable” by the IUCN.

Overall, habitats in the study area exist either in a semi-intact or highly altered state with numerous daily impacts being evident. Faunal and avifaunal diversity is comprised of only relatively common species of “Least Concern”, albeit one mammal SCC, the Duthie's Golden Mole (*Chlorotalpa duthieae*), is present in high numbers in the degraded northern part of the site, given suitable micro-habitat characteristics. Furthermore, species diversity on the site appears relatively high, with all species also being abundant, likely given the contact point between a high number of different habitat types. A low number of intact predator-prey dynamics (as is evidenced by the presence of one mammal and one avifaunal predator) is also observable. Taken together, ecosystem dynamics appear intact to some degree, with habitats on the site (especially the northern aquatic environments) forming a semi-functional ecological link within the study area landscape.

Species of Conservation Concern (SCC)

Along with the eight (two mammal, one amphibian, three avifaunal and two invertebrate) SCC listed in the DFFE Screening Tool (Table 1), the potential occurrence of 13 other (six mammal and seven avifaunal) SCC within the study area was assessed, given their recovery in the desktop assessment. The presence of one mammal SCC was confirmed one the site, with three further (one mammal and two avifaunal) SCC likely also occurring within the study area given suitable habitat characteristics. All remaining SCC were recovered as having a “Low” or “Medium”

probability of occurrence within the study area landscape and are therefore not further considered in this report.

Among the SCC confirmed or possibly occurring on the site, the presence of a large subpopulation of *C. duthieae* is of the greatest conservation concern as the on-site habitats for this species (Non-indigenous forest and Non-perennial stream banks habitat) represent a large proportion of its Area Of Occupancy (AOO). To this end, this subpopulation and its habitat on the site are of a high conservation concern as it is possible that the threat status of the species may change if it is to be destroyed. Conversely, it is unlikely that is unlikely that the threat statuses if the three remaining SCC (*A. capensis*, *B. trizonatus*, *C. notata*) may change if their on-site habitats are destroyed.

Site Ecological Importance (SEI)

Evaluation of the Site Ecological Importance (SEI) for the habitats of SCC confirmed or possibly occurring in the study area was performed following the methods and criteria outlined in the Species Environmental Assessment Guideline (SANBI, 2020). Evaluation of SEI was performed separately for each faunal (mammals and avifauna) considering their habitat requirements in conjunction with the spatial distribution of habitats within the study area.

Among the available faunal habitats, the Non-indigenous forest and Non-perennial stream / Wetland habitats are highly sensitive (especially given the confirmed presence of a large subpopulation of *C. duthieae*), and is retrieved as having a “High” SEI. To this end, avoidance mitigation is advocated in the case of the current development as the activities for this project will be of a high impact on the receiving environment. Together with this, offset mitigation should not be considered, given that the destruction of the subpopulation of *C. duthieae* may impact on its threat status.

The remainder of the habitats on the site are currently less sensitive from a faunal perspective and are retrieved as having a “Very low” SEI. Minimisation mitigation is

therefore acceptable for these parts of the study area, allowing for development activities of medium to high impact without restoration activities being required.

Current impacts

Current impacts within the study area include the following:

- The study area (especially Portion 7) is spatially proximate to a residential area (the adjacent Kranshoek suburb) from where daily noise and vibration is evident.
- A motor vehicle repair shop and junk yard is located in the north-eastern part of Portion 7, and vehicle traffic through the northern part of Portion 7 is evident on a daily basis.
- Noise and vibration from the motor vehicle repair shop and junk yard is also evident.
- Daily grazing by cattle through subsistence farming is evident in Portion 7.
- There is evidence of previous agriculture (fallow lands and old fields) in Portion 7, with some signs of semi-intact habitat structure, and a low incidence of alien and invasive vegetation.
- Open and cleared areas characterise large parts of Portion 7.
- Feral dog and domestic cat activity is evident in Portion 7 (i.e., which likely results in predation on the resident terrestrial fauna).
- A high incidence of alien and invasive vegetation with little remaining natural vegetation in is evident in Portion 8.
- Human foot traffic from the adjacent Kranshoek area is evident through both portions of the site.
- Noise and vibration from the dirt road directly adjacent and to the east of the both parts of the site is evident.
- Some signs of pollution (illegal waste dumping) is evident in both parts of the site.

Taken together, these impacts are not severe, but do contribute to an altered habitat structure on the site, which in turn influence the intactness of ecosystem dynamics here.

Anticipated project impacts

Planned development activities for the study area will include:

- Clearing of the vegetation,
- soil preparation,
- installation of roads and services, and
- construction of buildings and infrastructure.

Impacts from these activities during the construction phase will include:

- Destruction of habitat,
- direct mortality of fauna,
- vibration and noise (from machinery and people), and
- possible pollution of the surrounding area (outside of the project footprint).

During the operational phase, impacts from the new mixed-use housing development (i.e., edge effects) will include:

- Vibration and noise from vehicles and people,
- collision of fauna with vehicles on the newly constructed roads,
- possible pollution of the surrounding area through illegal waste dumping,
- human foot traffic through adjacent areas,
- predation on the resident fauna by domestic dogs and cats,
- illegal grazing through subsistence farming,
- uncontrolled burning of vegetation,
- possible poisoning of fauna, and
- illegal hunting.

Taken together, impacts during the operational phase may likely result in habitat degradation of remaining habitat areas adjacent to the development footprint.

Impact management actions

Given the conservation importance of the SCC confirmed or possibly occurring on the site, along with the “High” SEI retrieved for their habitats (Non-indigenous forest and Non-perennial stream / Wetland habitats), development planning should exclude these habitats and buffer them by at least 27m to 30m from any development planning. Offset mitigation should also not be considered as an option, given that the destruction of the subpopulation of *C. duthieae* may impact on its threat status.

In addition, certain impact management actions are suggested to reduce the direct and indirect impacts on the resident fauna and on habitats adjoining the receiving environment during both the construction and operational phases. Importantly, it may be required that proper fencing be installed around the developed footprint so as to curb human and domestic pet access to the surrounding environment.

Development alternatives

Alternative 1 constitutes the initial development layout which was assessed during the scoping phase of the current assessment. This alternative considers that the entire study area (40.2 hectares) will be developed, inclusive of the sensitive Non-indigenous forest and Non-perennial stream / Wetland habitats. This alternative further considers that none of the recommended impact management actions are implemented to reduce direct and indirect impacts on the resident fauna.

Alternatives 2 and 3 are qualitvely similar and considers that the Non-indigenous forest and Non-perennial stream / Wetland habitats in the north of the study area (in Portion 8) will be excluded and buffered by 27m (Alternative 3) or 30m (Alternative 2) from any development, leaving an area of 4.6 to 4.7 hectares as “No-Go” and rendering an area of 35.5 to 35.6 hectares for development. This alternative will entail the development of a Community Zone 1 consisting of a Primary and Seconday School with sports fields (soccer/rugby fields) around 27 to 30m from the

Non-perennial stream / Wetland habitat. This buffer zone from the subpopulation of *C. duthieae* will be sufficient, given several considerations.

Impact assessment

The impact assessment for the receiving environment in the current study was performed for the three development alternatives (Alternatives 1,2 and 3) considering both the construction and operational phases of the development, and was contrasted against the "No-Go" alternative. Development under Alternative 1 will result in the destruction of the large subpopulation of *C. duthieae* in the northern part of the site, along with the destruction of a significant proportion of the species' global habitat. To this end, development under Alternative 1 will likely result in a potential fatal flaw during the construction phase.

Conversely, development under either Alternatives 2 or 3 will restrict activities to an area of "Very low" SEI, and will comprise a completely fenced off Community Zone consisting of schools and with a sports field between 27m and 50m from the edge of the *C. duthieae* subpopulation. Impacts during the construction and operational phases are expected to be of a lower intensity and lower frequency, and offering an acceptable compromise from development planning to ensure persistence of the northern SCC habitats and subpopulations. To this end, development under this alternative will not have an influence on the decision.

Conclusions

Taken together, the results of the report indicate the following:

- Overall, habitats in the study area exist either in a semi-intact or highly altered state with numerous daily impacts being evident.
- Portion 7 has previously been subjected to agriculture, with large parts comprising either fallow lands and old fields with little remaining natural vegetation, or cleared areas harbouring only common pioneer grasses. Even so,

there are sections here which harbour more intact tracts of South Outeniqua Sandstone Fynbos vegetation.

- Portion 8 harbours a more degraded habitat structure with a high incidence of alien and invasive vegetation. A part of this portion comprises a non-perennial stream and associated wetland in the northern section.
- Faunal and avifaunal diversity is comprised of relatively common species of "Least Concern", albeit one mammal SCC, the Duthie's Golden Mole (*Chlorotalpa duthieae*), is present in high numbers in the degraded northern part of the site (Section 8), given suitable micro-habitat characteristics.
- Species diversity on the site appears relatively high, with all species also being abundant, likely given the contact point between a high number of different habitat types. Furthermore, a low number of intact predator-prey dynamics is observable on the site. Ecosystem dynamics therefore appear intact to some degree, with habitats on the site (especially the northern aquatic environments) forming a semi-functional ecological link within the study area landscape.
- The presence of one mammal SCC was confirmed one the site, with three further (one mammal and two avifaunal) SCC likely also occurring within the study area given suitable habitat characteristics.
- Among these SCC, the presence of a large subpopulation of *C. duthieae* is of the greatest conservation concern. The habitat for this species on the site (Non-indigenous forest and Non-perennial stream banks habitat) represents a large proportion of the Area Of Occupancy (AOO) for this species, and it is possible that the threat status of the species may change if it is to be destroyed.
- The Non-indigenous forest and Non-perennial stream / Wetland habitats are highly sensitive (especially given the confirmed presence of a large subpopulation of *C. duthieae*), and is retrieved as having a "High" SEI. The remainder of the habitats on the site are currently less sensitive from a faunal perspective and are retrieved as having a "Very low" SEI.
- Several current impacts are evident within the study area, none of which are severe, but which result in altered habitat structures over the site, in turn influencing the intactness of ecosystem dynamics.

- Planned development activities for the study area will be of a high direct impact during the construction phase, with several indirect impacts (edge effects) expected during the operational phase.
- Given the conservation importance of the SCC confirmed or possibly occurring on the site, along with the “High” SEI retrieved for their habitats (Non-indigenous forest and Non-perennial stream / Wetland habitats), development planning should exclude these habitats and buffer them by at least 27m to 30m from any development planning. Offset mitigation should also not be considered as an option, given that the destruction of the subpopulation of *C. duthieae* may impact on its threat status. Collectively, this will leave an area of 4.6 to 4.7 hectares as a “No-Go” area, and renders 35.5 to 35.6 hectares as potentially developable.
- To reduce the direct and indirect impacts on the resident fauna and on habitats adjoining the receiving environment, proper fencing may need to be installed around the developed footprint to curb human and domestic pet access to the surrounding environment.
- Among the two development alternatives, Alternative 1 will result in the destruction of the large subpopulation of *C. duthieae* in the northern part of the site, along with the destruction of a significant proportion of the species’ global habitat, and will likely result in a potential fatal flaw during the construction phase. This alternative will also bring similar indirect impacts into a part of the landscape where other subpopulations of SCC may persist in the adjoining areas.
- Conversely, development under either Alternatives 2 or 3 will restrict activities to an area of “Very low” SEI, and will comprise a completely fenced off Community Zone, with a sports field between 27m and 50m from the edge of the *C. duthieae* subpopulation. Impacts during the construction and operational phases are therefore expected to be of a lower intensity and lower frequency when compared to a housing development, and offers an acceptable compromise from development planning to ensure persistence of the northern SCC habitats and subpopulations.
- Taking into account the need to balance environmental outcomes with the need for housing from a municipal perspective, Alternatives 2 and 3 offer sustainable

development options which should not drastically affect critical habitats or species from a conservation perspective.

- The results from this report confirm the “High” site sensitivity for the northern section of Portion 8, as identified in the DFFE Screening Tool Report.
- Areas designated as an aquatic ESA and ONAs in the north of Portion 8 exist in a secondary state, but harbour a large subpopulation of the “Vulnerable” *C. duthieae* (Sections 8 to 11). To this end, this part of the site should be regarded as a degraded CBA and exclusion of the northern part of Portion 8 is also supported from a broader terrestrial biodiversity perspective.
- Although rehabilitation of this area is required as part of the management objective for this CBA category, removal of the alien and invasive trees which currently characterise the Non-indigenous forest habitat will compromise the micro-habitats preferred by *C. duthieae*. It is therefore recommended that these alien and invasive trees be kept in this part of the site, however they may be removed in the open Non-indigenous forest habitat to the south of the Non-perennial stream / Wetland habitat, as this part currently appears devoid of *C. duthieae*.

Taken together therefore, development under either Alternatives 2 or 3 offer an acceptable compromise from development planning which should balance the need between environmental outcomes and the need for housing from a municipal perspective, offering sustainable development options. To this end, development under either Alternatives 2 or 3 is supported from a faunal biodiversity perspective, given that the recommendations from this report are considered and implemented.

1. Introduction

The applicant is proposing a mixed-use housing development on Portions 7 and 8 of the Farm Kranshoek No. 432, Plettenberg Bay, Bitou Municipality, Western Cape (hereafter referred to as the "study area" or "site"). Blue Skies Research was appointed by Sharples Environmental Services cc (SES) on behalf of the applicant to perform the required terrestrial faunal and avifaunal assessment of the study area (see Sections 2 and 3). The current report represents an Impact Assessment for the site in accordance with the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended, and the Environmental Impact Assessment (EIA) Regulations 2014 (Government Notice (GN) 984), as amended.

Within the study area three development alternatives have been identified. Alternative 1 constitutes the initial development layout which was assessed during the scoping phase of the current assessment and is therefore represented throughout the initial sections of this report (Sections 3 to 10). Alternatives 2 and represent development layouts which were selected subsequent to the scoping phase, and following the inputs from this report, as well as those from the botanical and freshwater specialists. These alternatives are considered in during the impact assessment section of this report (Section 11).

2. Terms of Reference

2.1. General legislature pertaining to this report

This terrestrial faunal and avifaunal assessment report is compiled in accordance with the following guidelines:

- *Department of Environmental Affairs and Development Planning (DEA&DP) Guidelines for Involving Biodiversity Specialists in the EIA Process* (Brownlie, 2005).

- *Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes, Government Notice No. 320* (Gazetted 20 March 2020).
- *Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Animal Species*, *Government Notice No. 1150* (Gazetted 30 October 2020).
- South African National Biodiversity Institute (SANBI). 2020. *Species Environmental Assessment Guideline. Guidelines for the implementation of the terrestrial fauna and terrestrial flora species protocols for environmental impact assessments in South Africa*. South African National Biodiversity Institute, Pretoria. Version 2.1 2021.

2.2 Other sources consulted

Other sources pertaining to this report are as follows:

- IUCN. 2021. The IUCN Red List of Threatened Species. Version 2021-3. https://www.iucnlist.org. Accessed on 02 July 2023.
- *National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004): Publication of lists of critically endangered, endangered, vulnerable and protected species, Government Notice No. 2007* (Gazetted 14 December 2007).

3. Reporting protocol

The DFFE Screening Tool Report generated for the proposed project footprint identifies the site as being of an overall “High” sensitivity under the “Relative Animal Species Sensitivity Theme”, with Portion 8 largely corresponding to an area of “High” sensitivity and Portion 7 being of “Medium” sensitivity (owing to past agricultural land-use here; Figure 1). These sensitivities follow from the projected and possible occurrence of two mammal, one amphibian, three avifaunal and two invertebrate Species of Conservation Concern (SCC) (see Table 1). The current report therefore assesses the presence or likely presence of these mammal, amphibian, avifaunal and invertebrate SCC (as well as other possible SCC within these faunal groups, see

Section 9) within the study area in accordance with the protocols outlined in the Species Environmental Assessment Guideline (SANBI, 2020).

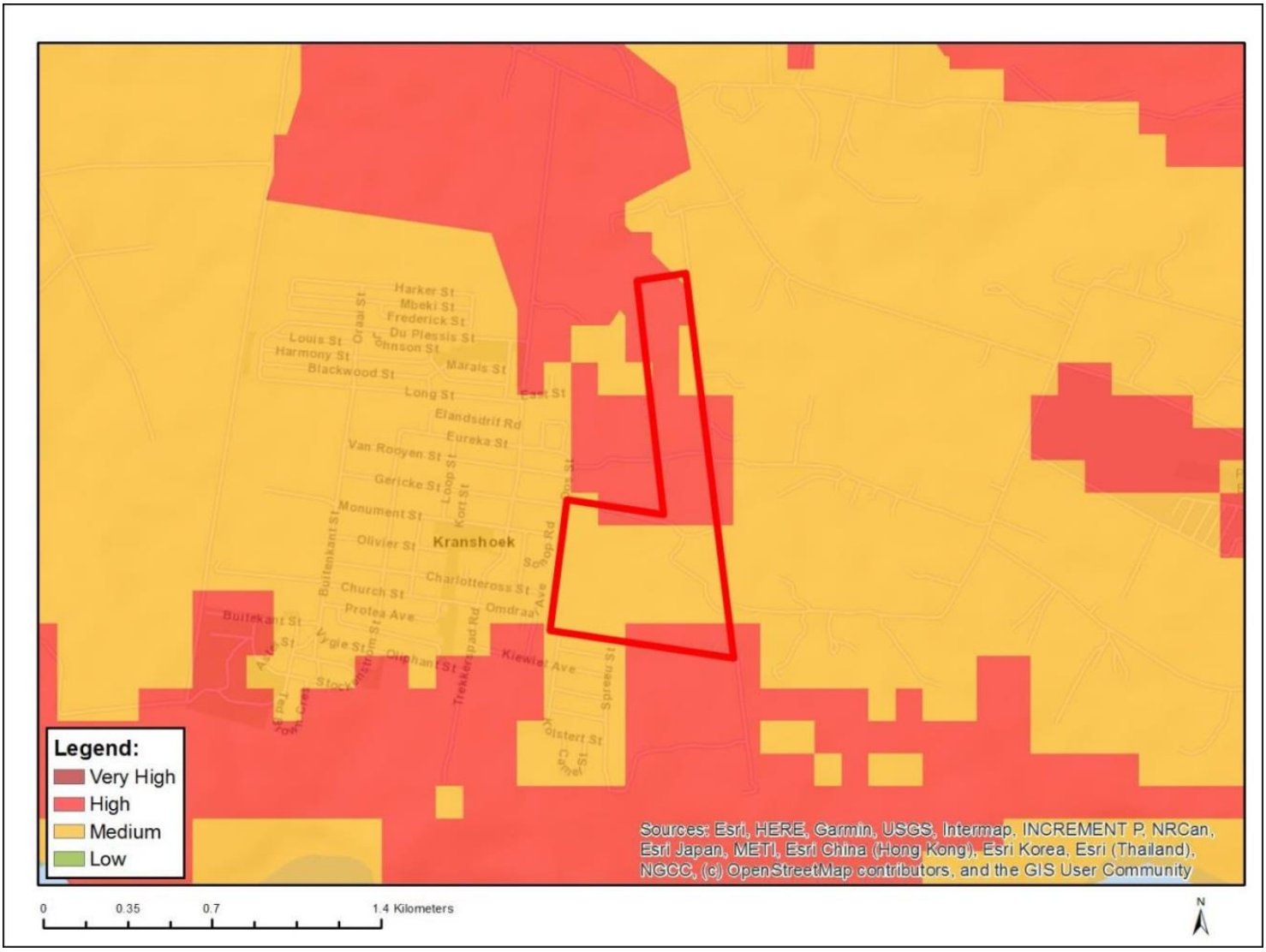


Figure 1 Relative Animal Species Sensitivity Map retrieved for the study area (Red polygon = Study area) by the DFFE Screening Tool (https://screening.environment.gov.za/screeningtool/).

Table 1 List of Species of Conservation Concern (SCC) identified in the DFFE Screening Tool Report (https://screening.environment.gov.za/screeningtool/). For each, the listed sensitivity (possibility of occurrence within the study area), scientific name and common name is shown, along with its current IUCN status. The name of "Sensitive Species 8" is purposefully omitted, given the sensitivity of this species.

Sensitivity	Species	Common name	IUCN status
High	*Circus ranivorus*	African Marsh-harrier	Least Concern
High	*Neotis denhami*	Denham's Bustard	Near-Threatened
High	*Bradypterus sylvaticus*	Knysna Warbler	Vulnerable
Medium	*Afrixalus knysnae*	Knysna Leaf-folding Frog	Endangered
Medium	*Neotis denhami*	Denham's Bustard	Near-Threatened
Medium	*Bradypterus sylvaticus*	Knysna Warbler	Vulnerable
Medium	*Aloeides thyra orientis*	Red Russet	Endangered
Medium	*Chlorotalpa duthieae*	Duthie's Golden Mole	Vulnerable
Medium	*Sensitive Species 8*	Sensitive Species 8	Least Concern
Medium	*Aneuryphymus montanus*	Yellow-winged Agile Grasshopper	Vulnerable

4. Overview of the study area

4.1 Geographic location

Portion 7 of the Farm Kranshoek No. 432 is located directly adjacent to, and east of the Kranshoek settlement, and appears to comprise a previous agricultural area (Figures 2 and 3). Portion 8 of the Farm Kranshoek No. 432 is located directly north of Portion 7, and is approximately 250m east of the Kranshoek settlement and 600m south of the Robberg Road. In total, these two farm portions comprise a study area of around 40.2 hectares in size.

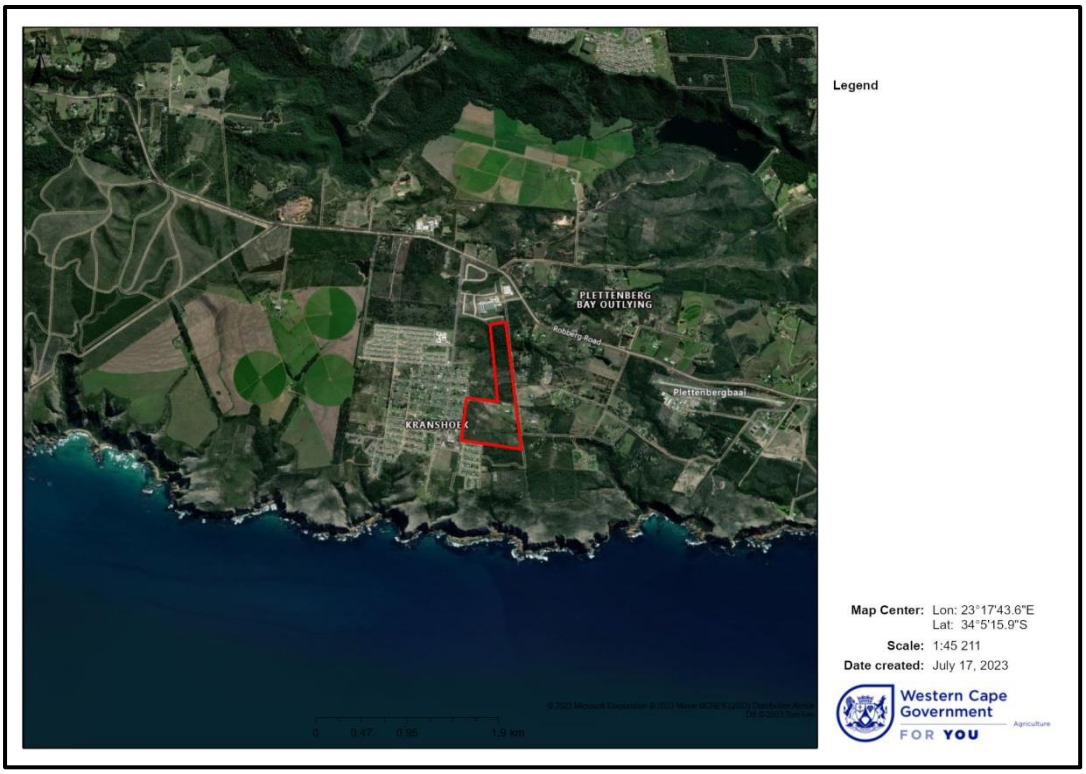


Figure 2 Spatial location of the study area relative to surrounding built up areas and man roads on a broad scale (Red polygon = Study area; map generated in Cape Farm Mapper version 2.6.10, Western Cape Department of Agriculture).

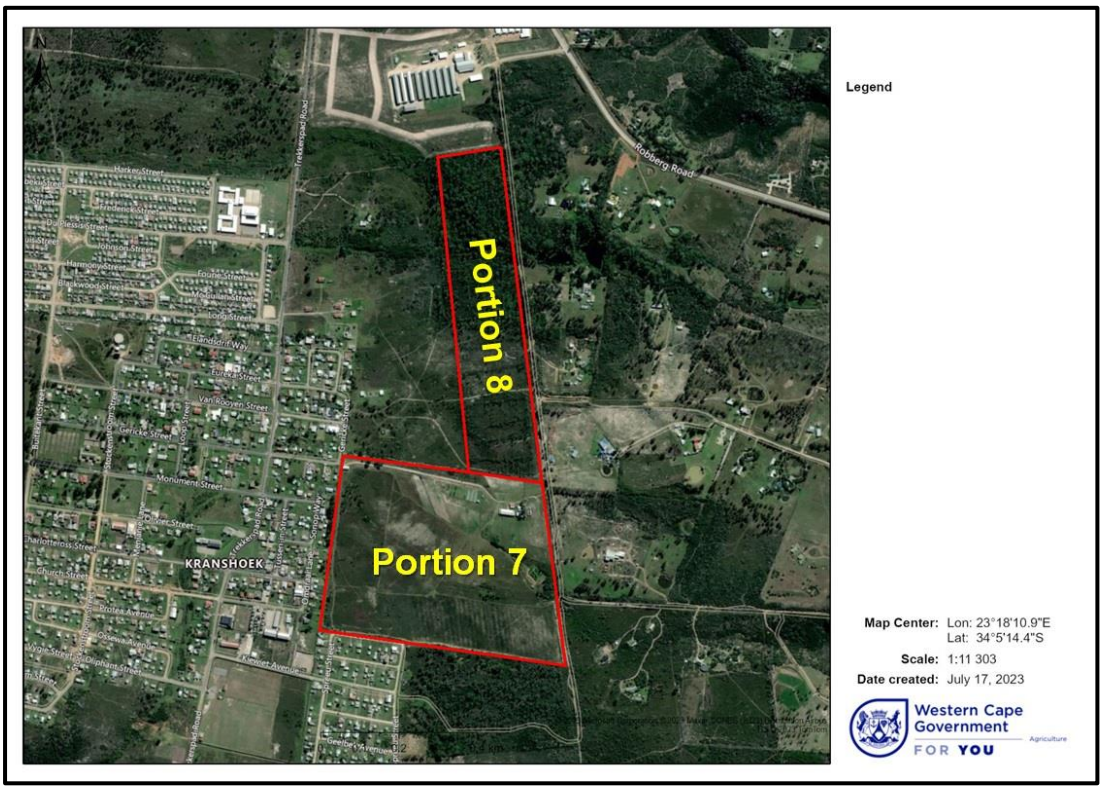


Figure 3 Spatial location of the study area (showing both farm portions) relative to surrounding built up areas and main roads at a finer scale (Red polygon = Study area; map generated in Cape Farm Mapper version 2.6.10, Western Cape Department of Agriculture).

4.2 Topology

The study area slopes slightly south-eastward over the larger part (both Portions 7 and 8), but with a section in the northern part (where the non-perennial stream is located in Portion 8) sloping eastward (Figure 4).

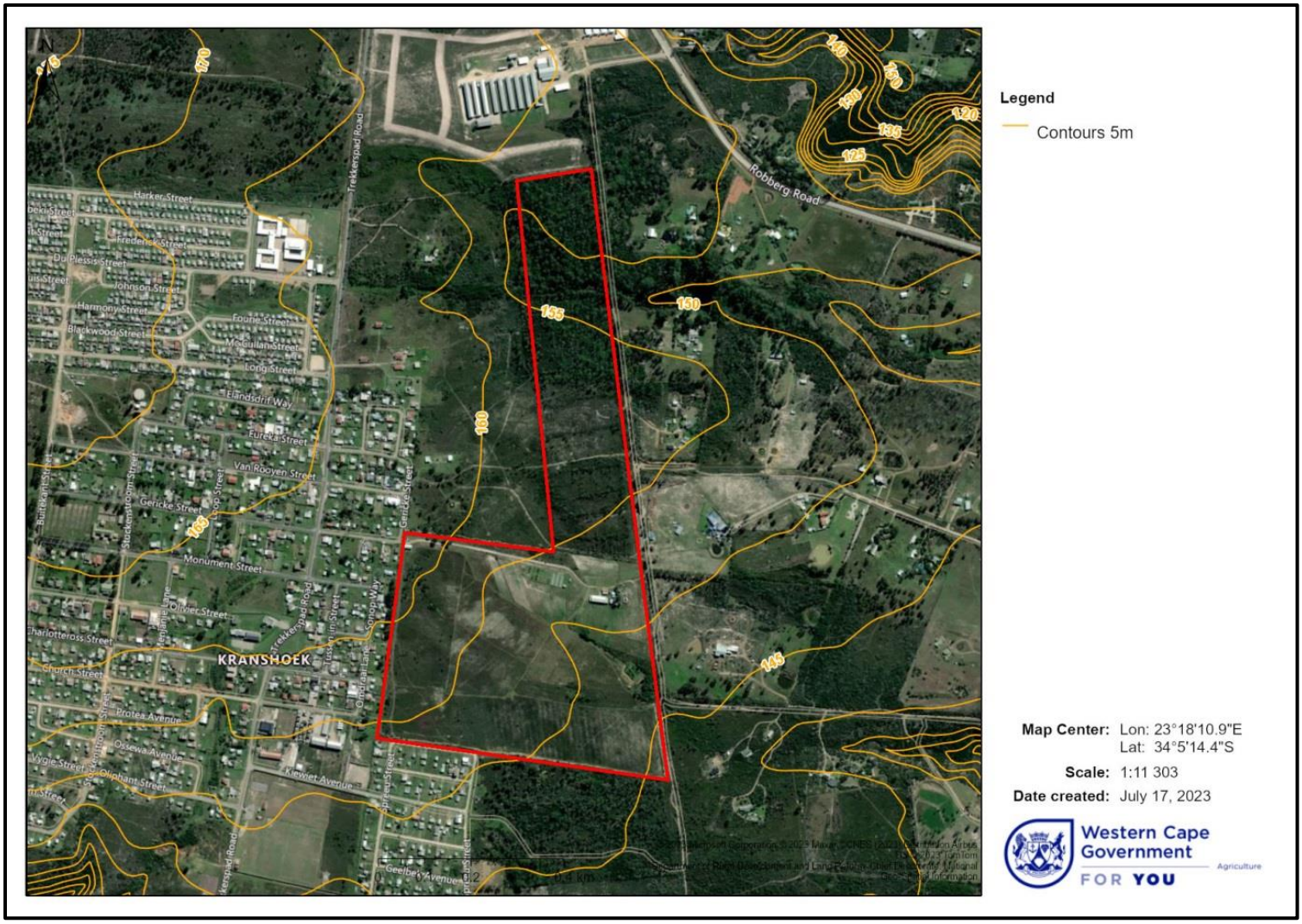


Figure 4 Topology of the study area showing 5 meter contour lines (Red polygon = Study area; map generated in Cape Farm Mapper version 2.6.10, Western Cape Department of Agriculture).

4.3 Wetlands and rivers

The northern part of the site (Portion 8) overlaps with a non-perennial stream which feeds several artificial dams and one wetland along its eastern course (Figure 5). A non-perennial stream is also located in the southern part of the site, which continues in an eastern direction outside of the study area (Figure 5).

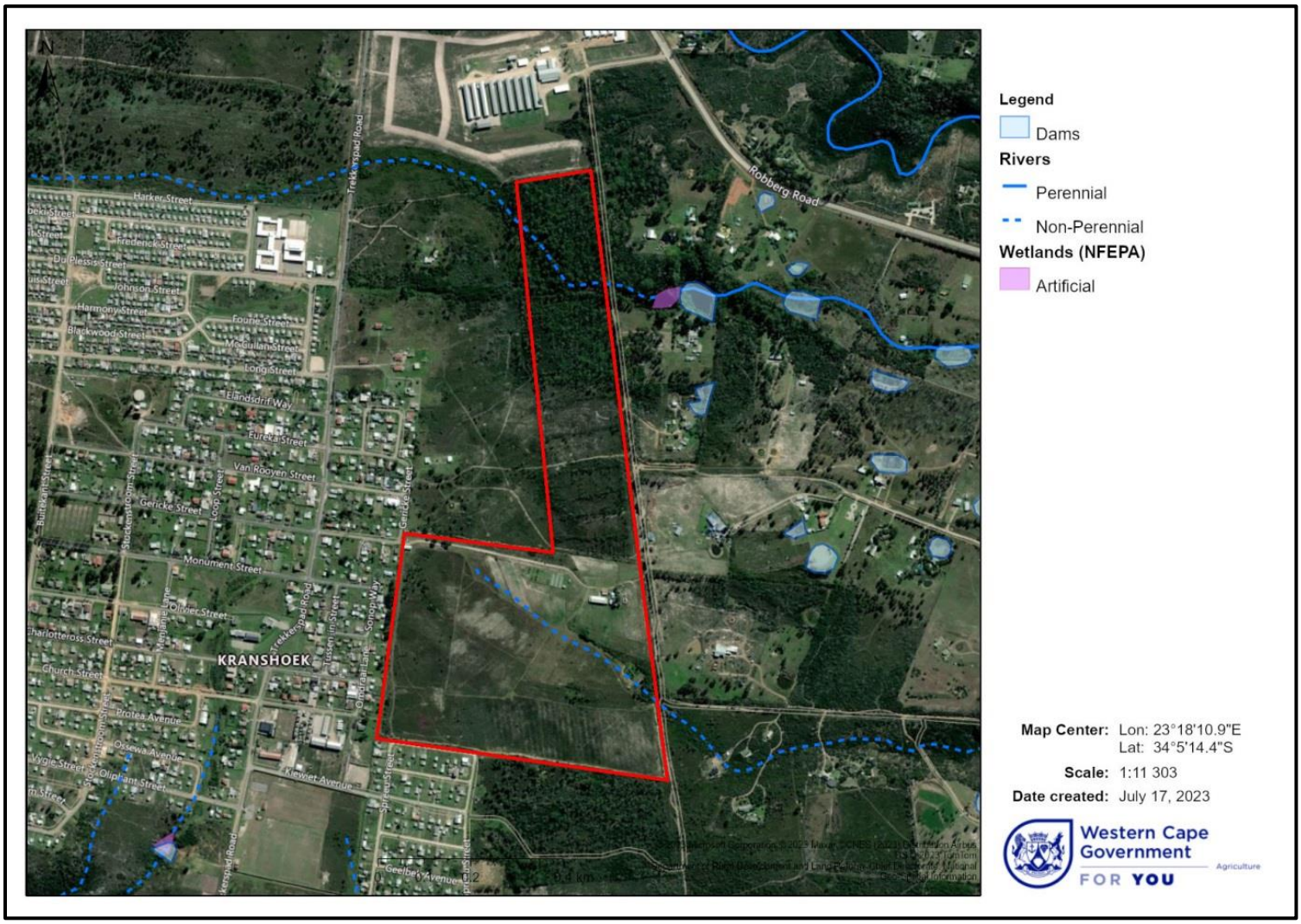


Figure 5 Distribution of wetlands and rivers relative to the study area (Red polygon = Study area; map generated in Cape Farm Mapper version 2.6.10, Western Cape Department of Agriculture).

4.4 Vegetation

Vegetation across the study area comprises South Outeniqua Sandstone Fynbos which is currently classified as “Least Concern” (VegMap, 2018; Figure 6). This vegetation remains in place to various degrees over the southern and central parts of the site, but is absent in the northern part of the site (see Section 7).

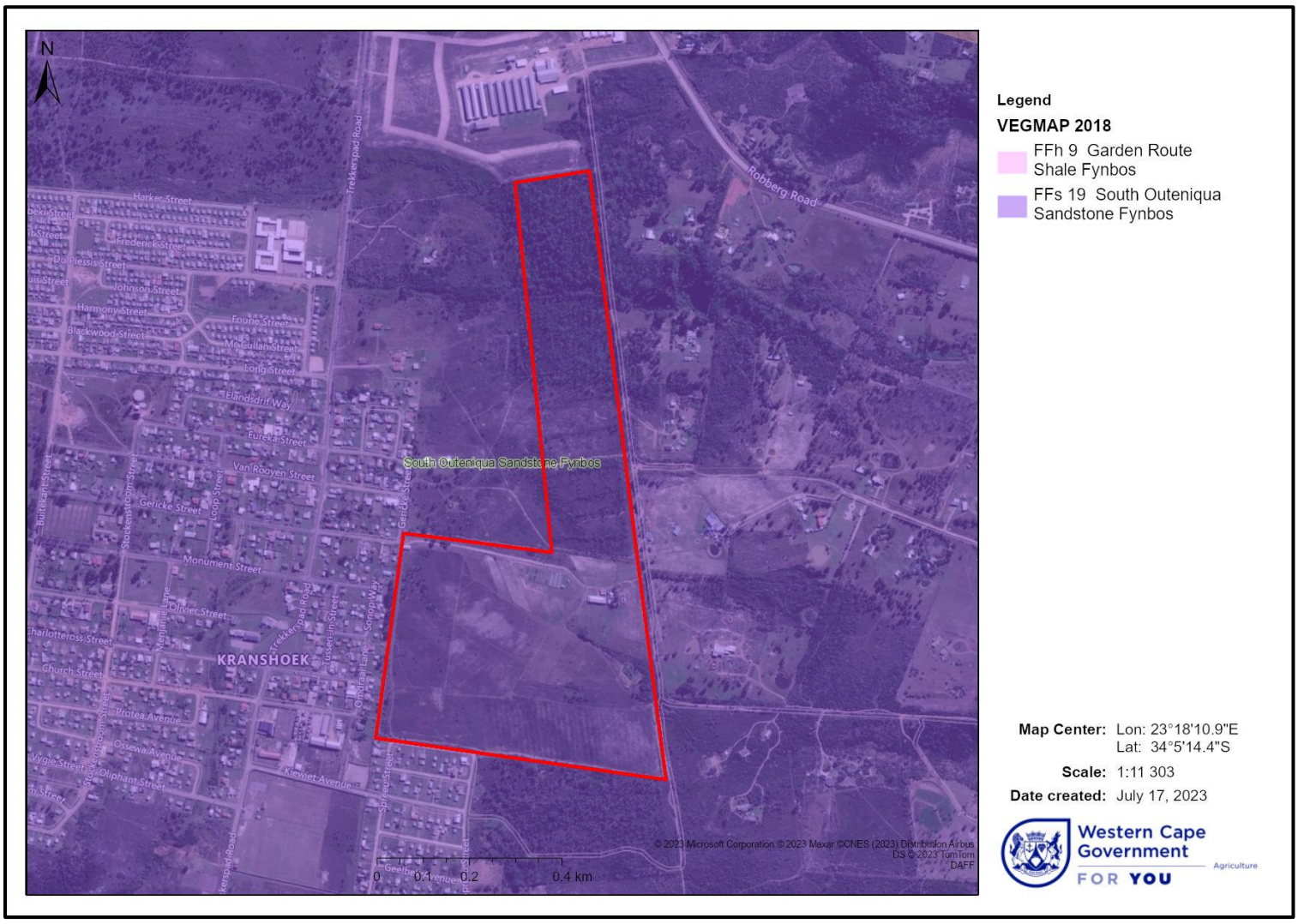


Figure 6 Vegetation type across the study area (VEGMAP, SANBI 2018; Red polygon = Study area; map generated in Cape Farm Mapper version 2.6.10, Western Cape Department of Agriculture).

4.5 Land cover

Land cover across the study area comprises previous cultivation areas (commercial annual crops rain-fed / dryland) and an industrial (built-up) area in the southern part (Portion 7), with the northern section (Portion 8) harbouring contiguous low forest and thicket and dense forest and woodland, interstitiated by low shrubland (fynbos) (Figure 7; Land Cover 73-class, Department of Environmental Affairs, 2020). Overall, these designations of land cover were found to be broadly accurate, but fail to recognise the intactness of Fynbos habitats in the southern section, or the drainage lines and associated wetlands and streams in the southern and northern parts of the site respectively (Section 7)

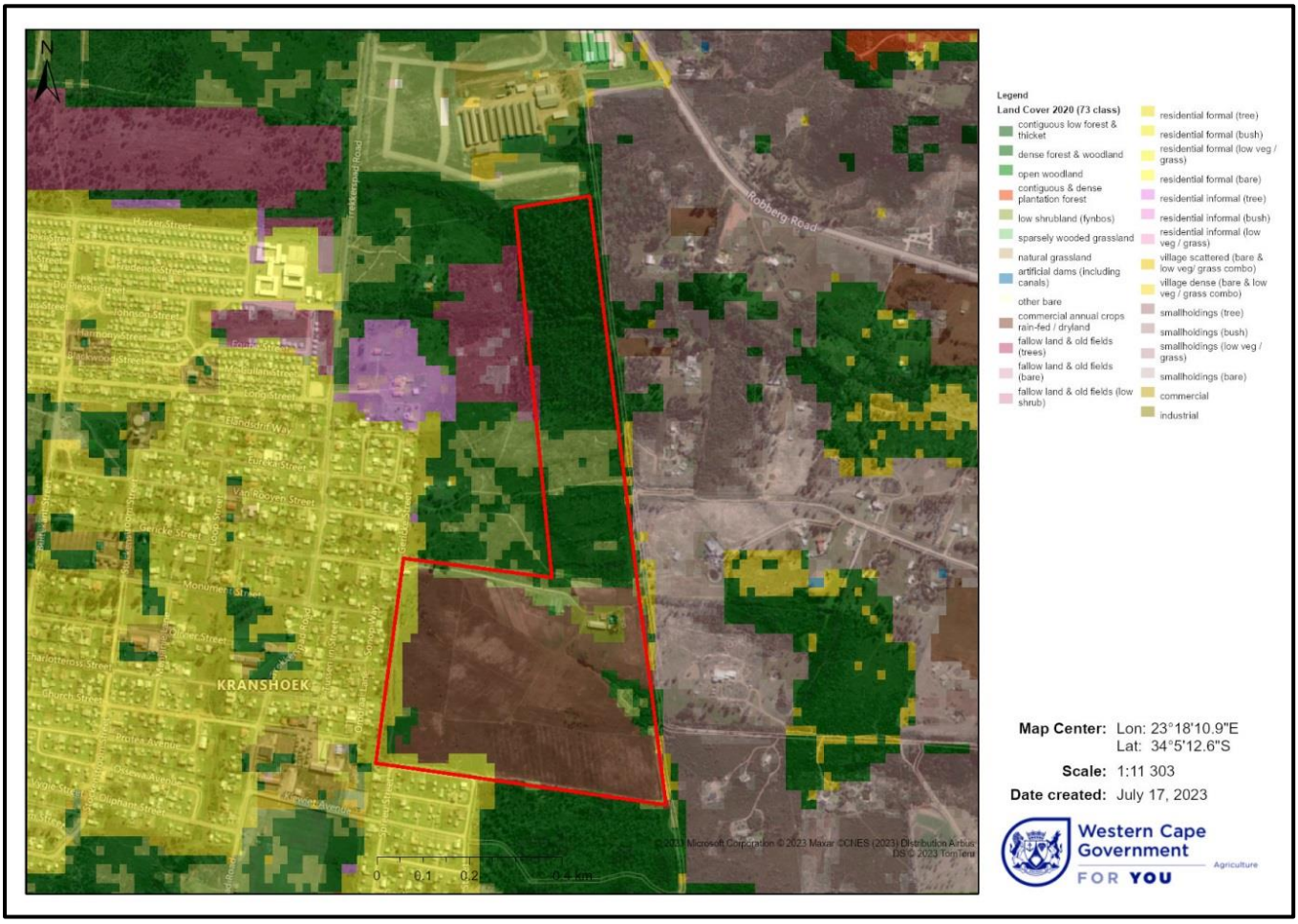


Figure 7 Land cover (Land Cover 73-class, Department of Environmental Affairs, 2020) within the study area (Red polygon = Study area; information sourced from Cape Farm Mapper version 2.6.10, Western Cape Department of Agriculture).

4.6 Critical Biodiversity Areas (CBAs), Ecological Support Areas (ESAs) and Other Natural Areas (ONAs)

Critical Biodiversity Areas (CBAs) are areas required to meet biodiversity targets for ecosystems, species and ecological processes, as identified in a systematic biodiversity plan (Purves and Holmes, 2015). Ecological Support Areas (ESAs) are not essential for meeting biodiversity targets but play an important role in supporting the ecological functioning of CBAs and/or in delivering ecosystem services.

The study area does not overlap with any Critical Biodiversity Areas (CBAs). The site does however intersect with a small portion of an aquatic Ecological Support Area (ESA) in the northern section of Portion 8, with a small section in Portion 7 corresponding to a degraded ESA, owing to the presence of a degraded watercourse (Figure 8).

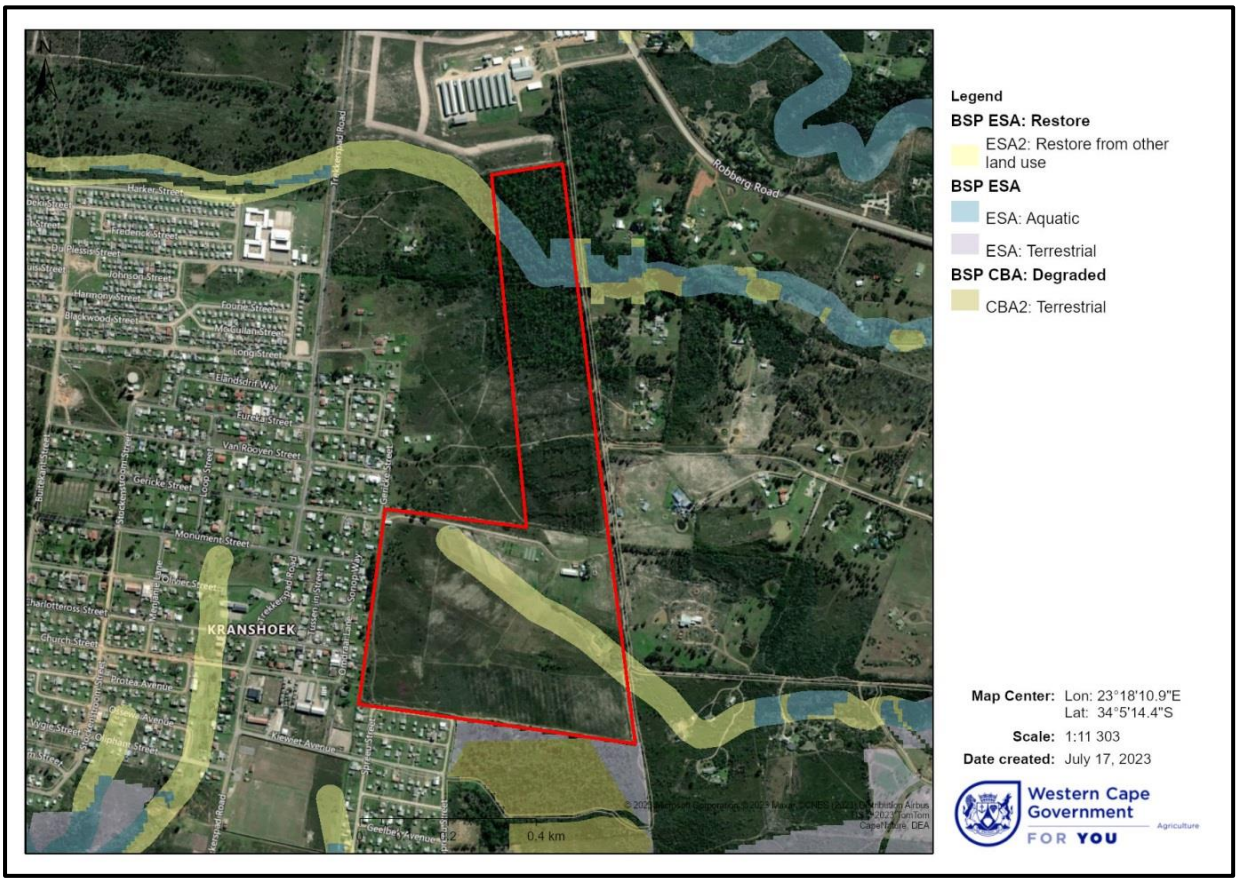


Figure 8 Spatial locations of Ecological Support Areas (ESAs) overlapping with the study area (Red polygon = Study area; information sourced from Cape Farm Mapper version 2.6.10, Western Cape Department of Agriculture).

The study area furthermore overlaps with Other Natural Areas (ONAs) in the northern section of Portion 8 (around the aquatic ESA; Figure 9). The presence and integrity of these ESAs and ONAs are discussed in Section 12.

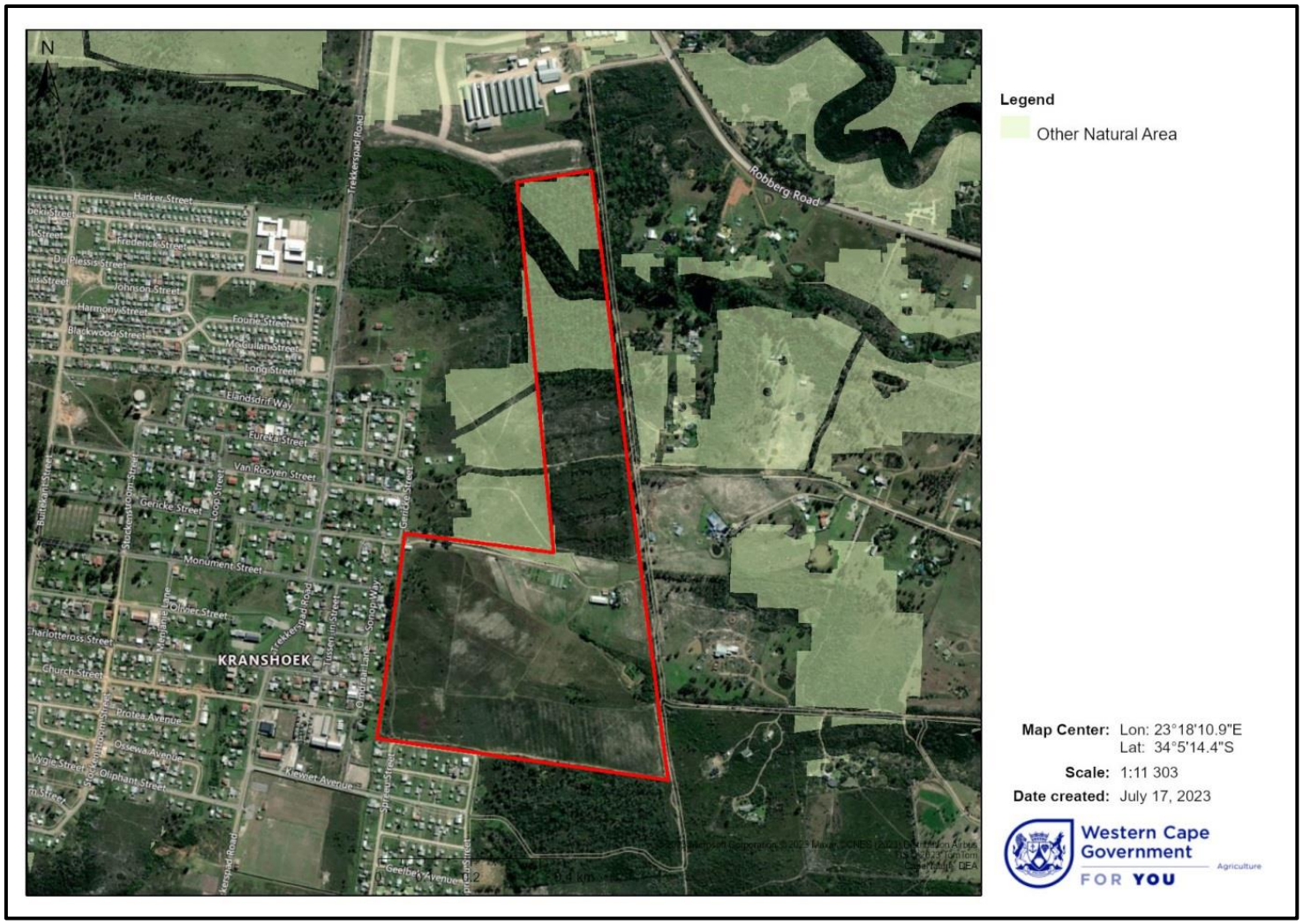


Figure 9 Spatial locations of Other Natural Areas (ONAs) overlapping with the study area (Red polygon = Study area; information sourced from Cape Farm Mapper version 2.6.10, Western Cape Department of Agriculture).

Table 2 A brief description of the Ecological Support Areas (ESAs) and Other Natural Areas (ONAs) categories which intersect with the study area (information sourced from Cape Farm Mapper version 2.6.10, Western Cape Department of Agriculture).

Feature	Category 2	Definition	Objective
Watercourse	ESA: Aquatic	Areas that are not essential for meeting biodiversity targets, but that play an important role in supporting the functioning of PAs or CBAs, and are often vital for delivering ecosystem services.	Maintain in a functional, near-natural state. Some habitat loss is acceptable, provided the underlying biodiversity objectives and ecological functioning are not compromised.
River, Wetland	ESA2: Restore from other land use	Areas that are not essential for meeting biodiversity targets, but that play an important role in supporting the functioning of PAs or CBAs, and are often vital for delivering ecosystem services.	Restore and/or manage to minimize impact on ecological processes and ecological infrastructure functioning, especially soil and water-related services, and to allow for faunal movement.
Other Natural Areas	Other Natural Areas	Areas not currently identified as a priority, but retain most of their natural character and perform a range of biodiversity and ecological infrastructure functions. Although not prioritised, they are still an important part of the natural ecosystem.	Minimize habitat and species loss and ensure ecosystem functionality through strategic landscape planning. Offers flexibility in permissible land-uses, but some authorisation may still be required for high-impact land-uses.

4.7 Ecosystem threat status

According to *The National List of Ecosystems that are Threatened and Need of Protection* (Government Gazette, 2011), the project footprint overlaps with a "Vulnerable" ecosystem type, even though the resident South Outeniqua Sandstone Fynbos is currently classified as "Least Concern (Figure 10).

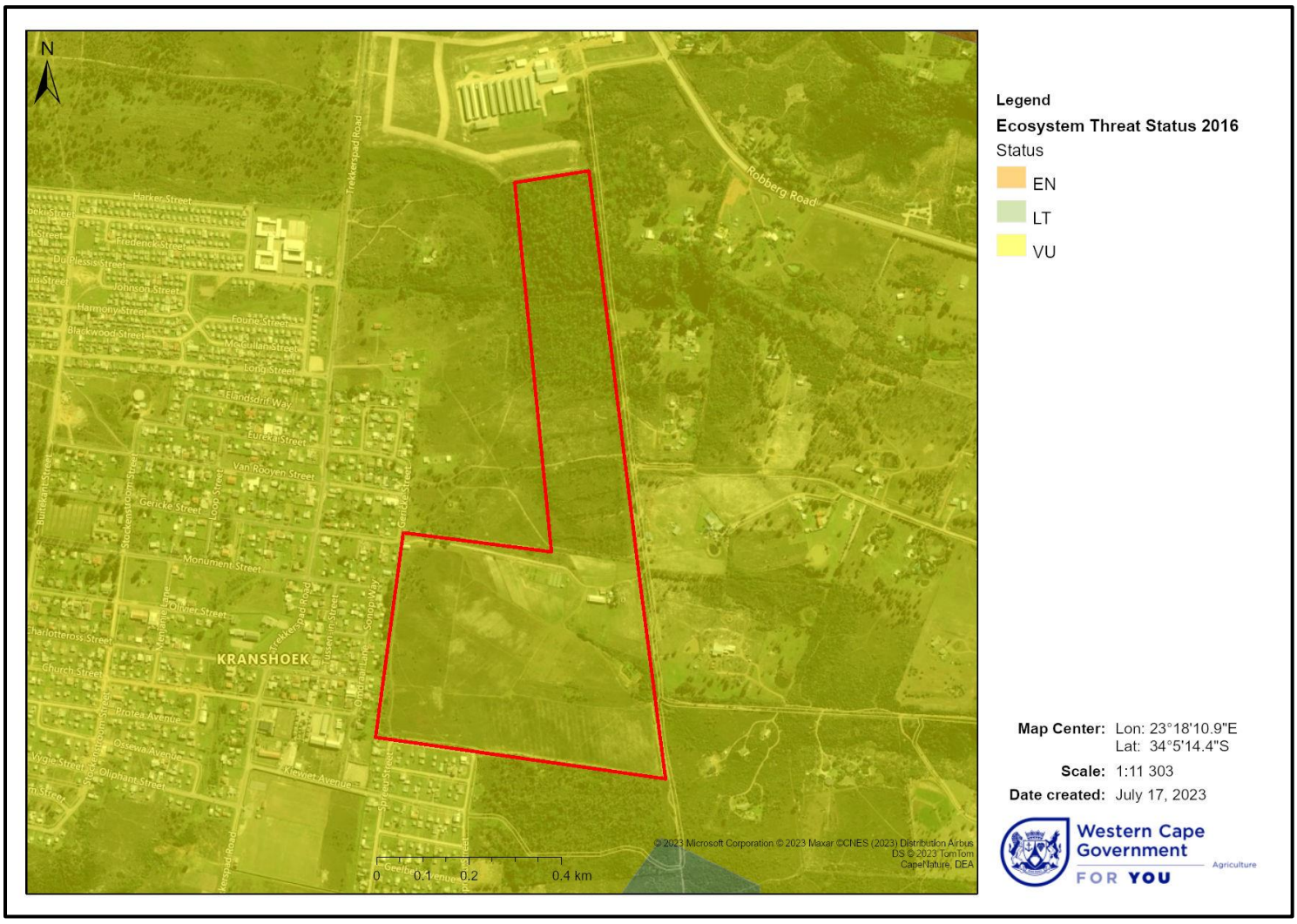


Figure 10 Spatial location of ecosystems and their threat statuses according to *The National List of Ecosystems that are Threatened and Need of Protection* (Government Gazette, 2011), overlapping with the study area (Red polygon = Study area; information sourced from Cape Farm Mapper version 2.6.10, Western Cape Department of Agriculture).

5. Study methodology

5.1 Study aims

This study represents an assessment of the terrestrial faunal and avifaunal diversity and abundances, -habitat composition, ecosystem dynamics and potential occurrence of mammal, amphibian, avifaunal and invertebrate (and other) SCC within the study area. As such, the aims of this investigation were to:

1.) Assess, define and create a spatial rendering of available faunal habitats across the study area landscape based on information gathered during the field survey as well as through a desktop assessment using the latest satellite imagery,

2.) compile a complete faunal desktop species list (including mammals, amphibians, avifauna and butterflies) for the study area based on a thorough desktop assessment so as to assess the presence of any of the listed SCC (Table 1) as well as any additional SCC within these faunal groups,

3.) compile a faunal species list (including mammals, amphibians, avifauna butterflies and grasshoppers) within the study area through field surveying so as to assess the possibility of occurrence of the SCC retrieved in the desktop assessment (based on appropriate sampling methods, as well as the presence of suitable habitat for these species), or any additional SCC which are present on the site, and

4.) generate spatial occurrence maps for the recovered faunal species within the study area to assess the spatial extent of areas supporting higher levels of diversity, and SCC subpopulations and habitats which may be of conservation concern.

5.2 Desktop assessment

To assess the possible occurrence of the listed (Table 1) as well as any additional mammal, amphibian, avifaunal and butterfly SCC, a desktop assessment was performed to create a representative desktop species list for these faunal groups. Given the low number of records for grasshopper species, the presence or absence of the Yellow-winged Agile Grasshopper could only be evaluated during the field survey.

5.2.1 Mammals

The desktop species list for mammals (Appendix A) was constructed with reference to the distributional data available in Skinner and Chimimba (2005). This list was further bolstered by referring to the observational records

available on the MammalMAP (https://vmus.adu.org.za/) and iNaturalist (www.iNaturalist.org) platforms for the study area landscape (QDGS: 3119AC).

5.2.2 Amphibians

The desktop species list for amphibians (Appendix B) was constructed with reference to the distributional data available in Du Preez and Carruthers (2009). This list was further bolstered by referring to the observational records available on the the FrogMAP (https://vmus.adu.org.za/) and iNaturalist (www.iNaturalist.org) platforms for the study area landscape (QDGS: 3423AB).

5.2.3 Avifauna

The desktop avifaunal species list for the study area was generated by referring to the species records of the South African Bird Atlas Project 2 (SABAP2, https://sabap2.birdmap.africa/) (Appendix C). The study area overlaps with two pentads (see below), both of which are moderately represented in the atlassing cards:

Pentad: 3405_2315

Full protocol cards: 14
Ad-hoc protocol cards: 45
Total cards: 59

Pentad: 3400_2315

Full protocol cards: 53
Ad-hoc protocol cards: 110
Total cards: 163

To create the avifaunal desktop species list for the study area, the species observed in both pentads were combined (see Appendix C), noting the total number of

observations in both pentads (including both full and ad-hoc protocols), and also noting the latest date that the species was recorded within these pentads.

5.2.4 Butterflies

The desktop species list for butterfly species (Appendix D) was constructed with reference to the observational records available on the LepiMAP (https://vmus.adu.org.za/) and iNaturalist (www.iNaturalist.org) platforms for the study area landscape (QDGS: 3423AB).

5.3 Field survey

The study area was surveyed on foot over two consecutive days on the 13th and 14th of July 2023, during the Winter season. Weather conditions during the surveying period were characterised by relatively warm daily temperatures, low cloud cover and low to moderate wind conditions (Figure 11).

Surveying included unconstrained point sampling through search meanders, as well active searching under rocks and debris. All tracks surveyed were recorded by GPS (Garmin eTrex® 10, Garmin International Inc, USA) and are represented in Figure 12. Terrestrial faunal species (mammals) were identified by direct visual observation, or by their tracks, burrows, remains or scat. Amphibian species were identified by direct visual observation, or auditory means and sound recordings. Avifaunal species were identified by visual observation, using a 180x zoom lens, or by auditory means. While no butterfly species were observed in the study area (likely owing to the Winter season), the presence or absence of the Yellow-winged Agile Grasshopper was evaluated based on suitable habitat (recently burnt Schlerophyll on south-facing slopes) for this species. All observations were recorded by GPS and the species or evidence of species' presence or activity were photographed using a digital camera (Canon PowerShot SX430 IS, Canon Inc, USA). A species list for all fauna recorded within the study area is given in Appendix E.

Given relatively optimal weather conditions, faunal and avifaunal species' activity was observed to be high over the surveying period, thereby resulting in 93 recorded observations across the study area (Figure 13, Appendix E), relating to one observation per every 0.4 hectares of study area (the study area is 40.2 hectares in extent). During surveying, faunal habitats were broadly identified in the field, and thereafter delineated through a desktop assessment of the study area using satellite imagery (CapeFarmMapper Version 2.6.4, Western Cape Department of Agriculture).

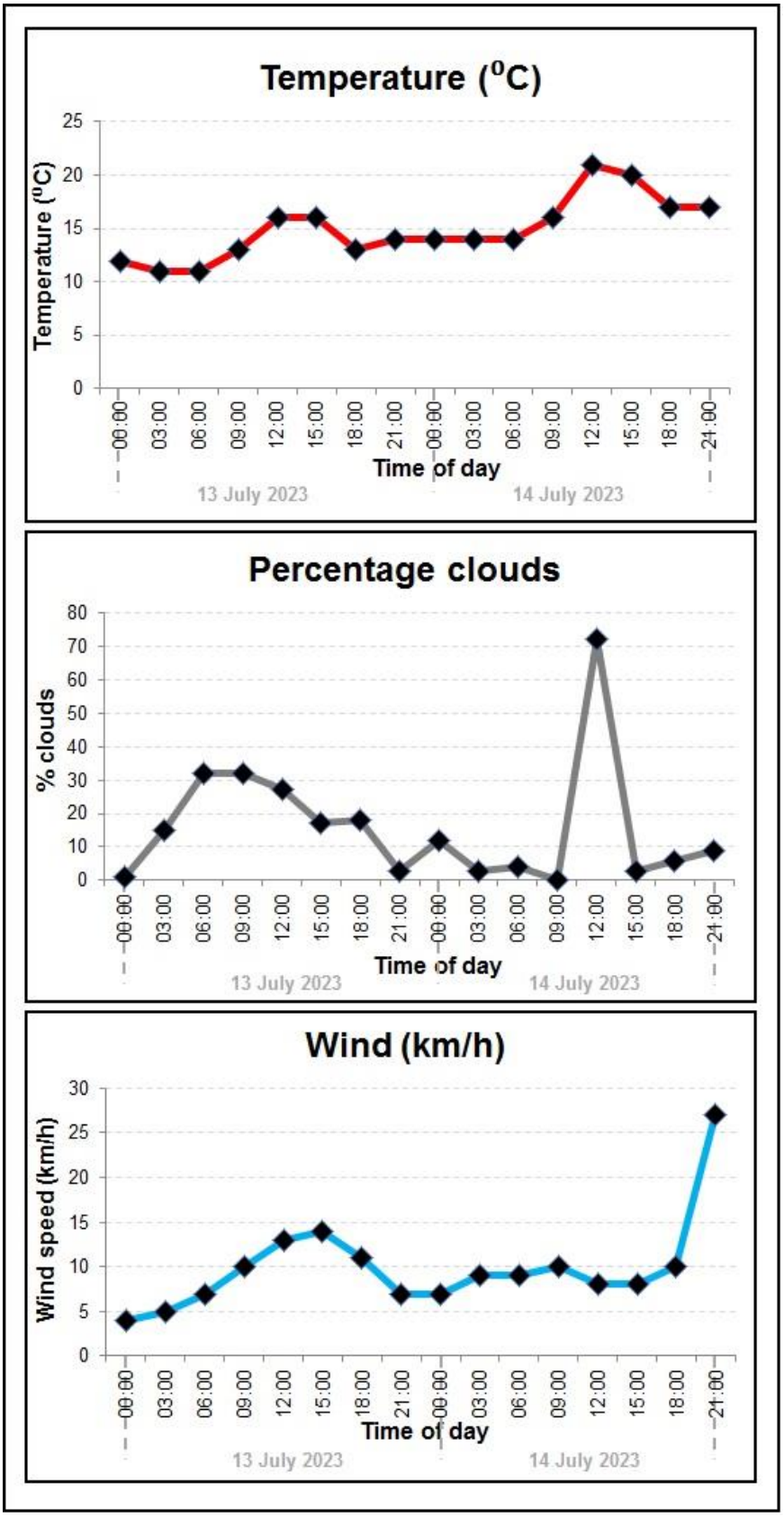


Figure 11 Weather conditions in the study area over the surveying period (13 to 14 July 2023). The time of day is indicated, along with the temperature (in °C), percentage cloud cover and wind speed (in km/h) (weather data sourced from https://www.worldweatheronline.com).

Figure 12 Spatial tracks recorded by GPS for all the search meanders across the study area over the surveying period.

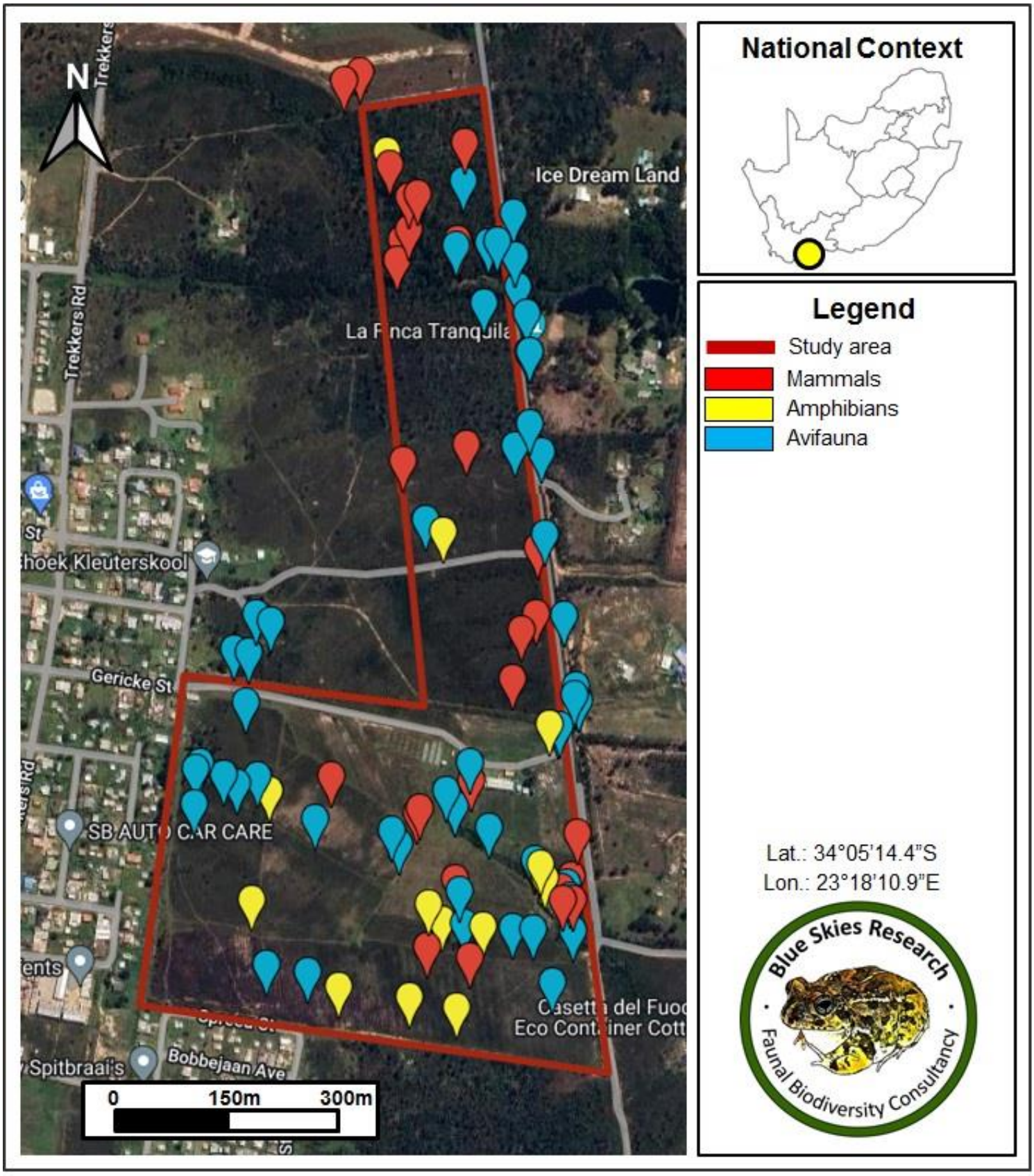


Figure 13 Spatial locations of all the faunal observations across the study area over the surveying period.

6. Assumptions and limitations

Weather conditions during the surveying period were relatively optimal for detecting a representative sample of the terrestrial faunal and avifaunal species diversity across the study area. Even so, not all species could be observed (especially cryptic species), and it is further possible that the surveying period did not correspond to the activity period or activity season of some species (especially butterflies and grasshoppers). Coupled to this, the thick and impenetrable nature of the alien and invasive vegetation of the Non-indigenous forest and Degraded Fynbos habitats in the study area (see Section 7) hampered sampling efforts to some degree, as not all areas could be accessed.

Furthermore, although the observed faunal composition of the study area only partly reflects the species richness of, and faunal abundances within the study area (Appendix E), the inclusion and consideration of SCC was further based on a thorough desktop assessment for the included faunal groups (mammals, amphibians, avifauna and butterflies; Appendices A to D), meaning that all possibly occurring SCC were considered in the current assessment (Section 9).

7. Faunal habitat types within the study area

The study area is comprised of eight broadly identified habitat types based on habitat composition and habitat integrity, with a distinct difference in habitat composition between Portions 7 and 8 (Figure 14, Table 3). Portion 7 has previously been subjected to agriculture, and therefore large parts comprises either fallow lands and old fields with little remaining natural vegetation, or cleared areas harbouring no natural vegetation and only common pioneer grasses. Even so, there are sections within Portion 7 which do not appear heavily degraded, and harbour a more intact shrubland habitat structure of South Outeniqua Sandstone Fynbos vegetation. Also noticeable in this portion is a recently burnt area, however it is doubtful that this area will be able to recover, given constant daily grazing pressures by cattle.

Overall, Portion 8 is indicative of a more degraded habitat structure with a high incidence of alien and invasive vegetation such as Bluegum, Port Jackson and Pine trees with little remaining Fynbos vegetation. The most noticeable feature in this portion comprises a non-perennial stream and associated wetland in the northern section. Collectively, these encompass the habitat conditions on the site.

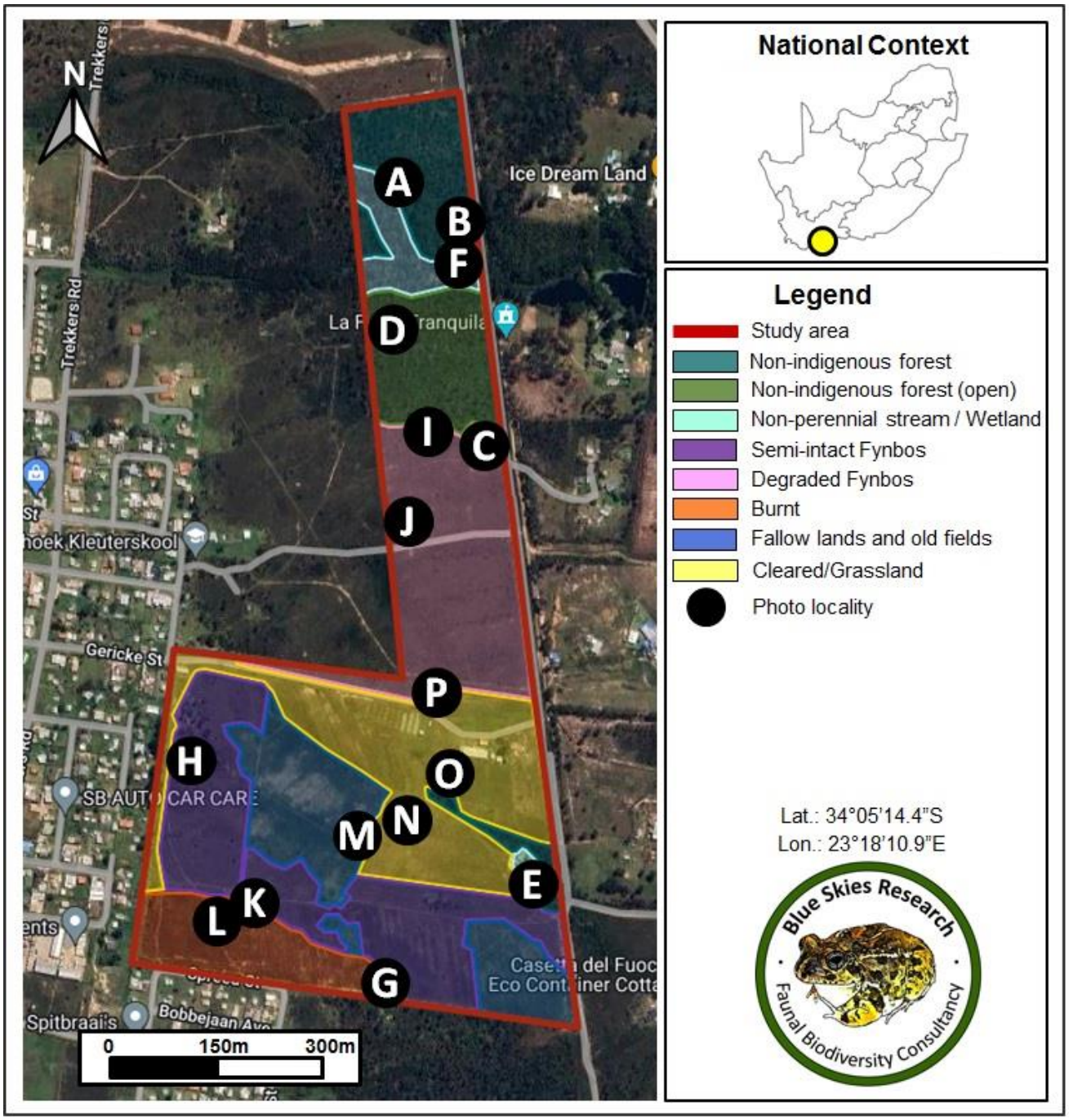
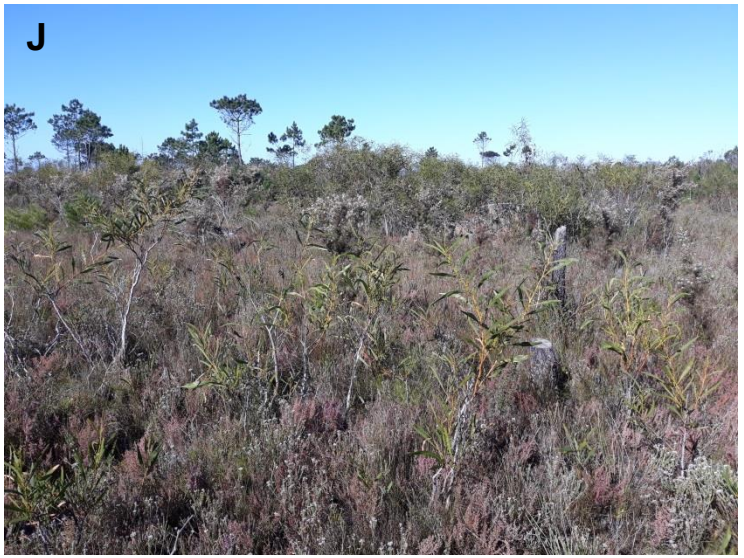


Figure 14 A broad indication of the spatial extent of habitat types surrounding the study area at a finer scale. Photo localities (A to P) correspond to the habitat photos in Table 3.

Table 3 Habitat locations, habitat descriptions and visual representations of the different habitat types within the study area. Location designations (A to P) correspond to the photo locations in Figure 14.

Location	Habitat description	Photo 1	Photo 2
A -34.08278; 23.30411 **B** -34.08331; 23.30505	**Non-indigenous forest habitat** This habitat constitutes a forested area comprising thick stands of alien and invasive Bluegum trees surrounding the non-perennial stream in the northern section of Portion 8. Although non-native, this habitat has a thick layer of leaf litter on moist loamy soils, harbouring one of the mammal SCC recorded within the study area (Section 9).		

C -34.08617; 23.30545 **D** -34.08471; 23.30406	**Non-indigenous forest (open) habitat** This habitat constitutes an extension of the forested area comprising alien and invasive Bluegum trees in the northern section of Portion 8. Even so, this habitat is of a more open nature, furthermore contains a higher incidence of alien and invasive Port Jackson trees, and does not harbour the leaf litter profile or moist loamy soils compared to the more northern part.		
E -34.0916; 23.30621 **F** -34.08381; 23.30502	**Non-perennial stream / Wetland habitat** This habitat type comprises the aquatic environments on the site, including an artificial dam in the eastern part of Portion 7, as well as the non-perennial stream and associated wetland in the northern part of Portion 8.		

G -34.09295; 23.30393 **H** 33°59'38.148"S 22^{0}27'43.128"E	**Semi-intact Fynbos habitat** This habitat type comprises thick stands of South Outeniqua Sandstone Fynbos vegetation in Portion 7. Although historically subjected to agriculture, and is currently being used for grazing, these habitats appear more intact with a higher flora diversity and with a low incidence of alien and invasive vegetation.		
I -34.08607; 23.30447 **J** -34.0871; 23.30422	**Degraded Fynbos habitat** This habitat type comprises stands of South Outeniqua Sandstone Fynbos vegetation in Portion 8, but appear more degraded with a lower flora diversity an a high to very high incidence of alien and invasive vegetation.		

K -34.09188; 23.30192 **L** -34.09212; 23.30142	**Burnt habitat** This habitat type would have harboured South Outeniqua Sandstone Fynbos vegetation in Portion 7, but has been burnt a number of years ago, and is unlikely to fully recover, given extensive cattle grazing here.		
M -34.09099; 23.30366 **N** -34.0909; 23.30434	**Fallow lands and old fields habitat** This habitat type comprises open areas which would have harboured South Outeniqua Sandstone Fynbos vegetation, but has been subjected to previous agricultural activities, and has not recovered since.		

O -34.09026; 23.30489 **P** -34.0892; 23.30462	**Cleared/Grassland habitat** This habitat type comprises open and cleared areas which harbour pioneer grasses and no remaining natural vegetation.		

8. Faunal and avifaunal composition within the study area

8.1 Mammals

8.1.1 Desktop assessment

The distributions of 63 mammal species overlap with the study area landscape (Appendix A). Among these, 56 species are currently listed as “Least Concern” by the IUCN (IUCN, 2021), with the remaining seven species representing mammal SCC. These mammal SCC include the following:

19. The Duthie's Golden Mole (*Chlorotalpa duthieae*) classified as “Vulnerable”,
20. Fynbos Golden Mole (*Amblysomus corriae*) classified as “Near-Threatened”,
21. Leopard (*Panthera pardus*) classified as “Vulnerable”,
22. African Clawless Otter (*Aonyx capensis*) classified as “Near-Threatened”,
23. Grey Rhebok (*Pelea capreolus*) classified as “Near-Threatened”,
24. Long-tailed Forest Shrew (*Myosorex longicaudatus*) classified as “Endangered”, and
25. White-tailed Rat (*Mystromys albicaudatus*) classified as “Vulnerable” by the IUCN.

From the observational records available on the MammalMAP (https://vmus.adu.org.za/) and iNaturalist (www.iNaturalist.org) platforms (QDGS: 3423AB), 14 mammal species have been confirmed in the study area landscape (Appendix A) of which 13 are currently listed as “Least Concern” and one, the African Clawless Otter (*Aonyx capensis*) classified as “Near-Threatened” by the IUCN.

8.1.2 Field survey

Evidence of six mammal species were recovered within the study area (Figures 14 and 15), five of which are currently classified as “Least concern” and one, the Duthie's Golden Mole (*Chlorotalpa duthieae*) classified as “Vulnerable” by the IUCN

(Appendix E). The distribution of this mammal SCC appears restricted to the non-indigenous forest habitat and banks of the Non-perennial stream / Wetland habitat in the northern part of the site (Portion 8), where a large subpopulation of this species is resident (Figure 15).

Other mammal species recorded include the Cape Grysbok (*Raphicerus melanotis*) which is abundant in Portion 8 of the site, and common rodents such as the African Mole-rat (*Cryptomys hottentotus*) and Four-striped Grass Mouse (*Rhabdomys pumilio*) which are abundant in Portion 7 of the site (Figure 15; Appendix E). Activity of single individuals of the Caracal (Caracal caracal) and Cape Porcupine (*Hystrix africaeaustralis*) were also noted (Appendix E).

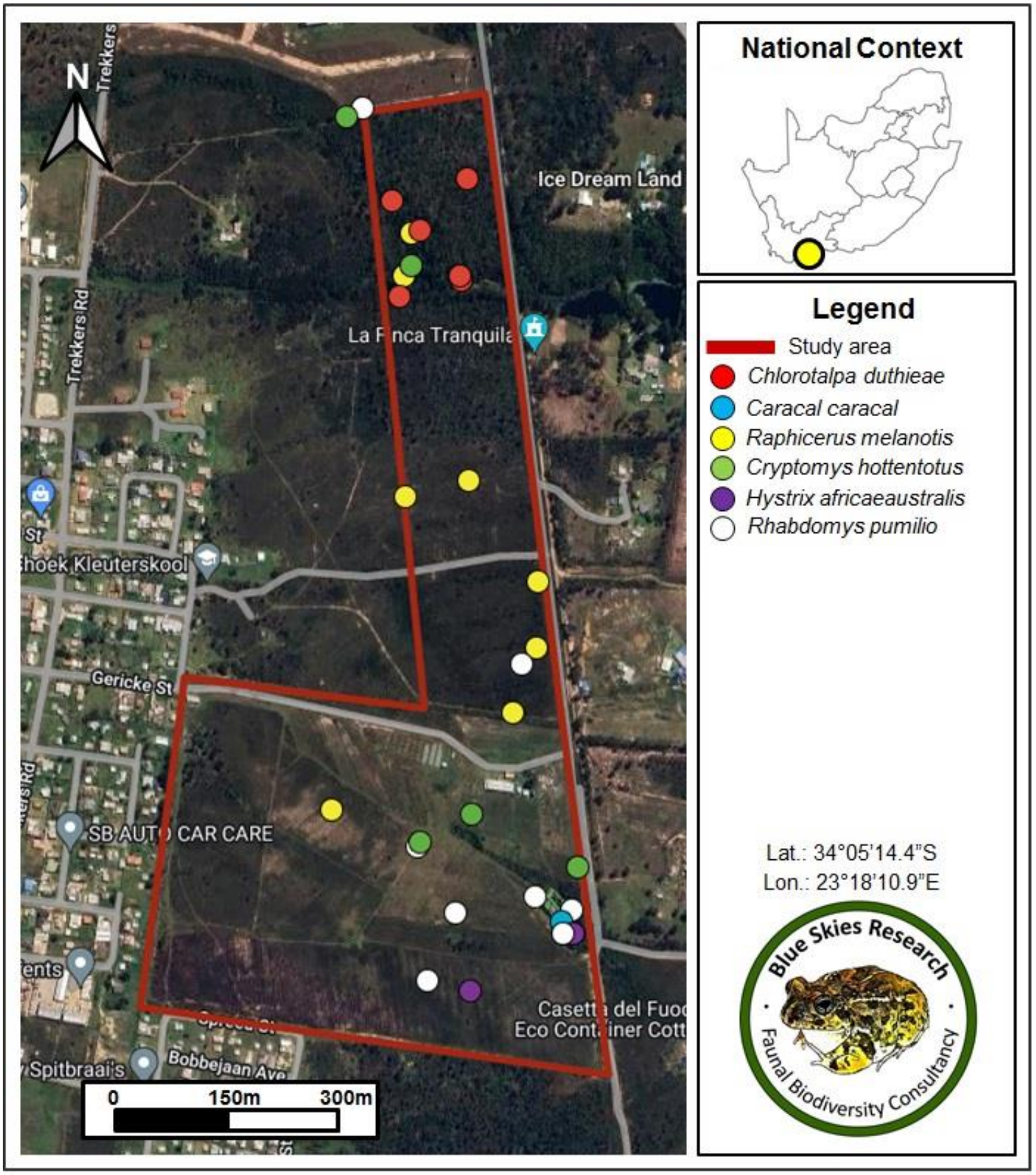


Figure 15 Spatial locations of the different mammal species recorded within the study area.

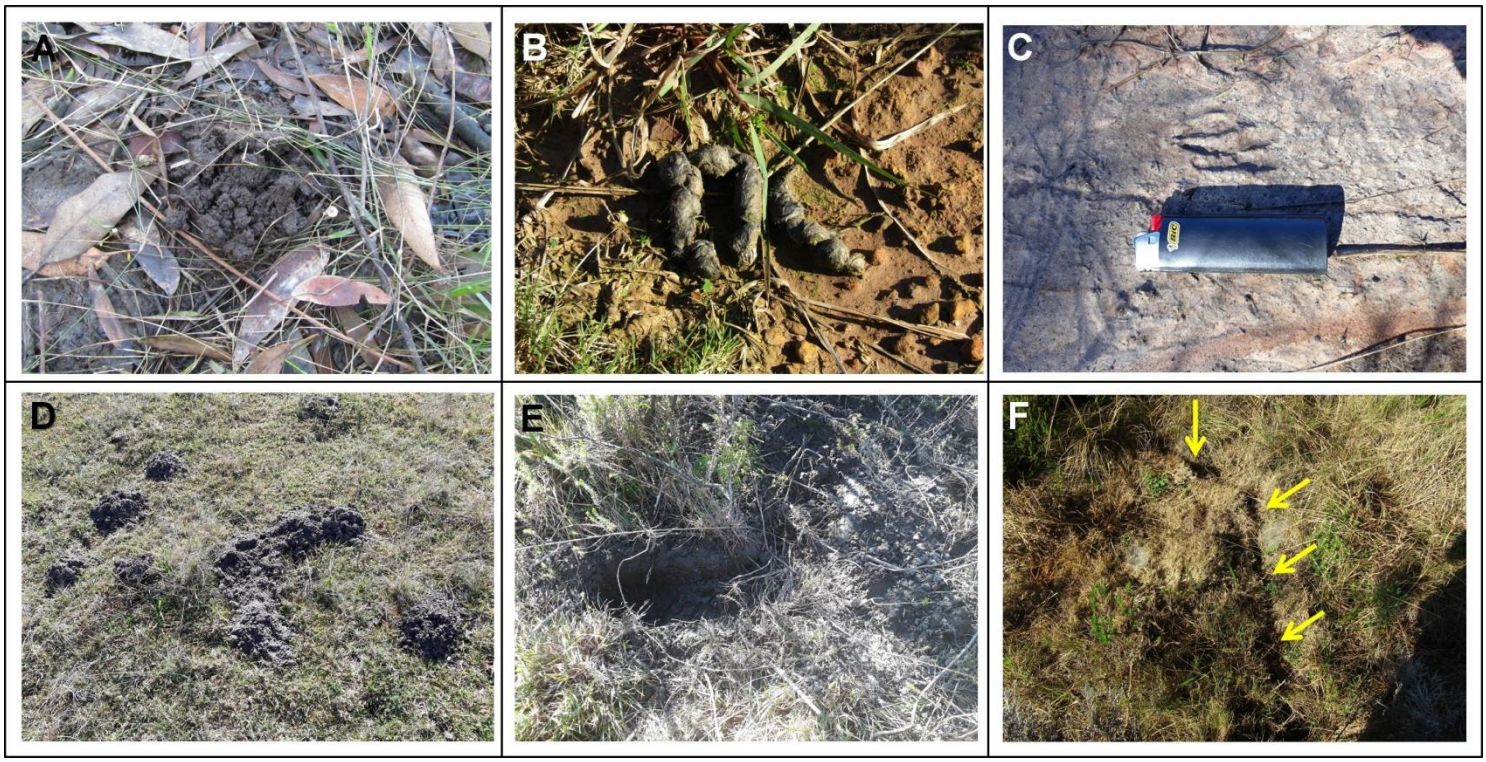


Figure 16 Photographic evidence of the different mammal species recorded in the study area. A) Tunnel system of the Duthie's Golden Mole (*Chlorotalpa duthieae*). B) Scat of the Caracal (*Caracal caracal*). C) Tracks of the Cape Gysbok (*Raphicerus melanotis*). D) Mounds of the African Mole-rat (*Cryptomys hottentotus*). E) Feeding hole of the Cape Porcupine (*Hystrix africaeaustralis*). F) Run (arrowed) of the Four-striped Grass Mouse (*Rhabdomys pumilio*).

8.2 Amphibians

8.2.1 Desktop assessment

The distributions of 16 amphibian species overlap with the study area landscape (Appendix A). Among these, 15 species are currently listed as “Least Concern” and one, the Knysna Leaf-folding Frog (*Afrixalus knysnae*) classified as “Endangered” by the IUCN (IUCN, 2021).

From the observational records available on the FrogMAP (https://vmus.adu.org.za/) and iNaturalist (www.iNaturalist.org) platforms (QDGS: 3423AB), only three of these amphibian species have been confirmed

in the study area landscape, all of which are currently listed as “Least Concern” by the IUCN (Appendix B)

8.2.2 Field survey

Three amphibian species were recorded within the study area, all of which are currently classified as “Least concern” (Figures 17 and 18, Appendix E). Overall, the most abundant amphibians on the site are the Boettger’s Dainty Frog (*Cacosternum boettgeri*) and Clicking Stream Frog (*Strongylopus grayii*) which are largely restricted to water-filled temporary pools created by the remnant agricultural furrows in Portion 7 (Figure 17). The only species recorded in Portion 8 is the Clicking Stream Frog which is found along the northern non-perennial stream and associated wetland area. A single individual of the Raucous Toad (*Sclerophrys capensis*) was also noted in Portion 7 of the site (Figures 17 and 18), but this species is likely also highly abundant in this part of the study area.

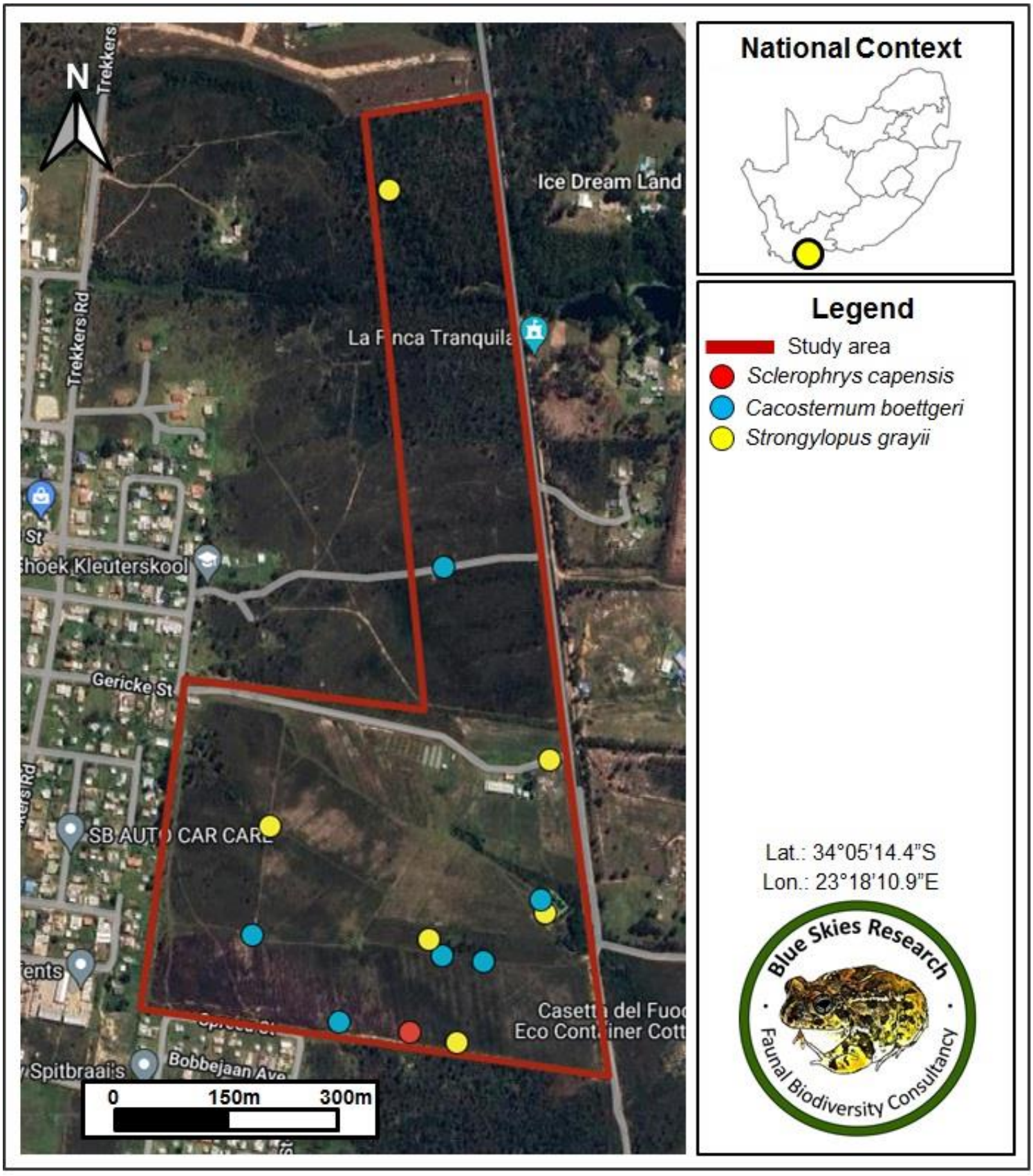


Figure 17 Spatial locations of the different amphibian species recorded within the study area.

Figure 18 One of the amphibian species, the Raucous Toad (*Sclerophrys capensis*), recorded within the study area.

8.3 Avifauna

8.3.1 Desktop assessment

According to the SABAP2 records, 188 bird species have been recorded from the pentads overlapping the study area with 178 species classified as “Least Concern” by the IUCN, and 10 species which constitute avifaunal SCC (Appendix C). These avifaunal SCC includes the:

1. Forest Buzzard (*Buteo trizonatus*) classified as “Near-Threatened”,
2. African Marsh Harrier (*Circus ranivorus*) classified as “Least Concern”,
3. Secretarybird (*Sagittarius serpentarius*) classified as “Endangered”,
4. Maccoa Duck (*Oxyura maccoa*) classified as “Endangered”,

5. Blue Crane (*Anthropoides paradiseus*) classified as “Vulnerable”,
6. Denham's Bustard (*Neotis denhami*) classified as “Near-Threatened”,
7. Knysna Warbler (*Bradypterus sylvaticus*) classified as “Vulnerable”,
8. Knysna Woodpecker (*Campethera notate*) classified as “Near-Threatened”,.
9. Cape Cormorant (*Phalacrocorax capensis*) classified as “Endangered”, and
10. Cape Gannet (*Morus capensis*) classified as “Endangered” by the IUCN.

8.3.2 Field survey

In total, 35 bird species were recorded within the study area, all of which are currently classified as “Least concern” by the IUCN (Figures 19 and 20, Appendix C). The majority of avifauna on the site constitute common vegetation associated species, with some wetland-associated species also being present at the artificial dams and within the northern wetland area of the site.

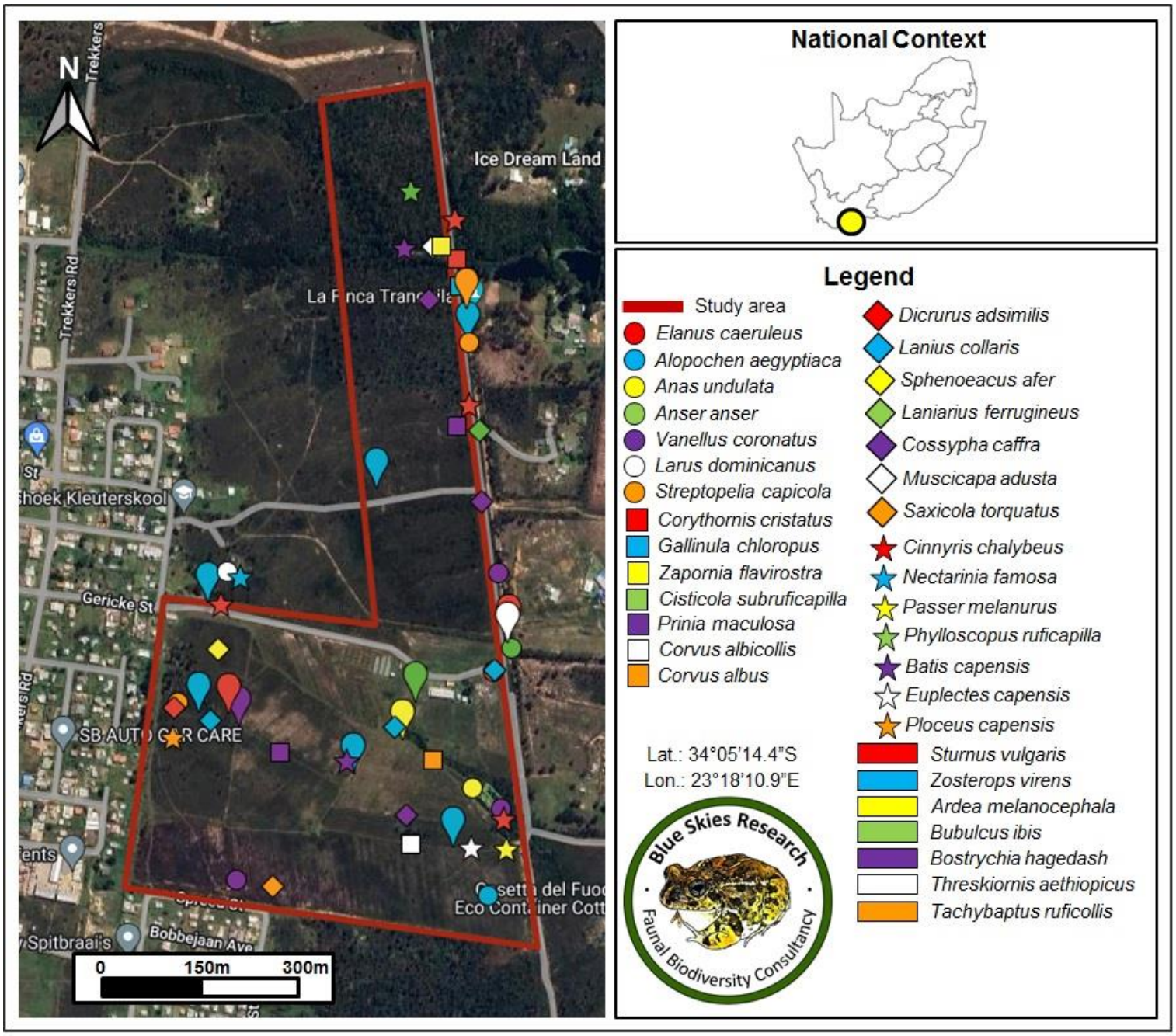


Figure 19 Spatial locations of the different avifaunal species recorded within the study area.

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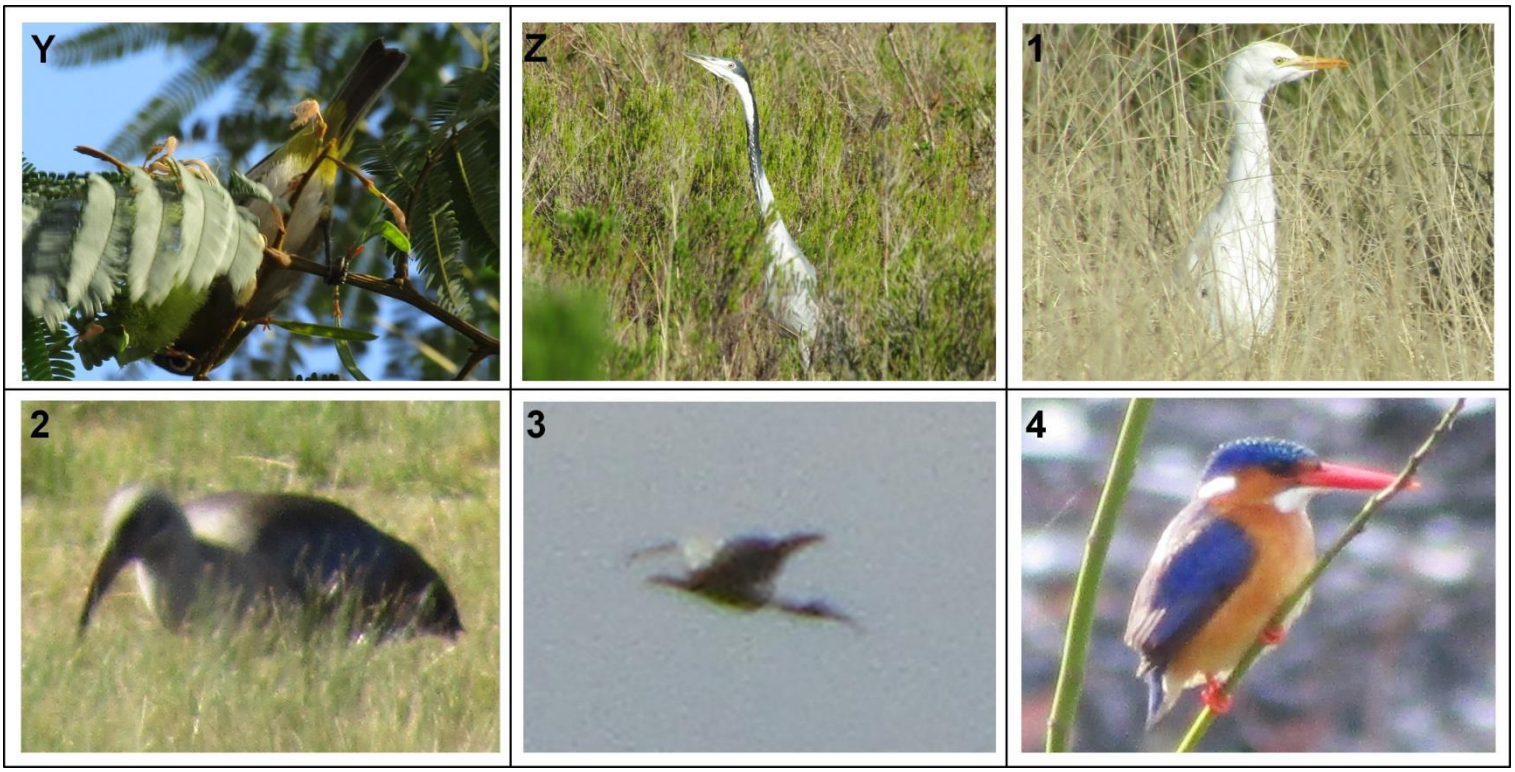


Figure 20 Photographic evidence of different avifaunal species recorded in the study area. A) Black-winged Kite (*Elanus caeruleus*). B) Egyptian Goose (*Alopochen aegyptiaca*). C) Yellow-billed Duck (*Anas undulate*). D) Greylag Goose (*Anser anser*). E) Crowned Lapwing (*Vanellus coronatus*). F) Kelp Gull (*Larus dominicanus*). G) Cape Turtle Dove (*Streptopelia capicola*). H) Black Crake (*Zapornia flavirostra*). I) Grey-backed Cisticola (*Cisticola subruficapilla*). J) Karoo Prinia (*Prinia maculosa*). K) Pied Crow (*Corvus albus*). L) Fork-tailed Drongo (*Dicrurus adsimilis*).

M) Southern Fiscal (*Lanius collaris*). N) Cape Grassbird (*Sphenoeacus afer*). O) Southern Boubou (*Laniarius ferrugineus*). P) Cape Robin-Chat (*Cossypha caffra*).Q) African Dusky Flycatcher (*Muscicapa adusta*). R) African Stonechat (*Saxicola torquatus*). S) Southern Double-collared Sunbird (*Cinnyris chalybeus*). T) Yellow-throated Woodland Warbler (*Phylloscopus ruficapilla*). U) Cape Batis (*Batis capensis*). V) Yellow Bishop (*Euplectes capensis*). W) Cape Weaver (*Ploceus capensis*). X) Common Starling (*Sturnus vulgaris*).

Y) Cape White-eye (*Zosterops virens*). Z) Black-headed Heron (*Ardea melanocephala*). 1) Western Cattle Egret (*Bubulcus ibis*). 2) Hadada Ibis (*Bostrychia hagedash*). 3) African Sacred Ibis (*Threskiornis aethiopicus*). 4) Malachite Kingfisher (*Corythornis cristatus*).

8.4 Butterflies

8.4.1 Desktop assessment

From the observational records available on the LepiMAP (https://vmus.adu.org.za/) and iNaturalist (www.iNaturalist.org) platforms (QDGS: 3423AB), 47 butterfly species have been confirmed in the study area landscape, all of which are currently listed as "Least Concern" by the IUCN (Appendix D). Importantly, no individuals within the genus *Aloeides* have been recorded in the study area landscape, and the distribution of the Red Russet (*Aloeides thyra orientis*) listed in Table 1 only stretches from Witsand to Gouritsmond in the west to the Brenton Peninsula near Knysna in the east (Mecenero et al. 2013), and therefore does not overlap with the study area.

8.4.2 Field survey

During the field survey no butterfly species were observed, in spite of the study area harbouring a large proportion of flowering Fynbos vegetation. It is likely that the Winter sampling season may have precluded butterfly activity and emergence. As such, butterfly diversity within the study area is based on the desktop assessment for this group.

8.5 Grasshoppers

No grasshopper species were observed within the study area landscape, likely owing to the wet nature of the habitats on the site along with the Winter sampling season precluding activity and emergence. Even so, the presence of the Yellow-winged Agile Grasshopper was evaluated based on suitable habitat (recently burnt Schlerophyll on south-facing slopes) for this species. Even though a burnt habitat does characterise the south-western part of the site, there is no Schlerophyll vegetation here, and this part furthermore represents a flat area which is not south-facing. To this end, suitable habitat for the Yellow-winged Agile Grasshopper is not present on the site, and it is highly unlikely that this species will occur here.

8.6 Faunal and avifaunal diversity within the study area

Overall, habitats in the study area exist either in a semi-intact or highly altered state (Section 7) with numerous daily impacts being evident (Section 11). Faunal and avifaunal diversity is comprised of only relatively common species of “Least Concern” (IUCN, 2021), albeit one mammal SCC, the Duthie's Golden Mole (*Chlorotalpa duthieae*), is present in high numbers in the degraded northern part of the site, given suitable micro-habitat characteristics (Section 9). Furthermore, species diversity on the site appears relatively high, with all species also being abundant, likely given the contact point between a high number of different habitat types (Sections 7 and 8). A low number of intact predator-prey dynamics (as is evidenced by the presence of one mammal and one avifaunal predator) is also observable (Section 8). Taken together, ecosystem dynamics appear intact to some degree, with habitats on the site (especially the northern aquatic environments) forming a semi-functional ecological link within the study area landscape.

9. Species of Conservation Concern

Along with the eight (two mammal, one amphibian, three avifaunal and two invertebrate) SCC listed in the DFFE Screening Tool (Table 1), the potential occurrence of 13 other (six mammal and seven avifaunal) SCC within the study area was assessed (Table 4), given their recovery in the desktop assessment (see Section 8). The probability of occurrence of each specific SCC within the study area landscape was assessed based on the following criteria:

Confirmed - The species was confirmed as present within the study area during the field survey.

High - The species was not confirmed as present within the study area during the field survey but has been recorded in the overlapped QDGS in the case of mammals, amphibians and butterflies. In the case of avifauna, the species has been recorded in the overlapped pentads recently (less than 2 years ago) and in high number (>10 times) and is therefore likely to also occur in the study area, given suitable habitat characteristics.

Medium - The species was not confirmed as present within the study area during the field survey, and has not been recorded in the overlapped QDGS in the case of mammals, amphibians and butterflies. In the case of avifauna, the species has been recorded a number of times (<10 times) in the overlapped pentads recently (less than 2 years ago). Suitable habitat for the species is also present in the study area.

Low - No suitable habitat for the species is present in the study area. In the case of avifauna, the species has been recorded a low number of times (<10 times) or more than five years ago in the overlapped pentads.

The presence of one mammal SCC was confirmed one the site, with three further (one mammal and two avifaunal) SCC likely also occurring within the study area given suitable habitat characteristics (Table 4). All remaining SCC were recovered as

having a “Low” or “Medium” probability of occurrence within the study area landscape and are therefore not further considered in this report.

Table 4 Probability of occurrence of specific SCC in the study area. For each species, the taxonomic Family, scientific name and common name is shown, along with its current classification under the IUCN Red List of Threatened Species (IUCN, 2021). In addition, the species' preferred habitat and the probability that the species occurs within the study area is given, along with a justification for listing this probability.

Order	Family	Species	Common name	Status	Habitat	Probability of occurrence in the study area	Justification of probability
Sensitive Species 8	Sensitive Species 8	*Sensitive Species 8*	*Sensitive Species 8*	-	-	Low	The species was not confirmed during the field survey, and it has not been recorded in the study area landscape. It is unlikely that this species will occur on the site, given less suitable habitat characteristics.
Afrosoricida	Chrysochloridae	*Chlorotalpa duthieae*	Duthie's Golden Mole	Vulnerable	The species occurs on alluvial sands and sandy loams in Southern Cape Afrotemperate forests (especially coastal platform and scarp forest patches) in the Fynbos and Moist Savanna biomes (Bronner, 2015). The species also thrives in cultivated areas and gardens.	Confirmed	The presence of the species was confirmed in the Non-indigenous forest habitat and banks of the Non-perennial stream / Wetland habitat in the northern part of Portion 8. This part of the site harbours a large subpopulation of this species, where it is confined to the moist loamy soils with suitable leaf litter cover.
Afrosoricida	Chrysochloridae	*Amblysomus corriae*	Fynbos Golden Mole	Near-Threatened	The species prefers sandy soils and soft loams in Mountain Fynbos, Grassy Fynbos and Renosterveld of South West Cape (Bronner and Mynhardt, 2015). Also in Afromontane forest and southern African moist savanna along the southern Cape coast. The species furthermore thrives in gardens, cultivated lands, golf courses and livestock paddocks, and is also present in exotic plantations, but apparently at lower densities (Bronner, 2013).	Low	The species was not confirmed during the field survey, and it has not been recorded in the study area landscape. Furthermore, the site does not harbour the sandy soils and soft loams (although loam soils are found in the north of Portion 8, they are of a too dense nature) preferred by this species, and it is unlikely to occur in the study area.
Carnivora	Felidae	*Panthera pardus*	Leopard	Vulnerable	The species occurs in the widest range of habitats among any of the Old World Cats, including the larger part of Africa and Asia (Nowell and Jackson 1996). Generally, Leopards prefer medium-sized ungulate prey (10- 40 kgs) where available (Hayward et al. 2006). They have a highly varied diet, however, feeding on insects, reptiles, birds and small mammals up to large ungulates.	Medium	The species was not confirmed during the field survey, and it has not been recorded in the study area landscape. Given the wide habitat tolerances of this species, along with an on-site suitable ungulate prey base, it may be possible that the species may ephemerally move through the study area landscape.

Carnivora	Mustelidae	*Aonyx capensis*	African Clawless Otter	Near-Threatened	The species occupies aquatic freshwater areas and is seldom found far from water. It may occur in many seasonal or episodic rivers provided suitable-sized pools persist (Nel and Somers, 2007, Somers and Nel, 2013).	High	The species was not confirmed during the field survey, but has been recorded in the study area landscape owing to the presence of aquatic habitats. Although the species will not occur in the southern part of the site (Portion 7), it is likely that it may use the non-perennial stream and wetland habitats in the north of the site (Portion 8).
Eulipotyphla	Soricidae	*Myosorex longicaudatus*	Long-tailed Forest Shrew	Endangered	The species is found in forests, forests edges, fynbos and boggy grassland, and depends on moist microhabitats (typically above the 800 mm isohyet). It is restricted to pristine primary habitat that has not been degraded (Baxter et al. 2020).	Low	The species was not confirmed during the field survey, and it has not been recorded in the study area landscape. Given that none of the habitats on the site exist in a pristine primary state, it is unlikely that this species will occur here.
Anura	Hyperoliidae	*Afrixalus knysnae*	Knysna Leaf-folding Frog	Endangered	The species occurs in a coastal mosaic of vegetation types, including mountain fynbos heathland and forest. It breeds in small dams and shallow semi-permanent water with much emergent vegetation, and even in well vegetated ornamental garden ponds. It is suspected that this species requires high water quality for breeding.	Medium	The species was not confirmed during the field survey, and it has not been recorded in the study area landscape. Although the site does contain aquatic habitats (non-perennial streams, dams, wetlands and semi-permanent water-filled depressions), the water quality here appears relatively poor, and it is not likely that this species will occur here in large numbers.
Accipitriformes	Accipitridae	*Buteo trizonatus*	Forest Buzzard	Near-Threatened	This species inhabits native temperate forests from sea level up to 1,000 m, and rarely to 1,500 m (Ferguson-Lees and Christie 2001). It can also be found in plantations, though usually near to areas of native forest (Ferguson-Lees and Christie 2001).	High	The species was not confirmed during the field survey, but has been recorded a high number of times (53 times) in the study area landscape, with the latest observation in May 2023 (Appendix C). Although the site does not support any native forests, it is likely that this species may frequent the Non-indigenous forest habitat in the north of the site (Portion 8).
Accipitriformes	Accipitridae	*Circus ranivorus*	African Marsh Harrier	Least Concern	The species breeds in wetlands, foraging primarily over reeds and lake margins (Harrison *et al.* 1997). Its diet consists largely of small mammals, particularly striped mouse *Rhabdomys pumilio* (Kemp and Dean, 1988).	Low	The species was not confirmed during the field survey and has been recorded only once and more than five years ago (in December 2013) in the study area landscape (Appendix C). It is therefore unlikely that the species will be present on the site.
Accipitriformes	Sagittariidae	*Sagittarius serpentarius*	Secretarybird	Endangered	The species inhabits open landscapes, ranging from open plains and grasslands, to lightly wooded savanna, but is also found in agricultural areas and sub-desert (Ferguson-Lees and Christie, 2001), with up to 50% of recorded individuals in the Fynbos biome in winter being found in transformed environments (Hofmeyr *et al*. 2014). The species avoids areas of >20% wood cover (Loftie-Eaton, 2017). Although the species is nomadic, individuals which inhabit moist grassland tend to be less nomadic but may travel 20-30 km per day while foraging (Kemp and Kemp, 1977; Whitecross *et al*. 2019). The species preys on a variety of invertebrates (insects form 86% of the diet, Whitecross *et al*. 2019) and vertebrates (rodents, other mammals, lizards, snakes, eggs, young birds and amphibians, Kemp and Kemp, 1977; Ferguson-Lees and Christie, 2001). Breeding occurs throughout the year and the species typically nests in a flat-topped Acacia or other thorny tree (Ferguson-Lees and Christie, 2001).	Low	The species was not confirmed during the field survey and has been recorded only once in the study area landscape (in July 2020; Appendix C). It is therefore unlikely that the species will be present on the site.

Anseriformes	Anatidae	*Oxyura maccoa*	Maccoa Duck	Endangered	During the breeding season the species inhabits small temporary and permanent inland freshwater lakes (Berruti *et al*. 2005, 2007), preferring those that are shallow and nutrient-rich (Johnsgard,1978, Johnsgard and Carbonell, 1996) with extensive emergent vegetation such as reeds (*Phragmites* spp.) and cattails (*Typha* spp.) (Johnsgard and Carbonell, 1996) on which it relies for nesting. It prefers areas with a bottom of mud or silt and minimal amounts of floating vegetation, since this provides the best foraging conditions (Johnsgard and Carbonell, 1996). It also breeds on man-made habitats, such as small farm wetlands, and sewage-farm basins (Johnsgard, 1978, Johnsgard and Carbonell, 1996). Outside the breeding season it will wander over larger, deeper lakes and brackish lagoons (del Hoyo *et al*. 1992, Berruti *et al*. 2005, 2007). It is thought to find refuge on the larger lakes while moulting (Berruti *et al*. 2005, 2007). The species tends to nest over deeper water among emergent vegetation (Berruti *et al*. 2005, 2007). The nest is usually constructed from reeds and cattails that have been bent down to form a basin (Johnsgard and Carbonell, 1996), although old nests of Red-knobbed Coots *Fulica cristata* may sometimes be used	Low	The species was not confirmed during the field survey and has been recorded only five times in the study area landscape, with the latest observation in April 2021 (Appendix C). Furthermore, habitats on the site are not characteristic of the open water conditions required by this species, and it is therefore unlikely that the species will be present on the site.
Galliformes	Gruidae	*Anthropoides paradiseus*	Blue Crane	Vulnerable	This species breeds in natural grass- and sedge-dominated habitats, preferring secluded grasslands at high elevations where the vegetation is thick and short (Barnes, 2000). Occasionally it will breed in or near wetland areas (Barnes, 2000), in pans or on islands in dams (Hockey *et al*. 2005). Particularly in the Western Cape of South Africa, it also uses lowland agricultural areas, particularly pasture, fallow fields and cereal crop fields as stubble becomes available after harvest (Barnes, 2000, Hockey *et al*. 2005). During the non-breeding season the species inhabits short, dry, natural grasslands, as well as the Karoo and fynbos biomes (Barnes, 2000). In fynbos it occurs almost exclusively in cultivated habitats, largely avoiding the natural vegetation (Barnes, 2000), although this habitat may provide important cover for juveniles (Bidwell *et al*. 2006). The agricultural habitats that it uses include pastures, croplands, particularly where cereal crops are grown (Barnes, 2000), and fallow fields. It is intolerant of intensively grazed and burnt grassland (Hockey *et al*. 2005). It roosts in shallow wetlands (Barnes, 2000, Hockey *et al*. 2005).	Low	The species was not confirmed during the field survey and has been recorded only once and more than five years ago (in September 2009) in the study area landscape (Appendix C). It is therefore unlikely that the species will be present on the site.

Otidiformes	Otididae	*Neotis denhami*	Denham's Bustard	Near-Threatened	The species inhabits grasslands, grassy *Acacia*-studded dunes, fairly dense shrubland, light woodland, farmland, crops, dried marsh and arid scrub plains, also grass-covered ironstone pans and burnt savanna woodland in Sierra Leone and high rainfall sour grassveld, planted pastures and cereal croplands in fynbos in South Africa (del Hoyo et al. 1996). It feeds on insects, small vertebrates and plant material (Collar, 1996).	Medium	The species was not confirmed during the field survey, but has been recorded a number of times (9 times) in the study area landscape, with the latest observation in March 2023 (Appendix C). Although the site does support the shrubland habitats which this species may utilize (the South Outeniqua Sandstone Fynbos vegetation in the southern part of the site corresponding to Portion 7), this part of the site is subjected to daily disturbances through cattle grazing. Any occurrence of this species on the site will therefore be ephemeral.
Passeriformes	Locustellidae	*Bradypterus sylvaticus*	Knysna Warbler	Vulnerable	The species occurs in thick, tangled vegetation along the banks of watercourses, or covering drainage lines in fynbos forest patches, or on the edges of afromontane forest. It breeds in dense understory vegetation (Pryke et al. 2010).	Low	The species was not confirmed during the field survey and has been recorded only once and more than five years ago (in October 2013) in the study area landscape (Appendix C). It is therefore unlikely that the species will be present on the site.
Piciformes	Picidae	*Campethera notata*	Knysna Woodpecker	Near-Threatened	The species is confined to coastal areas of forest, woodland, dense bush, Euphorbia scrub, or open country with large trees.	High	The species was not confirmed during the field survey, but has been recorded a number of times (8 times) in the study area landscape, with the latest observation in February 2023 (Appendix C). Although the site does not support any native forests, it is likely that this species may be present in the Non-indigenous forest habitat in the north of the site (Portion 8).
Suliformes	Phalacrocoracidae	*Phalacrocorax capensis*	Cape Cormorant	Endangered	This species is usually found in the Benguela Current less than 10 km from the coast (del Hoyo *et al*. 1992), although it does occasionally range as far as 70km offshore. During both the breeding and the non-breeding seasons it inhabits cliffs and ledges on the mainland and on offshore islands (Nelson, 2005). It is occasionally found in the brackish waters of coastal lagoons, estuaries and harbours (del Hoyo *et al*. 1992), but does not use these habitats for breeding. It occurs in highest densities in areas of suitable habitat near the recruitment grounds for pilchards (Clupeidae) and anchovies (Engraulidae.) (Crawford and Shelton, 1978).	Low	The species was not confirmed during the field survey and has been recorded only twice in the study area landscape (with the latest observation in December 2021; Appendix C). It is unlikely that the species will be present on the site.
Suliformes	Sulidae	Morus capensis	Cape Gannet	Endangered	This species is strictly marine. It prefers to nest on flat or gently sloping open ground on offshore islands, but will also use island cliffs as well as man-made structures such as guano platforms (Hockey et al. 2005). It most often forages within 120 km of the shore (Adams and Navarro 2005), particularly frequenting areas where purse-seine netting occurs (Nelson 2005). It occasionally wanders further offshore over the continental shelf (del Hoyo et al. 1992) where it benefits from the discards of deep-water stern trawlers (Nelson 2005).	Low	The species is strictly marine in its habitat requirements, with the site not harbouring any marine habitat. It is certain that this species will not occur on the site.

Lepidoptera	Lycaenidae	Aloeides thyra	Red Russet	Endangered	It occurs in a variety of habitats, including the sea-shore, sandy scrub-covered ground (e.g. coastal fynbos on flat sandy ground (either naturally occurring or from anthropogenic disturbances such as footpaths or unsurfaced track) between 40 m to 240 m above sea level) and at high altitudes in mountains. It also penetrates into parts of the Karoo. Larval host plants for Aloeides thyra are not differentiated between subspecies, and so the larval host plants for this taxon are assumed to include Aspalathus acuminate, A. tulbaghensis, A. cymbiformis and A. laricifolia (see e.g. Henning et al. 2009, Mecenero et al. 2013, Williams 2016).	Low	No individuals within the genus *Aloeides* have been recorded in the study area landscape, and the distribution of *Aloeides thyra orientis* only stretches from Witsand to Gouritsmond in the west to the Brenton Peninsula near Knysna in the east (Mecenero et al. 2013), and therefore does not overlap with the study area. It is therefore unlikely that this species will be present on the site.
Orthoptera	Acrididae	*Aneuryphymus montanus*	Yellow-winged Agile Grasshopper	Vulnerable	The species is associated with fynbos vegetation, where it has been collected "amongst partly burnt stands of evergreen Sclerophyll in rocky foothills" (Brown 1960). It prefers south-facing cool slopes (Kinvig 2005).	Low	Even though a burnt habitat does characterise the south-western part of the site, there is no Schlerophyll vegetation here, and this part furthermore represents a flat area which is not south facing. To this end, suitable habitat for the Yellow-winged Agile Grasshopper is not present on the site, and it is highly unlikely that this species will occur here.

9.1 Conservation statuses of SCC in the study area

Among the SCC confirmed or possibly occurring on the site, the presence of a large subpopulation of *C. duthieae* is of the greatest conservation concern. This species is only known from 9 locations (IUCN, 2021), making this subpopulation a novel distributional record (an observational record for this species has been added to the iNaturalist platform). In addition, the habitat for this species on the site (Non-indigenous forest and Non-perennial stream banks habitat; Figure 21) represent a large proportion of the Area Of Occupancy (AOO) for this species, ranging between 4% (IUCN, 2021) and 34% (Species Environmental Assessment Guideline) of its known distribution (Table 5). To this end, this subpopulation and its habitat on the site are of a high conservation concern as it is possible that the threat status of the species may change if it is to be destroyed.

No data on the AOO of the three remaining SCC (*A. capensis*, *B. trizonatus*, *C. notata*) which possibly occur on the site is currently available, however their on-site habitats currently form a small part of their Extent Of Occurrence (EOO) and it is unlikely that their threat statuses may change if these habitats are destroyed. Notably, the on-site habitats of these species are exactly similar to that of *C. duthieae* (Table 5). Given the confirmed or possible presence of all four SCC therefore, their on-site habitats are considered during calculation of SEI as well as during the impact assessment. In addition, the major threats to the persistence of these species (Table 5) are also taken into account during the impact assessment.

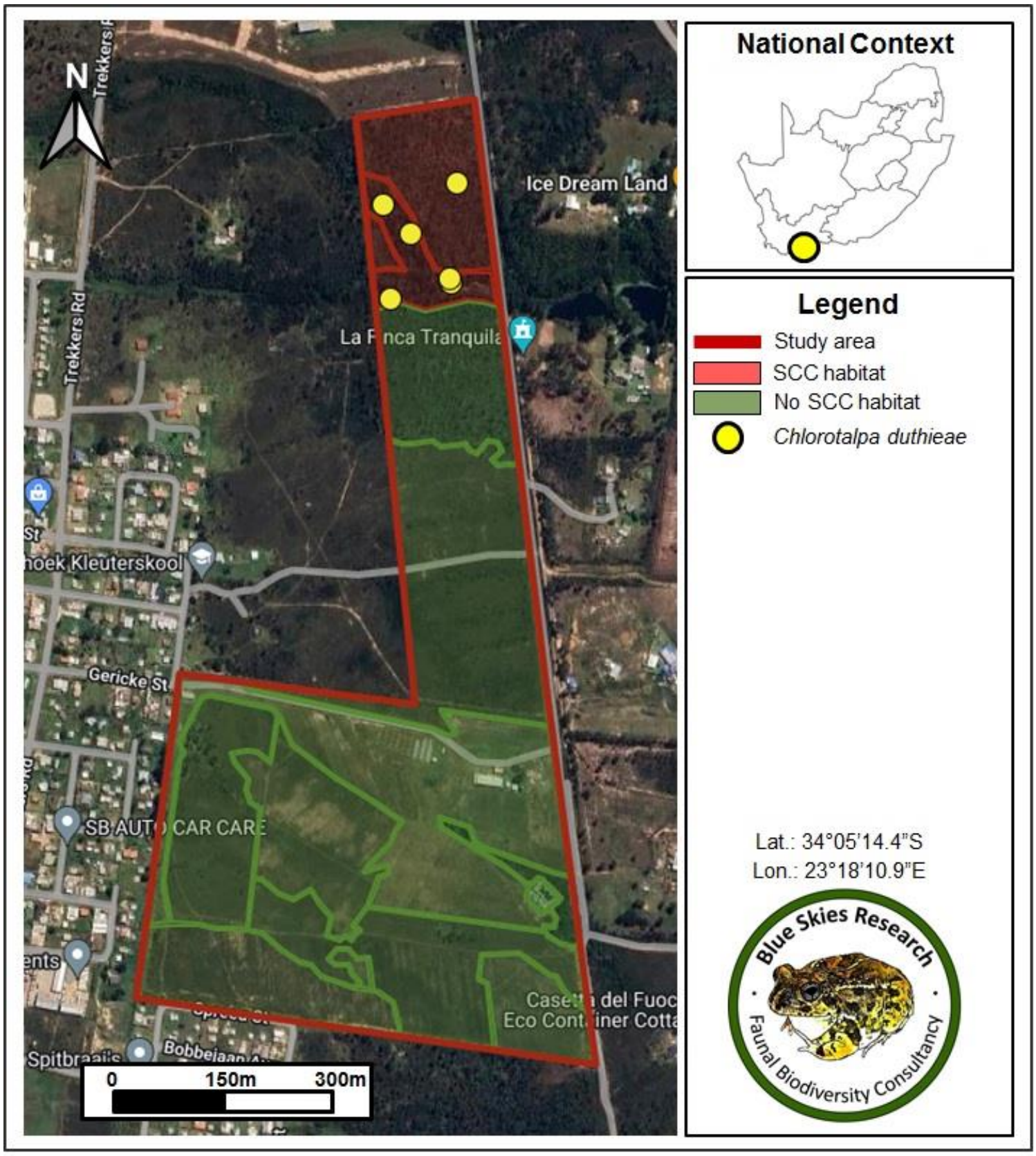


Figure 21 Spatial locations of SCC habitats within the study area, with an indication of the spatial records for the confirmed subpopulation of *C. duthieae*.

Table 5 Table showing the SCC confirmed or possibly occurring in the study area along with the full conservation status classification by the IUCN, the specific habitat for this SCC and its extent on the site, the listed Area Of Occupancy (AOO) and Extent Of Occurrence (EOO) of the species, ant the proportion of the AOO and EOO which is encompassed by its on-site habitat. In addition, major threats to each species is shown, as listed by the IUCN (IUCN, 2021).

Species	Common name	IUCN status	Habitat on site	AOO (ha)	EOO (ha)	%AOO/%EOO	Threats
Chlorotalpa duthieae	Duthie's Golden Mole	Vulnerable B1ab(iii)+2ab(iii)	Non-indigenous forest (4.44 ha); Non-perennial stream banks (1.37 ha)	14 400 / 17	1 400 000	4.040 / 34.176 / 0.0004	Habitat alteration and fragmentation owing to development and increased urbanization. Replacement of indigenous forest, predation by domestic pets in vicinity of human habitations, and persecution by gardeners.
Aonyx capensis	African Clawless Otter	Near Threatened A2cde+3cde	Non-perennial stream / Wetland (1.37 ha)	-	-	-	Declining state of freshwater ecosystems. Bush clearing, deforestation, overgrazing, siltation, draining of wetlands or water extraction or denudation of riparian vegetation. Killing for skins and other body parts, or because they are regarded as competitors for food.
Buteo trizonatus	Forest Buzzard	Near Threatened D1	Non-indigenous forest (4.44 ha)	-	17 900 000	- / 0.00002	Deforestation
Campethera notata	Knysna Woodpecker	Near Threatened C2a(ii); D1	Non-indigenous forest (4.44 ha)	-	17 900 000	- / 0.00002	Clearance of coastal bush and township development.

10. Evaluation of Site Ecological Importance (SEI)

10.1 Evaluating SEI for habitats in the study area

Evaluation of the Site Ecological Importance (SEI) for the habitats of SCC confirmed or possibly occurring in the study area was performed following the methods and criteria outlined in the Species Environmental Assessment Guideline (SANBI, 2020). Evaluation of SEI was performed separately for each faunal group (mammals and avifauna) considering their habitat requirements (Section 9) in conjunction with the spatial distribution of habitats within the study area (Section 7). In short, SEI is a function of the Biodiversity Importance (BI) of the receptor (e.g., SCC, the vegetation/faunal community or habitat type present on the site) and its resilience to impacts (Receptor Resilience, RR) as follows: SEI = BI + RR. Biodiversity Importance (BI) is in turn a function of Conservation Importance (CI) and the Functional Integrity (FI) of the receptor as follows: BI = CI + FI.

To calculate the Conservation Importance (CI) and Functional Integrity (FI) of each habitat within the study area, the criteria outlined in Table 6 and Table 7 were respectively used.

According to the Species Environmental Assessment Guideline, Conservation Importance (CI) may defined as follows:

Conservation Importance (CI): "*The importance of a site for supporting biodiversity features of conservation concern present, e.g. populations of IUCN threatened and Near Threatened species (CR, EN, VU and NT), Rare species, range-restricted species, globally significant populations of congregatory species, and areas of threatened ecosystem types, through predominantly natural processes.*"

Table 6 Conservation importance (CI) criteria (table adapted from the Species Environmental Assessment Guideline, SANBI, 2020).

Conservation Importance (CI)	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 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.

According to the guideline, Functional Integrity (FI) is defined as:

Functional integrity (FI): "*The receptors' current ability to maintain the structure and functions that define it, compared to its known or predicted state under ideal conditions. Simply stated, FI is: 'A measure of the ecological condition of the impact receptor as determined by its remaining intact and functional area, its connectivity to other natural areas and the degree of current persistent ecological impacts.*"

Table 7 Functional integrity (FI) criteria (table adapted from the Species Environmental Assessment Guideline, SANBI, 2020).

Functional Integrity (FI)	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 (e.g. ploughing).
High	Large (> 20 ha but < 100 ha) intact area for any conservation status of ecosystem type or > 10 ha for EN ecosystem types. Good habitat connectivity with potentially functional ecological corridors and a regularly used road network between intact habitat patches. Only minor current negative ecological impacts (e.g. few livestock utilising area) with no signs of major past disturbance (e.g. ploughing) and good rehabilitation potential.
Medium	Medium (> 5 ha but < 20 ha) semi-intact area for any conservation status of ecosystem type or > 20 ha for VU ecosystem types. Only narrow corridors of good habitat connectivity or larger areas of poor habitat connectivity and a busy used road network between intact habitat patches. Mostly minor current negative ecological impacts with some major impacts (e.g. established population of alien and invasive flora) and a few signs of minor past disturbance. Moderate rehabilitation potential.
Low	Small (> 1 ha but < 5 ha) area. Almost no habitat connectivity but migrations still possible across some 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.

Based on assessments of CI and FI for habitats within the study area, the Biodiversity Importance (BI) of each habitat was calculated using the matrix in Table 8 (based on the formula: BI = CI + FI). As Biodiversity Importance (BI) is a function of Conservation Importance (CI) and the Functional Integrity (FI) of a receptor, BI can be derived from a simple matrix of CI and FI as follows:

Table 8 Matrix for calculating Biodiversity Importance (BI) (table adapted from the Species Environmental Assessment Guideline, SANBI, 2020).

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

Finally, the Receptor Resilience for each habitat was evaluated following the criteria listed in Table 9. According to the Species Assessment Guidelines, Receptor resilience (RR) may defined as follows:

Receptor resilience (RR): "*The intrinsic capacity of the receptor to resist major damage from disturbance and/or to recover to its original state with limited or no human intervention.*"

Table 9 Receptor Resilience (RR) criteria (table adapted from the Species Environmental Assessment Guideline, SANBI, 2020).

Receptor Resilience (RR)	**Fulfilling Criteria**
Very high	Habitat that can recover rapidly (~ less than 5 years) to restore > 75%28 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.

Taken together, the Site Ecological Importance (SEI) was calculated for each habitat within the study area using the formula: SEI = BI + RR, and following the matrix outlined in Table 10. The interpretation of the development actions allowed for each SEI category are outlined in Table 11.

Table 10 Matrix for calculating Site Ecological Importance (SEI) (table adapted from the Species Environmental Assessment Guideline, SANBI, 2020).

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

Table 11 Guidelines for interpreting SEI in the context of the proposed development activities (table adapted from the Species Environmental Assessment Guideline, SANBI, 2020).

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.

10.2 SEI for mammal SCC habitats in the study area

The SEI results for mammal SCC habitats within the study area are given in Table 12 with the spatial representation for each habitat and its concomitant SEI category portrayed in Figure 22.

Given the confirmed presence of a large subpopulation of *C. duthieae* in the Non-indigenous forest and Non-perennial stream / Wetland habitats, along with the potential presence of *A. capensis* in the Non-perennial stream / Wetland habitat, the SEI of these habitats is retrieved as “High”, even though respectively existing in a transformed and non-pristine state. To this end, either avoidance mitigation is advocated, or minimisation mitigation in the case of low impact development activities with changes to project infrastructure design to limit the amount of habitat impacted. Even though offset mitigation may be required for high impact activities, this should not be considered in the case of the current project, given that the destruction of this population of *C. duthieae* may impact on its threat status (Section 9).

Because the remainder of the habitats on the site currently do not harbour any confirmed or possible subpopulations of mammal SCC, and furthermore do not present large tracts of suitable habitat for such species, these areas are retrieved as having a “Very low” SEI. Minimisation mitigation is therefore acceptable, allowing for development activities of medium to high impact without restoration activities being required (Table 10).

Table 12 Evaluation of SEI for mammal SCC habitats within the study area. BI = Biodiversity Importance, RR = Receptor Resilience.

Habitat type	Conservation Importance	Functional Integrity	Receptor Resilience	Site Ecological Importance
Non-indigenous forest	**High** - Confirmed presence of *C. duthieae* listed as "Vulnerable" under Criterion B.	**Low** - Several major current negative ecological impacts (this habitat consists mostly of alien and invasive vegetation with almost no remaining natural vegetation).	**Very low** - Although this habitat already exists in a degraded state (through the significant presence of alien and invasive vegetation), it does offer suitable habitat for a large subpopulation of *C. duthieae* through creating a suitable forest environment. As such, this subpopulation will be permanently destroyed if this habitat is developed.	High - BI = Medium; RR = Very low
Non-indigenous forest (open)	**Very low** - No suitable habitat for or potential presence of any mammal SCC.	**Low** - Several major current negative ecological impacts (this habitat consists mostly of alien and invasive vegetation with very little remaining natural vegetation).	**Very high** - Because this habitat already exists in a degraded state (through the significant presence of alien and invasive vegetation), it can only recover to this state.	Very low - BI = Very low; RR = Very High
Non-perennial stream / Wetland	**High** - Confirmed presence of *C. duthieae* listed as "Vulnerable" under Criterion B on the stream banks. Potential presence of *A. capensis*listed as "Near-Threatened" under Criterion A.	**Medium** - These aquatic habitats currently exist in a degraded landscape with some major impacts (a high incidence of alien and invasive vegetation) with a non-pristine water quality, but it is still adequate to support aquatic faunal components and a subpopulation of *C. duthieae* on the stream banks.	**Very low** - These aquatic habitats do not exist in a pristine state, but will be unable to recover fully from major disturbance, even after a long period (>15 years). Furthermore, the stream banks offer suitable habitat for *C. duthieae*. As such, this subpopulation will be permanently destroyed if this habitat is developed	High - BI = Medium; RR = Very low
Semi-intact Fynbos	**Very low** - No suitable habitat for or potential presence of any mammal SCC.	**Medium** - Medium (>5 ha but <20 ha) semi-intact area of a "Vulnerable" ecosystem type. Some major impacts (grazing by cattle and a low incidence of alien an invasive vegetation) with some signs of past disturbance (agriculture) and moderate rehabilitation potential.	**Low** - Although some signs of past (agricultural use) and current (grazing by cattle and a low incidence of alien an invasive vegetation) impacts are evident within this habitat, this habitat still retains much of its natural characteristics and flora diversity. As such, this habitat will be unlikely to recover fully after a relatively long period (>15 years).	Very low - BI = Very low; RR = Low
Degraded Fynbos	**Very low** - No suitable habitat for or potential presence of any mammal SCC.	**Low** - Several major current negative ecological impacts (a high incidence of alien and invasive vegetation with very little remaining natural vegetation).	**Very high** - Because this habitat already exists in a degraded state (through the significant presence of alien and invasive vegetation and very little remaining natural vegetation), it can only recover to this state.	Very low - BI = Very low; RR = Very high

Burnt	**Very low** - No suitable habitat for or potential presence of any mammal SCC.	**Low** - Several major current negative ecological impacts (this habitat has been burnt, but is unlikely to recover to its natural state, given on-going pressures from grazing by cattle).	**Medium** - This habitat has been burnt, but is unlikely to recover to its natural state (given on-going pressures from grazing by cattle). Even so, it may be able to recover slowly to its previous natural state (more than 10 years) if this disturbance is removed.	Very low - BI = Very low; RR = Medium
Fallow lands and old fields	**Very low** - No suitable habitat for or potential presence of any mammal SCC.	**Low** - Several major current negative ecological impacts (this habitat has been subjected to previous agriculture, and is currently used for grazing, and has very little remaining natural vegetation).	**Very high** - Because this habitat already exists in a transformed state (through previous agriculture and little remaining natural vegetation), it can only recover to this state.	Very low - BI = Very low; RR = Very high
Cleared/Grassland	**Very low** - No suitable habitat for or potential presence of any mammal SCC.	**Very low** - Several major current negative ecological impacts (no remaining natural vegetation).	Very high - Because this habitat already exists in a transformed state with no remaining natural vegetation, it can only recover to this state.	Very low - BI = Very low; RR = Very high

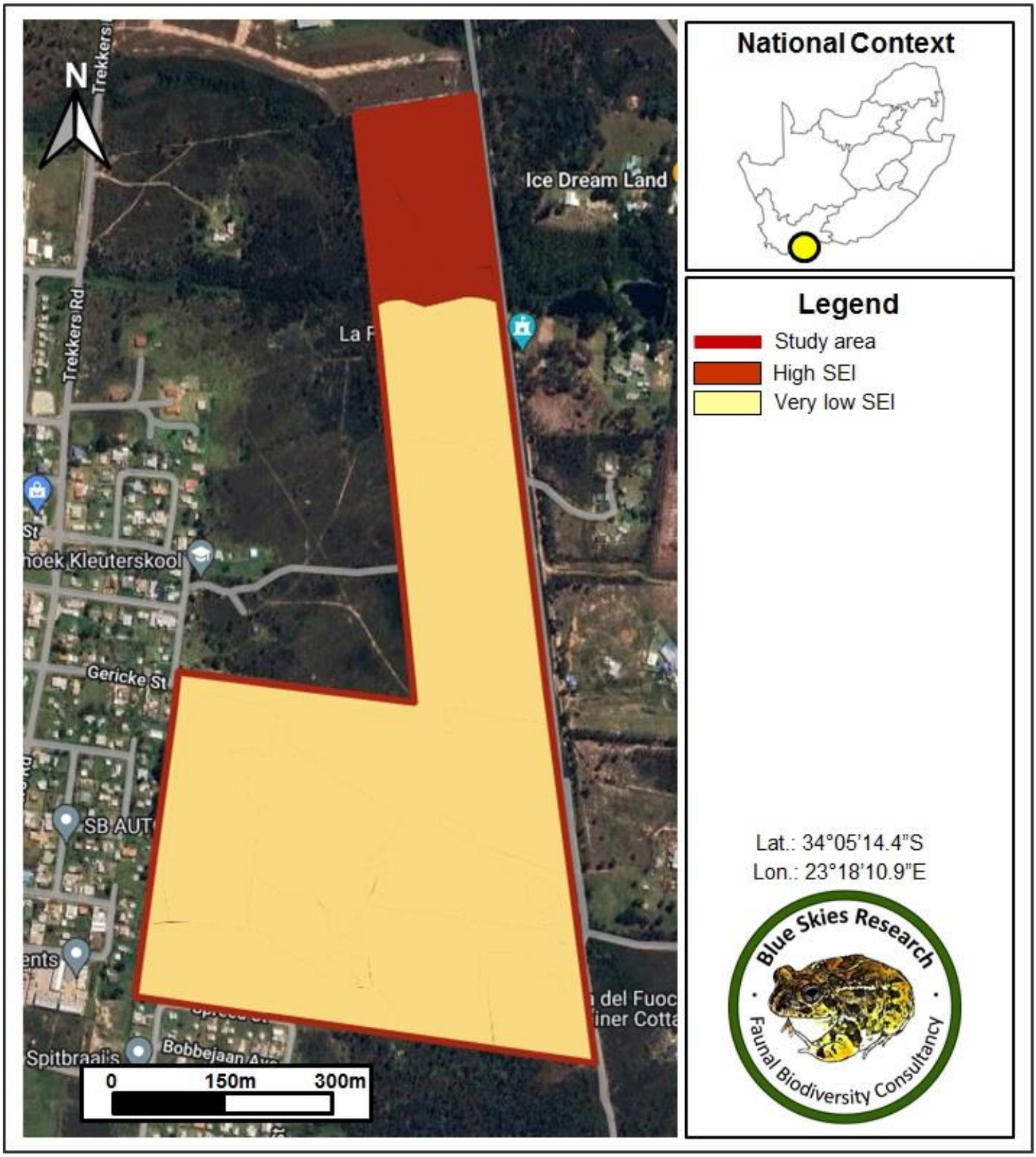


Figure 22 Spatial representation of the SEI of mammal SCC habitats within the study area.

10.3 SEI for avifaunal SCC habitats in the study area

The SEI results for avifaunal SCC habitats within the study area are given in Table 13 with the spatial representation for each habitat and its concomitant SEI category portrayed in Figure 23.

The Non-indigenous forest area on the site currently offers suitable habitat for *B. trizonatus* and *C. notata*, however given that this habitat is comprised of alien and invasive vegetation, it is retrieved as having a “Very low” SEI. Conversely, while the Non-perennial stream / Wetland habitat exists in a non-pristine state, its inability to recover from any major disturbance leads to a “High” SEI.

From an avifaunal SCC perspective therefore, the Non-perennial stream / Wetland habitat will require either avoidance mitigation, or minimisation mitigation in the case of low impact development activities. Offset mitigation may also be allowable for high impact activities. All other habitats on the site (including the Non-indigenous forest habitat) are retrieved as having a “Very low” SEI. Minimisation mitigation is therefore acceptable, allowing for development activities of medium to high impact without restoration activities being required (Table 10).

Table 13 Evaluation of SEI for avifaunal SCC habitats within the study area. BI = Biodiversity Importance, RR = Receptor Resilience.

Habitat type	Conservation Importance	Functional Integrity	Receptor Resilience	Site Ecological Importance
Non-indigenous forest	**High** - Potential presence of *B. trizonatus* listed as "Near-Threatened" under Criterion D and *C. notata* listed as "Near-Threatened" under Criterion C.	**Low** - Several major current negative ecological impacts (this habitat consists mostly of alien and invasive vegetation with almost no remaining natural vegetation).	**Very high** - Because this habitat already exists in a degraded state (through the significant presence of alien and invasive vegetation), it can only recover to this state.	Very low - BI = Medium; RR = Very high
Non-indigenous forest (open)	**Very low** - No suitable habitat for or potential presence of any avifaunal SCC.	**Low** - Several major current negative ecological impacts (this habitat consists mostly of alien and invasive vegetation with very little remaining natural vegetation).	**Very high** - Because this habitat already exists in a degraded state (through the significant presence of alien and invasive vegetation), it can only recover to this state.	Very low - BI = Very low; RR = Very High
Non-perennial stream / Wetland	**Very low** - No suitable habitat for or potential presence of any avifaunal SCC.	**Medium** - These aquatic habitats currently exist in a degraded landscape with some major impacts (a high incidence of alien an invasive vegetation) with a non-pristine water quality, but it is still adequate to support aquatic faunal components and a subpopulation of *C. duthieae* on the stream banks.	**Low** - These aquatic habitats do not exist in a pristine state, but will be unable to recover fully from major disturbance, even after a long period (>15 years).	High - BI = Medium; RR = Low
Semi-intact Fynbos	**Very low** - No suitable habitat for or potential presence of any avifaunal SCC.	**Medium** - Medium (>5 ha but <20 ha) semi-intact area of a "Vulnerable" ecosystem type. Some major impacts (grazing by cattle and a low incidence of alien an invasive vegetation) with some signs of past disturbance (agriculture) and moderate rehabilitation potential.	**Low** - Although some signs of past (agricultural use) and current (grazing by cattle and a low incidence of alien an invasive vegetation) impacts are evident within this habitat, this habitat still retains much of its natural characteristics and flora diversity. As such, this habitat will be unlikely to recover fully after a relatively long period (>15 years).	Very low - BI = Very low; RR = Low

Degraded Fynbos	**Very low** - No suitable habitat for or potential presence of any avifaunal SCC.	**Low** - Several major current negative ecological impacts (a high incidence of alien and invasive vegetation with very little remaining natural vegetation).	**Very high** - Because this habitat already exists in a degraded state (through the significant presence of alien and invasive vegetation and very little remaining natural vegetation), it can only recover to this state.	Very low - BI = Very low; RR = Very high
Burnt	**Very low** - No suitable habitat for or potential presence of any avifaunal SCC.	**Low** - Several major current negative ecological impacts (this habitat has been burnt, but is unlikely to recover to its natural state, given on-going pressures from grazing by cattle).	**Medium** - This habitat has been burnt, but is unlikely to recover to its natural state (given on-going pressures from grazing by cattle). Even so, it may be able to recover slowly to its previous natural state (more than 10 years) if this disturbance is removed.	Very low - BI = Very low; RR = Medium
Fallow lands and old fields	**Very low** - No suitable habitat for or potential presence of any avifaunal SCC.	**Low** - Several major current negative ecological impacts (this habitat has been subjected to previous agriculture, and is currently used for grazing, and has very little remaining natural vegetation).	**Very high** - Because this habitat already exists in a transformed state (through previous agriculture and little remaining natural vegetation), it can only recover to this state.	Very low - BI = Very low; RR = Very high
Cleared/Grassland	**Very low** - No suitable habitat for or potential presence of any avifaunal SCC.	**Very low** - Several major current negative ecological impacts (no remaining natural vegetation).	Very high - Because this habitat already exists in a transformed state with no remaining natural vegetation, it can only recover to this state.	Very low - BI = Very low; RR = Very high

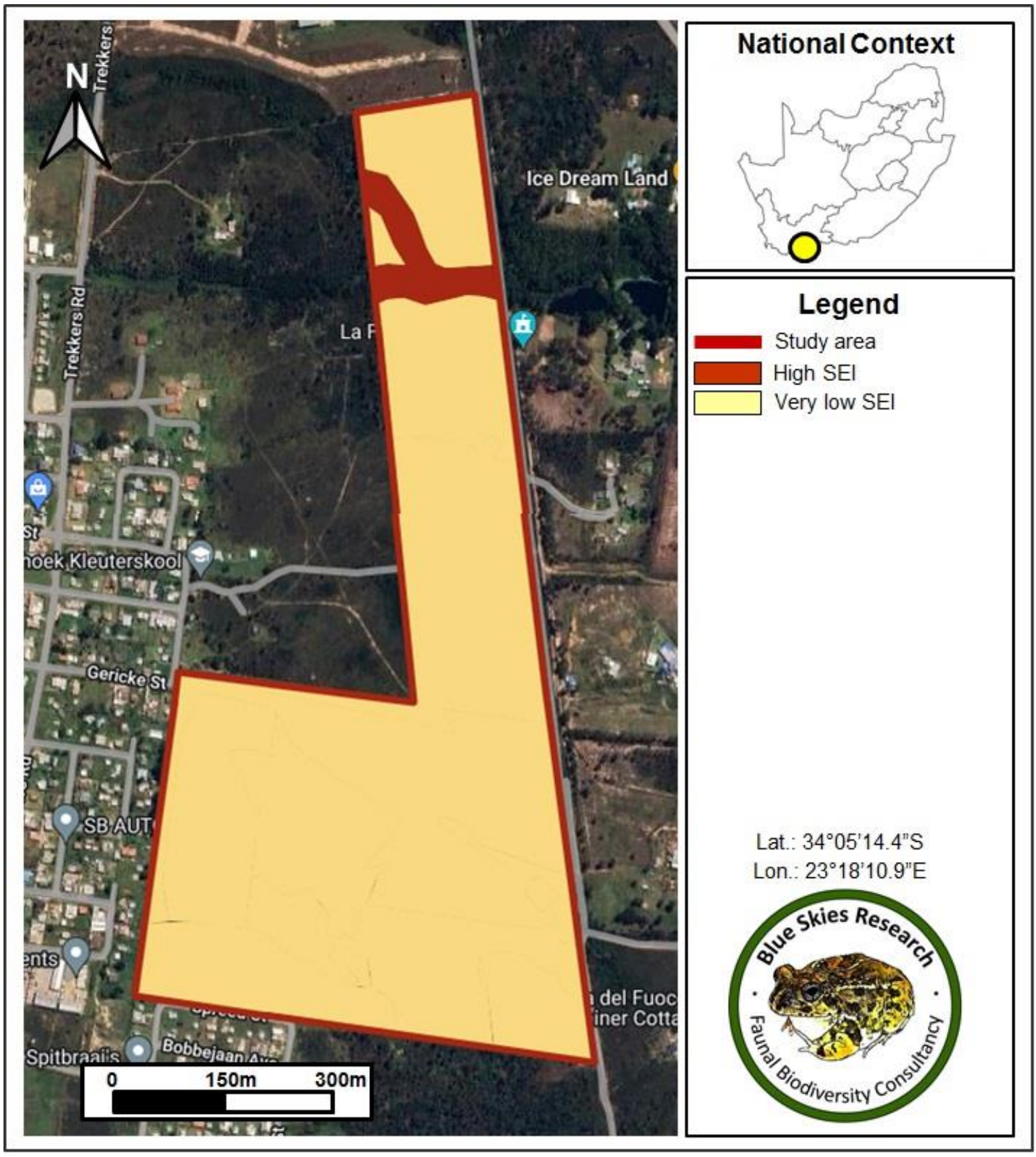


Figure 23 Spatial representation of the SEI of avifaunal SCC habitats within the study area.

10.4 Combined SEI for SCC habitats in the study area

The combined SEI results for SCC habitats within the study area are given in Table 14 with the spatial representation for each habitat and its concomitant SEI category portrayed in Figure 24.

Among the available faunal habitats, the Non-indigenous forest and Non-perennial stream / Wetland habitats are highly sensitive (especially given the confirmed presence of a large subpopulation of *C. duthieae*), and is retrieved as having a "High" SEI. To this end, avoidance mitigation is advocated in the case of the current development as the activities for this project will be of a high impact on the receiving environment (Section 11). Together with this, offset mitigation should not be considered, given that the destruction of the subpopulation of *C. duthieae* may impact on its threat status (Section 9).

The remainder of the habitats on the site are currently less sensitive from a faunal perspective and are retrieved as having a "Very low" SEI. Minimisation mitigation is therefore acceptable for these parts of the study area, allowing for development activities of medium to high impact without restoration activities being required (Table 10).

Table 14 Evaluation of SEI for SCC habitats within the study area.

Habitat type	Mammal SEI	Avifaunal SEI	Combined SEI	Explanation
Non-indigenous forest	High	Very low	High	Mammal SEI designated as High
Non-indigenous forest (open)	Very low	Very low	Very low	-
Non-perennial stream / Wetland	High	High	High	-
Semi-intact Fynbos	Very low	Very low	Very low	-
Degraded Fynbos	Very low	Very low	Very low	-
Burnt	Very low	Very low	Very low	-
Fallow lands and old fields	Very low	Very low	Very low	-
Cleared/Grassland	Very low	Very low	Very low	-

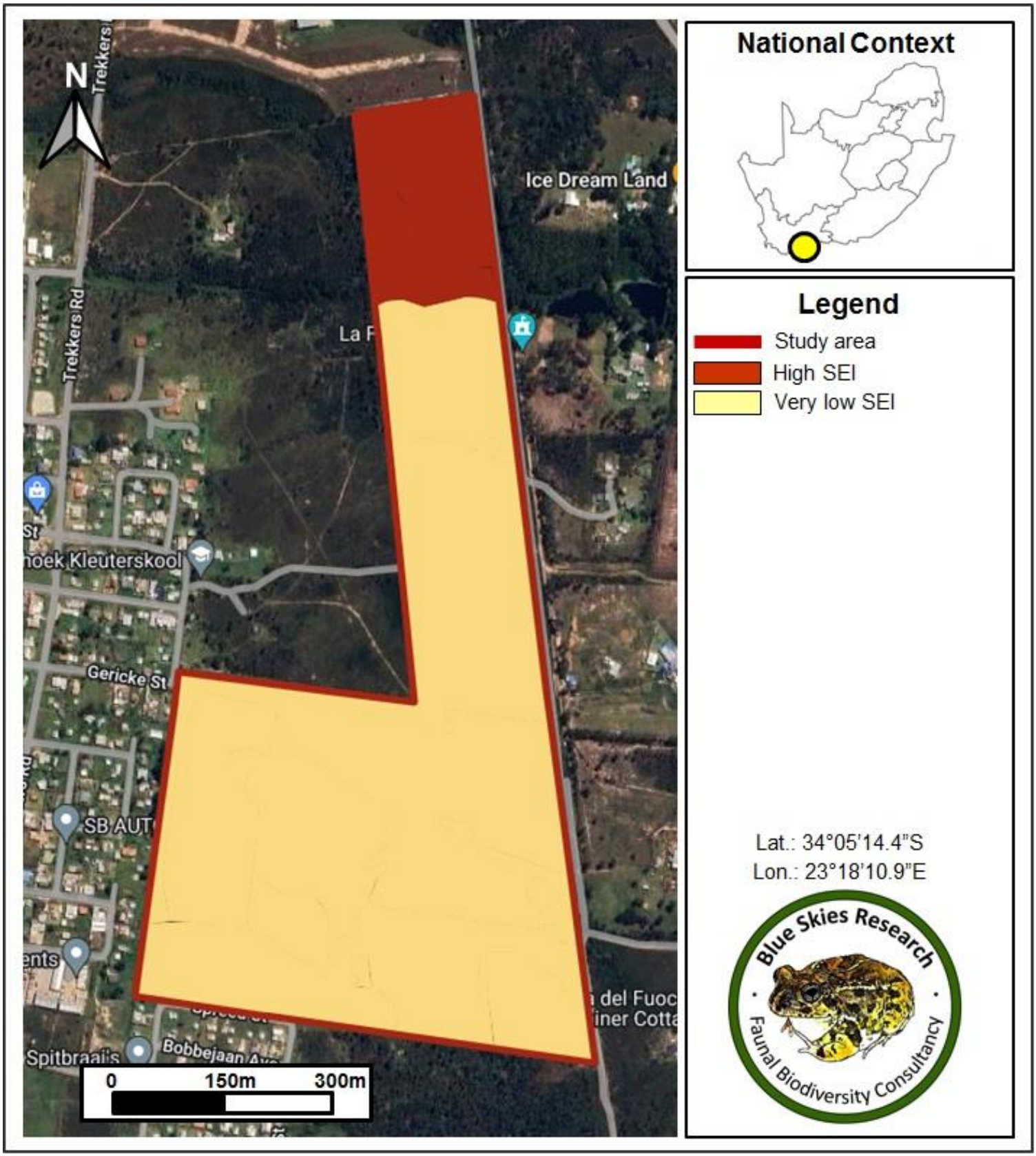


Figure 24 Spatial representation of the SEI of SCC habitats within the study area.

11. Current impacts, project-related impacts, mitigation measures and impact assessment

11.1 Current impacts

Current impacts within the study area include the following:

- The study area (especially Portion 7) is spatially proximate to a residential area (the adjacent Kranshoek suburb) from where daily noise and vibration is evident.
- A motor vehicle repair shop and junk yard is located in the north-eastern part of Portion 7, and vehicle traffic through the northern part of Portion 7 is evident on a daily basis.
- Noise and vibration from the motor vehicle repair shop and junk yard is also evident.
- Daily grazing by cattle through subsistence farming is evident in Portion 7.
- There is evidence of previous agriculture (fallow lands and old fields) in Portion 7, with some signs of semi-intact habitat structure, and a low incidence of alien and invasive vegetation.
- Open and cleared areas characterise large parts of Portion 7.
- Feral dog and domestic cat activity is evident in Portion 7 (i.e., which likely results in predation on the resident terrestrial fauna).
- A high incidence of alien and invasive vegetation with little remaining natural vegetation in is evident in Portion 8.
- Human foot traffic from the adjacent Kranshoek area is evident through both portions of the site.
- Noise and vibration from the dirt road directly adjacent and to the east of the both parts of the site is evident.
- Some signs of pollution (illegal waste dumping) is evident in both parts of the site.

Taken together, these impacts are not severe, but do contribute to an altered habitat structure on the site, which in turn influence the intactness of ecosystem dynamics here.

11.2 Anticipated project impacts

Planned development activities for the study area will include:

- Clearing of the vegetation,
- soil preparation,
- installation of roads and services, and
- construction of buildings and infrastructure.

Impacts from these activities during the construction phase will include:

- Destruction of habitat,
- direct mortality of fauna,
- vibration and noise (from machinery and people), and
- possible pollution of the surrounding area (outside of the project footprint).

During the operational phase, impacts from the new mixed-use housing development (i.e., edge effects) will include:

- Vibration and noise from vehicles and people,
- collision of fauna with vehicles on the newly constructed roads,
- possible pollution of the surrounding area through illegal waste dumping,
- human foot traffic through adjacent areas,
- predation on the resident fauna by domestic dogs and cats,
- illegal grazing through subsistence farming,
- uncontrolled burning of vegetation,
- possible poisoning of fauna, and
- illegal hunting.

Taken together, impacts during the operational phase may likely result in habitat degradation of remaining habitat areas adjacent to the development footprint.

11.3 Impact management actions and mitigation measures

Given the conservation importance of the SCC confirmed or possibly occurring on the site (Section 9), along with the “High” SEI retrieved for the habitats of these SCC (Section 10), it is advocated that any development planning should exclude these habitats (i.e., regard these as “No-Go” areas; Table 15). In addition, these habitats should be buffered by at least 27m to 30m where no development should be considered (Table 15). Offset mitigation should also not be considered as an option, given that the destruction of the subpopulation of *C. duthieae* may impact on its threat status (Section 9). Collectively, this will leave an area of between 4.6 and 4.7 hectares as a “No-Go” area, and renders 35.5 to 35.6 hectares as potentially developable (Figure 25).

In addition, certain impact management actions are suggested to reduce the direct and indirect impacts on the resident fauna and on habitats adjoining the receiving environment during both the construction and operational phases (Table 15). Importantly, it may be required that proper fencing be installed around the developed footprint so as to curb human and domestic pet access to the surrounding environment.

Table 15 Possible project impacts along with associated impact management actions.

Impact	Impact management action(s)
Destruction of habitats (construction phase)	The persistence of the majority of SCC confirmed or possibly occurring in the study area are threatened by direct impacts of habitat alteration, -fragmentation, -degradation and -loss and due to development and increased urbanization. As such, it is recommended that the **Non-indigenous forest** and **Non-perennial stream / Wetland habitats** (all habitats which are retrieved as "High" SEI) **be excluded from any development planning** (i.e., **avoidance mitigation**). Currently, these "No-Go" areas constitute the northern part of Portion 8 (Figure 34). Although the Species Environmental Assessment Guideline (SANBI, 2020) recommends a buffer distance of at least 200m from the edge of any population of SCC (as is the case with the current subpopulation of *C. duthieae* listed as "Vulnerable"), this buffer distance may be adapted based on the type of development and the intensity of associated impacts. Given that direct impacts from the current development of Community Zone 1 will be restricted to an area outside of, and **at least 27m to 30m** away from the subpopulation of *C. duthieae*, along with the fact that the planned development will reduce indirect impacts in the long term (i.e., the operational phase, see Subsection 11.4.2), **this buffer distance will be sufficient to reduce impacts of SCC confirmed or possibly on the site**. Should development proceed in the remaining developable areas of the site, footprints should be kept at a minimum so as not to impinge on adjacent habitats in the landscape (i.e., minimisation mitigation)
Direct mortality of fauna (construction phase)	Every effort should be made to save and **relocate any mammal, reptile, amphibian, bird, or invertebrate that cannot flee of its own accord**, encountered during site preparation (i.e., to avoid and minimise the direct mortality of faunal species). These animals should be **relocated to a suitable habitat area immediately outside the project footprint** (in the adjoining natural habitats), but under no circumstance to an area further away.
Vibration and noise (construction and operational phases)	Vibration and noise through machinery, vehicles and people is **unavoidable** during the construction and operational phases. As such, **no mitigation measures are suggested** to reduce this impact during the construction or operational phases.
Pollution of the surrounding area (construction and operational phases)	It is recommended that pollution of the development footprint, as well as any areas adjacent to the footprint, be **monitored and** avoided during the construction phase. During the **operational phase** it is recommended that the newly **developed residential area be fenced off** so as to curb further pollution through illegal waste dumping in the surrounding landscape.
Habitat degradation of, and threats to fauna and SCC within areas surrounding the project footprint (operational phase)	Several edge effects are expected during the operational phase, emanating from the developed part of the site. These edge effects include vibration and noise from vehicles and people, collision of fauna with vehicles on the newly constructed roads, human foot traffic, predation by domestic pets (dogs and cats), poisoning of fauna, illegal grazing through subsistence farming, uncontrolled burning of vegetation and illegal hunting within areas adjacent to the development footprint. it is therefore recommended that the **newly developed residential area be fenced off with adequate mesh wiring** (of an adequate specification to also exclude any domestic pets from the adjacent landscape) so as to reduce access to the high sensitivity areas outside of the footprint and reduce indirect impacts on the surrounding landscape

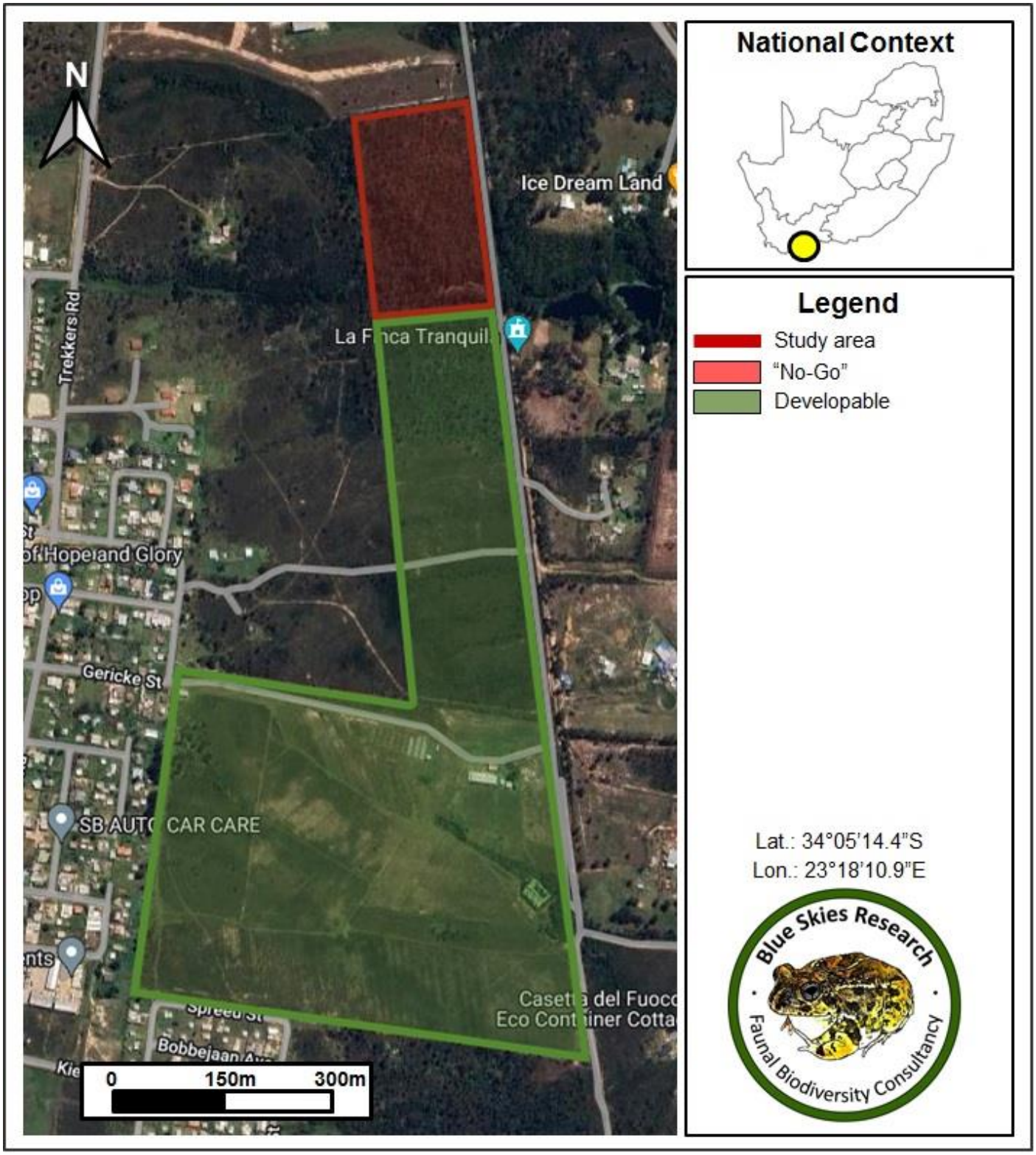


Figure 25 "Constraints and Opportunities" map of the study area landscape showing areas where avoidance mitigation is advocated (i.e., "No-Go" areas based on the presence of suitable habitat for the recovered and possibly occurring SCC, inclusive of a 27m to 30m buffer) and areas which are of a lower sensitivity and are therefore suitable for potential development.

11.4 Development alternatives

11.4.1 Alternative 1

Alternative 1 constitutes the initial development layout which was assessed during the scoping phase of the current assessment. This alternative considers that the entire study area (40.2 hectares) will be developed, inclusive of the sensitive Non-indigenous forest and Non-perennial stream / Wetland habitats (Figure 26). This alternative further considers that none of the recommended impact management actions (Table 15) are implemented to reduce direct and indirect impacts on the resident fauna.

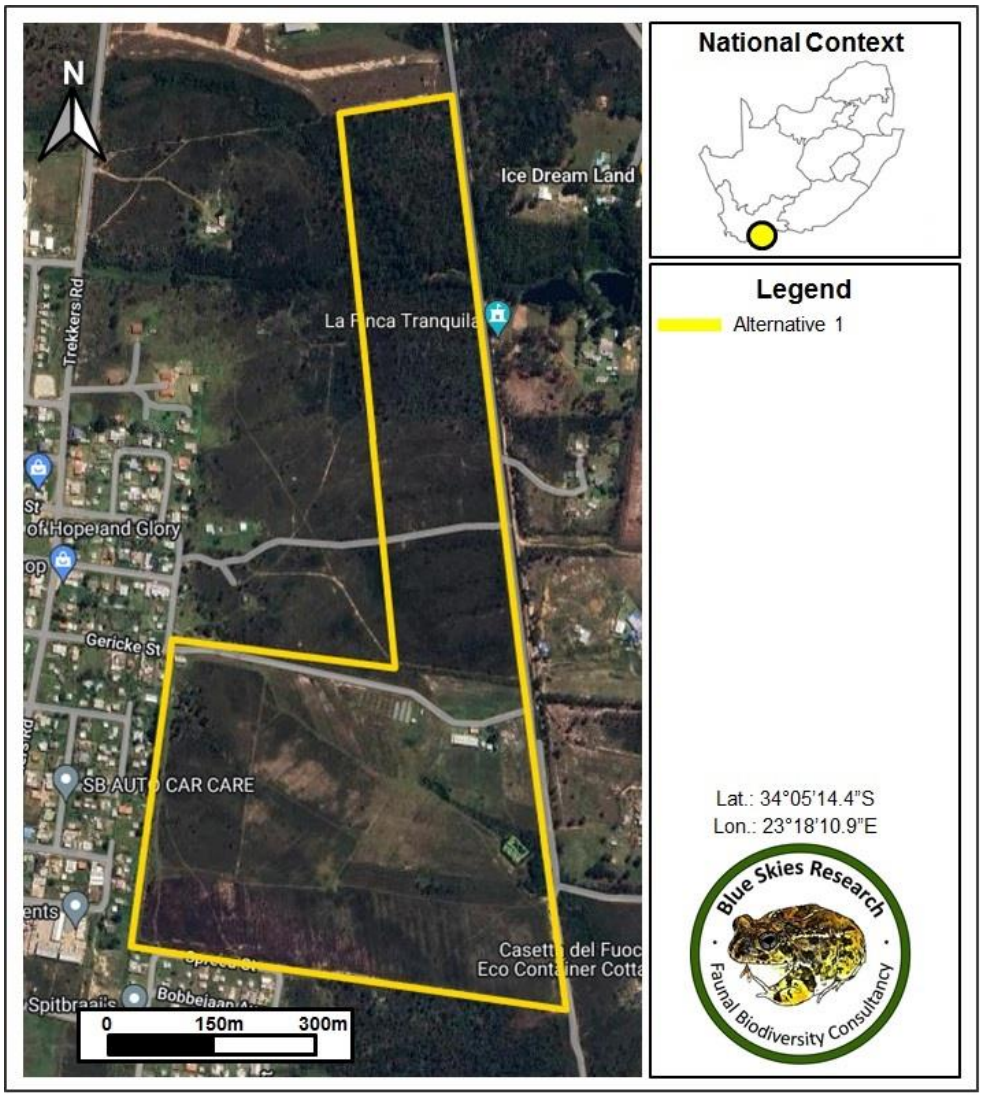


Figure 26 Spatial extent of development under Alternative 1.

11.4.2 Alternative 2

Alternative 2 represents a development layout which was selected subsequent to the scoping phase, and following the inputs from this report, as well as those from the botanical and freshwater specialists. This alternative considers that the Non-indigenous forest and Non-perennial stream / Wetland habitats in the north of the study area (in Portion 8) will be excluded and buffered by 30m from any development (Figure 27), leaving an area of approximately 4.7 hectares as “No-Go” (to be be zoned as an **Open Space Zone 1**) and rendering an area of 35.5 hectares for development. This alternative will entail the development of a Community Zone 1 consisting of a Primary and Seconday School with sports fields (soccer/rugby fields) around 30m from the Non-perennial stream / Wetland habitat. This buffer zone from the subpopulation of *C. duthieae* will be sufficient, given several considerations:

- Direct impacts from development of the Community Zone will be restricted to an area outside of, and at least 30m away from the subpopulation of *C. duthieae*.
- The Community Zone will be completely fenced off from the surrounding landscape which should reduce indirect impacts (collision of fauna with vehicles, human foot traffic, predation by domestic pets, poisoning of fauna, further pollution through illegal waste dumping) in the undeveloped northern part of the site.
- The placement of a large sports field 30m to 50m from the edge of the *C. duthieae* subpopulation will be of a lower impact compared to a housing development and will only lead to irregular noise and vibration during the day (during the operational phase), which should not overly impact on the species as it is predominantly nocturnal, being active and feeding during the night time.
- Because *C. duthieae* does utilize urban lawns (J.H. Visser, personal observation), the presence of suitable moist microhabitats which harbour a suitable invertebrate prey base such is found on sports fields may potentially add novel habitat for this species, allowing the subpopulation to propagate into the area further south which is not currently possible given the arid nature of habitats here.

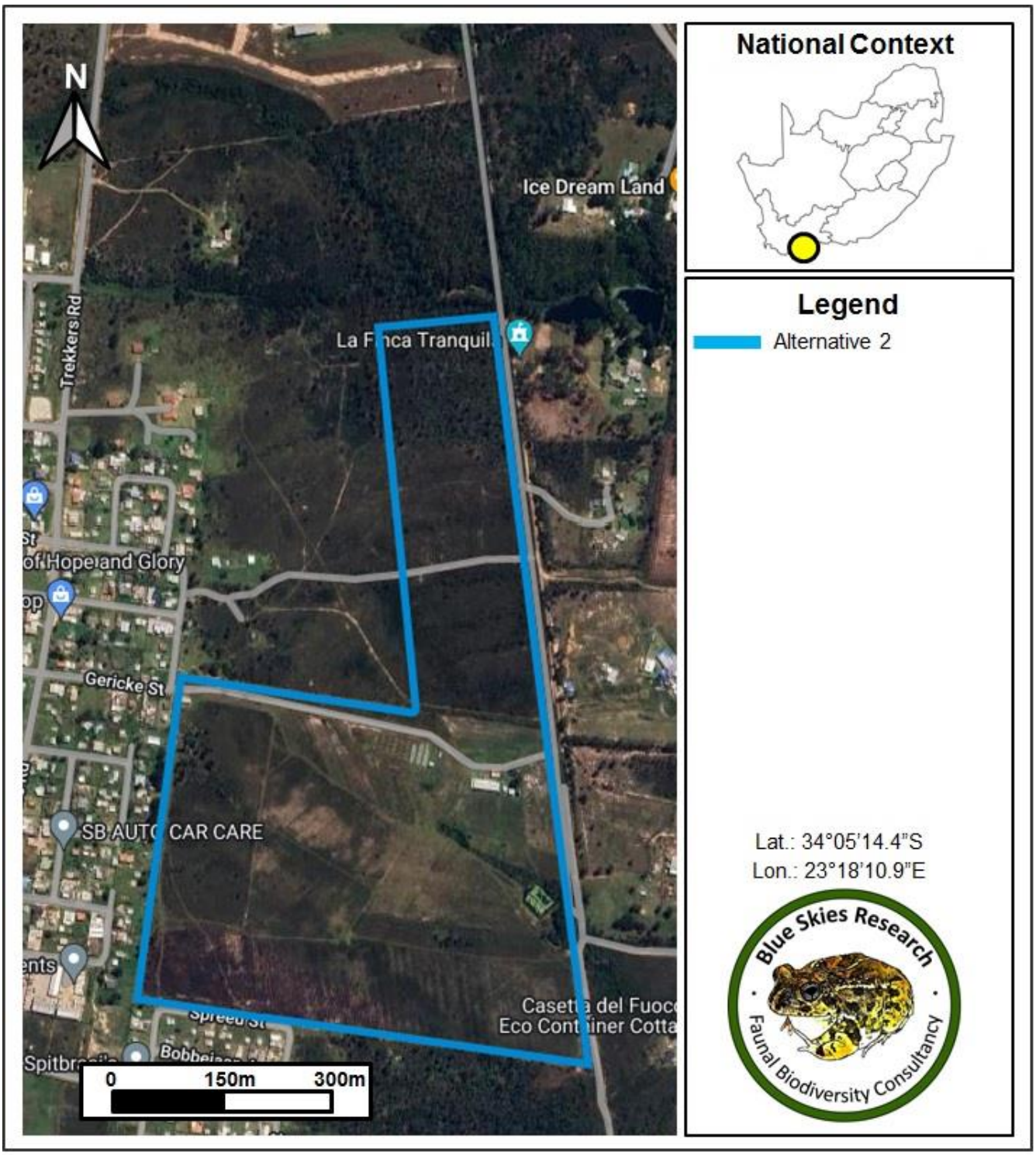


Figure 27 Spatial extent of development under Alternative 2.

11.4.3 Alternative 3

Alternative 3 is qualitvely similar to Alternative 2, and also considers that the Non-indigenous forest and Non-perennial stream / Wetland habitats in the north of the study area (in Portion 8) will be excluded, but buffered by 27m from any development (Figure 28), leaving an area of approximately 4.6 hectares as “No-Go” (this area is to be zoned as **Open Space Zone 2** in the **north** and **Open Space Zone 1** in the **south**), and rendering an area of 35.6 hectares for development. This alternative will also entail the development of a Community Zone 1 consisting of a Primary and Seconday School with sports fields (soccer/rugby fields) in the northern limit of the site, albeit around 27m from the Non-perennial stream / Wetland habitat. Like with Alternative 2, this buffer zone from the subpopulation of *C. duthieae* will also be sufficient, given several considerations:

- Direct impacts from development of the Community Zone will be restricted to an area outside of, and at least 27m away from the subpopulation of *C. duthieae*.
- The Community Zone will be completely fenced off from the surrounding landscape which should reduce indirect impacts (collision of fauna with vehicles, human foot traffic, predation by domestic pets, poisoning of fauna, further pollution through illegal waste dumping) in the undeveloped northern part of the site.
- The placement of a large sports field 27m to 47m from the edge of the *C. duthieae* subpopulation will be of a lower impact compared to a housing development and will only lead to irregular noise and vibration during the day (during the operational phase), which should not overly impact on the species as it is predominantly nocturnal, being active and feeding during the night time.

Because *C. duthieae* does utilize urban lawns (J.H. Visser, personal observation), the presence of suitable moist microhabitats which harbour a suitable invertebrate prey base such is found on sports fields may potentially add novel habitat for this species, allowing the subpopulation to propagate into the area further south which is not currently possible given the arid nature of habitats here.

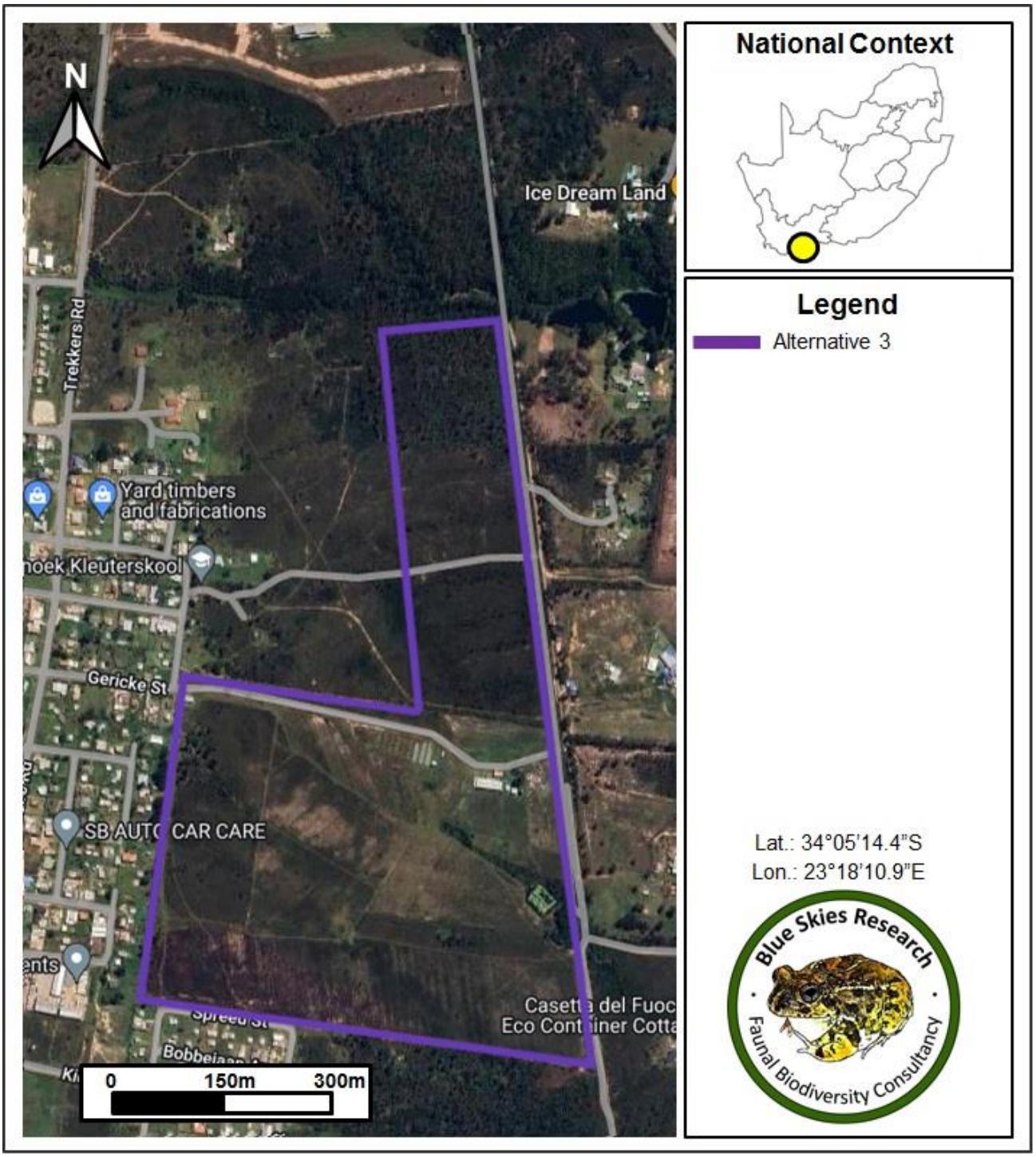


Figure 28 Spatial extent of development under Alternative 3.

11.4.4 “No-Go” alternative

This alternative considers that no development will take place. Under this alternative, all current impacts will persist (Subsection 11.1).

11.5 Impact assessment

11.5.1 Methodology

The following impact assessment methodology was used to investigate the impacts of the different development alternatives on the receiving environment. Firstly, the intensity, duration and extent of impacts on the receiving environment are evaluated based on the defining criteria outlined in Table 16 (Part A). Collectively, these criteria are considered a function of the consequence of impacts on the receiving environment (Table 17, Part B). This consequence of the impacts, together with the probability that the impact will occur, is then used to determine the significance of the impacts on the receiving environment (Table 18, Part C), which may in turn be used to inform the appropriate decisions during the EA process (Table 19, Part D).

Table 16 Definitions and criteria for defining the intensity, duration and extent of impacts on the receiving environment. VH = Very high, H = High, M= Medium, L= Low and VL= Very low and + denotes a positive impact.

PART A: DEFINITIONS AND CRITERIA		
Definition of SIGNIFICANCE		**Significance = consequence x probability**
Definition of CONSEQUENCE		**Consequence is a function of intensity, spatial extent and duration**
Criteria for ranking of the INTENSITY of environmental impacts	**VH**	Severe change, disturbance or degradation. Associated with severe consequences. May result in severe illness, injury or death. Targets, limits and thresholds of concern continually exceeded. Substantial intervention will be required. Vigorous/widespread community mobilisation against project can be expected. May result in legal action if impact occurs.
	H	Prominent change, disturbance or degradation. Associated with real and substantial consequences. May result in illness or injury. Targets, limits and thresholds of concern regularly exceeded. Will definitely require intervention. Threats of community action. Regular complaints can be expected when the impact takes place.
	M	Moderate change, disturbance or discomfort. Associated with real but not substantial consequences. Targets, limits and thresholds of concern may occasionally be exceeded. Likely to require some intervention. Occasional complaints can be expected.
	L	Minor (Slight) change, disturbance or nuisance. Associated with minor consequences or deterioration. Targets, limits and thresholds of concern rarely exceeded. Require only minor interventions or clean-up actions. Sporadic complaints could be expected.

	VL	Negligible change, disturbance or nuisance. Associated with very minor consequences or deterioration. Targets, limits and thresholds of concern never exceeded. No interventions or clean-up actions required. No complaints anticipated.
	VL+	Negligible change or improvement. Almost no benefits. Change not measurable/will remain in the current range.
	L+	Minor change or improvement. Minor benefits. Change not measurable/will remain in the current range. Few people will experience benefits.
	M+	Moderate change or improvement. Real but not substantial benefits. Will be within or marginally better than the current conditions. Small number of people will experience benefits.
	H+	Prominent change or improvement. Real and substantial benefits. Will be better than current conditions. Many people will experience benefits. General community support.
	VH+	Substantial, large-scale change or improvement. Considerable and widespread benefit. Will be much better than the current conditions. Favourable publicity and/or widespread support expected.
Criteria for ranking the DURATION of impacts	**VL**	Very short, always less than a year. Quickly reversible
	L	Short-term, occurs for more than 1 but less than 5 years. Reversible over time.
	M	Medium-term, 5 to 20 years.
	H	Long term, between 20 and 35 years. (Likely to cease at the end of the operational life of the activity)
	VH	Very long, permanent, +20 years (Irreversible. Beyond closure)
Criteria for ranking the EXTENT of impacts	**VL**	A part of the site/property.
	L	Whole site.
	M	Beyond the site boundary, affecting immediate neighbours
	H	Local area, extending far beyond site boundary.
	VH	Regional/National

Table 17 Matrices for determining the consequence of environmental impacts on the receiving environment. VH = Very high, H = High, M= Medium, L= Low and VL= Very low.

PART B: DETERMINING CONSEQUENCE							
			EXTENT				
			A part of the site/property	Whole site	Beyond the site, affecting neighbours	Local area, extending far beyond site.	Regional/ National
			VL	**L**	**M**	**H**	**VH**
INTENSITY = VL							
DURATION	Very long	**VH**	**Low**	**Low**	**Medium**	**Medium**	**High**
	Long term	**H**	**Low**	**Low**	**Low**	**Medium**	**Medium**
	Medium term	**M**	**Very Low**	**Low**	**Low**	**Low**	**Medium**

	Short term	L	Very low	Very Low	Low	Low	Low
	Very short	VL	Very low	Very Low	Very Low	Low	Low
INTENSITY = L							
DURATION	Very long	VH	Medium	Medium	Medium	High	High
	Long term	H	Low	Medium	Medium	Medium	High
	Medium term	M	Low	Low	Medium	Medium	Medium
	Short term	L	Low	Low	Low	Medium	Medium
	Very short	VL	Very low	Low	Low	Low	Medium
INTENSITY = M							
DURATION	Very long	VH	Medium	High	High	High	Very High
	Long term	H	Medium	Medium	Medium	High	High
	Medium term	M	Medium	Medium	Medium	High	High
	Short term	L	Low	Medium	Medium	Medium	High
	Very short	VL	Low	Low	Low	Medium	Medium
INTENSITY = H							
DURATION	Very long	VH	High	High	High	Very High	Very High
	Long term	H	Medium	High	High	High	Very High
	Medium term	M	Medium	Medium	High	High	High
	Short term	L	Medium	Medium	Medium	High	High
	Very short	VL	Low	Medium	Medium	Medium	High
INTENSITY = VH							
DURATION	Very long	VH	High	High	Very High	Very High	Very High
	Long term	H	High	High	High	Very High	Very High
	Medium term	M	Medium	High	High	High	Very High
	Short term	L	Medium	Medium	High	High	High
	Very short	VL	Low	Medium	Medium	High	High
			VL	**L**	**M**	**H**	**VH**
			A part of the site/property	Whole site	Beyond the site, affecting neighbours	Local area, extending far beyond site.	Regional/ National
			EXTENT				

Table 18 Matrix for determining the significance of environmental impacts on the receiving environment. VH = Very high, H = High, M= Medium, L= Low and VL= Very low.

PART C: DETERMINING SIGNIFICANCE							
PROBABILITY (of exposure to impacts)	Definite/ Continuous	**VH**	**Very Low**	**Low**	**Medium**	**High**	**Very High**
	Probable	**H**	**Very Low**	**Low**	**Medium**	**High**	**Very High**
	Possible/ frequent	**M**	**Very Low**	**Very Low**	**Low**	**Medium**	**High**
	Conceivable	**L**	**Insignificant**	**Very Low**	**Low**	**Medium**	**High**
	Unlikely/ improbable	**VL**	**Insignificant**	**Insignificant**	**Very Low**	**Low**	**Medium**
			VL	**L**	**M**	**H**	**VH**
			CONSEQUENCE				

Table 19 Interpretation of the significance of environmental impacts on the receiving environment.

PART D: INTERPRETATION OF SIGNIFICANCE	
Significance	**Decision guideline**
Very High	Potential fatal flaw unless mitigated to lower significance.
High	It must have an influence on the decision. Substantial mitigation will be required.
Medium	It should have an influence on the decision. Mitigation will be required.
Low	Unlikely that it will have a real influence on the decision. Limited mitigation is likely to be required.
Very Low	It will not have an influence on the decision. Does not require any mitigation
Insignificant	Inconsequential, not requiring any consideration.

11.5.2 Impact assessment for the development alternatives

The impact assessment for the receiving environment in the current study was performed for the three development alternatives (Alternatives 1, 2 and 3) considering both the construction and operational phases of the development, and was contrasted against the “No-Go” alternative (Table 20). Development under Alternative 1 will result in the destruction of the large subpopulation of *C. duthieae* in the northern part of the site, along with the destruction of a significant proportion of the species’ global habitat. To this end, development under Alternative 1 will likely result in a potential fatal flaw during the construction phase, unless mitigated to lower significance. Given that newly developed area under Alternative 1 will also bring similar indirect impacts (i.e., edge effects; Subsection 11.2) into this part of the landscape where other subpopulations of SCC may persist in the adjoining areas, it is expected that this should have and an influence on the decision and mitigation will be required to curb these impacts.

Conversely, development under either Alternatives 2 or 3 will restrict activities to an area of “Very low” SEI, and will comprise a completely fenced off Community Zone consisting of schools and with a sports field between 27m and 50m from the edge of the *C. duthieae* subpopulation. To this end, impacts during the construction and operational phases are expected to be of a lower intensity and lower frequency when compared to a housing development, and offers an acceptable compromise from development planning to ensure persistence of the northern SCC habitats and subpopulations. Development under these alternatives will therefore not have an influence on the decision.

Should the “No-Go” alternative be considered, impacts will remain similar to what is the case currently (Subsection 11.1), and the site will continue to harbour altered habitats and semi-intact ecosystem dynamics. Taking this into account, along with the need to balance environmental outcomes with the need for housing from a municipal perspective, Alternatives 2 and 3 offer sustainable development options which should not drastically affect critical habitats or species from a conservation perspective.

Table 20 Impact assessment of the three development alternatives (considering both the construction and operational phases of the project), contrasted against the “No-Go” alternative.

	Alternative 1		Alternative 2		Alternative 3		"No-Go" Alternative
	Construction phase	**Operational phase**	**Construction phase**	**Operational phase**	**Construction phase**	**Operational phase**	
Extent	**Very high** - Given the confirmed presence of *C. duthieae* on the site, along with the fact that the on-site habitats for this species represent a significant proportion of the species' AOO, the destruction of this habitat and the resident subpopulation may impinge on the threat status of this species at a national level.	**Medium** - Once transformed into a newly developed urban area, impacts from edge effects (vibration and noise from vehicles and people, collision of fauna with vehicles on the newly constructed roads, human foot traffic, predation by domestic pets, poisoning of fauna, illegal grazing through subsistence farming, uncontrolled burning of vegetation and illegal hunting; Subsection 11.2) may affect remaining habitats adjacent to the development footprint	**Low** - Because the habitats of "High" SEI (i.e., the habitats harbouring and potentially harbouring SCC within the study area) will be excluded under this alternative, all impacts during the construction phase should be restricted to a part of the site retrieved as "Very low" SEI. Even so, development under this alternative will be in an area around 30m from the edge of the *C. duthieae* subpopulation, with noise and vibration possibly impacting on this species over a relatively short period during construction (between 1 to 5 years).	**Low** - Because the Community Zone and associated northern sports field is located around 30m to 50m from the edge of the *C. duthieae* subpopulation, edge effects will be of a lower intensity compared to a housing development, and irregular noise and vibration from this area are not likely to severely impact on this predominantly nocturnal species and cause extinction or compromising of this subpopulation. Even so, these impacts may cause disturbance over the entire site.	**Low** - Because the habitats of "High" SEI (i.e., the habitats harbouring and potentially harbouring SCC within the study area) will be excluded under this alternative, all impacts during the construction phase should be restricted to a part of the site retrieved as "Very low" SEI. Even so, development under this alternative will be in an area around 27m from the edge of the *C. duthieae* subpopulation, with noise and vibration possibly impacting on this species over a relatively short period during construction (between 1 to 5 years).	**Low** - Because the Community Zone and associated northern sports field is located around 27m to 47m from the edge of the *C. duthieae* subpopulation, edge effects will be of a lower intensity compared to a housing development, and irregular noise and vibration from this area are not likely to severely impact on this predominantly nocturnal species and cause extinction or compromising of this subpopulation. Even so, these impacts may cause disturbance over the entire site.	**Low** - Impacts will remain similar to what is the case currently (Subsection 11.1), and will continue to influence habitat integrity over the entire site.
Duration	**Very high** - Should the confirmed subpopulation of *C. duthieae* along with its habitat on the site be destroyed, this may have a permanent and irreversible impact on the persistence and threat status of this species.	**Very high** - Once transformed into a newly developed urban area, impacts from edge effects (Subsection 11.2) will be a permanent feature in the study area landscape, and will also bring these impacts closer to remaining habitats and SCC subpopulations adjacent to the development footprint.	**Low** - Impacts will be restricted to a part of the site retrieved as "Very low" SEI, and will persist for the duration of the construction phase (likely between 1 to 5 years).	**Low** - Although impacts will be restricted to a part of the site retrieved as "Very low" SEI, the placement of the Community Zone 30m to 50m from the edge of the *C. duthieae* subpopulation will lead to irregular daily noise and vibration over a short period (less than a year).	**Low** - Impacts will be restricted to a part of the site retrieved as "Very low" SEI, and will persist for the duration of the construction phase (likely between 1 to 5 years).	**Low** - Although impacts will be restricted to a part of the site retrieved as "Very low" SEI, the placement of the Community Zone 27m to 47m from the edge of the *C. duthieae* subpopulation will lead to irregular daily noise and vibration over a short period (less than a year).	**Low** - Impacts will remain similar to what is the case currently (Subsection 11.1), but are currently not severe and should persist for a short term (between 1 to 5 years).

Intensity	**Very high** - Should the confirmed subpopulation of *C. duthieae* along with its habitat on the site be destroyed, this will result in severe change, disturbance and degradation to the persistence and threat status of this species.	**High** - Given permanent human settlement in the newly developed urban area, this will be associated with prominent change, disturbance and degradation (real and substantial consequences), as this will bring edge effects to a closer proximity to habitats and SCC subpopulations remaining in the adjacent landscape..	**Medium** - Even though impacts will be restricted to a part of the site retrieved as "Very low" SEI, this will lead to the destruction of the semi-intact Outeniqua Sandstone Fynbos vegetation which is currently classified as "Least Concern", but represents a "Vulnerable" ecosystem. This habitat on the site is, however, subjected to on-going daily impacts. Furthermore, development under this alternative will be in an area around 30m from the edge of the *C. duthieae* subpopulation, with noise and vibration possibly impacting on this species, albeit this will not lead to the extinction or compromising of this subpopulation. To this end, direct impacts under this development alternative will result in moderate change and disturbance associated with real but not substantial consequences.	**Low** - Because the Community Zone will be completely fenced off from the surrounding landscape, this should reduce indirect impacts (collision of fauna with vehicles, human foot traffic, predation by domestic pets, poisoning of fauna and further pollution through illegal waste dumping) in the undeveloped northern part of the site. Furthermore, the placement of a large sports field 30m to 50m from the edge of the *C. duthieae* subpopulation will be of a lower impact compared to a housing development and will only lead to irregular noise and vibration during the day, which is not likely to severely impact on this species as it is predominantly nocturnal, being active and feeding during the night time. Because *C. duthieae* also utilizes urban lawns, the presence of suitable moist microhabitats which harbour a suitable invertebrate prey base such is found on sports fields may potentially add novel habitat for this species,	**Medium** - Even though impacts will be restricted to a part of the site retrieved as "Very low" SEI, this will lead to the destruction of the semi-intact Outeniqua Sandstone Fynbos vegetation which is currently classified as "Least Concern", but represents a "Vulnerable" ecosystem. This habitat on the site is, however, subjected to on-going daily impacts. Furthermore, development under this alternative will be in an area around 27m from the edge of the *C. duthieae* subpopulation, with noise and vibration possibly impacting on this species, albeit this will not lead to the extinction or compromising of this subpopulation. To this end, direct impacts under this development alternative will result in moderate change and disturbance associated with real but not substantial consequences.	**Low** - Because the Community Zone will be completely fenced off from the surrounding landscape, this should reduce indirect impacts (collision of fauna with vehicles, human foot traffic, predation by domestic pets, poisoning of fauna and further pollution through illegal waste dumping) in the undeveloped northern part of the site. Furthermore, the placement of a large sports field 27m to 47m from the edge of the *C. duthieae* subpopulation will be of a lower impact compared to a housing development and will only lead to irregular noise and vibration during the day, which is not likely to severely impact on this species as it is predominantly nocturnal, being active and feeding during the night time. Because *C. duthieae* also utilizes urban lawns, the presence of suitable moist microhabitats which harbour a suitable invertebrate prey base such is found on sports fields may potentially add novel habitat for this species,	**Low** - Impacts will remain similar to what is the case currently (Subsection 11.1), but are currently not severe and will lead to further minor change, disturbance or nuisance to the study area, associated with minor consequences or deterioration.
Consequence	**Very high**	**High**	**Medium**	**Low**	**Medium**	**Low**	**Low**
Probability	**Very high** - Definite destruction of the confirmed subpopulation of *C. duthieae* along with its habitat on the site.	**Medium** - Possible and frequent impacts on habitats adjoining the newly developed urban area.	**Low** - Conceivable impacts on the fauna within and surrounding the development footprint.	**Low** - Conceivable impacts on the habitats surrounding the development footprint.	**Low** - Conceivable impacts on the fauna within and surrounding the development footprint.	**Low** - Conceivable impacts on the habitats surrounding the development footprint.	**Low** - Conceivable impacts on the habitats in the study area.
Significance	**Very high**	**Medium**	**Low**	**Very low**	**Low**	**Very low**	**Very low**
Interpretation of significance	Potential fatal flaw unless mitigated to lower significance.	It should have an influence on the decision. Mitigation will be required.	Unlikely that it will have a real influence on the decision. Limited mitigation is likely to be required.	It will not have an influence on the decision. Does not require any mitigation.	Unlikely that it will have a real influence on the decision. Limited mitigation is likely to be required.	It will not have an influence on the decision. Does not require any mitigation.	It will not have an influence on the decision. Does not require any mitigation.

12. Conclusion

12.1 Listed sensitivity in the DFFE Screening Tool Report

The results from this report confirm the “High” site sensitivity for the northern section of Portion 8, as identified in the DFFE Screening Tool Report (Figure 1, Section 3). This follows from the confirmed occurrence of a large subpopulation of *C. duthieae* - one of the mammal SCC listed in the Screening Tool Report (Table 1). Furthermore, habitats here may harbour potential subpopulations of three further (one mammal and two avifaunal) SCC (all of which were recovered in the desktop assessment, Section 8). As such, the sensitivity of this part of the site is considered to be “Very high”, confirming the requirement for this Impact Assessment.

12.2 Overlap with Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs)

The site currently intersect with a small portion of an aquatic Ecological Support Area (ESA) in the northern section of Portion 8, with a small section in Portion 7 corresponding to a degraded ESA, owing to the presence of a degraded watercourse (Subsection 4.6). Furthermore, the areas surrounding the aquatic ESA in the northern section of Portion 8 is designated as Other Natural Areas (ONAs).

Following the ground-truthing phase however, it was established that the areas designated as an aquatic ESA and ONAs in the north of Portion 8 exist in a secondary state, but harbour a large subpopulation of the “Vulnerable” *C. duthieae* (Sections 8 to 11). To this end, this part of the site should be regarded as a degraded CBA, defined as: “*Areas in a degraded or secondary condition that are required to meet biodiversity targets, for species, ecosystems or ecological processes and infrastructure*”. To this end, the management objective for a CBA2 is to “*Maintain in a natural or near-natural state, with no further loss of habitat. Degraded areas should be rehabilitated. Only low-impact, biodiversity-sensitive land-uses are appropriate.*”

To this end, exclusion of the northern part of Portion 8 is also supported from a broader terrestrial biodiversity perspective. Even so, rehabilitation of this area would entail that the alien and invasive trees which currently characterise the Non-indigenous forest be removed. In the case of the current study, this is not advisable as these trees create the moist understory, leaf litter and loamy soils preferred by *C. duthieae*. It is therefore recommended that these alien and invasive trees be kept in this part of the site, however they may be removed in the open Non-indigenous forest habitat to the south of the Non-perennial stream / Wetland habitat, as this part currently appears devoid of *C. duthieae*.

12.3 Conclusion

This report provides a representative faunal assessment of the study area considering facets of:

- Terrestrial faunal and avifaunal habitat composition (Section 7),
- terrestrial faunal and avifaunal components (Section 8),
- the presence of any terrestrial faunal and avifaunal SCC on the site (Section 9),
- the conservation status and on-site habitats of, and threats to these SCC (Section 9),
- the SEI of habitats within the study area, with associated acceptable development activities (Section 10),
- mitigation measures and impact management actions to be implemented during the construction and operational phases of the project along with a “Constraints and opportunities” map of the site (Section 11), and
- an impact assessment (considering both the construction and operational phases) for two development alternatives (Alternative 1 and 2) contrasted against the “No-Go” alternative (Section 11).

Taken together, the results of the report indicate the following:

- Overall, habitats in the study area exist either in a semi-intact or highly altered state (Section 7) with numerous daily impacts being evident (Section 11).

- Portion 7 has previously been subjected to agriculture, with large parts comprising either fallow lands and old fields with little remaining natural vegetation, or cleared areas harbouring only common pioneer grasses. Even so, there are sections here which harbour more intact tracts of South Outeniqua Sandstone Fynbos vegetation (Section 7).
- Portion 8 harbours a more degraded habitat structure with a high incidence of alien and invasive vegetation. A part of this portion comprises a non-perennial stream and associated wetland in the northern section (Section 7).
- Faunal and avifaunal diversity is comprised of relatively common species of "Least Concern", albeit one mammal SCC, the Duthie's Golden Mole (*Chlorotalpa duthieae*), is present in high numbers in the degraded northern part of the site (Section 8), given suitable micro-habitat characteristics (Section 9).
- Species diversity on the site appears relatively high, with all species also being abundant, likely given the contact point between a high number of different habitat types (Section 8). Furthermore, a low number of intact predator-prey dynamics is observable on the site (Section 8). Ecosystem dynamics therefore appear intact to some degree, with habitats on the site (especially the northern aquatic environments) forming a semi-functional ecological link within the study area landscape (Section 8).
- The presence of one mammal SCC was confirmed one the site, with three further (one mammal and two avifaunal) SCC likely also occurring within the study area given suitable habitat characteristics (Section 9).
- Among these SCC, the presence of a large subpopulation of *C. duthieae* is of the greatest conservation concern (Section 9). The habitat for this species on the site (Non-indigenous forest and Non-perennial stream banks habitat) represents a large proportion of the Area Of Occupancy (AOO) for this species, and it is possible that the threat status of the species may change if it is to be destroyed (Section 9).
- The Non-indigenous forest and Non-perennial stream / Wetland habitats are highly sensitive (especially given the confirmed presence of a large subpopulation of *C. duthieae*), and is retrieved as having a "High" SEI (Section 10). The remainder of the habitats on the site are currently less

sensitive from a faunal perspective and are retrieved as having a “Very low” SEI (Section 10).

- Several current impacts are evident within the study area, none of which are severe, but which result in altered habitat structures over the site, in turn influencing the intactness of ecosystem dynamics (Section 11).
- Planned development activities for the study area will be of a high direct impact during the construction phase, with several indirect impacts (edge effects) expected during the operational phase (Section 11).
- Given the conservation importance of the SCC confirmed or possibly occurring on the site (Section 9), along with the “High” SEI retrieved for their habitats (Non-indigenous forest and Non-perennial stream / Wetland habitats, Section 10), development planning should exclude these habitats and buffer them by at least 27m to 30m (Section 11). Offset mitigation should also not be considered as an option, given that the destruction of the subpopulation of *C. duthieae* may impact on its threat status (Section 9). Collectively (and depending on the development alternative considered, see below), this will leave an area of between 4.6 to 4.7 hectares as a “No-Go” area, and renders 35.5 to 35.6 hectares as potentially developable.
- To reduce the direct and indirect impacts on the resident fauna and on habitats adjoining the receiving environment, proper fencing may need to be installed around the developed footprint to curb human and domestic pet access to the surrounding environment.
- Among the three development alternatives, Alternative 1 will result in the destruction of the large subpopulation of *C. duthieae* in the northern part of the site, along with the destruction of a significant proportion of the species’ global habitat, and will likely result in a potential fatal flaw during the construction phase. This alternative will also bring similar indirect impacts into a part of the landscape where other subpopulations of SCC may persist in the adjoining areas.
- Conversely, development under Alternatives 2 and 3 will restrict activities to an area of “Very low” SEI, and will comprise a completely fenced off Community Zone, with a sports field between 27m and 50m from the edge of the *C. duthieae* subpopulation. Impacts during the construction and

operational phases are therefore expected to be of a lower intensity and lower frequency when compared to a housing development, and offers an acceptable compromise from development planning to ensure persistence of the northern SCC habitats and subpopulations.

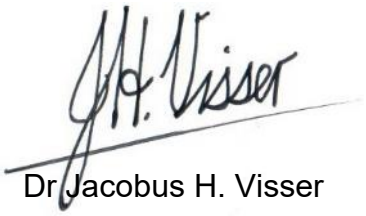
- Taking into account the need to balance environmental outcomes with the need for housing from a municipal perspective, Alternatives 2 and 3 offer sustainable development options which should not drastically affect critical habitats or species from a conservation perspective.
- The results from this report confirm the “High” site sensitivity for the northern section of Portion 8, as identified in the DFFE Screening Tool Report.
- Areas designated as an aquatic ESA and ONAs in the north of Portion 8 exist in a secondary state, but harbour a large subpopulation of the “Vulnerable” *C. duthieae* (Sections 8 to 11). To this end, this part of the site should be regarded as a degraded CBA and exclusion of the northern part of Portion 8 is also supported from a broader terrestrial biodiversity perspective.
- Although rehabilitation of this area is required as part of the management objective for this CBA category, removal of the alien and invasive trees which currently characterise the Non-indigenous forest habitat will compromise the micro-habitats preferred by *C. duthieae*. It is therefore recommended that these alien and invasive trees be kept in this part of the site, however they may be removed in the open Non-indigenous forest habitat to the south of the Non-perennial stream / Wetland habitat, as this part currently appears devoid of *C. duthieae*.

Taken together therefore, development under either Alternatives 2 or 3 offers an acceptable compromise from development planning which should balance the need between environmental outcomes and the need for housing from a municipal perspective, offering sustainable development options. To this end, development under either Alternatives 2 or 3 is supported from a faunal biodiversity perspective, given that the recommendations from this report are considered and implemented.

13. Conditions to which this statement is subjected

The content of this report is based on the author's best scientific and professional knowledge as well as available information. Since environmental impact studies deal with dynamic natural systems, additional information may come to light at a later stage which is not listed in this report. As such, the conclusions and recommendations made in this report are done in good faith based on information gathered at the time of the investigation.

This report must not be altered or added to without the prior written consent of the author. This also refers to electronic copies of the report, which are supplied for the purposes of inclusion as part of other reports, including main reports. Similarly, any recommendations, statements or conclusions drawn from or based on this report must make reference to this report. If these form part of a main report relating to this investigation or report, this report must be included in its entirety as an appendix or separate section to the main report.



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SACNASP Registration Number: 128018

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Appendix A

Appendix A Desktop species list of the mammal species which have a distribution overlapping with the study area (constructed with reference to Skinner and Chimimba, 2005). Species in bold have been previously recorded within the study area landscape (QDGS: 3423AB, MammalMAP, https://vmus.adu.org.za/; iNaturalist, www.iNaturalist.org). For each species, the taxonomic Order, Family, species binomial name and common name is shown, along with the current IUCN Red List classification of the species.

Mammals Desktop Species List				
Order	**Family**	**Species**	**Common name**	**Status**
Afrosoricida	Chrysochloridae	*Chlorotalpa duthieae*	Duthie's Golden Mole	Vulnerable
		Amblysomus corriae	Fynbos Golden Mole	Near-Threatened
		Amblysomus hottentotus	Hottentot Golden Mole	Least Concern
Carnivora	Canidae	*Canis mesomelas*	Black-backed Jackal	Least Concern
		Vulpes chama	Cape Fox	Least Concern
	Felidae	***Caracal caracal***	**Caracal**	**Least Concern**
		Felis silvestris	**African Wild Cat**	**Least Concern**
		Leptailurus serval	**Serval**	**Least Concern**
		Panthera pardus	Leopard	Vulnerable
	Hyaenidae	*Proteles cristata*	Aardwolf	Least Concern
	Herpestidae	***Atilax paludinosus***	**Marsh Mongoose**	**Least Concern**
		Cynictis penicillata	**Yellow Mongoose**	**Least Concern**
		Herpestes ichneumon	Egyptian Mongoose	Least Concern
		Herpestes pulverulentus	**Cape grey Mongoose**	**Least Concern**
	Mustelidae	***Aonyx capensis***	**African Clawless Otter**	**Near-Threatened**
		Ictonyx striatus	Zorilla	Least Concern
		Mellivora capensis	Honey Badger	Least Concern
		Poecilogale albinucha	African Striped Weasel	Least Concern

	Viverridae	*Genetta genetta*	Common Genet	Least Concern
		Genetta tigrina	Cape Genet	Least Concern
Cetartiodactyla	Bovidae	*Oreotragus oreotragus*	Klipspringer	Least Concern
		Pelea capreolus	Grey Rhebok	Near-Threatened
		Philantomba monticola	Blue Duiker	Least Concern
		Raphicerus campestris	Steenbok	Least Concern
		Raphicerus melanotis	Cape Grysbok	Least Concern
		Sylvicapra grimmia	Common Duiker	Least Concern
		Tragelaphus scriptus	**Southern Bushbuck**	**Least Concern**
	Suidae	Potamochoerus larvatus	Bushpig	Least Concern
Chiroptera	Molossidae	*Tadarida aegyptiaca*	Egyptian Free-tailed Bat	Least Concern
	Nycteridae	*Nycteris thebaica*	Cape Long-eared Bat	Least Concern
	Pteropodidae	Epomophorus wahlbergi	Wahlberg's Epauletted Fruit Bat	Least Concern
		Rousettus aegyptiacus	Egyptian Fruit Bat	Least Concern
	Rhinolophidae	*Rhinolophus capensis*	Cape Horseshoe Bat	Least Concern
		Rhinolophus clivosus	Geoffroy's Horseshoe Bat	Least Concern
	Vespertilionidae	*Myotis tricolor*	Temminck's Hairy Bat	Least Concern
		Neoromicia capensis	**Cape Bat**	**Least Concern**
Eulipotyphla	Soricidae	*Crocidura cyanea*	Reddish-grey Musk Shrew	Least Concern
		Crocidura flavescens	Greater Red Musk Shrew	Least Concern
		Myosorex longicaudatus	Long-tailed Forest Shrew	Endangered
		Myosorex varius	Forest Shrew	Least Concern
		Suncus infinitesimus	Least Dwarf Shrew	Least Concern
		Suncus varilla	Lesser Dwarf Shrew	Least Concern
Hyracoidea	Procaviidae	***Procavia capensis***	**Rock Hyrax**	**Least Concern**
Lagomorpha	Leporidae	*Lepus saxatilis*	Cape Scrub Hare	Least Concern
		Pronolagus saundersiae	Hewitt's Red Rock Hare	Least Concern
Primates	Cercopithecidae	***Chlorocebus pygerythrus***	**Vervet Monkey**	**Least Concern**
		Papio ursinus	**Chacma Baboon**	**Least Concern**

Rodentia	Bathyergidae	*Cryptomys hottentotus*	African Mole-rat	Least Concern
		Georychus capensis	Cape Mole-rat	Least Concern
	Gliridae	*Graphiurus murinus*	Woodland Dormouse	Least Concern
	Hystricidae	*Hystrix africaeaustralis*	Cape Porcupine	Least Concern
	Muridae	*Acomys subspinosus*	Cape Spiny Mouse	Least Concern
		Gerbillurus paeba	Hairy-footed Gerbil	Least Concern
		Micaelamys namaquensis	Namaqua Rock Rat	Least Concern
		Mus minutoides	Pygmy Mouse	Least Concern
		Myomyscus verreauxii	Verreaux's Mouse	Least Concern
		Otomys irroratus	**Southern African Vlei Rat**	**Least Concern**
		Rhabdomys pumilio	**Four-striped Grass Mouse**	**Least Concern**
	Nesomyidae	*Dendromus melanotis*	Grey Climbing Mouse	Least Concern
		Dendromus mesomelas	Brant's Climbing Mouse	Least Concern
		Mystromys albicaudatus	White-tailed Rat	Vulnerable
		Saccostomus campestris	Pouched Mouse	Least Concern
		Steatomys krebsii	Krebs' Fat Mouse	Least Concern

Appendix B

Appendix B Desktop species list of the amphibian species which have a distribution overlapping with the study area (constructed with reference to Du Preez and Carruthers, 2009). Species in bold have been previously recorded within the study area landscape (QDGS: 3423AB, FrogMAP (https://vmus.adu.org.za/); iNaturalist, www.iNaturalist.org). For each species, the taxonomic Order, Family, species binomial name and common name is shown, along with the current IUCN Red List classification of the species.

Amphibians Desktop Species List				
Order	**Family**	**Species**	**Common name**	**Status**
Anura	Brevicipitidae	*Breviceps fuscus*	Plain Rain Frog	Least Concern
	Bufonidae	***Sclerophrys capensis***	**Raucous Toad**	**Least Concern**
		Sclerophrys pardalis	Eastern Leopard Toad	Least Concern
		Vandijkophrynus angusticeps	Cape Sand Toad	Least Concern
	Hyperoliidae	*Afrixalus knysnae*	Knysna Leaf-folding Frog	Endangered
		Hyperolius horstockii	Horstock's Reed Frog	Least Concern
		Hyperolius marmoratus	**Painted Reed Frog**	**Least Concern**
		Semnodactylus wealii	Rattling Frog	Least Concern
	Pipidae	*Xenopus laevis*	African Clawed Frog	Least Concern
	Pyxicephalidae	*Amietia delalandii*	Delalande's River Frog	Least Concern
		Amietia fuscigula	Dark-throated River Frog	Least Concern
		Cacosternum boettgeri	Boettger's Dainty Frog	Least Concern
		Cacosternum nanum	Bronze Caco	Least Concern
		Strongylopus fasciatus	Striped Stream Frog	Least Concern
		Strongylopus grayii	**Clicking Stream Frog**	**Least Concern**
		Tomopterna delalandii	Cape Sand Frog	Least Concern

Appendix C

Appendix C Desktop species list of the avifaunal species which have been recorded in the two pentads (3405_2315 and 3400_2315) which overlap the study area (the South African Bird Atlas Project 2, https://sabap2.birdmap.africa/). To create this species list, the species observed in both pentads were combined, noting the total number of observations in both pentads, and also the latest date the species was recorded within these pentads (both shown). Furthermore, for each species, the taxonomic Order, Family, species binomial name and common name is shown, along with the current IUCN Red List classification of the species. Species in bold represent avifaunal species of conservation concern (SCC).

Avifauna Desktop Species List						
Order	**Family**	**Species**	**Common name**	**IUCN status**	**Number of observations**	**Latest record**
Accipitriformes	Accipitridae	*Accipiter melanoleucus*	Black Sparrowhawk	Least Concern	5	2023/07/15
		Accipiter minullus	Little Sparrowhawk	Least Concern	1	2023/03/18
		Accipiter tachiro	African Goshawk	Least Concern	2	2023/05/21
		Buteo buteo	Common Buzzard	Least Concern	13	2022/02/18
		Buteo rufofuscus	Jackal Buzzard	Least Concern	50	2022/06/27
		Buteo trizonatus	**Forest Buzzard**	**Near-Threatened**	**53**	**2023/05/21**
		Circus ranivorus	African Marsh Harrier	Least Concern	1	2013/12/20
		Elanus caeruleus	Black-winged Kite	Least Concern	20	2023/03/19
		Haliaeetus vocifer	African Fish Eagle	Least Concern	9	2022/06/27
		Hieraaetus pennatus	Booted Eagle	Least Concern	1	2015/07/04
		Lophaetus occipitalis	Long-crested Eagle	Least Concern	7	2022/06/27
		Milvus aegyptius	Yellow-billed Kite	Least Concern	10	2022/02/23
		Polyboroides typus	African Harrier-Hawk	Least Concern	4	2023/03/19
	Pandionidae	*Pandion haliaetus*	Western Osprey	Least Concern	1	2021/01/01
	Sagittariidae	***Sagittarius serpentarius***	**Secretarybird**	**Endangered**	**1**	**2020/07/26**

Anseriformes	Anatidae	*Alopochen aegyptiaca*	Egyptian Goose	Least Concern	90	2023/07/15
		Anas capensis	Cape Teal	Least Concern	1	2021/05/28
		Anas erythrorhyncha	Red-billed Teal	Least Concern	35	2022/02/18
		Anas sparsa	African Black Duck	Least Concern	3	2023/07/15
		Anas undulata	Yellow-billed Duck	Least Concern	54	2023/07/15
		Anser anser	Greylag Goose	Least Concern	2	2023/07/15
		Dendrocygna viduata	White-faced Whistling Duck	Least Concern	40	2023/07/15
		Netta erythrophthalma	Southern Pochard	Least Concern	1	2017/04/15
		Oxyura maccoa	**Maccoa Duck**	**Endangered**	**5**	**2021/04/17**
		Plectropterus gambensis	Spur-winged Goose	Least Concern	6	2021/01/07
		Spatula smithii	Cape Shoveler	Least Concern	16	2022/02/17
		Tadorna cana	South African Shelduck	Least Concern	1	2010/05/05
		Thalassornis leuconotus	White-backed Duck	Least Concern	8	2023/07/15
Bucerotiformes	Phoeniculidae	*Phoeniculus purpureus*	Green Wood Hoopoe	Least Concern	10	2023/07/15
	Upupidae	*Upupa africana*	African Hoopoe	Least Concern	11	2023/02/22
Caprimulgiformes	Apodidae	*Apus affinis*	Little Swift	Least Concern	3	2022/10/22
		Apus apus	Common Swift	Least Concern	1	2018/01/01
		Apus barbatus	African Black Swift	Least Concern	7	2022/04/07
		Apus caffer	White-rumped Swift	Least Concern	20	2022/12/20
		Cypsiurus parvus	African Palm Swift	Least Concern	4	2022/12/20
		Tachymarptis melba	Alpine Swift	Least Concern	4	2022/04/07
	Caprimulgidae	*Caprimulgus pectoralis*	Fiery-necked Nightjar	Least Concern	7	2022/04/07
Charadriiformes	Burhinidae	*Burhinus capensis*	Spotted Thick-knee	Least Concern	3	2021/01/15
		Charadrius pecuarius	Kittlitz's Plover	Least Concern	6	2021/12/04
		Charadrius tricollaris	Three-banded Plover	Least Concern	27	2021/12/04
		Vanellus armatus	Blacksmith Lapwing	Least Concern	54	2023/07/15
		Vanellus coronatus	Crowned Lapwing	Least Concern	25	2023/07/15
	Charadriidae	*Vanellus melanopterus*	Black-winged Lapwing	Least Concern	19	2022/02/17
	Haematopodidae	*Haematopus moquini*	African Oystercatcher	Least Concern	2	2015/08/13

	Jacanidae	*Actophilornis africanus*	African Jacana	Least Concern	3	2020/07/26
	Laridae	*Larus dominicanus*	Kelp Gull	Least Concern	57	2022/12/20
		Thalasseus bergii	Greater Crested Tern	Least Concern	1	2013/10/19
	Scolopacidae	*Gallinago nigripennis*	African Snipe	Least Concern	18	2021/07/30
	Stercorariidae	*Ciconia ciconia*	White Stork	Least Concern	6	2021/03/22
Coliiformes	Coliidae	*Colius striatus*	Speckled Mousebird	Least Concern	34	2023/07/15
		Urocolius indicus	Red-faced Mousebird	Least Concern	2	2014/07/16
Columbiformes	Columbidae	*Columba arquatrix*	African Olive Pigeon	Least Concern	15	2023/03/18
		Columba guinea	Speckled Pigeon	Least Concern	55	2023/07/15
		Columba livia	Rock Dove	Least Concern	4	2022/10/22
		Spilopelia senegalensis	Laughing Dove	Least Concern	19	2023/03/19
		Streptopelia capicola	Cape Turtle Dove	Least Concern	79	2023/06/10
		Streptopelia semitorquata	Red-eyed Dove	Least Concern	79	2023/07/15
Coraciiformes	Alcedinidae	*Ceryle rudis*	Pied Kingfisher	Least Concern	3	2021/04/17
		Coracias garrulus	European Roller	Least Concern	2	2021/02/03
		Halcyon albiventris	Brown-hooded Kingfisher	Least Concern	22	2023/03/18
		Megaceryle maxima	Giant Kingfisher	Least Concern	3	2018/08/18
Cuculiformes	Cuculidae	*Centropus burchellii*	Burchell's Coucal	Least Concern	8	2022/10/22
		Chrysococcyx caprius	Diederik Cuckoo	Least Concern	3	2020/10/31
		Chrysococcyx cupreus	African Emerald Cuckoo	Least Concern	2	2020/10/31
		Chrysococcyx klaas	Klaas's Cuckoo	Least Concern	12	2022/10/22
		Cuculus clamosus	Black Cuckoo	Least Concern	3	2022/10/22
		Cuculus solitarius	Red-chested Cuckoo	Least Concern	14	2022/10/22
Falconiformes	Falconidae	*Falco biarmicus*	Lanner Falcon	Least Concern	2	2020/07/03
		Falco peregrinus	Peregrine Falcon	Least Concern	4	2022/10/07
		Falco rupicolus	Rock Kestrel	Least Concern	6	2021/12/04
Galliformes	Gruidae	***Anthropoides paradiseus***	**Blue Crane**	**Vulnerable**	**1**	**2009/09/05**
	Numididae	*Numida meleagris*	Helmeted Guineafowl	Least Concern	52	2023/05/21
	Phasianidae	*Coturnix coturnix*	Common Quail	Least Concern	2	2021/10/15

		Pternistis afer	Red-necked Spurfowl	Least Concern	5	2022/04/07
		Pternistis capensis	Cape Spurfowl	Least Concern	2	2013/10/31
	Rallidae	*Fulica cristata*	Red-knobbed Coot	Least Concern	45	2023/07/15
		Gallinula chloropus	Common Moorhen	Least Concern	50	2023/07/15
		Zapornia flavirostra	Black Crake	Least Concern	1	2015/03/31
Musophagiformes	Musophagidae	*Tauraco corythaix*	Knysna Turaco	Least Concern	34	2023/05/21
Otidiformes	Otididae	***Neotis denhami***	**Denham's Bustard**	**Near-Threatened**	**9**	**2023/03/31**
Passeriformes	Acrocephalidae	*Acrocephalus gracilirostris*	Lesser Swamp Warbler	Least Concern	1	2015/03/31
	Alaudidae	*Calandrella cinerea*	Red-capped Lark	Least Concern	6	2021/07/30
	Campephagidae	*Ceblepyris caesius*	Grey Cuckooshrike	Least Concern	7	2022/10/22
	Cisticolidae	*Apalis thoracica*	Bar-throated Apalis	Least Concern	42	2023/05/21
		Camaroptera brachyura	Green-backed Camaroptera	Least Concern	6	2022/10/22
		Cisticola ayresii	Wing-snapping Cisticola	Least Concern	7	2021/10/15
		Cisticola fulvicapilla	Neddicky	Least Concern	46	2022/12/20
		Cisticola juncidis	Zitting Cisticola	Least Concern	23	2023/03/19
		Cisticola subruficapilla	Grey-backed Cisticola	Least Concern	3	2021/10/25
		Cisticola textrix	Cloud Cisticola	Least Concern	1	2014/07/16
		Cisticola tinniens	Levaillant's Cisticola	Least Concern	11	2022/10/22
		Prinia maculosa	Karoo Prinia	Least Concern	30	2022/12/20
	Corvidae	*Corvus albicollis*	White-necked Raven	Least Concern	52	2023/07/15
		Corvus albus	Pied Crow	Least Concern	43	2023/07/15
		Corvus capensis	Cape Crow	Least Concern	66	2023/07/15
	Dicruridae	*Dicrurus adsimilis*	Fork-tailed Drongo	Least Concern	49	2023/07/15
	Estrildidae	*Coccopygia melanotis*	Swee Waxbill	Least Concern	7	2023/07/15
		Estrilda astrild	Common Waxbill	Least Concern	13	2023/03/19
	Fringillidae	*Crithagra flaviventris*	Yellow Canary	Least Concern	2	2015/03/07
		Crithagra gularis	Streaky-headed Seedeater	Least Concern	19	2023/07/15
		Crithagra scotops	Forest Canary	Least Concern	9	2023/05/21
		Crithagra sulphurata	Brimstone Canary	Least Concern	20	2023/05/21

	Crithagra totta	Cape Siskin	Least Concern	3	2021/01/15
	Serinus canicollis	Cape Canary	Least Concern	37	2022/10/22
Hirundinidae	*Cecropis abyssinica*	Lesser Striped Swallow	Least Concern	1	2018/12/01
	Cecropis cucullata	Greater Striped Swallow	Least Concern	21	2023/03/19
	Hirundo albigularis	White-throated Swallow	Least Concern	10	2023/03/19
	Hirundo dimidiata	Pearl-breasted Swallow	Least Concern	2	2021/01/15
	Hirundo rustica	Barn Swallow	Least Concern	44	2023/03/19
	Psalidoprocne pristoptera	Black Saw-wing	Least Concern	25	2023/03/18
	Ptyonoprogne fuligula	Rock Martin	Least Concern	3	2021/12/04
	Riparia paludicola	Brown-throated Martin	Least Concern	4	2022/02/17
Laniidae	*Lanius collaris*	Southern Fiscal	Least Concern	99	2023/07/15
Locustellidae	*Bradypterus baboecala*	Little Rush Warbler	Least Concern	3	2020/10/31
	Bradypterus sylvaticus	**Knysna Warbler**	**Vulnerable**	**1**	**2013/10/31**
Macrosphenidae	*Cryptillas victorini*	Victorin's Warbler	Least Concern	3	2022/10/22
	Sphenoeacus afer	Cape Grassbird	Least Concern	18	2022/10/07
Malaconotidae	*Chlorophoneus olivaceus*	Olive Bushshrike	Least Concern	14	2022/10/22
	Dryoscopus cubla	Black-backed Puffback	Least Concern	8	2023/05/21
	Laniarius ferrugineus	Southern Boubou	Least Concern	48	2023/07/15
	Tchagra tchagra	Southern Tchagra	Least Concern	2	2015/04/23
	Telophorus zeylonus	Bokmakierie	Least Concern	12	2021/04/07
Monarchidae	*Terpsiphone viridis*	African Paradise Flycatcher	Least Concern	10	2023/03/19
	Trochocercus cyanomelas	Blue-mantled Crested Flycatcher	Least Concern	2	2020/10/30
Motacillidae	*Anthus cinnamomeus*	African Pipit	Least Concern	9	2022/02/17
	Anthus leucophrys	Plain-backed Pipit	Least Concern	11	2021/04/17
	Anthus nicholsoni	Nicholson's Pipit	Least Concern	1	2019/05/14
	Macronyx capensis	Cape Longclaw	Least Concern	31	2021/12/04
	Motacilla capensis	Cape Wagtail	Least Concern	68	2023/07/15
Muscicapidae	*Cossypha caffra*	Cape Robin-Chat	Least Concern	43	2023/05/21
	Cossypha dichroa	Chorister Robin-Chat	Least Concern	7	2023/05/21

	Melaenornis silens	Fiscal Flycatcher	Least Concern	23	2022/12/20
	Muscicapa adusta	African Dusky Flycatcher	Least Concern	25	2023/07/15
	Oenanthe familiaris	Familiar Chat	Least Concern	2	2021/01/16
	Pogonocichla stellata	White-starred Robin	Least Concern	2	2022/06/27
	Saxicola torquatus	African Stonechat	Least Concern	36	2022/02/18
	Turdus olivaceus	Olive Thrush	Least Concern	16	2023/05/21
Nectariniidae	*Anthobaphes violacea*	Orange-breasted Sunbird	Least Concern	9	2022/12/20
	Chalcomitra amethystina	Amethyst Sunbird	Least Concern	40	2023/07/15
	Cinnyris afer	Greater Double-collared Sunbird	Least Concern	49	2023/07/15
	Cinnyris chalybeus	Southern Double-collared Sunbird	Least Concern	44	2023/05/21
	Cyanomitra verreauxii	Mouse-coloured Sunbird	Least Concern	9	2023/07/15
	Hedydipna collaris	Collared Sunbird	Least Concern	5	2023/02/22
	Nectarinia famosa	Malachite Sunbird	Least Concern	5	2022/06/27
Oriolidae	*Oriolus larvatus*	Eastern Black-headed Oriole	Least Concern	51	2023/07/15
Passeridae	*Passer diffusus*	Southern Grey-headed Sparrow	Least Concern	17	2023/07/15
	Passer domesticus	House Sparrow	Least Concern	23	2022/08/25
	Passer melanurus	Cape Sparrow	Least Concern	3	2021/01/16
Phylloscopidae	*Phylloscopus ruficapilla*	Yellow-throated Woodland Warbler	Least Concern	2	2015/08/25
Platysteiridae	*Batis capensis*	Cape Batis	Least Concern	16	2023/02/22
Ploceidae	*Euplectes capensis*	Yellow Bishop	Least Concern	24	2022/10/22
	Euplectes orix	Southern Red Bishop	Least Concern	1	2013/03/02
	Ploceus capensis	Cape Weaver	Least Concern	61	2023/07/15
	Ploceus velatus	Southern Masked Weaver	Least Concern	1	2018/12/01
Promeropidae	*Promerops cafer*	Cape Sugarbird	Least Concern	12	2018/05/08
Pycnonotidae	*Andropadus importunus*	Sombre Greenbul	Least Concern	71	2023/07/15
	Phyllastrephus terrestris	Terrestrial Brownbul	Least Concern	3	2019/03/16
	Pycnonotus capensis	Cape Bulbul	Least Concern	51	2023/05/21
Sturnidae	*Creatophora cinerea*	Wattled Starling	Least Concern	1	2020/11/10
	Notopholia corusca	Black-bellied Starling	Least Concern	14	2023/07/15

		Onychognathus morio	Red-winged Starling	Least Concern	23	2022/07/30
		Sturnus vulgaris	Common Starling	Least Concern	74	2023/07/15
	Viduidae	*Vidua macroura*	Pin-tailed Whydah	Least Concern	22	2022/12/20
	Zosteropidae	*Zosterops virens*	Cape White-eye	Least Concern	57	2023/07/15
Pelecaniformes	Ardeidae	*Ardea alba*	Great Egret	Least Concern	1	2009/09/05
		Ardea cinerea	Grey Heron	Least Concern	13	2023/07/15
		Ardea melanocephala	Black-headed Heron	Least Concern	46	2023/07/15
		Ardea purpurea	Purple Heron	Least Concern	1	2009/09/05
		Bubulcus ibis	Western Cattle Egret	Least Concern	78	2023/07/15
		Egretta garzetta	Little Egret	Least Concern	2	2018/12/01
		Nycticorax nycticorax	Black-crowned Night Heron	Least Concern	2	2018/08/18
	Scopidae	*Scopus umbretta*	Hamerkop	Least Concern	5	2023/07/15
	Threskiornithidae	*Bostrychia hagedash*	Hadada Ibis	Least Concern	103	2023/07/15
		Platalea alba	African Spoonbill	Least Concern	5	2021/01/30
		Plegadis falcinellus	Glossy Ibis	Least Concern	1	2022/08/18
		Threskiornis aethiopicus	African Sacred Ibis	Least Concern	88	2023/07/15
Piciformes	Indicatoridae	*Indicator variegatus*	Scaly-throated Honeyguide	Least Concern	4	2018/11/10
	Lybiidae	*Lybius torquatus*	Black-collared Barbet	Least Concern	6	2023/03/19
	Picidae	***Campethera notata***	**Knysna Woodpecker**	**Near-Threatened**	**8**	**2023/02/22**
		Dendropicos fuscescens	Cardinal Woodpecker	Least Concern	1	2021/10/25
		Dendropicos griseocephalus	Olive Woodpecker	Least Concern	4	2022/10/22
Podicipediformes	Podicipedidae	*Tachybaptus ruficollis*	Little Grebe	Least Concern	32	2023/07/15
Sphenisciformes	Spheniscidae	*Bubo africanus*	Spotted Eagle-Owl	Least Concern	5	2020/11/28
Suliformes	Anhingidae	*Anhinga rufa*	African Darter	Least Concern	13	2023/07/15
	Phalacrocoracidae	*Microcarbo africanus*	Reed Cormorant	Least Concern	31	2023/05/21
		Phalacrocorax capensis	**Cape Cormorant**	**Endangered**	**2**	**2021/12/04**
		Phalacrocorax lucidus	White-breasted Cormorant	Least Concern	17	2022/02/17
	Sulidae	***Morus capensis***	**Cape Gannet**	**Endangered**	**4**	**2021/10/25**

Appendix D

Appendix D Desktop species list of the buttefly species which have been previously recorded within the study area landscape (QDGS: 3423AB; LepiMAP (https://vmus.adu.org.za/); iNaturalist (www.iNaturalist.org). For each species, the taxonomic Order, Family, species binomial name and common name is shown, along with the current IUCN Red List classification of the species.

Butterflies Desktop Species List				
Order	**Family**	**Species**	**Common name**	**IUCN status**
Lepidoptera	Hesperiidae	*Afrogegenes letterstedti*	Common Dodger	Least Concern
		Afrogegenes ocra	Yellow dodger	Not Assessed
		Eretis umbra	Small Marbled Elf	Least Concern
		Metisella metis	Western Gold-spotted Sylph	Least Concern
		Pelopidas mathias	Black-branded Swift	Least Concern
		Pelopidas thrax	White-banded Swift	Least Concern
	Lycaenidae	*Anthene definita*	Common Hairtail	Least Concern
		Cacyreus fracta	Water Bronze	Least Concern
		Cacyreus lingeus	Bush Bronze	Least Concern
		Cacyreus marshalli	Common Geranium Bronze	Least Concern
		Chrysoritis palmus	Water Opal	Least Concern
		Eicochrysops messapus	Cupreous Blue	Least Concern
		Lampides boeticus	Pea Blue	Least Concern
		Myrina silenus	Amber Fig-tree Blue	Least Concern
		Tarucus thespis	Vivid Dotted Blue	Least Concern
		Zizeeria knysna	African Grass Blue	Least Concern
	Nymphalidae	*Acraea horta*	Garden Acraea	Least Concern
		Acraea neobule	Wandering Donkey Acraea	Least Concern
		Amauris echeria	Chief	Least Concern
		Bicyclus safitza	Black-haired Bush Brown	Least Concern

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	Cassionympha cassius	Rainforest Brown	Least Concern
	Charaxes brutus	White-barred Charaxes	Least Concern
	Charaxes varanes	Common Pearl Charaxes	Least Concern
	Cymothoe alcimeda	Battling glider	Least Concern
	Danaus chrysippus	Plain Tiger	Least Concern
	Dira clytus	Cape Autumn Widow	Least Concern
	Hypolimnas misippus	Common Diadem	Least Concern
	Junonia hierta	Yellow Pansy	Least Concern
	Junonia oenone	Dark Blue Pansy	Least Concern
	Junonia orithya	Blue Pansy	Least Concern
	Precis archesia	Garden Commodore	Least Concern
	Pseudonympha magus	Silver-bottom Brown	Least Concern
	Telchinia rahira	Marsh Wizard	Least Concern
	Vanessa cardui	Painted Lady	Least Concern
Papilionidae	*Papilio demodocus*	Citrus Swallowtail	Least Concern
	Papilio nireus	Narrow Green-banded Swallowtail	Least Concern
Pieridae	*Belenois aurota*	Pioneer White	Least Concern
	Belenois gidica	Pointed Caper White	Least Concern
	Belenois zochalia	Forest Caper White	Least Concern
	Catopsilia florella	African Migrant	Least Concern
	Colias electo	African Clouded Yellow	Least Concern
	Colotis euippe	Round-winged Orange Tip	Least Concern
	Dixeia charina	African Small White	Least Concern
	Mylothris agathina	Eastern Dotted Border	Least Concern
	Nepheronia buquetii	Green-eyed Vagrant	Least Concern
	Pieris brassicae	Large White	Least Concern
	Pontia helice	Southern Meadow White	Least Concern

Appendix E

Appendix E Species list of the faunal species recovered within the study area during the field survey. For each, the taxonomic Order, Family, species binomial name and species common name are shown, along with the current IUCN Red List classification of the species, and the number of records of the species during the surveying period.

Mammals					
Order	**Family**	**Species**	**Common name**	**IUCN status**	**Number of observations**
Afrosoricida	Chrysochloridae	*Chlorotalpa duthieae*	Duthie's Golden Mole	Vulnerable	6
Carnivora	Felidae	*Caracal caracal*	Caracal	Least Concern	1
Cetartiodactyla	Bovidae	*Raphicerus melanotis*	Cape Grysbok	Least Concern	8
Rodentia	Bathyergidae	*Cryptomys hottentotus*	African Mole-rat	Least Concern	5
	Hystricidae	*Hystrix africaeaustralis*	Cape Porcupine	Least Concern	2
	Muridae	*Rhabdomys pumilio*	Four-striped Grass Mouse	Least Concern	8
Amphibians					
Order	**Family**	**Species**	**Common name**	**IUCN status**	**Number of observations**
Anura	Bufonidae	*Sclerophrys capensis*	Raucous Toad	Least Concern	1
	Pyxicephalidae	*Cacosternum boettgeri*	Boettger's Dainty Frog	Least Concern	6
		Strongylopus grayii	Clicking Stream Frog	Least Concern	6
Avifauna					
Order	**Family**	**Species**	**Common name**	**IUCN status**	**Number of observations**
Accipitriformes	Accipitridae	*Elanus caeruleus*	Black-winged Kite	Least Concern	1
Anseriformes	Anatidae	*Alopochen aegyptiaca*	Egyptian Goose	Least Concern	1
		Anas undulata	Yellow-billed Duck	Least Concern	1
		Anser anser	Greylag Goose	Least Concern	1
Charadriiformes	Burhinidae	*Vanellus coronatus*	Crowned Lapwing	Least Concern	3

	Laridae	*Larus dominicanus*	Kelp Gull	Least Concern	1
Columbiformes	Columbidae	*Streptopelia capicola*	Cape Turtle Dove	Least Concern	2
Coraciiformes	Alcedinidae	*Corythornis cristatus*	Malachite Kingfisher	Least Concern	1
Galliformes	Rallidae	*Gallinula chloropus*	Common Moorhen	Least Concern	1
		Zapornia flavirostra	Black Crake	Least Concern	1
Passeriformes	Cisticolidae	*Cisticola subruficapilla*	Grey-backed Cisticola	Least Concern	1
		Prinia maculosa	Karoo Prinia	Least Concern	2
	Corvidae	*Corvus albicollis*	White-necked Raven	Least Concern	1
		Corvus albus	Pied Crow	Least Concern	1
	Dicruridae	*Dicrurus adsimilis*	Fork-tailed Drongo	Least Concern	1
	Laniidae	*Lanius collaris*	Southern Fiscal	Least Concern	3
	Macrosphenidae	*Sphenoeacus afer*	Cape Grassbird	Least Concern	1
	Malaconotidae	*Laniarius ferrugineus*	Southern Boubou	Least Concern	1
	Muscicapidae	*Cossypha caffra*	Cape Robin-Chat	Least Concern	3
		Muscicapa adusta	African Dusky Flycatcher	Least Concern	1
		Saxicola torquatus	African Stonechat	Least Concern	1
	Nectariniidae	*Cinnyris chalybeus*	Southern Double-collared Sunbird	Least Concern	4
		Nectarinia famosa	Malachite Sunbird	Least Concern	1
	Passeridae	*Passer melanurus*	Cape Sparrow	Least Concern	1
	Phylloscopidae	*Phylloscopus ruficapilla*	Yellow-throated Woodland Warbler	Least Concern	1
	Platysteiridae	*Batis capensis*	Cape Batis	Least Concern	2
	Ploceidae	*Euplectes capensis*	Yellow Bishop	Least Concern	1
		Ploceus capensis	Cape Weaver	Least Concern	1
	Sturnidae	*Sturnus vulgaris*	Common Starling	Least Concern	2
	Zosteropidae	*Zosterops virens*	Cape White-eye	Least Concern	3
Pelecaniformes	Ardeidae	*Ardea melanocephala*	Black-headed Heron	Least Concern	1
		Bubulcus ibis	Western Cattle Egret	Least Concern	1
	Threskiornithidae	*Bostrychia hagedash*	Hadada Ibis	Least Concern	1
		Threskiornis aethiopicus	African Sacred Ibis	Least Concern	1

Podicipediformes	Podicipedidae	*Tachybaptus ruficollis*	Little Grebe	Least Concern	1

Appendix D

Curriculum Vitae of Jacobus Hendrik Visser

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Qualifications

- PhD (Zoology), University of Johannesburg (2015 - 2017)
- MSc (Zoology), Stellenbosch University (2011 - 2013)
- BSc Honours (Zoology) cum laude, Stellenbosch University (2010)
- BSc (Biodiversity and Ecology) cum laude, Stellenbosch University (2007 - 2009)

Scientific publications

- **Visser J.H.** (2013). Gene-flow in the rock hyrax (*Procavia capensis*) at different spatial scales. MSc thesis, Stellenbosch University, Stellenbosch, South Africa. https://core.ac.uk/download/pdf/37420485.pdf
- **Visser J.H.** (2017). Evolution of the South African Bathyergidae: patterns and processes. PhD dissertation, University of Johannesburg, Johannesburg, South Africa.

- **Visser J.H.**, Bennett N.C., Jansen van Vuuren B. (2014). Local and regional scale genetic variation in the Cape dune mole-rat, *Bathyergus suillus*. PLos ONE 9(9):e107226. https://doi.org/10.1371/journal.pone.0107226
- **Visser J.H.**, Bennett N.C., Jansen van Vuuren B. (2017). Distributional range, ecology and mating system of the Cape mole-rat, *Georychus capensis* family Bathyergidae. Canadian Journal of Zoology 95 (10): 713-726. https://doi.org/10.1139/cjz-2017-0016
- **Visser J.H.**, Bennett N.C., Jansen van Vuuren B. (2018). Spatial genetic diversity in the Cape mole-rat, *Georychus capensis*: Extreme isolation of populations in a subterranean environment. PLoS ONE 13(3): e0194165. https://doi.org/10.1371/journal.pone.0194165
- **Visser J.H.**, Bennett N.C., Jansen van Vuuren B. (2019). Evolutionary and ecological patterns within the South African Bathyergidae: Implications for taxonomy. Molecular Phylogenetics and Evolution 130, 181-197. https://doi.org/10.1016/j.ympev.2018.10.017
- **Visser J.H.**, Bennett N.C., Jansen van Vuuren B. (2019). Phylogeny and biogeography of the African Bathyergidae: a review of patterns and processes. Journal of Biogeography PeerJ 7:e7730. https://doi.org/10.7717/peerj.7730
- **Visser J.H.**, Geerts S. (2020). Describing sexual dimorphism and fine scale spatial distributions in the Drab Thick-tail Scorpion, *Parabuthus planicauda*. African Zoology 55 (3): 250-256. https://doi.org/10.1080/15627020.2020.1796525
- **Visser J.H.**, Geerts S. (2021). Static allometry and sexual dimorphism in the Striped Lesser-thicktail Scorpion, *Uroplectes lineatus*. Arachnology 18 (7), 700–707. https://doi.org/10.13156/arac.2020.18.7.700
- **Visser J.H.**, Geerts S. (in review). Sexual dimorphism and static allometry in the burrowing scorpion, *Opistophthalmus pallipes*. African Zoology.
- **Visser J.H.**, Geerts S. (2021). Sexual dimorphism and static allometry in the South African scorpion *Opistophthalmus karrooensis*. Arachnology 18 (9), 1057-1063.
- **Visser J.H.**, Geerts S., Jansen van Vuuren B. (2021). Phylogeographic patterns in a semi-lithophilous burrowing scorpion from South Africa, *Opistophthalmus pallipes*. Zoological Science 38 (1): 36-44. https://doi.org/10.2108/zs200094

- **Visser J.H.**, Robinson T.J., Jansen van Vuuren B. (2020). Spatial genetic structure in the rock hyrax (*Procavia capensis*) across the Namaqualand and western Fynbos areas of South Africa - a mitochondrial and microsatellite perspective. Canadian Journal of Zoology 98 (8): 557-571. https://doi.org/10.1139/cjz-2019-0154
- Uhrová M., Mikula O., Bennett N.C., Van Daele P., Piálek L., Bryja J., **Visser J.H.**, Jansen van Vuuren B., Šumbera R. (2022). Species limits and phylogeographic structure in two genera of solitary African mole-rats *Georychus* and *Heliophobius*. Molecular Phylogenetics and Evolution 167 (2022) 107337

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- Bennett N.C, Jarvis J.U.M., **Visser J.H.**, Maree, S. (2016). A conservation assessment of *Georychus capensis*. In: Child M.F., Roxburgh L., Do Linh San E., Raimondo D., Davies-Mostert H.T. (Eds). The Red List of Mammals of South Africa, Swaziland and Lesotho. South African National Biodiversity Institute and Endangered Wildlife Trust, South Africa. https://www.ewt.org.za/wp-content/uploads/2019/02/16.-Cape-Mole-rat-Georychus-capensis_LC.pdf
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- Maree S., Jarvis J.U.M., Bennett N.C., **Visser J.H.** (2017). *Bathyergus suillus*. The IUCN Red List of Threatened Species 2017:e.T2620A110017759. http://dx.doi.org/10.2305/IUCN.Uk.2017-2.RLTS.T2620A110017759.en.
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- **Visser J.H.**, Wimberger K. (2016). A conservation assessment of *Procavia capensis*. In: Child M.F., Roxburgh L., Do Linh San E., Raimondo D., Davies-Mostert H.T. (Eds). The Red List of Mammals of South Africa, Swaziland and

Lesotho. South African National Biodiversity Institute and Endangered Wildlife Trust, South Africa. https://www.ewt.org.za/wp-content/uploads/2019/02/3.-Rock-Hyrax-Procavia-capensis_LC.pdf

List of fauna reports

- **Visser, J.H.** Terrestrial Animal Species Compliance Statement Report For A Portion of Remainder of Farm 630, Rawsonville, Breede Valley Municipality. November 2021. Prepared for inClover Environmental Consulting.
- **Visser, J.H.** Terrestrial Faunal and Avifaunal Species Compliance Statement Report for a Portion of Brazil 329, Nama Khoi Municipality, Namakwa District. April 2022. Prepared for WNel Environmental Consulting Services.
- **Visser, J.H.** Terrestrial Faunal And Avifaunal Species Scoping Report for the Proposed Waste Management Facility at Portions 1 and 6 of Farm 32 Brakkefontein, City of Cape Town. April 2022. Prepared for SLR Consulting.
- **Visser, J.H.** Terrestrial Faunal And Avifaunal Species Impact Assessment Report for a Portion of Riet Valleij (Somerset Vale, Farm Portion RE/150), Estelm Boerdery, Swellendam Municipality, Overberg District. June 2022. Prepared for PHS Consulting.
- **Visser, J.H.** Site Sensitivity Verification Report for Remainder of Farm De Draay No 563, Overstrand Municipality. August 2022. Prepared for PHS Consulting.
- **Visser, J.H.** Terrestrial Faunal and Avifaunal Impact Assessment Report for Remainder of Farm Rooilandia No. 472, Breede Valley Municipality. October 2022. Prepared for McGregor Environmental Services.
- **Visser, J.H.** Terrestrial Faunal and Avifaunal Species Impact Assessment Report for Portion 3 of Farm 781, Theewaterskloof Local Municipality. December 2022. Prepared for PHS Consulting.
- **Visser, J.H.** Terrestrial Faunal Species Compliance Statement Report for Farm Portion 49, Hansmoeskraal Farm 202, George Local Municipality. April 2023. Prepared for Sharples Environmental Services cc (SES).
- **Visser, J.H.** Terrestrial Faunal and Avifaunal Species Compliance Statement Report for Farm 153 Vissershok (C1038: Upgrading of TR11/1), City of Cape

Town Municipality. May 2023. Prepared for Sharples Environmental Services cc (SES).

- **Visser, J.H.** Terrestrial Faunal and Avifaunal Species Impact Assessment Report for Farm Witteklip 69/123, Vredenburg, Saldanha Bay Municipality. June 2023. Prepared for Ecosense Environmental Consultants.
- **Visser, J.H.** Terrestrial Faunal and Avifaunal Species Impact Assessment Report for the Proposed Greenvalley Mixed-use Development on Portion 28, 31 and 32 of the Farm Wittedrift No. 306, and Associated Bulk Infrastructure, Plettenberg Bay, Bitou Municipality. June 2023. Prepared for Sharples Environmental Services cc (SES).
- **Visser, J.H.** Terrestrial Faunal and Avifaunal Species Compliance Statement Report for the Upgrade of the Schaapkop Sewer Rising Main on Remainder of Erf 464 and Erf 13486, George Local Municipality. July 2023. Prepared for Sharples Environmental Services cc (SES).
- **Visser, J.H.** Terrestrial Faunal and Avifaunal Species Compliance Statement Report for the Proposed Sandmine on Portion 109 of the Farm Zwarte Jongers Fontein No. 489, Hessequa Municipality. August 2023. Prepared for Pro-Earth Consulting.
- **Visser, J.H.** Terrestrial Faunal and Avifaunal Species Impact Assessment Report for the Upgrading of Herold's Bay Sewer Pump Station and Associated Rising Main on Remainder of Farm Brakfontein 236, Portion 10 of Farm Brakfontein 236 and Erven RE/95 and 116, Herholds Bay, George Municipality. September 2023. Prepared for Sharples Environmental Services cc (SES).
- **Visser, J.H.** Terrestrial Faunal and Avifaunal Species Impact Assessment Report for the Proposed Flood Damage Repairs, Rehabilitation and Other Mitigation Measures in Van Riebeeck Gardens and Camphersdrift, George, George Municipality. September 2023. Prepared for Sharples Environmental Services cc (SES).
- **Visser, J.H.** Terrestrial Faunal and Avifaunal Species Compliance Statement Report for the Proposed Hartenbos Waste Water Treatment Works PV Solar Plant on Remainder of Portion 101 of the Farm Hartenbosch 217, Mossel Bay, MosseL Bay Municipality. September 2023. Prepared for Sharples Environmental Services cc (SES).

- **Visser, J.H.** Terrestrial Faunal and Avifaunal Species Site Sensitivity Verification Report for the Proposed Construction of Tourist Accommodation on Portions 10, 11 and 13 of the Farm Arieskraal A 456, Elgin. September 2023. Prepared for PHS Consulting.

Other projects

- Southern African Bird Atlas Project 2 (SABAP2)
- Endemism, genetic variance and conservation priorities in the highlands of south-western Africa.
- Biodiversity and ecology of scorpions in the Cape Floristic Region.
- National Biodiversity Assessment 2018: The status of South Africa's ecosystems and biodiversity. Synthesis Report. South African National Biodiversity Institute, an entity of the Department of Environment, Forestry and Fisheries, Pretoria.

Conferences

- Presenter at the 2017 conference of the South African Wildlife Management Association (Presentation title: The influence of commercial game farming on maintaining genetic diversity in the sable antelope (*Hippotragus niger*) and roan antelope (*Hippotragus equinus*)
- Presenter at the 2017 conference of the Zoological Society of Southern Africa (Presentation title: Evolution of the South African Bathyergidae: Patterns and processes)
- Presenter at the 2010 conference of the Zoological Society of Southern Africa (Presentation title: Local and regional scale genetic variation in the Cape dune mole-rat, *Bathyergus suillus*