
Proposed Mixed Use Development for RE/464, Gwayang Industrial Park, George, Western Cape

Terrestrial Animal Species Site Sensitivity Verification and Scoping Report



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Date: June 2024
Version: Draft



DECLARATION OF SPECIALIST INDEPENDENCE

- I consider myself bound to the rules and ethics of the South African Council for Natural Scientific Professions (SACNASP);
- At the time of conducting the study and compiling this report I did not have any interest, hidden or otherwise, in the proposed development that this study has reference to, except for financial compensation for work done in a professional capacity;
- Work performed for this study was done in an objective manner. Even if this study results in views and findings that are not favourable to the client/applicant, I will not be affected in any manner by the outcome of any environmental process of which this report may form a part, other than being members of the general public;
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- I undertake to disclose all material information in my possession that reasonably has or may have the potential of influencing any decision to be taken with respect to the application by a competent authority to such a relevant authority and the applicant;
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- All the particulars furnished by me in this document are true and correct.



Monica Leitner (MSc)

June 2024

SUMMARY OF EXPERIENCE AND ABRIDGED CV

- MONICA LEITNER

Core skills

- MSc. Zoology (University of Pretoria) and 5 years of work experience (project management and field work) for ecological research projects aimed at invertebrate diversity, ecological functioning, and large mammal ecology.
- Extensive ecological and field work experience (before, during and after postgraduate degrees) across a range of environments (mesic to arid savanna, grasslands and mountain terrain, sub-Antarctic) and taxa (invertebrates, avifauna, amphibians, reptiles, small mammals and large mammals).
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Work experience

- 2022-2023: Marine mammal field assistant on sub-Antarctic Marion Island (Marion Island Marine Mammal Programme, University of Pretoria)
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- 2019-2022: Research assistant for Marion Island Marine Mammal Programme (University of Pretoria).
- 2018-2019: Environmental Conservation Officer on sub-Antarctic Marion Island (Department of Environmental Affairs).
- 2016-2018: Research assistant for Sani Pass (Drakensburg) long term invertebrate and ecosystem monitoring project (Centre for Invasion Biology, University of Pretoria).

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- MSc. Zoology (with distinction, 2015, University of Pretoria)

Publications

- Trisos MO, Parr CL, Davies AB, Leitner M & February EC. 2021. Mammalian herbivore movement into drought refugia has cascading effects on savanna insect communities. *Journal of Animal Ecology*, <https://doi.org/10.1111/1365-2656.13494>
- Leitner M, Davies AB, Robertson MP, Parr CL & Van Rensburg BJ. 2020. Termite mounds create heterogeneity in invertebrate communities across a savanna rainfall gradient. *Biodiversity and Conservation*, 29(4), pp.1427-1441

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- Leitner M, Davies AB, Parr CL, Eggleton P & Robertson MP. 2018. Woody encroachment slows decomposition and termite activity in an African savanna. *Global change biology*, 24(6), pp.2597-2606

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References

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ABBREVIATIONS AND ACCRONYMS

CBA	Critical Biodiversity Area
CD:NGI	Chief Directorate: National Geo-spatial Information
DFFE	Department of Forestry, Fisheries, and the Environment
ESA	Ecological Support Area
EWT	Endangered Wildlife Trust
NEMA	National Environmental Management Act
SANBI	South African National Biodiversity Institute
SCC	Species of Conservation Concern

SDP	Site Development Plan
SSVR	Site Sensitivity Verification Report
WCBSP	Western Cape Biodiversity Spatial Plan

1. INTRODUCTION

Confluent Environmental Pty (Ltd) was appointed by Cape EAPrac to compile a Terrestrial Animal Species Scoping Report for a proposed mixed-use development on a portion of RE/464 (referred to as Gwayang Precinct), Pacaltsdorp, George.

1.1 General Site Location

The development has been proposed by the George Municipality and the proposed development area is ca. 185 hectare in extent. It is located adjacent to the R102 'airport road' from which access to the site is obtained. Another access point is through an existing residential suburb (Groeneweide Park) on the north-eastern area from York Street which is the main road into the George CBD. The site is therefore well located from a development perspective. The Gwaing River is in the valley bottom west of the site with tributaries extending across the site which ultimately reach the river. West of the site and adjacent to the river are significant existing features, namely the George waste disposal site (dump) and the Gwaing Wastewater Treatment Works (WWTW). Southeast of a site is an existing industrial area located between the N2 highway and York Street.

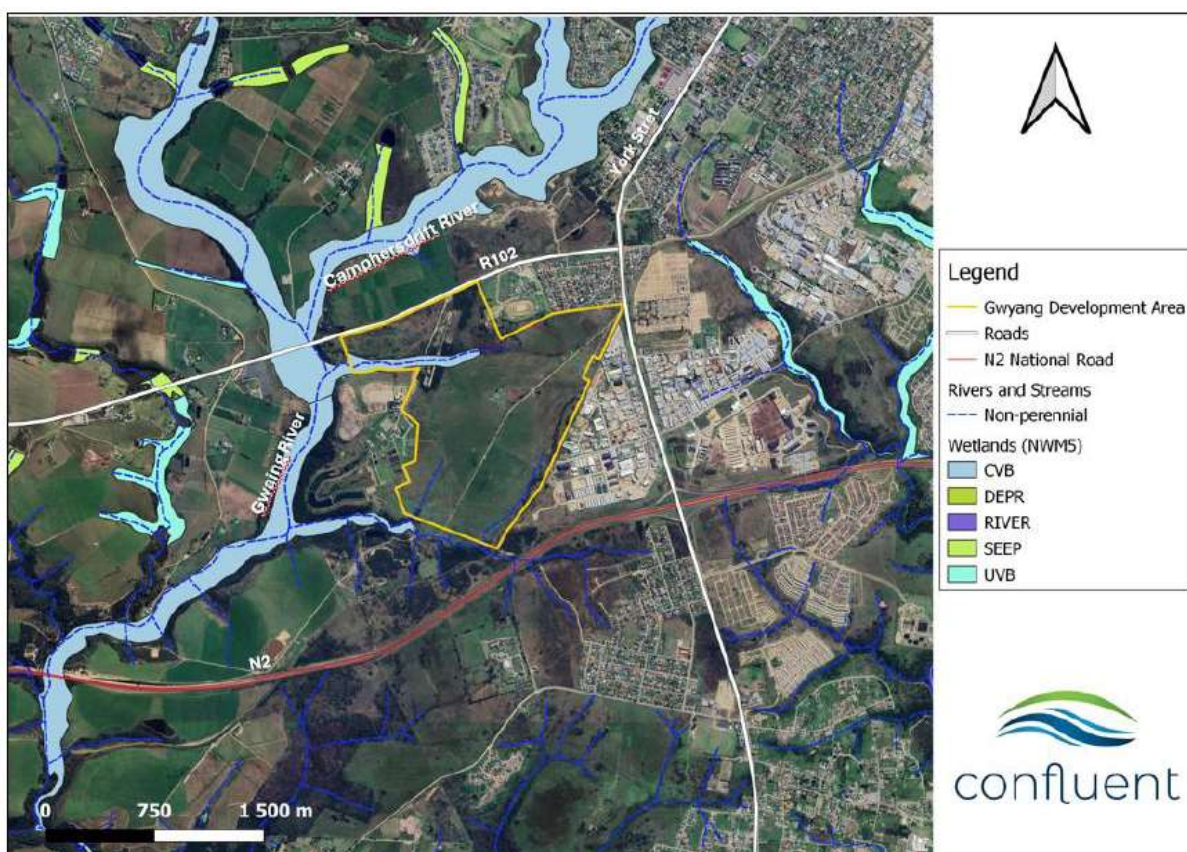


Figure 1. Location of the proposed development area on RE/464 in George showing mapped watercourses and roads for reference.

1.2 Development Layout

The development is proposed by the George Municipality, who would like to create registrable erven for release in an integrated mixed-use development. Terrestrial Animal Species inputs were provided to inform the conceptual development plan, which has subsequently been

revised to produce at least two alternative layouts, and may still be modified to accommodate various requirements and site sensitivities.

For both layouts, the development assessed in this report would result in the development of significant residential areas for expansion in the form of group housing and apartments. Industrial areas would include light and heavy industry, but the specifications were unknown at the time of writing. Large business / retail complexes referred to as 'big box developments' are planned for along the R102, and facilities supporting the local community such as a creche and religious centre would be incorporated. The development would need be serviced by an interconnected network of roads and would require the installation of supporting services such as water and sewerage connections and pipelines.

The proposed relative precinct positions were provided by George Municipality in Figure 2, aiding as a high-level guide to the desired conceptual layout. Following this, a preferred Site Development Plan (SDP) was developed (Figure 3).



Figure 2. Relative precinct positions for consideration (George Municipality).

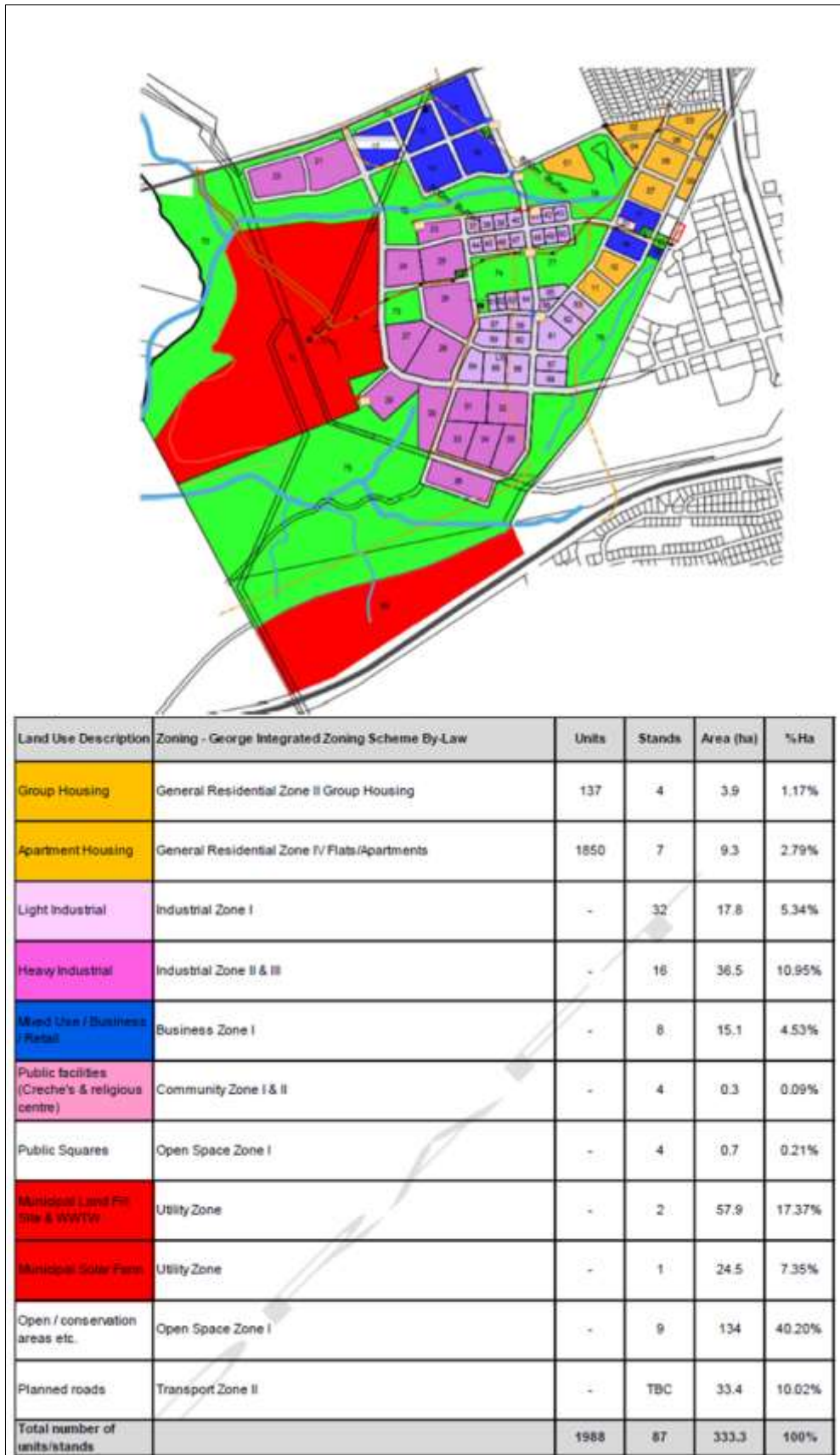


Figure 3. Preferred Site Development Plan layout and land use areas.

Following a series of engagements between the biodiversity specialist team, planning, designers, and project managers, an alternative Site Development Plan was developed (Figure 4). Benefits of the Alternative SDP are that it aims to cross fewer watercourses at less sensitive points, avoid an area of sensitive fynbos, and avoid an area adjacent to the airport road where golden moles have been recorded.

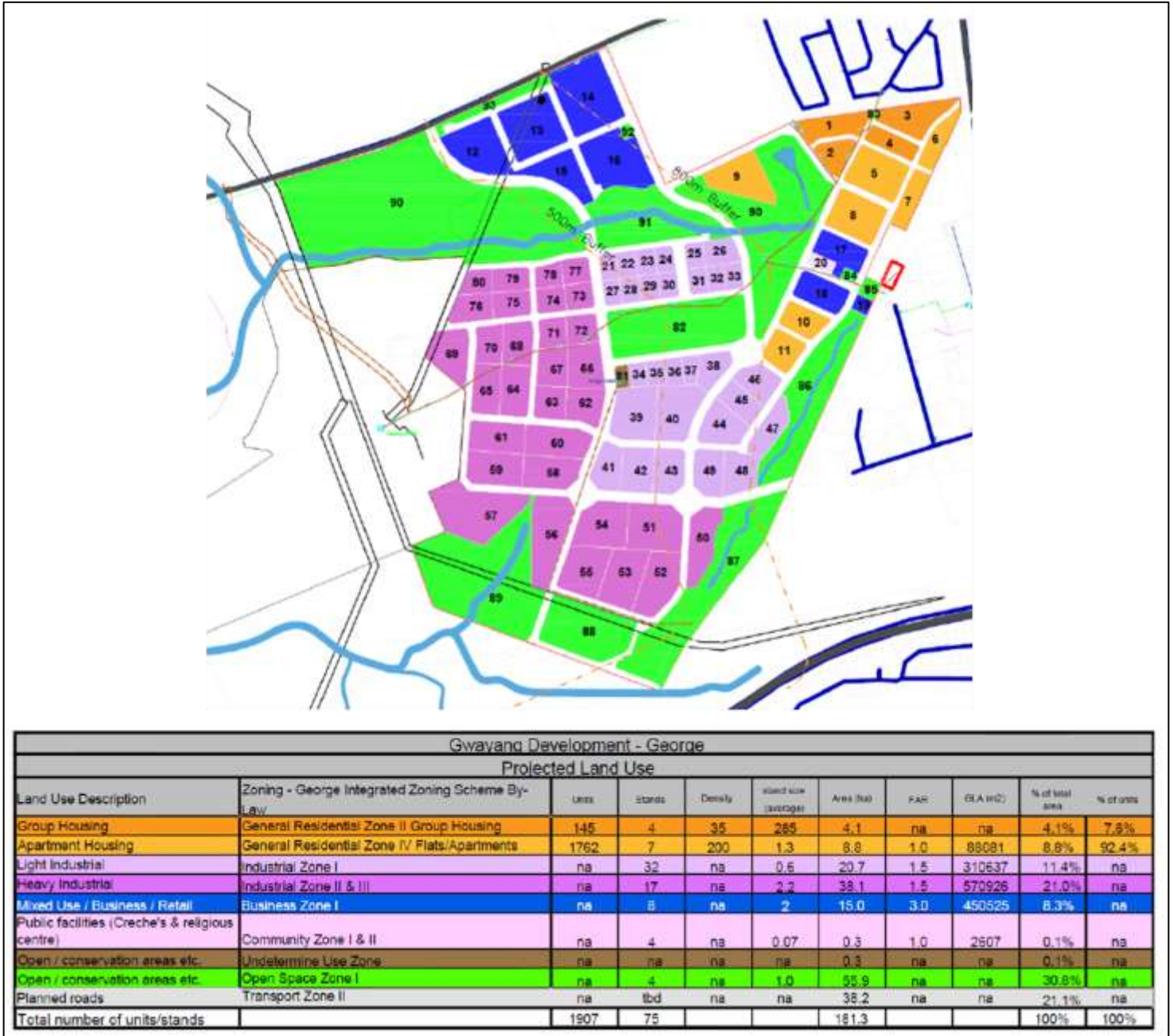


Figure 4. Alternative Site Development Plan layout and land use areas following engagement with biodiversity specialists.

2. TERMS OF REFERENCE

2.1 Online Screening Tool

The scope of work for this report is guided by the legislative requirements of the National Environmental Management Act (NEMA; Act 107 of 1998). The Department of Forestry, Fisheries and the Environment (DFFE) Screening Tool determined a HIGH and MEDIUM sensitivity for the terrestrial animal species theme across Gwayang Precinct (Figure 5), with several animal Species of Conservation Concern (SCC) potentially present (Table 1).

As per Published Government Notice No. 1150 of the Government Gazette 43855 (30 October 2020):

A **HIGH** sensitivity rating indicates:

1. Confirmed habitat for SCC.
2. SCC, listed on the IUCN Red List of Threatened Species or South Africa's National Red List website as Critically Endangered, Endangered or Vulnerable, according to the IUCN Red List 3.1. Categories and Criteria and under the national category of Rare.

These areas are unsuitable for development due to a very likely impact on SCC.

A **MEDIUM** sensitivity rating indicates:

1. Suspected habitat for SCC based either on historical records (prior to 2002) or being a natural area included in a habitat suitability model for this species.
2. SCC listed on the IUCN Red List of Threatened Species or South Africa's National Red List website as Critically Endangered, Endangered or Vulnerable according to the IUCN Red List 3.1. Categories and Criteria and under the national category of Rare.

MAP OF RELATIVE ANIMAL SPECIES THEME SENSITIVITY



Figure 5. DFFE Online Screening Tool outcome for the terrestrial animal species theme for Gwayang Precinct. The property boundary (within which Gwayang Precinct site is located) is indicated by the blue dashed line.

Table 1. Animal Species of Conservation Concern (SCC) highlighted by the DFFE Online Screening Tool for Gwayang Precinct.

Sensitivity	Classification	Scientific name	Common name	Red list status*
High	Amphibian	<i>Afrivalus knysnae</i>	Knysna Leaf-folding Frog	Endangered
High	Avifauna	<i>Circus ranivorus</i>	Marsh Harrier	Endangered
High	Avifauna	<i>Neotis denhami</i>	Denham’s Bustard	
High	Avifauna	<i>Bradypterus sylvaticus</i>	Knysna Warbler	Vulnerable
High	Avifauna	<i>Polemaetus bellicosus</i>	Martial Eagle	Endangered
Medium	Amphibian	<i>Afrivalus knysnae</i>	Knysna Leaf-folding Frog	Endangered
Medium	Avifauna	<i>Stephanoaetus coronatus</i>	Crowned Eagle	Vulnerable
Medium	Avifauna	<i>Neotis denhami</i>	Denham’s Bustard	Vulnerable

Medium	Mammal	<i>Sensitive species 8</i>	-	Vulnerable
Medium	Invertebrate	<i>Aneuryphymus montanus</i>	Yellow-winged Agile Grasshopper	Vulnerable

2.2 Scope of work

The purpose of this report is to verify the site sensitivity of Gwayang Precinct for the terrestrial animal species theme in accordance with the protocols specified in the Published Government Notice No. 1150, Government Gazette 43855 (30 October 2020).

The site sensitivity verification includes:

- A desktop assessment, to:
 - Characterize the vegetation, climate, general habitat features and topography of the property.
 - Assess the property's location within the context of the Western Cape Biodiversity Spatial Plan (WCBSP).
 - Conduct a historical assessment of the property and immediate surroundings for any disturbances, development and changes in land use or habitat characteristics over time.
 - Provide information on the habitat requirements for SCC highlighted by the DFFE online screening tool, in addition to other SCC indicated through online resources (e.g. Virtual Museum, iNaturalist) for the property and surrounding areas.
- On-site inspection(s) and field assessments to:
 - Verify the current land use and identify current impacts or disturbances on the property.
 - Characterize faunal habitats, determine the habitat suitability and the likelihood of SCC occurring on the property.
 - Conduct taxa-specific sampling for SCC in suitable habitats.
- Any other available and relevant information from:
 - Discussions with landowners/neighbours.
 - Previous report findings for the property or surrounding areas.

Should the site sensitivity verification indicate a **LOW** sensitivity, then a Terrestrial Animal Species Compliance Statement will be issued.

Should the site sensitivity verification indicate a **HIGH** sensitivity, then a Terrestrial Animal Species Specialist Assessment will be compiled. As per the published protocols and guidelines (SANBI 2020), areas of medium sensitivity are also ascribed to a HIGH sensitivity if the SCC are likely to occur.

3. DESKTOP ASSESSMENT

3.1 Vegetation, Climate and General Habitat

George, Western Cape falls within the Fynbos biome and experiences a temperate climate year-round (Mucina and Rutherford 2006, Rebelo, *et al.* 2006). The mapped vegetation type over most of the site is Garden Route Granite Fynbos (Critically Endangered) with Cape Lowland Alluvial Vegetation (Endangered) along the Gwaing river - a detailed botanical specialist assessment for the site is available (B. Fouche, Confluent Environmental). Average temperatures range between 26°C and 6°C, with the hottest days experienced from December to March peaking around 36°C and the coldest days experienced from June-August falling to -1°C on cold nights. Rain occurs throughout the year in a bimodal pattern with peaks in autumn (April) and spring (October-November) (Figure 6).

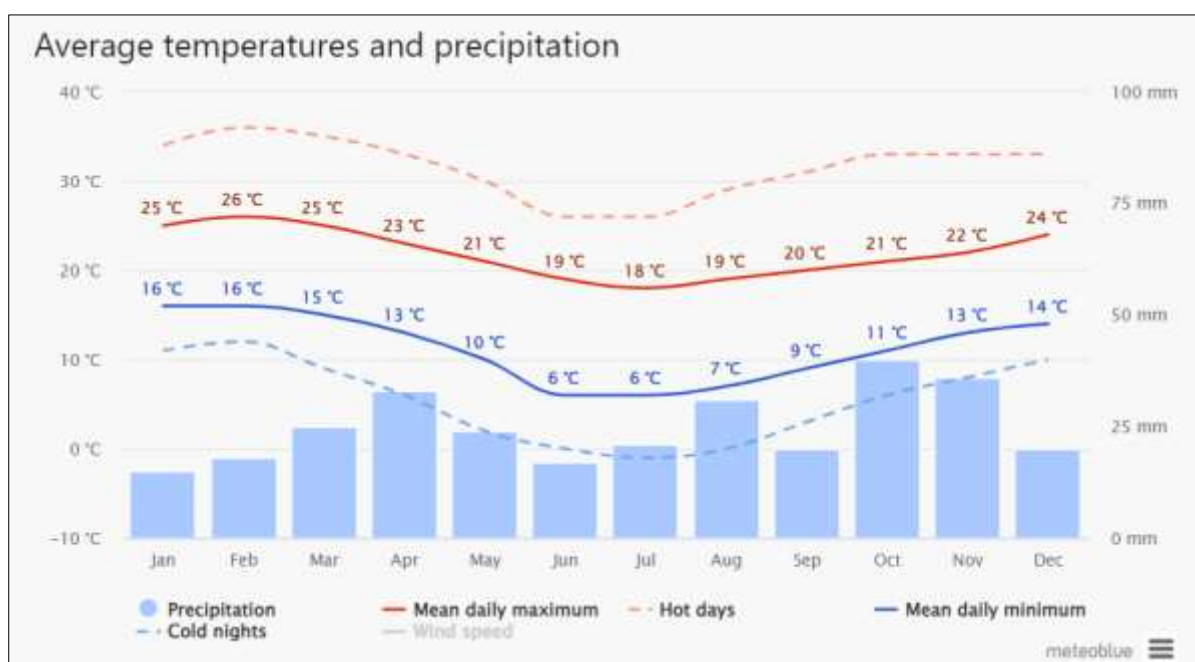


Figure 6. Summary of historical climate (modelled) for George (www.meteoblue.com).

Satellite imagery from Google Earth and Cape Farm Mapper was used to assess general vegetation structure, elevational gradients and water bodies (NWM5) within the project area (Figure 7). The site is largely transformed by agriculture (dry pasture) and alien plant invasion is seen predominantly along the Gwaing River in the west, but also prevalent to the south of the site. Topography is flat to gently sloping areas over much of the agricultural fields in the centre of the site, and high gradient slopes are seen along the Gwaing riverbanks and tributary valley sides. A detailed aquatic specialist report is also available for the site (J. Dabrowski, Confluent Environmental).

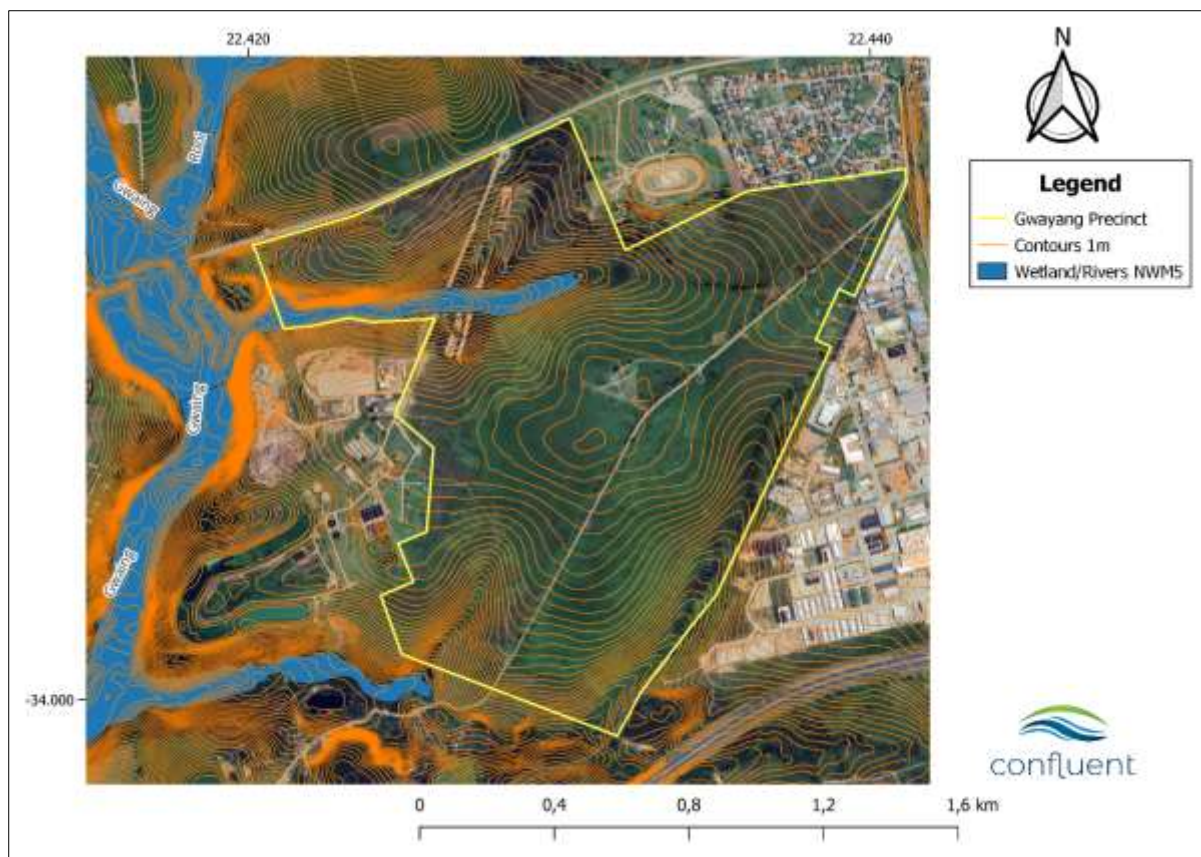


Figure 7. Satellite imagery of Gwayang Precinct showing topography (1m contours), vegetation structure and mapped watercourses (NWM5).

3.2 Western Cape Biodiversity Spatial Plan

Additional mapping layers were applied to Gwayang Precinct to include the Western Cape Biodiversity Spatial Plan (WCBSP) (CapeNature 2017), with Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs) assessed in Figure 8 and Table 2. Most of the site does not contain WCBSP layers (i.e. the agricultural/pasture areas), however the mapping layers that are present align closely with mapped waterbodies and watercourses (Figure 8). The Gwaing River in the west is predominantly a CBA1 and the two westerly flowing tributaries are mapped as CBA1, CBA2 and ESA2. A large section of the south-western portion of the site is also mapped as a CBA2 indicating a degraded area that needs restoration.

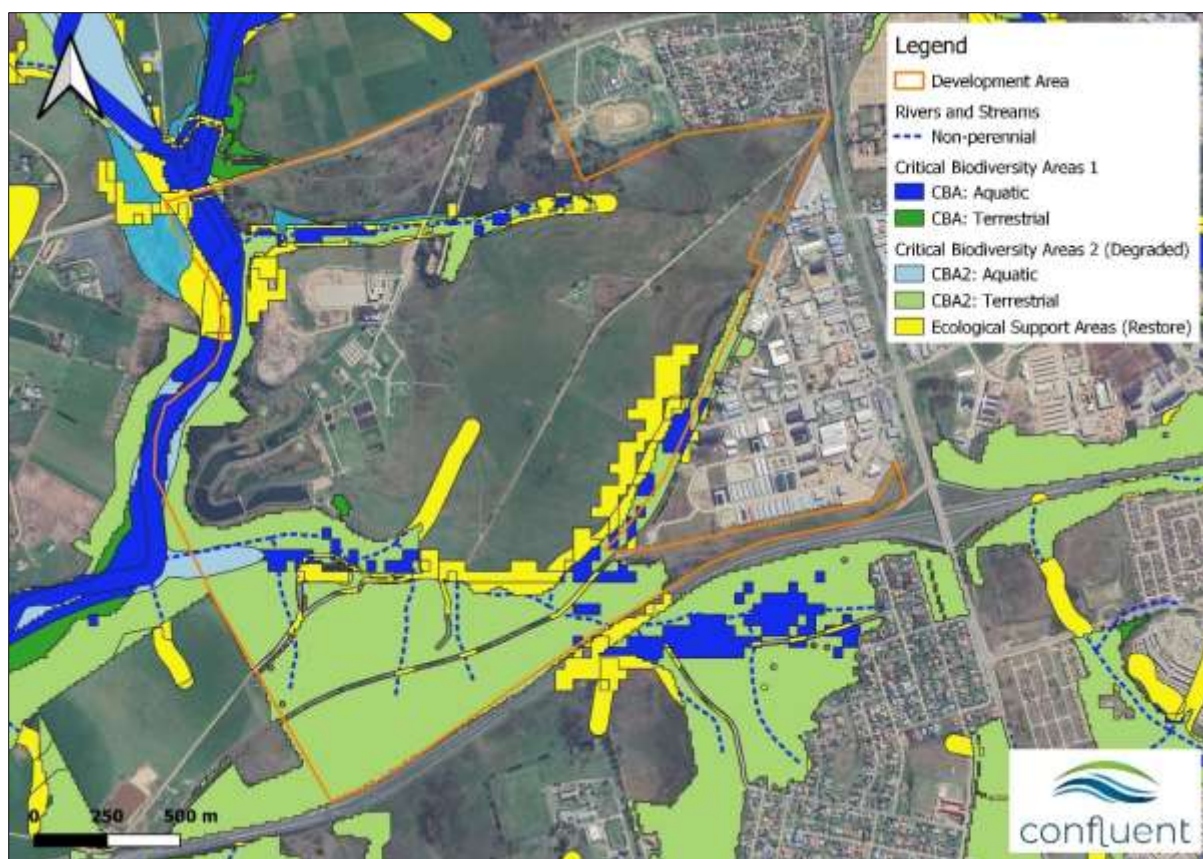


Figure 8. Site map of Gwayang Precinct with layers for the Western Cape Biodiversity Spatial Plan's Critical Biodiversity Areas (CBA) and Ecological Support Areas (ESA).

Table 2. Definitions and objectives for conservation categories identified in the Western Cape Biodiversity Spatial Plan (CapeNature 2017).

WCBSP Category	Definition	Management Objective
Critical Biodiversity Area 1 (CBA1)	Areas in a natural condition. Required to meet biodiversity targets for species, ecosystems or ecological processes and infrastructure.	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.
Critical Biodiversity Area 2 (CBA2)	Areas in a degraded or secondary condition. Required to meet biodiversity targets for species, ecosystems or ecological processes and infrastructure.	Maintain in a functional, 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.
Ecological Support Area 2 (ESA 2)	Areas severely degraded or have no natural cover and ecological functioning severely impaired. Not essential for meeting biodiversity targets but support ecological	Restoration required to return ecological functioning. Some limited habitat loss may be acceptable. A greater range of land uses over wider areas is appropriate but ensures

	functioning and delivering ecosystem services.	the underlying biodiversity objectives and ecological functioning are not compromised.
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3.3 Historical Assessment of Project Area

Gwayang Precinct has experienced significant disturbance over the last 88 years (Figure 9).

1936: The site was mostly natural fynbos vegetation with no evidence of alien trees seen in the landscape. Agriculture is taking place in the west and there is a road running diagonally across the site (north-east to south-west). The railway in the south and along the eastern boundary is also present.

1957: Beginnings of alien plant invasion (Black Wattle, *A. mearnsii*) seen along the outskirts of the site, especially to the south. Alien plant invasion is also seen along tributaries to the Gwaing River in the north and south of the site itself. New agricultural fields seen to the north and south on adjacent properties. Excavations observed in the north of the site, most notably in the north-western corner.

1974: The site is now extensively utilised for agriculture. Alien plant expansion and thickening is seen along the Gwaing River (to the west) and its tributary to the south of the property, although the tributary within the northern section of the site appears to have been cleared to expand agricultural pastures. The excavation in the north-west of the site is still clearly evident, and a new excavation appears in the south of the site.

1989: The excavation in the north of the site has been expanded and is now actively used as an old landfill site. There are also extensive excavations in the south of the site. Construction on and around the site has taken place, with the N2 highway now seen in the south, the showgrounds in the north and the Waste Water Treatment Works (WWTW) ponds in the west. The radio flyers club mini runway has also been established in the middle of the site. Urban development (an industrial area) is also seen to the east of the site.

2003: Substantial alien vegetation thickening has occurred along the Gwaing River and all its tributaries including the northern section of the site. The excavations in the south of the site have now been almost completely revegetated and experience the densest invasion of alien plants. Irrigation circles appear in the middle of the site as pastures are irrigated. The landfill closest to the R102 road (north-west of site) appears to be decommissioned, and the beginnings of the present-day landfill just to the south thereof (outside the site, along the Gwaing River) are seen. Residential development is also taking place around the showgrounds in the north of the site and the industrial area to the east is expanding. An artificial stream appears to have formed in the east of the site alongside the industrial area and is likely a consequence of stormwater runoff.

2006: Extensive earthworks (scraping/grading) has occurred throughout the north-western section of the site, likely to rehabilitate the old landfill site. Only the section south of the small road across this area has been left undisturbed. Some development is taking place at the WWTW and near the present-day landfill site. Irrigation is still occurring on the agricultural pastures.

2011: The north-western section (old landfill site area) has completely revegetated now, and the new landfill site's excavations are expanding. The shooting range in the north of the site is evident now. Irrigation is still occurring on the agricultural pastures. Additional clearing and new mini-runways are seen at the radio flyers club in the middle of the site.

2024: Substantial clearing has occurred around the present-day landfill area. Extensive alien vegetation thickening has occurred throughout the Gwaing River and its tributaries on and around the site. Additionally, the disturbed old landfill site in the north-west is showing more shrubby vegetation growth now, and the shooting range to the north has experienced a lot of alien tree invasion. Irrigation of the pastures appears to have ceased. The industrial area to the east of the site has expanded significantly, and the artificial stream stemming from this along the eastern boundary seems to have increased in water capacity (more runoff) and the density of vegetation alongside it.

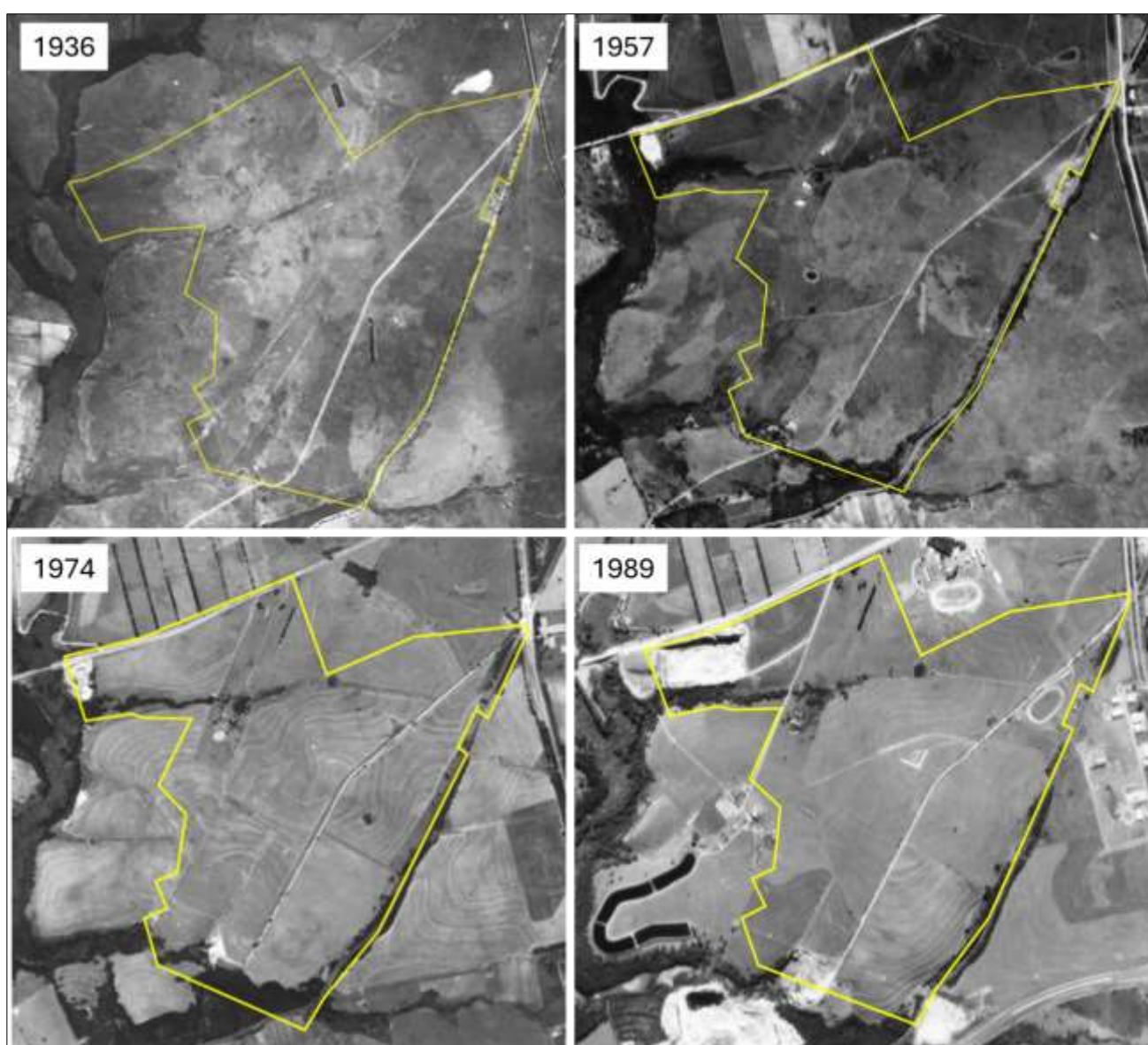


Figure 9. Historical imagery of Gwayang Precinct (indicated by the yellow line) for 1936-1989. Images sourced from the CD: NGI geospatial portal.

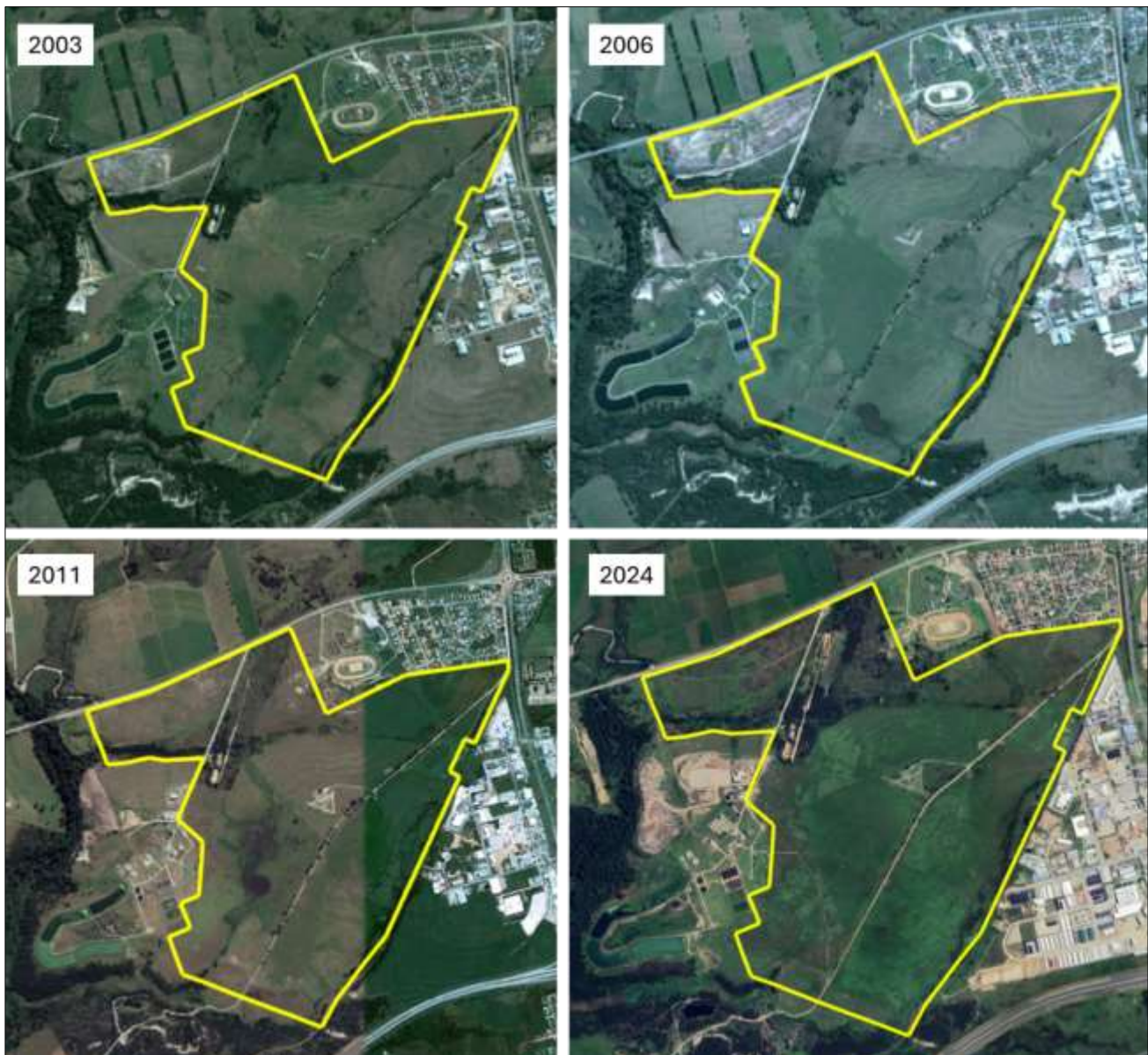


Figure 10. Historical imagery of Gwayang Precinct (indicated by the yellow line) for 2003-2024. Images sourced from Google Earth.

A present-day image of the site has been overlaid with areas of historical and present modifications and large-scale disturbances (Figure 11). Agricultural fields were not identified in this figure but make up the bulk of the remainder of the site. Fields are currently utilised for grazing cattle and were historically irrigated with moveable sprinklers using water from the WWTW. Kikuyu grass was sown on some of the fields for the purpose of commercial supply of instant lawn. This operation has ceased along with the irrigation.

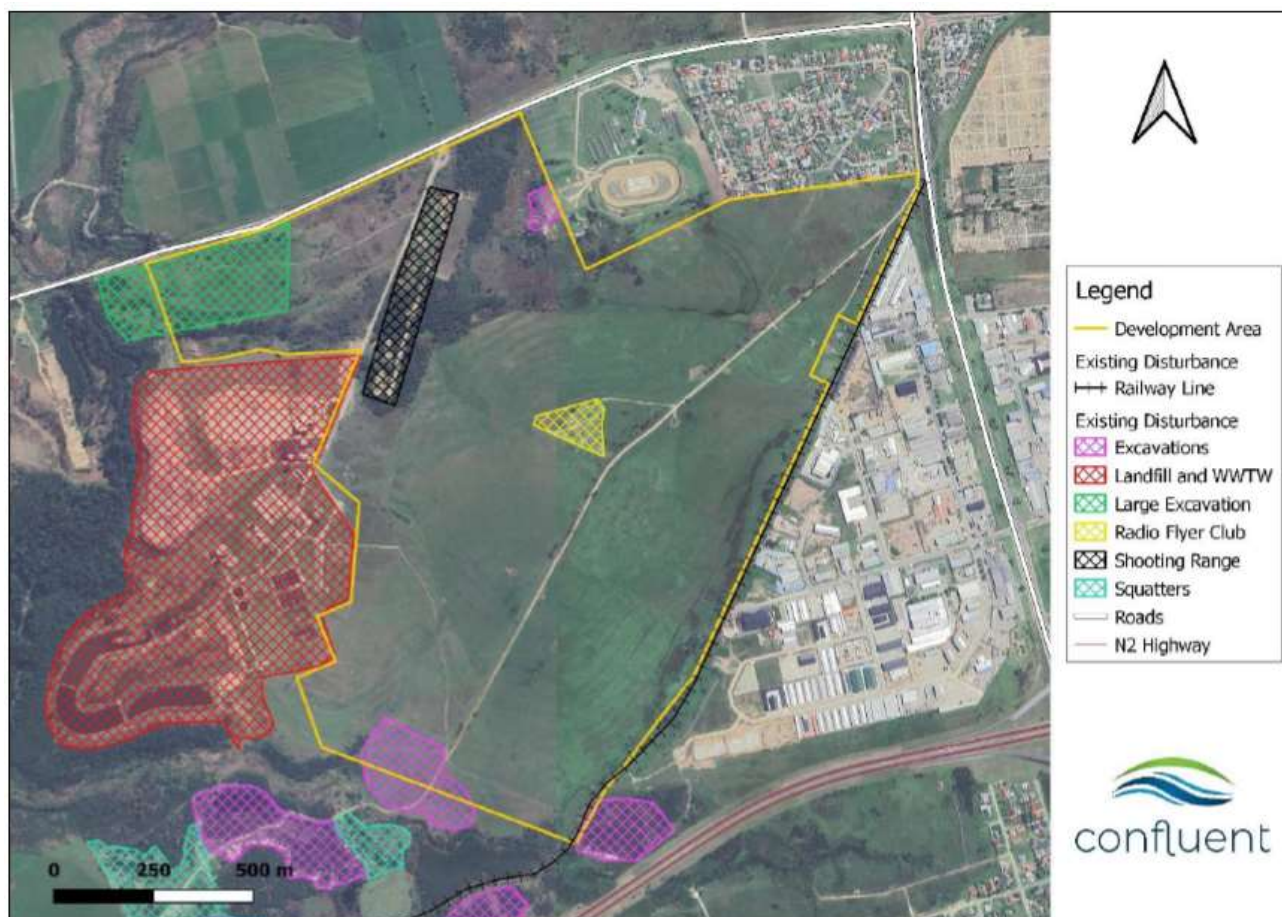


Figure 11. Map of the development area and immediate surrounds showing existing and recent disturbances to the site.

3.4 Species of Conservation Concern

In addition to the SCC highlighted by the DFFE screening tool (Table 1), the following public resources were consulted to provide additional SCC for Gwayang Precinct and its immediate surroundings:

1. iNaturalist (all taxa) within 4 km x 4 km of the project area ([URL for iNaturalist search area](#)).
2. Virtual Museum for herpetofauna, mammals and invertebrate taxa within the Quarter Degree Squares (QDS) 3322CD and 3422AB (as the site borders these): DungBeetleMAP, FrogMAP, LacewingMAP, LepiMAP, MammalMAP, OdonataMAP, ReptileMAP, ScorpionMAP, SpiderMAP.
3. South African Bird Atlas Project (SABAP2) for pentads 3355_2225, 3400_2225, 3355_2220 and 3400_2220 (as the site borders these).

Some SCC reported on the platforms were highly unlikely to occur the site given either clearly unsuitable habitat or being deemed a vagrant/transient animal. For example, given that the property does not contain any coastal/marine habitats, all animals reliant on such habitat for their existence are therefore highly unlikely to occur on site. For the purposes of this report

these animals were excluded from further assessment (see also Section 4.2 and Appendix 1 for additional information).

The combined list of SCC (from DFFE Screening Tool and public resources) possibly occurring on the property, along with their habitat, breeding and feeding requirements are listed in Table 3. The information for each SCC presented in Table 3 stems largely from the online SANBI Red List of South African Species (<http://speciesstatus.sanbi.org>) in addition to a few key resources for each taxa:

4. Avifauna: Roberts Birds of Southern Africa VII (Roberts, et al. 2005)
5. Mammals: The Mammals of the Southern African Subregion (Skinner 2005)
6. Invertebrates:
 - Field guide to the insects of South Africa (Picker, Griffiths and Weaving 2019)
 - Field guide to the butterflies of South Africa (Woodhall 2005)
 - Field guide to the spiders of South Africa (Dippenaar-Schoeman 2023)
7. Amphibians: A complete guide to the frogs of Southern Africa (Du Preez and Carruthers 2015)
8. Reptiles: A guide to the reptiles of Southern Africa (Alexander 2013)

Any information presented from different sources is cited in the text.

Table 3. Summary of habitat, breeding and feeding requirements for animal SCC potentially occurring on Gwayang Precinct.

Species	Red list status	Habitat	Breeding	Feeding
AVIFAUNA				
<i>Circus ranivorus</i> Marsh Harrier ¹	Endangered	<ul style="list-style-type: none"> -Considered a waterbird. -Roosts on taller trees around wetland edges from where it has a good vantage point. -Can adapt to novel wetland habitats such as wastewater treatment works 	<ul style="list-style-type: none"> -Breeding occurs between September and December. -Egg-laying is from August to November in South Africa. -Nests made of grass, reed stems or sticks in reedbeds, short sedge areas or in trees along the water's edge. - The same nest is often reused by the same pair in following years. 	<ul style="list-style-type: none"> -Dietary assessment (Simmons <i>et al.</i>, 1991) of pellets and prey deliveries to nests includes birds, frogs, fish, eggs and micromammals (<i>Rhabdomys</i>, <i>Otomys</i>, and Shrews). -Hunts primarily in wetland habitats using various flight methods including soaring, hovering and low flight over wetlands and along the water's edge. - May hunt in open grasslands or pastures near wetland areas.
<i>Polemaetus bellicosus</i> Martial Eagle ¹	Endangered	<ul style="list-style-type: none"> -Savanna, Karoo shrubland, semi desert. -Can occur in open farmland with clumps of trees. -Rare in mountainous and forest areas. 	<ul style="list-style-type: none"> -Monogamous, pair bond lasts several seasons. Solitary nester. -Nest is a substantial platform of sticks (up to 1.5m long and 3cm thick) on tall trees or pylons. -Nest tree usually tallest in vicinity, and nest placed in a large fork 	<ul style="list-style-type: none"> - Mainly small mammals like hare, jackal, small antelope, mongoose, small baboons, but also small stock animals, birds (especially gamebirds) and reptiles (especially monitor lizards). - Usually hunts on the wing by soaring high and attacking in long slanting stoop. Surprises prey by using available cover.

¹ DFFE Online Screening Tool

			<p>below the canopy. Rarely uses rocky outcrops.</p> <p>-One egg is laid, with incubation 48-53 days predominantly by female bird.</p>	<p>Occasionally hunts from perch, especially at waterholes or along game trails.</p> <p>- Prey killed by impact or strangulation and taken to high perch to eat.</p>
<p><i>Bradypterus sylvaticus</i></p> <p>Knysna warbler¹</p>	Vulnerable	<p>-Inhabits dense understorey vegetation along riverbanks in fynbos forest patches, riverine woodland and afro-montane forest and has even adapted to thickets of non-native brambles (e.g. <i>Rubus</i>). (BirdLife International, 2016).</p>	<p>-Breeds from August and December coinciding with the greatest abundance of invertebrate species.</p> <p>(BirdLife International, 2016).</p>	<p>-Mostly on ground, creeping through dense, matted vegetation and scratches in humus</p> <p>- Eats mostly grasshoppers, insect larvae, spiders, slugs, worms.</p>
<p><i>Falco biarmicus</i></p> <p>Lanner Falcon²</p>	Vulnerable	<p>- Most frequently in open grassland or cleared woodlands and agricultural lands.</p> <p>-Breeding pairs favour habitat close to cliffs, but will also be found near alternative roosting sites like electricity pylons, buildings, large trees.</p>	<p>-Monogamous, long-term pair bond, territorial.</p> <p>-Nest is typically a simple scrape on cliffs, buildings or bird boxes, but will occasionally use stick nests from other species (including White-necked raven, Verreaux's eagle, Bateleur) in trees or electricity pylons.</p>	<p>- Hunts from high perch or from air, using speed to surprise and catch prey but also adept at using cover.</p> <p>- Prey taken in air and on ground.</p> <p>- Pairs can hunt cooperatively.</p> <p>- Prey mostly birds (>80%) but will also take reptiles and insects.</p>
<p><i>Neotis denhami</i></p> <p>Denham's Bustard¹</p>	Vulnerable	<p>- Inhabit a mosaic of cultivated pastures, agricultural crop-lands and natural vegetation, with seasonal variation in their preferences (Allan, 2003).</p>	<p>- Male courtship displays occur between August and January, but mainly in September and October (Allan, 2003)</p>	<p>- Ground-dwelling bird that forages in open grasslands and savannas (Tarboton, 1989)</p>

² SABAP2 pentads

		<ul style="list-style-type: none"> - Cultivated pastures are favoured habitat during winter in the southern Cape (Allan, 2003). - Harvested cereal crop fields (stubble fields) are favoured, but ploughed fields and fields with growing cereal crops are avoided (Allan, 2003). - Primarily inhabits open grasslands and African savannas (Allan, 2003). - Being large-bodied with low flight manoeuvrability also leads to preference for open habitat. - Preference for grasslands with a mix of short and tall grasses, and good visibility for foraging. - Proximity to water sources, such as rivers or wetlands, is important for drinking and potential foraging (Allan, 2003). - Avoids dense forests and habitats with high human disturbance. 	<ul style="list-style-type: none"> - Eggs are laid in September and October, with unfledged young present between September and January (Allan, 2003). - Preference for natural vegetation over pastures during summer breeding months (Allan, 2003). - Larger bird groupings occur in winter, while in summer smaller groupings or individual birds occur (Allan, 2003). - Nesting sites are concealed in open grasslands, often near vegetation or shrubs. - Females construct shallow ground nests lined with grass or plant materials (Allan, 2003). - Clutches consist of 1-3 eggs, incubated primarily by the female. <p>Incubation lasts around 21-24 days.</p>	<ul style="list-style-type: none"> - Diet is omnivorous including insects, seeds, fruit, and vegetation (Tarboton, 1989). - Grasshoppers, beetles and termites are important insect prey, especially in the breeding season (Allan, 2003). - Feeding technique is probing and pecking the ground with their long bills (Tarboton, 1989) -Opportunistically feed on grasshopper swarms.
<p><i>Sagittarius serpentarius</i></p> <p>Secretarybird²</p>	<p>Vulnerable</p>	<ul style="list-style-type: none"> -Grassland, open savanna, Karoo shrubland with scattered trees. -Can occupy other short-grass areas. 	<ul style="list-style-type: none"> -Monogamous, solitary nester. -Territorial with home ranges usually 50-60 km² around nests, actively defends against conspecifics. 	<ul style="list-style-type: none"> -Anything it can overpower: insects, reptiles, birds, small mammals. -Attracted to recently burnt areas for prey but does not eat carrion.

		<p>-Absent from rocky hills and dense woodlands.</p>	<p>-Nest is a large flat platform on top of flat thorn trees (<i>Senegalia</i> or <i>Vachellia</i> spp.) or black wattle (<i>Acacia mearnsii</i>).</p> <p>-Nests can be reused in successive years.</p> <p>-1-3 eggs laid, incubation 40-46 days.</p>	<p>-Most prey caught on ground with bill and swallowed whole.</p> <p>-Larger prey killed with downward blows of feet and torn up before swallowing.</p>
<p><i>Stephanoaetus coronatus</i></p> <p>Crowned eagle¹</p>	Vulnerable	<p>-Forest (including gallery forest), dense woodlands and forested gorges in savannas and grasslands.</p> <p>-Also in Eucalyptus and Pine plantations.</p> <p>-Perches for long periods, resting in canopy. Sometimes soars high over territory, then descends vertically to perch.</p> <p>-Manoeuvres agilely through thick forest, can take off vertically from forest floor.</p>	<p>-Monogamous, possibly long-term pair bond.</p> <p>-Territorial (at least 10 km²), solitary nester.</p> <p>-Tallest trees used to build large stick platform nest (sticks/branches up to 1.5m long, 3cm thick). Nest copiously lined with beachwood (<i>Faurea saligna</i>), Pine or <i>Eucalyptus</i> leaves/needles.</p> <p>-Nest often reused and added to in consecutive years, can reach up 2-3m diameter, 3m high.</p> <p>-Nest trees often at the base of cliff/ravine or at the edge of plantation. Nest trees usually White-stinkwood (<i>Celtis africana</i>), yellowwoods (<i>Podocarpus</i> spp.), Cabbage tree (<i>Cussonia spicata</i>)</p>	<p>-Predominantly feeds on mammals (96% diet) and mostly on hyrax, antelope and primates. Will also take porcupine, hares, mongoose, sometimes domestic stock and domestic cats/dogs. Avian prey includes Hadeda Ibis, Egyptian geese and domestic chickens. Reptile prey mainly monitor lizards.</p> <p>-Most prey taken on ground, but occasionally crashes into dense foliage in pursuit.</p> <p>-Frequently still-hunts (stalks prey) and hunts from concealed perches frequently above waterholes in evening waiting for antelope to drink.</p> <p>-Pair sometimes hunt monkeys cooperatively.</p> <p>-Prey struck with downward blow of open foot, massive hind claw penetrates the skull killing instantly.</p>

			<p>but also <i>Eucalytus</i> and Pine species.</p> <p>-Incubation 49-51 days. .</p>	<p>-Large prey that cannot be lifted are partly eaten and dismembered on the ground and then cached in trees.</p>
<p><i>Alcedo semitorquata</i></p> <p>Half-collared Kingfisher²</p>	<p>Near Threatened</p>	<p>-Clear, well-vegetated, fast-flowing perineal streams in forested habitat.</p> <p>-Stream habitat usually narrow and secluded with dense marginal vegetation, near rapids</p> <p>-Also occurs in estuaries and well-vegetated lake shores but generally avoids dams.</p>	<p>- Monogamous, solitary nester, territorial. Territory is ca. 1km of river.</p> <p>- Burrows into vertical river banks (usually 1m high) with overhanging vegetation and roots providing screening. Entrance usually 40 cm below top of embankment, and sometimes only 15cm above water. Burrow chamber lined with fish bones.</p> <p>- Laying dates Sep-Mar. Eggs incubated for >16 days, and brooding limited to 5 days. Nestling period ca. 27 days, and fledgling dependence on adults limited.</p>	<p>- Sits motionless on perch for long time before diving steeply into water. Rarely hovers above water.</p> <p>-Diet mainly fish (3-7 cm in size), carried back to perch to eat. Also consumes crabs, aquatic insects and amphibians.</p>
<p><i>Coracias garrulus</i></p> <p>European Roller²</p>	<p>Near Threatened</p>	<p>-Non-breeding migrant to South Africa, non-breeding range entirely within sub-Saharan Africa.</p> <p>-Most widespread in East and Southern African savannas. Occurs throughout South Africa in patchy distribution, but irregular visitor to Eastern and Western Cape.</p>	<p>- Non-breeding visitor to region.</p>	<p>-Frequently perches in open (branches, telephone poles/wires).</p> <p>-Forages from perch with sit-and-wait technique, also hawks insects in flight.</p> <p>-Attracted to bush fires.</p> <p>-Feeds predominantly on insects .</p>

		-Closed to open savanna, most common in broadleaf habitats with grassy clearings and less common in areas without a well developed woody cover.		
<i>Grus paradiseus</i> Blue Crane ²	Near Threatened	-Open grassland, grassland/Karoo, wetlands. -Habitats with >300mm per year annual rainfall. -Adapted to crop lands and pastures and tolerant of intense grazing or burnt grasslands.	-Monogamous, solitary nester. -Nests on wet ground (on a pad of vegetation) or dry ground (small layer of stones, dung, vegetation) -Often reuses same nesting site for several years	-Pecking and digging with bill. -Omnivorous, feeds on small bulbs, seeds, roots, insects, crabs, amphibians, fish and small mammals. -Eats crops (maize, lucerne, wheat) and sometimes noted as causing damage, but also eats insect pests. -Commonly feeds at small stock feedlots.
<i>Buteo trizonatus</i> Forest Buzzard ²	Least Concern (Regional), Near Threatened (Global)	-Afromontane forests and plantations (mainly Pine, but also <i>Eucalyptus</i>). -Generally unobtrusive, perching on large branches partially concealed under canopy, sometimes perching in open at the edge of forest edge.	-Monogamous, territorial, solitary nester. -Nest is platform of sticks, cup-lined with green leaves. Nests in plantations are smaller than in native forests. -Laying dates from August-November. -Breeding is confined to the Western Cape and Eastern Cape Provinces.	-Forages along forest edges and within (also plantations). Hunts mainly from perch. -Diet consists of small mammals (mice and moles), small birds, snakes, lizards, frogs and invertebrates.

MAMMALS				
<p><i>Myosorex longicaudatus</i></p> <p>Long-tailed forest shrew³</p>	Endangered	<p>- Typically associated with Afromontane evergreen forest, mostly preserved along the deep valleys and cooler south-facing slopes.</p> <p>- Also found in range of moist habitats in montane and temperate forests, forests edges, fynbos and boggy grassland. Depends on permanently moist microhabitats.</p> <p>-Long tail suggests an arboreal lifestyle.</p>	<p>- Not known</p>	<p>-Little known, but predominantly seeds and some insects.</p>
<p><i>Panthera pardus</i></p> <p>Leopard³</p>	Vulnerable	<p>-Wide habitat tolerance, but generally associated with rocky outcrops, hills, mountains and forests.</p> <p>-Manage to persist in areas of development provided there is adjacent cover of rocky hills or forest.</p>	<p>-Solitary animals with males and females holding territories and defend against same sex.</p> <p>-No specific breeding season but has been found to peak in unison with some ungulate prey species births in certain regions (i.e. impala in Kruger National Park).</p> <p>-Oestrous lasts 7 days during which male and female copulate frequently.</p>	<p>-Nocturnal, solitary hunter.</p> <p>-Small to medium animals, usually ungulates < 70kg (Impala, Klipspringer, Grey Rhebuck, Cape Grysbok, Duiker) but also take Baboons, Hyrax, hares, rodents, reptile, livestock or domestic cats/dogs.</p> <p>-Usually drags larger prey items into cover (dense shrubs) or up trees.</p>

³ Virtual Museum QDS

			-Gestation 106 days and cubs remain with mother for 12months after which siblings remain together for a further 2-3 months.	
Sensitive Species 8 ¹	Vulnerable	<ul style="list-style-type: none"> -Specialised habitat requirements within a home range of approximately 0.75 ha. - Strong habitat preference for dense vegetation with good undergrowth providing good cover in which to retreat. -Forest, thicket, dense coastal bush, independent of water. -Can inhabit forest edges and transitional zones. -Requires diverse plant community with variety of tree and shrub species. -Can adapt to fragmented habitat given sufficient cover and food availability. -Actively avoids open grasslands, and areas with human disturbance. 	<ul style="list-style-type: none"> -Breeds throughout the year. -Males establish territories and exhibit aggressive behaviours towards other males and to attract females. 	<ul style="list-style-type: none"> - Highly selective feeders, often feeding on food below troops of monkeys or frugivorous birds which drop lots of material. - Preference for fruit, but also fallen leaves, flowers and insects. Seldom actively browse. -Active in the early morning and late afternoon, foraging for around 8 hours a day within their territory.
<i>Amblysomus corriae</i>	Near Threatened	-Sandy soils and soft loams in Mountain Fynbos, Grassy Fynbos and Renosterveld of South West Cape. Also Afromontane forest and	-Probably breeds aseasonally because pregnant females have been captured in August, May, and December.	-Insectivorous, mainly feeding on earthworms and insects.

Fynbos Golden Mole ³		<p>southern African moist savanna along the southern Cape coast.</p> <p>-Favours richer and wetter soils preferring forest fringes and associated fynbos.</p> <p>-Thrives in gardens, cultivated lands, golf courses and livestock paddocks. Can be present in exotic plantations, but at lower densities.</p>	<p>-Mean litter size is two; young are altricial and hairless at birth</p>	
<p><i>Poecilogale albinucha</i></p> <p>African Striped Weasel³</p>	Near Threatened	<p>-Rare in range and easily overlooked.</p> <p>-Predominantly nocturnal and well adapted to subterranean lifestyle.</p> <p>-Most abundant in savanna and grasslands, particularly with rainfall > 600mm per year. But habitat tolerance is very broad, found in lowland rainforest, semi-desert grassland, fynbos (with dense grass) and pine plantations (Child <i>et al.</i> 2016).</p>	<p>-Breeding season during spring and summer months in southern Africa.</p> <p>-Usually only one litter per season, comprises of 1-3 pups, fully grown at 20 weeks.</p>	<p>-Small mammal specialist, up to own body weight in size, but occasionally takes birds also.</p> <p>-Has fast metabolism and requires an abundance of prey in territory (Child <i>et al.</i> 2016).</p> <p>-Very close association with mole-rats, likely as a food source but also for habitat preference, especially in western, drier sections of its range (Child <i>et al.</i> 2016).</p>
TERRESTRIAL INVERTEBRATES				
<i>Aneuryphymus montanus</i>	Vulnerable	<p>-Very low area of occupancy between 100 and 1 000 km². Threatened by declining habitat due to invasion by aliens and habitat transformation.</p>	<p>-Little is known about the feeding requirements of this species.</p>	<p>-Little is known about the reproductive habits or requirements for this species.</p>

<p>Yellow-winged Agile Grasshopper¹</p>		<p>-Strong association with sclerophyllous fynbos vegetation on the southern slopes of the Outeniqua mountains, post-fire.</p> <p>-Threats to the species include habitat transformation and invasion by alien plants.</p>		
<p><i>Ceratogomphus triceraticus</i></p> <p>Cape Thorntail Dragonfly³</p>	<p>Near Threatened</p>	<p>-Wide range throughout the Western Cape.</p> <p>- Pools in streams, and occasionally in reservoirs. Rocky, shallow rivers, with deposition pools, and possibly farm dams.</p> <p>-Usually in fairly open or hilly country side.</p> <p>-Main threat is invasive alien trees, loss of habitat, water pollution and to lesser extent agriculture. Clearing of alien trees greatly benefits species.</p>	<p>Not known.</p>	<p>- Little is known, but taxon is insectivorous.</p>
<p><i>Ecchlorolestes nylephtha</i></p> <p>Queen Malachite Damselfly³</p>	<p>Near Threatened</p>	<p>-Known from streams near Storms River and in the Tsitsikamma Forest (Western Cape and Eastern Cape) (Samways 2006 in press).</p> <p>-Endemic to South Africa.</p> <p>-Occupies a very specific microhabitat inhabits small, fern-fringed streams in the deep shade of</p>	<p>-Little known, but the Genus typically lays eggs on tender green shoots of vegetation overhanging streams</p>	<p>- Little is known, but taxon is insectivorous.</p>

		the forest at relatively southerly latitudes (ca 34°S).		
AMPHIBIANS				
<i>Afrivalus knysnae</i> Knysna Leaf-folding Frog ¹	Endangered	<ul style="list-style-type: none"> - Typically inhabit endorheic (inward draining) wetlands with shallow water (< 50cm), high clarity, and sufficient vegetation suitable for breeding. - No streaming or running water recorded at any of the sites where they've been recorded. -The frog is associated with vegetation it can use for breeding which includes indigenous and exotic species. For example, slender knotweed (<i>Persicaria decipiens</i>) and kikuyu grass (<i>Pennisetum clandestinum</i>). -It requires a habitat with diverse plant species, including shrubs, grasses, and ferns, providing shelter and breeding sites (De Lange and Du Preez 2018). 	<ul style="list-style-type: none"> - Females lay eggs on leaves which are folded and sealed by males, creating a protected environment. - Breeding occurs during warmer wetter months such as September to November (F. De Lange 2019). - Breeding takes place near deeper parts of the waterbody, but still close to the water's edge. 	<ul style="list-style-type: none"> - Insectivorous, feeding on small invertebrates found in its habitat (e.g. insects and spiders). - Foraging behaviour includes actively searching for prey on the forest/fynbos floor and in the leaf litter. - Uses its sticky, projectile tongue to capture and quickly ingest prey. - Primarily active at night, relying on its vision to locate and capture prey in the darkness.

4. FIELD ASSESSMENT

4.1 Methods

Following the Species Environmental Assessment Guidelines (SANBI 2020) and Table 3, taxa-specific sampling techniques were conducted in habitats where SCC were likely to occur. Taxa-specific sampling was interspersed with a meander across the project area to collect additional opportunistic data for all fauna and inspect all habitat types (Table 4).

Table 4. Sampling techniques conducted for potential SCC occurring Gwayang Precinct.

Taxa	Field methods	Public platform where observations were reported
Avifauna	<ul style="list-style-type: none"> Meander* across site for direct observations. 12 point counts (5-minute bird counts). 	Birdclasser (species lists), iNaturalist (photos)
Mammals	<ul style="list-style-type: none"> Meander* across site for direct observations, tracks, scats and signs. Camera trapping (2 cameras active for 48 hours, spanning two nights). Sherman traps (3 habitats with 3 traps each (9 total)) set for two consecutive nights. Mole traps (2 traps set up for 2 consecutive nights in one habitat with ample mole activity). 	iNaturalist (photos)
Amphibia	<ul style="list-style-type: none"> Meander* across site for direct observations. Active searching. 	iNaturalist (photos)
Invertebrates	<ul style="list-style-type: none"> Meander* across site for direct observations. Active searching. Sweep netting. 	iNaturalist (photos)

* Meandering involved walking slowly across the site through various habitats and key landscape features. Active observations took place for all fauna throughout this walk which was then supplemented by taxa specific sampling methods in habitats deemed most suitable for SCC.

4.2 Assumptions and Limitations

- While the public platforms mentioned in Section 3.4 are excellent sources of additional information for animal species occurring within an area, these results require some expert interpretation to determine which of the SCC are relevant to include in the faunal assessment of the project area. For example, the coarse spatial scale of reporting within the Virtual Museum platforms (Quarter Degree Square level (27km x 27km) or SABAP2 pentad level (9km x 7 km) can result in species records from habitats quite different to those present on site. Additionally, these platforms include sightings of vagrant or transient animals upon which an assessment cannot reasonably be based. Expert

interpretation is therefore applied to the full list of SCC identified by the various public platforms (see Appendix 1) and some species are then excluded from further assessment due to the project area clearly lacking suitable habitat or the species clearly representing a vagrant or transient animal outside its normal range. The SCC assessed in this report therefore represent those which may reasonably occur on site. However, there is always the possibility that some SCC (although unlikely to occur on site) are overlooked in this process.

2. Ten field visits took place to the site for the faunal assessment. While this increased the likelihood of detecting animal species, this still only represents a few “snap-shots” in time and it is possible that SCC occurring on site were not observed during these visits. These results should not be treated as an exhaustive list of species occurring on site.
3. Site visits took place during daylight hours so the likelihood of encountering nocturnal species was limited. Camera traps were however used to assist in detecting nocturnal (and diurnal) animals over a 48-hour period. Sherman traps and live mole traps were set up and active over two consecutive nights to sample nocturnal small mammals.
4. The site visit coincided with late summer to autumn months. This may be of consequence for some species showing seasonal variation in breeding and activity patterns, particularly the frog SCC which has a decreased likelihood of detection outside its breeding season (Sep-Nov). This is however the optimal time of year to detect the presence of golden moles, which are generally most active in warmer and wetter conditions.
5. Evidence of animals in the form of tracks, scats and signs always brings with it a level of uncertainty, but best efforts were made in this regard and uncertainties are highlighted in the report.


4.3 Site Inspection Details

Ten site visits took place to Gwayang Precinct: 22 February, 7 March, 8 March, 9 March, 13 March, 24 March, 25 March, 26 March. Weather on site varied from cool and overcast to warm and sunny.

Habitats for fauna species identified during site visits are illustrated in Table 5 and mapped in Figure 12 below. The majority of the site is agricultural pasture, being actively grazed by cattle, with some areas having experienced past disturbances (compact soils or excavations evident) and have more shrubs and forbs present. Wetlands occur on the site, mostly within the tributaries to the Gwaing River, and range from seasonal to more permanent in nature with some dams observed as well. Alien plant invasion is seen around the site, including stands of Black Wattle (*A. mearnsii*) and areas of mixed alien plant species. Only one small patch of natural fynbos is present on site, but some other patches of disturbed/modified fynbos are also seen with these more densely vegetated and dominated by *Passerina falcifolia*.

During the site visits an effort was made to cover the site and inspect all habitat types, with sampling for SCC conducted in suspected suitable habitats (Figure 13).

Table 5. Fauna habitats identified on Gwayang Precinct during site visits.

<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Agricultural pastures</p>		
<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Disturbed grassy habitat</p>		
<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Wetlands and dams</p>		
<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Alien plant invasions</p>		

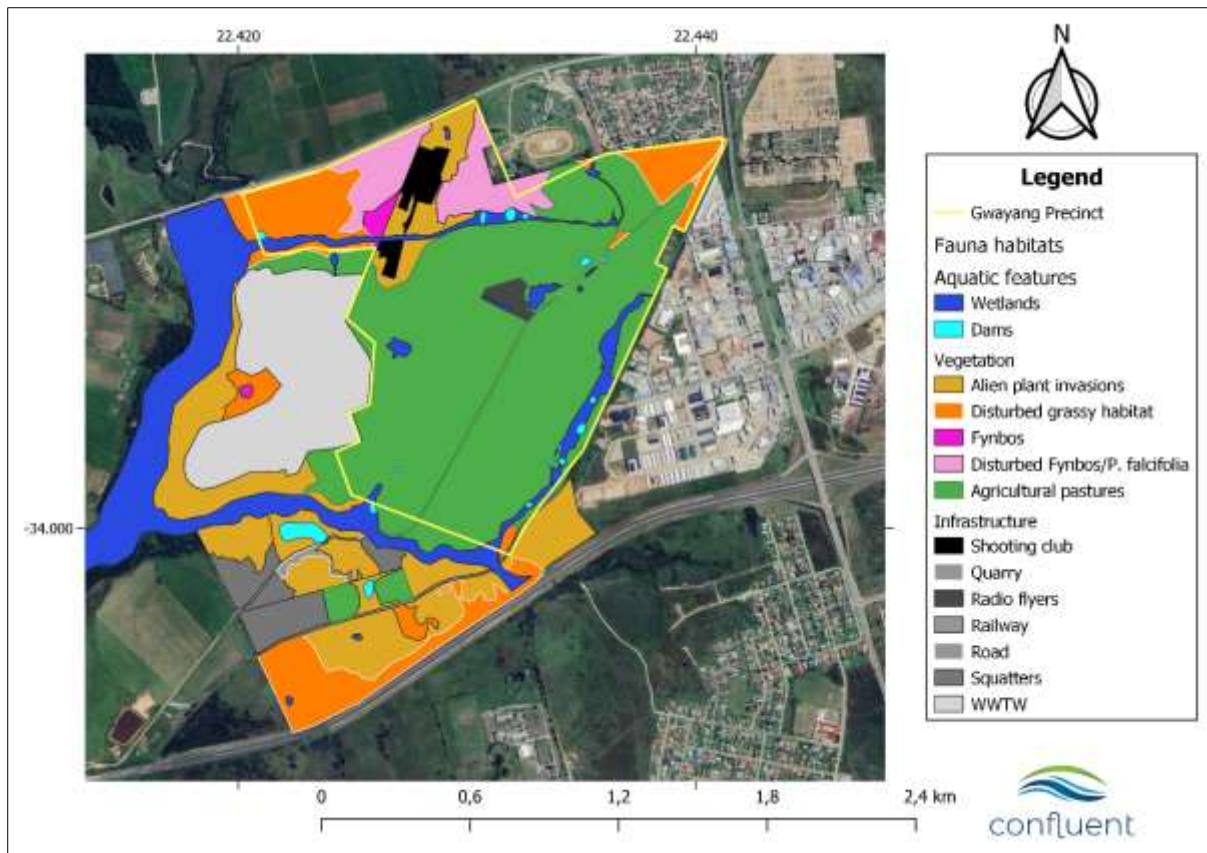


Figure 12. Mapped fauna habitats on Gwayang Precinct and immediate surroundings.

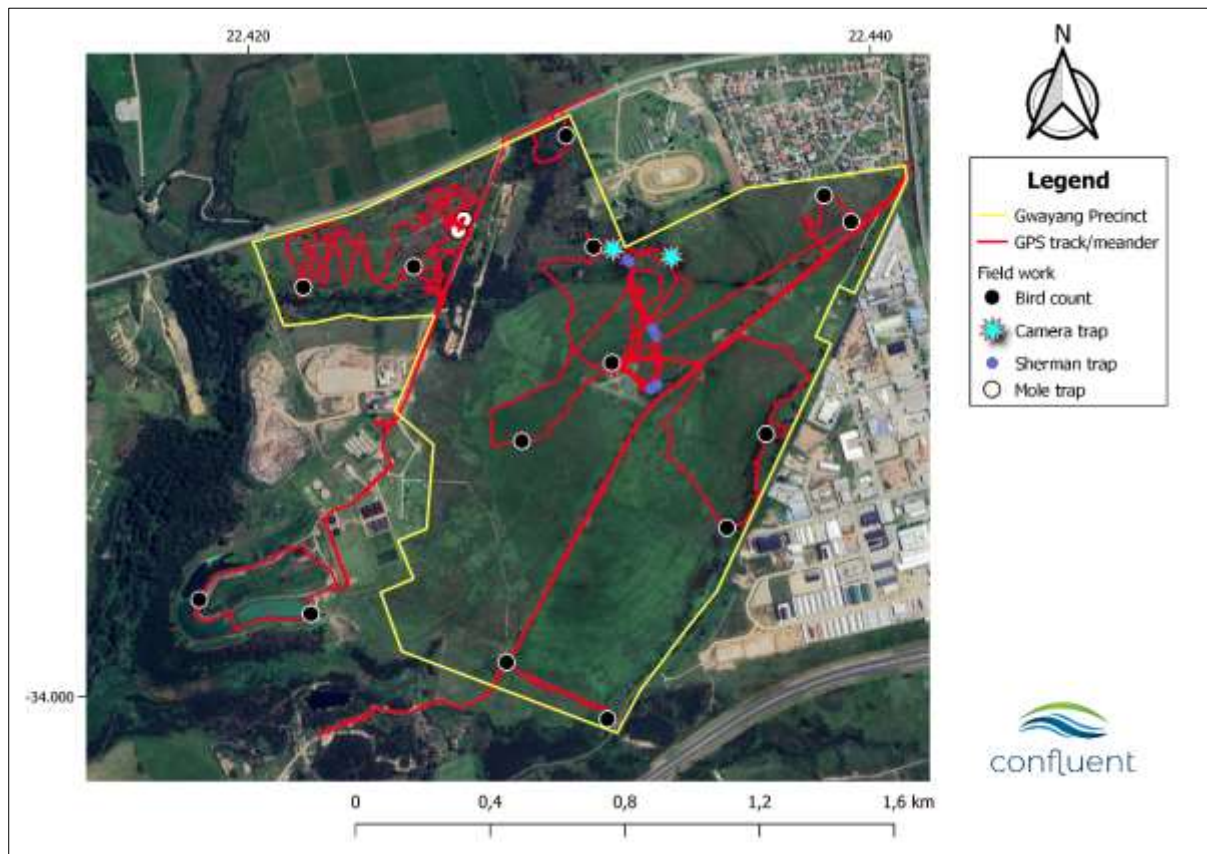


Figure 13. GPS tracks and fauna field work conducted during site visits conducted in February and March 2024.

4.4 Results

4.4.1 Avifauna

12 bird counts were conducted across the site in addition to opportunistic sightings noted throughout the meander and searching for nests/roosting sites in suspected habitat. A total of 46 bird species were identified on the site during the site visits (See Appendix 2, Figure 14).

One SCC, a Forest buzzard (*Buteo trizonatus*) was encountered during the site visits. Only one individual was seen along the stand of alien plant invasion near the entrance road to the landfill (next to the shooting range). Other non-SCC raptors were frequently encountered during site visits (e.g. Yellow-billed Kite, Booted Eagle, Long-crested Eagle), with a resident pair of Jackal Buzzards seen on almost every occasion. This indicates that the pastures have a healthy rodent/small mammal population and act as valuable hunting areas for birds of prey - see Mammal Section below for details of rodents found on site.

While not encountered during the field visits, the pastures (although modified environments) can act as suitable foraging habitat for two other SCC: Denham's Bustard (*Neotis denhami*) and Blue Crane (*Grus paradisea*). In conversation with the tenant leasing land for cattle grazing on the site, he mentioned seeing some bustard-like birds over the 20-year period he has been visiting the site.

An additional site visit (including two bird counts) was conducted to the WWTW facility to the west of the site on 26 March, to investigate suspected habitat for the African Marsh Harrier (*Circus ranivorus*) SCC, which has been documented to adapt to such facilities. This site visit revealed very limited habitat for this SCC, as only two ponds had reed fringes/collars and these were deemed too narrow to provide sufficient suitable habitat for the SCC (Figure 15). An additional 8 bird species were seen at the WWTW ponds, and given that these were mostly waterbirds, they were unlikely to occur on the Gwayang Precinct site (See Appendix 2).

Although not in the development footprint of the site, some areas adjacent to the western boundary are worth considering for impacts the development might have on avifauna in surrounding area. The landfill is a major attractant to birds that will feed off the waste (and associated rodent populations) and many birds are seen flying to and from the landfill each day (e.g. Sacred Ibis, Pied Crows, Kelp Gulls).



Figure 14. Some avifauna species seen during site visits to Gwayang Precinct. See Appendix 2 for species list of birds observed during site visits.



Figure 15. WWTW ponds to the west of Gwayang Precinct site, showing limited suitable habitat for the African Marsh Harrier (*C. ranivorus*) SCC. Most ponds have little to no suitable reed collars around them (top left), while others have narrow sections/patches of reeds and/or Typha (top right, bottom right). One pond had a larger patch of Typha/reed habitat (bottom left), although this was still deemed insufficient to be attractive or suitable for the SCC given its small size and isolation from other suitable habitats in the broader landscape. Cattle grazing (bottom right) and human disturbance also takes place around the ponds, further decreasing the chances of the SCC utilising this area.

4.4.2 Mammals

Evidence of the Fynbos Golden Mole SCC (*Amblysomus corriae*) was found in the northern section of the site near the land fill (Figure 16). Extensive sub-surface tunnelling, typical of this SCC, were evident near the patch of natural fynbos vegetation but this SCC can adapt to modified environments and extensive tunneling was also found within the disturbed fynbos and grassy habitats in the immediate surroundings as well. Consequently, two live (baited) mole traps were placed within this area to attempt to capture a golden mole over two consecutive nights (spanning 24-26 March 2024). Unfortunately, no golden moles were caught and therefore the precautionary principle is applied to this SCC.



Figure 16. Golden mole activity and sub-surface tunnelling seen in north-western section of the site within natural fynbos and modified/disturbed habitats.

Sherman traps were set in three habitat types (pasture, wetland, modified fynbos) to catch small mammals on site. Three traps were placed in each habitat, spaced 10m apart in a transect and were active over two consecutive nights. Two rodents were caught with this method: South African Vlei Rat (*Otomys irroratus*) and Four Striped Field Mouse (*Rhabdomys pumilio*) which are important prey species for raptors (see Avifauna section above also). Ample rodent burrows, runways and droppings were observed throughout the pasture, modified grassy habitat, fynbos and modified fynbos habitats on site.



Figure 17. Mammal species found on Gwayang Precinct during site visits: *Otomys irroratus* (rodent left top, left bottom); *Rhabdomys pumilio* (rodent right top, right bottom), Cape Bushbuck droppings (top right); Mole-rat mounds (bottom right).

Camera traps were set up in two habitats (invaded wattle stands and modified fynbos), baited with tinned fish to attract animals, and left active for 48 hours (spanning two nights). No animals were photographed during this time. Cape Bushbuck dung was found on site near the wetland habitat in the north of the site, and a lot of mole-rat activity was evident across the site with molehills found in all habitat types except in dense invaded (alien plant) areas.

4.4.3 Terrestrial Invertebrates

No SCC were found during the site visits and no suitable fynbos or aquatic habitat was identified for these species. Nonetheless, sweepnetting was conducted in various habitats and a preliminary species list includes invertebrates from 17 families found on site.



Figure 18. Invertebrates observed during site visits to Gwayang Precinct

4.4.4 Amphibians

No SCC were found during the site visits, however, one wetland on site presented as suitable habitat for the Knysna Leaf-folding Frog SCC (*A. knysnae*). However, the detectability of this SCC is greatly reduced outside its breeding season (Sep-Nov) and therefore species-specific sampling in the appropriate season is recommended to further confirm its presence/absence at this wetland.

A few other frog species (non-SCC) were heard calling at the same wetland: Bronze Cacos (*Cacosternum nanum*) and Striped Stream Frogs (*Strongylopus fasciatus*); while Clicking Stream Frogs (*Strongylopus grayii*) were heard at other wetlands and dams across the site.

4.4.5 Reptiles

No reptile SCC were highlighted for this site by the DFFE Screening Tool or any of the public platforms. As such, no targeted sampling took place for this group and no reptiles were opportunistically encountered on site.

4.4.6 Likelihood of Occurrence for SCC

Following the terrestrial fauna surveys and site inspection, the possible SCC occurring on Gwayang Precinct were evaluated according to their likelihood of occurrence. It is always possible that a species assessed as having a low probability of occurrence can still occur on the site, especially for the golden moles species which are listed as having a low likelihood of detection (SANBI 2020), and therefore this table should only be used as a guideline.

Table 6. Likelihood of occurrence for terrestrial fauna SCC on Gwayang Precinct.

Species	Red list status	Observed on site	Suitable habitat	Likelihood of occurrence	Reason
AVIFAUNA					
<i>Circus ranivorus</i> (Marsh Harrier)	Endangered	No	Possible	Low	No extensive marshland habitat typical for SCC. While the SCC has been documented to adapt to Waste Water Treatment Works facilities, the one adjacent to the site provide little vegetation/habitat suitable for this SCC and it is unlikely that it occurs here. The site is also disconnected from other suitable large wetland habitat and no sighting of the SCC have been reported in the immediate surroundings (last reported in 2020 within SABAP2 pentads). The WWTW and adjacent pastures experiences a lot of human disturbance and cattle grazing which likely to deter SCC, and it is therefore given a low likelihood of occurrence.
<i>Polemaetus bellicosus</i> (Martial Eagle)	Endangered	No	Possible	Low	Not typical habitat for SCC which prefers Karoo and Savanna habitat. Only marginal habitat present on site, with large trees only present along the Gwaing River for perching. Given the isolated and transformed nature of the site and its proximity to urban development, it is also anticipated that there is limited prey availability for the SCC. This site experiences a lot of human disturbance (cattle herding on pastures, people living in thickets/dense vegetation, a landfill site with a lot of human activity and busy roads). The SCC is given a low likelihood of occurrence.
<i>Bradypterus sylvaticus</i> (Knysna Warbler)	Vulnerable	No	No	Low	Only potentially suitable habitat along the Gwaing River to the west of site. No suitable habitat on site.
<i>Falco biarmicus</i> (Lanner Falcon)	Vulnerable	No	Possible	Low	SCC can adapt to urban landscapes and infrastructure for breeding, and the open pastures could act as hunting grounds. However, habitat transformation and agriculture are known threats decreasing habitat suitability for the SCC. Additionally, the SCC has not been flagged by the

Species	Red list status	Observed on site	Suitable habitat	Likelihood of occurrence	Reason
					DFFE Screening Tool for the site, indicating that the area is not mapped as suspected/known habitat. The SCC was last reported in the SABAP2 pentads in 2021. It is therefore given a low likelihood of occurrence on site.
<i>Neotis denhami</i> (Denham's Bustard)	Vulnerable	No	Yes	Medium-High	While not natural habitat, the open pastures on site can act as foraging habitat for SCC. However, the amount of human disturbance on site (frequent cattle herding, feral/hunting dogs, vagrants living in the dense vegetation) is likely to deter the SCC. Nonetheless, this species is given a medium-high likelihood of occurrence on site due to the suitability of the and size of pasture habitats and a discussion with long-time tenant (cattle farmer) indicating previous sightings of the SCC on site.
<i>Sagittarius serpentarius</i> (Secretarybird)	Vulnerable	No	Yes	Low	The SCC has not been flagged by the DFFE Screening Tool for the site, indicating that the area is not mapped as suspected/known habitat. While the pasture fields are potential foraging habitat, the amount of human disturbance and proximity to urban development is likely to deter the SCC. Sightings of the SCC on public platforms are rare, and therefore the SCC is given a low likelihood of occurrence.
<i>Stephanoaetus coronatus</i> (Crowned eagle)	Vulnerable	No	No	Low	No natural forest vegetation present on site. Only marginally suitable habitat in terms of tree cover is present near site in the invaded areas along the Gwaing River. The SCC is unlikely to occur on site.
<i>Alcedo semitorquata</i> (Half-collared Kingfisher)	Near Threatened	No	Low	Low	Gwaing river to the west of site is possibly suitable habitat for the SCC, but there is no suitable river habitat on site and the SCC is unlikely to occur.

Species	Red list status	Observed on site	Suitable habitat	Likelihood of occurrence	Reason
<i>Coracias garrulus</i> (European Roller)	Near Threatened	No	Possible	Low	Limited to no suitable habitat on site, as SCC prefers savanna-type habitats with well-developed woody cover. May use the pasture lands, but these are very open with limited shrub cover. Also documented as an irregular visitor to the Western Cape and therefore given a low likelihood of occurrence on site.
<i>Grus paradiseus</i> (Blue Crane)	Near Threatened	No	Yes	Medium	While no natural habitat is present on site, the SCC can adapt and utilise pastures/agricultural landscapes. The high levels of human activity on site is however likely to deter SCC, and therefore it is given a Medium likelihood of occurrence.
<i>Buteo trizonatus</i> (Forest Buzzard)	Least Concern (Regional), Near Threatened (Global)	Yes	Yes	Confirmed	Seen on edges of the wattle invasions in north of site.
MAMMALS					
<i>Myosorex longicaudatus</i> (Long-tailed forest shrew)	Endangered	No	Yes	Medium	No typical forest habitat on site, however suitable wetland/moist habitat is present. The site is highly transformed due to agriculture, alien plant invasions and earthworks and SCC is documented to be reliant on pristine primary habitat which is hardly present on site. However, there is an unconfirmed finding of the SCC near the Waste Water Treatment Works reported on a public platform due to a cat bringing it home. It is anticipated

Species	Red list status	Observed on site	Suitable habitat	Likelihood of occurrence	Reason
					that this suspected individual stemmed from along the Gwaing River or moist habitats outside the site which have experienced less disturbance and have denser tree cover. Nevertheless, the precautionary principle is applied and the SCC is given a medium likelihood of occurrence on site along the wetland extending through the north of the site towards the Gwaing River which appears less disturbed over time and has a direct link (corridor) to the suspected Gwaing River habitat.
<i>Panthera pardus</i> (Leopard)	Vulnerable	No	Marginal	Low	Limited suitable habitat with no rocky outcrops on site. While some dense cover exists, it is mostly restricted to the Gwaing river margins to the west and some alien plant invasions in the north and to the south of this site. A lot of human activity within and around the site (vagrant settlements, cattle herding, landfill used) likely deterring SCC and it is unlikely to occur on the site.
Sensitive Species 8	Vulnerable	No	No	Low	Little to no suitable habitat on site and a lot of human activity and hunting/feral dogs deterring SCC.
<i>Amblysomus corriae</i> (Fynbos Golden Mole)	Near Threatened	Possibly	Yes	Very High	Extensive subterranean tunnels found in the north-west of the site. Tunnelling was observed within a small patch of natural fynbos habitat as well as within the disturbed/modified habitats surrounding the old landfill site. While not possible to confirm the species identity given the observation of tunnels alone (genetic testing will be necessary), this sub-surface tunnelling behaviour is typical of golden moles. The precautionary principle is therefore applied and SCC assumed present.
<i>Poecilogale albinucha</i> (African Striped Weasel)	Near Threatened	No	Yes	Low	SCC has close association with mole-rats and feeds on small mammals, for both of which activity was seen across site. However, SCC is rare within its range, is actively persecuted for traditional medicine purposes (there are many vagrants and an informal settlement near to site), is negatively affected by overgrazing and reduction in grass cover (evident across most of the site) and feral dogs (present on site) are known to kill them due to competition for small mammal prey. The site contains all

Species	Red list status	Observed on site	Suitable habitat	Likelihood of occurrence	Reason
					these known negative impacts on the SCC and it is therefore given a low likelihood of occurrence.
TERRESTRIAL INVERTEBRATES					
<i>Aneuryphymus montanus</i> (Yellow-winged Agile Grasshopper)	Vulnerable	No	No	Low	No suitable sclerophyllous fynbos habitat on site. Site is highly transformed by agriculture and alien plant invasions.
<i>Ceratogomphus triceraticus</i> (Cape Thorntail Dragonfly)	Near Threatened	No	Possible	Low	Limited to no suitable stream/river habitat on site. While possible habitat might exist along the Gwaing river to the west of the site, it is frequently polluted and heavily invaded with alien plants making it unlikely to host the SCC.
<i>Ecchlorolestes nylephtha</i> (Queen Malachite Damselfly)	Near Threatened	No	Possible	Low	No suitable habitat on site. While possible habitat might exist along the Gwaing river to the west of the site, it is frequently polluted and heavily invaded with alien plants making it unlikely to host the SCC.
AMPHIBIANS					
<i>Afrixalus knysnae</i> (Knysna Leaf-folding Frog)	Endangered	No	Possible	Medium-High	One possibly suitable wetland found in north of site. Field work for this report took place outside SCC breeding/calling season thereby limiting the detectability of the SCC. The precautionary principle is applied, and SCC assumed to be present at this wetland until further field work is conducted during the appropriate time of year to increase detectability.

5. SITE SENSITIVITY VERIFICATION

After the site visit and fauna surveys, it is determined that the site sensitivity for the terrestrial animal theme of Gwayang Precinct is **VERY HIGH and HIGH**.

Based on the information in this report during the desktop and field assessment, the following reasons support this finding:

- The discovery of extensive subterranean tunnels near the small patch of natural fynbos near the landfill site indicating the highly likely presence of the Fynbos Golden Mole (*A. corriae*) SCC. Further investigation revealed extensive tunnelling across the entire north-western area, including also the old landfill site and the surrounding disturbed environment. Although not possible to confirm the identity of this species based on the tunnels alone, this area contains the last remaining patch of natural fynbos vegetation on the site, increasing the chances that the SCC occurs in this area.
- Although the pastures are modified landscapes, they are still of benefit to avifauna SCC that have adapted to utilize these open habitats for foraging, i.e. Denham's Bustard (*N. denhami*) and Blue Crane (*G. paradiseus*). While not possible to confirm their presence on site, during a conversation with a long-term tenant (cattle farmer) there was an indication that Denham's bustard was previously seen on site.
- The sightings of several raptor species including one SCC (Forest Buzzard, *B. trizonatus*) during the site visits indicates that the pasture areas serve as suitable hunting grounds and have healthy prey populations, including small mammals (vlei rat and striped field mouse were caught on site during Sherman trapping) and/or gamebird (guineafowl seen on site during each site visit).
- One wetland in the north of the site is potential habitat for the Knysna Leaf-folding frog (*A. knysnae*), although this cannot be confirmed as the field visit took place outside breeding season when the detectability of the SCC is low. An additional species-specific assessment/sampling is essential during the breeding season (Sep-Nov) to accurately determine the presence of this SCC. Until such species-specific assessment/sampling is conducted, the precautionary approach is applied for the SCC given the habitat suitability.
- While no typical forest habitat exists, there is possible wetland habitat on the site for the endangered Long-tailed Forest Shrew (*M. longicaudatus*). This SCC was not flagged by the DFFE online Screening Tool, none were observed on site, and across most of the site substantial habitat modifications have taken place (alien plant invasion, cattle grazing/agriculture), indicating that this is not ideal or typical habitat. However, the SCC has a low detectability probability, and a suspected individual was reported on a public platform on-site (found near the WWTW). As such, the precautionary principle is applied to this SCC, and the natural wetland in the north of the site is highlighted as most likely habitat given the best connectivity to the Gwaing River and generally having experienced less habitat alterations/impacts compared to the rest of the site.

As per the Published Government Notice No. 1150, Government Gazette 43855 (30 October 2020), the **VERY HIGH/HIGH** sensitivity ratings for Gwayang Precinct requires a Terrestrial

Animal Species Specialist be conducted for all SCC with a medium-very high likelihood of occurrence on site.

6. SITE ECOLOGICAL IMPORTANCE

Site Ecological Importance (SEI) is a standardised metric used to highlight areas of importance for species within a development site/property. It allows for transparent and comparable reporting of the site-based ecological importance of various areas/habitats and indicates the potential impacts of the development on associated SCC (SANBI 2020).

It is important to note that the SEI reported here is specific to the proposed development and associated activities of this report and can only be used to compare multiple layouts for this development.

SEI scoring is shown in Table 7 below (see Appendix 5 for SEI methods) and Figure 19 illustrates the SEI results for Gwayang Precinct. A guideline for interpreting SEI ratings is provided in Table 8.

Buffers have been applied to the habitats where the Long-tailed Forest Shrew (*M. longicaudatus*) and the Knysna Leaf-folding Frog (*A. knysnae*) SCC are likely to occur. Buffers of 40m are assigned these habitats, following the recommendation of the Aquatic Specialist, with the aim being to preserve the current ecological functioning and the immediate surrounding habitat of these wetlands. The 40m buffer is deemed sufficient for the Knysna Leaf-folding Frog, as this species is restricted to the periphery of its wetland habitat for foraging activities, seeks refuge in areas mainly at or around the edges of the wetland, breeding occurring within the deeper sections of the water and estivation is only known to occur within the wetland zone as well. The 40m buffer is also deemed suitable for the Long-tailed Forest Shrew, given that this is not typical forest habitat, these areas have been disturbed over time and that the preservation of the current wetland conditions, functioning and immediate surroundings will serve as a precautionary measure to benefit the SCC that likely only has a marginal occurrence in this habitat.

Table 7. Site Ecological Importance assessment for Gwayang Precinct. Conservation status for SCC is abbreviated to indicate Critically Endangered (CR), Endangered (EN), Vulnerable (VU) or Near Threatened (NT). When relevant, the extent of occurrence (EOO) is indicated as part of the justification for the conservation importance (CI) metric.

Habitat and associated SCC	Conservation Importance (CI)	Functional Integrity (FI)	Biodiversity Importance	Receptor Resilience (RR)	Site Ecological Importance (SEI)
Pastures and closely associated disturbed grassy habitat serving as foraging grounds for Denham's	HIGH SCC is VU listed under Criterion C, with EOO > 10 km ² .	MEDIUM Habitat is transformed (agricultural pastures) but does serve as an opportunistic	MEDIUM	HIGH Agricultural pastures (transformed habitat) can return rapidly after disturbance.	LOW

Habitat and associated SCC	Conservation Importance (CI)	Functional Integrity (FI)	Biodiversity Importance	Receptor Resilience (RR)	Site Ecological Importance (SEI)
Bustard (<i>N. denhami</i>)		foraging area for the SCC.			
Pastures and closely associated disturbed grassy habitats serving as foraging grounds for Blue Crane (<i>G. paradiseus</i>)	MEDIUM SCC listed as NT.	MEDIUM Habitat is transformed (agricultural pastures) but does serve as an opportunistic foraging area for the SCC.	MEDIUM	HIGH Agricultural pastures (transformed habitat) can return rapidly after disturbance.	LOW
Alien plant stands (trees) as habitat for Forest Buzzard (<i>B. trizonatus</i>)	MEDIUM SCC listed as globally NT.	MEDIUM Habitat is highly transformed (dense stand of alien plant invasions) but does serve as a suitable habitat for SCC.	MEDIUM	VERY HIGH Alien trees will return rapidly and SCC highly likely to return after disturbance	VERY LOW
Wetland in north of site as habitat for Long-tailed Forest Shrew (<i>M. longicaudatus</i>)	HIGH SCC listed as EN under Criterion B, with EOO > 10 km ² .	MEDIUM Areas around wetland in north of site are surrounded by disturbance that negatively affect SCC (e.g. alien plant invasions, cattle grazing) resulting in only narrow corridors of movement for SCC between suitable habitat patches.	MEDIUM	MEDIUM Wetland in north of site likely to return to current state within 5-10 years, however SCC is given a moderate likelihood of returning after disturbance by recolonising from more likely/suspected habitat along Gwaing River.	MEDIUM
Artificial dams and	LOW	MEDIUM	LOW	HIGH	VERY LOW

Habitat and associated SCC	Conservation Importance (CI)	Functional Integrity (FI)	Biodiversity Importance	Receptor Resilience (RR)	Site Ecological Importance (SEI)
wetlands across site	No suspected SCC.	Narrow corridors of connectivity and several impacts from cattle grazing/presence.		Artificial dams/wetland habitat recover to current state in <10 years	
Disturbed grassy habitat and modified fynbos in north-west of site as habitat for Fynbos Golden Mole (<i>A. corriae</i>).	MEDIUM SCC listed as NT.	MEDIUM Even though little natural habitat remains, extensive golden mole activity was found across the transformed landscape so connectivity is good within the habitat (and the patch of natural fynbos patch) and the habitat is able to sustain SCC population. However, this habitat is disconnected from other areas in the landscape as it is surrounded by roads restricting the movement of the SCC.	MEDIUM	LOW Last major disturbance to this habitat was 16 years ago, but transformed habitat is expected to recover in <10 years. While SCC can adapt to modified landscapes, the SCC has a low likelihood of returning to site after disturbance due to its limited mobility (ground dwelling and limited by soil texture) and no connectivity to other habitat in surrounding landscape since the area is surrounded by roads.	HIGH
Natural fynbos in north of site as habitat for Fynbos Golden Mole (<i>A. corriae</i>).	VERY HIGH Natural fynbos patch is mapped as Garden Route Granite Fynbos, listed	LOW Natural fynbos (likely core habitat) patch is ca. 1 hectare in size, surrounded by	MEDIUM	LOW Natural fynbos patch will take >15 years to recover after disturbance. SCC has a low	HIGH

Habitat and associated SCC	Conservation Importance (CI)	Functional Integrity (FI)	Biodiversity Importance	Receptor Resilience (RR)	Site Ecological Importance (SEI)
	as CR ecosystem type.	modified/disturbed fynbos habitat in which SCC is also found. No habitat connectivity to other natural fynbos patches in the landscape.		likelihood of returning to habitat after disturbance due to limited mobility (ground dwelling) and lack of connectivity to other fynbos habitat, although recolonisation could occur from the transformed habitat surrounding the fynbos patch.	
<p>Wetland in north of site as habitat for Knysna Leaf-folding Frog (<i>A. knysnae</i>)</p>	<p>HIGH</p> <p>SCC listed as EN under Criterion B, with EOO > 10 km².</p>	<p>HIGH</p> <p>This wetland is experiencing little to no negative impacts that would affect presence of the SCC.</p>	<p>HIGH</p>	<p>VERY LOW</p> <p>Due to limited mobility, no connectivity to other suitable habitats and the SCC's limited tolerance for alterations to aquatic habitat, this SCC is unlikely to return after disturbance.</p>	<p>VERY HIGH</p>

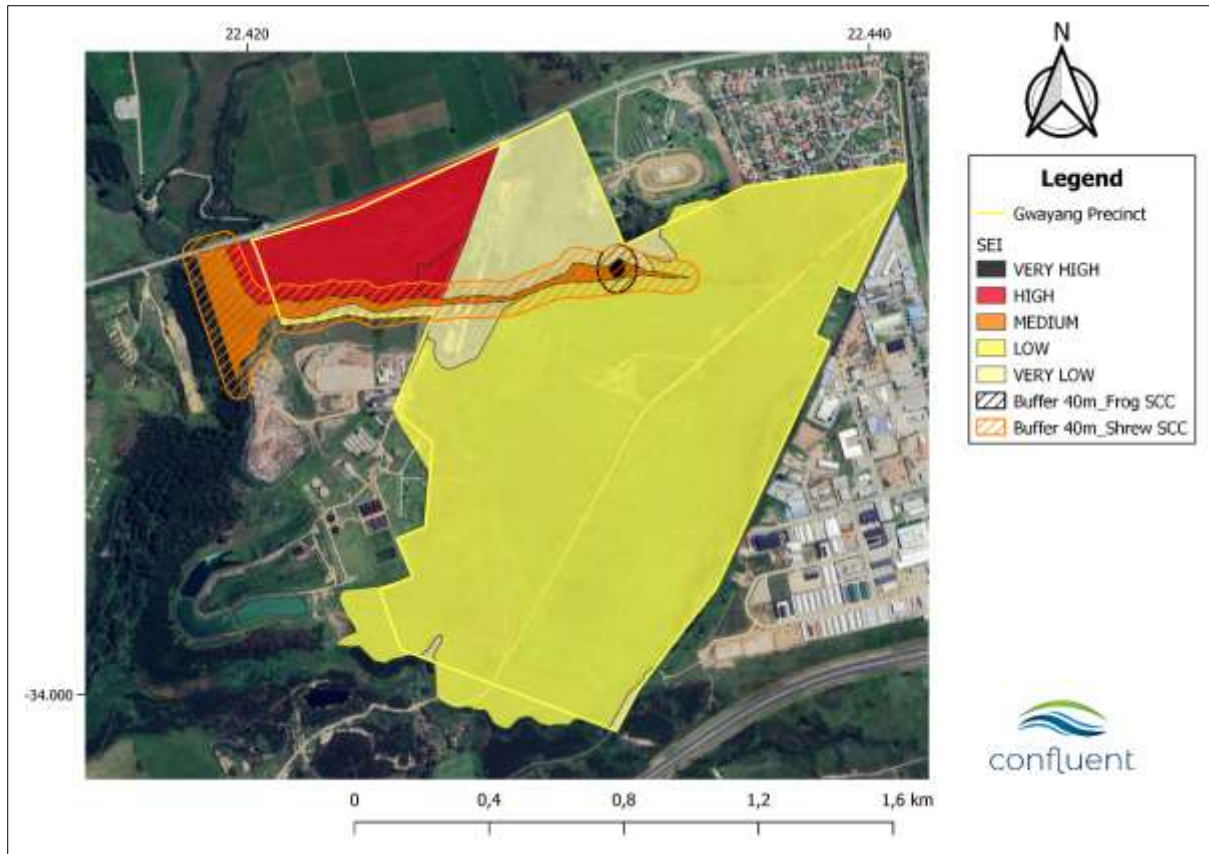


Figure 19. Site Ecological Importance for terrestrial fauna SCC on Gwayang Precinct.

Table 8. Guideline for interpreting Site Ecological Importance ratings within the context of the proposed development (SANBI 2020).

Site Ecological Importance	Guideline for interpreting Site Ecological Importance ratings
Very High	Avoidance mitigation. No destructive development activities should be considered. Offset mitigation is not acceptable or possible.
High	Avoidance mitigation wherever possible. Minimization mitigation, through changes to infrastructure designs to limit amount of habitat lost/impacted. Offset mitigation may be required.
Medium	Minimization and restoration mitigation. Development activities of medium impact may be acceptable followed by restoration.
Low	Minimization and restoration mitigation. Development activities of medium to high impact may be acceptable followed by restoration.
Very Low	Minimization mitigation. Development activities of medium to high impact acceptable and restoration may not necessarily be required.

7. PRELIMINARY IMPACT ASSESSMENT CONSIDERATIONS

As it is a scoping report, this assessment does not include a comprehensive impact assessment. In this section, the main impacts associated with each development phase are highlighted along with mitigation measures. This section is provided to the development and engineering team to provide guidance in terms of further planning for the development, as well as for Interested and Affected Parties concerned about potential impacts and whether they will be considered in the process. All impacts will be thoroughly addressed and rated in the impact assessment report to follow this one.

7.1 Reference to be made to Botanical Terrestrial and Aquatic specialist reports

Many impacts to fauna can be mitigated through minimizing impacts to the natural environment within which they occur. As such, many mitigation measures throughout this section address this aspect of 'habitat protection', protection of wetlands, and maintenance of water quality. In addition to the measures highlighted throughout the next sections, it is imperative that the Botanical Scoping Report (B. Fouche, Confluent Environmental) and the Aquatic Scoping Report (J. Dabrowski, Confluent Environmental) be consulted, and these mitigation measures implemented to reduce the impact of the development on plant species and aquatic resources or habitats, since fauna rely heavily on these.

7.2 Layout and design

While two SDPs have been put forward and are assessed within this report, there are some additional considerations within the layout and design phase of the project.

7.2.1 Conservation of Golden Mole SCC habitat

Description: Golden mole (either Fynbos golden mole - Near Threatened; or Duthie's golden mole - Vulnerable) activity has been observed within the development footprint, leading to the HIGH SEI rating for the north-west section of the development.

Consequences of impact:

Given the limited mobility of the species (ground-dwelling and reliance on soil textures) and the isolated nature of the area within which they occur (surrounded by busy roads, and a river valley), it is highly unlikely that the SCC will be able recolonize if it were to be highly impacted. This places this population of golden moles at high risk of local extinction from this area on site.

Mitigation:

The natural fynbos patch is likely the last remaining natural habitat for the SCC on site and should be avoided at all costs to give this already isolated population the best chance of persisting in this area. The alternative SDP achieves this by avoiding the fynbos patch.

It is recommended that development be minimized in the north-west section as far as possible. This is achieved by the alternate SDP which avoids this area entirely. One road bisects the area which will lead to fragmentation of the habitat within the

alternative SDP. However, most of the habitat is preserved to the west of the proposed road and provides ample habitat for SCC to persist here.

7.2.2 Prevention of Genetic constraints of Isolation on Golden Mole SCC

Description: Under the alternative development scenario, Golden Mole habitat is fragmented by an essential road, depicted in yellow (Figure 20). Mole habitat on site will be divided into two fragments following the development of this road: 3.9 ha in east (habitat 1) and 13.4 ha in the west (habitat 2).

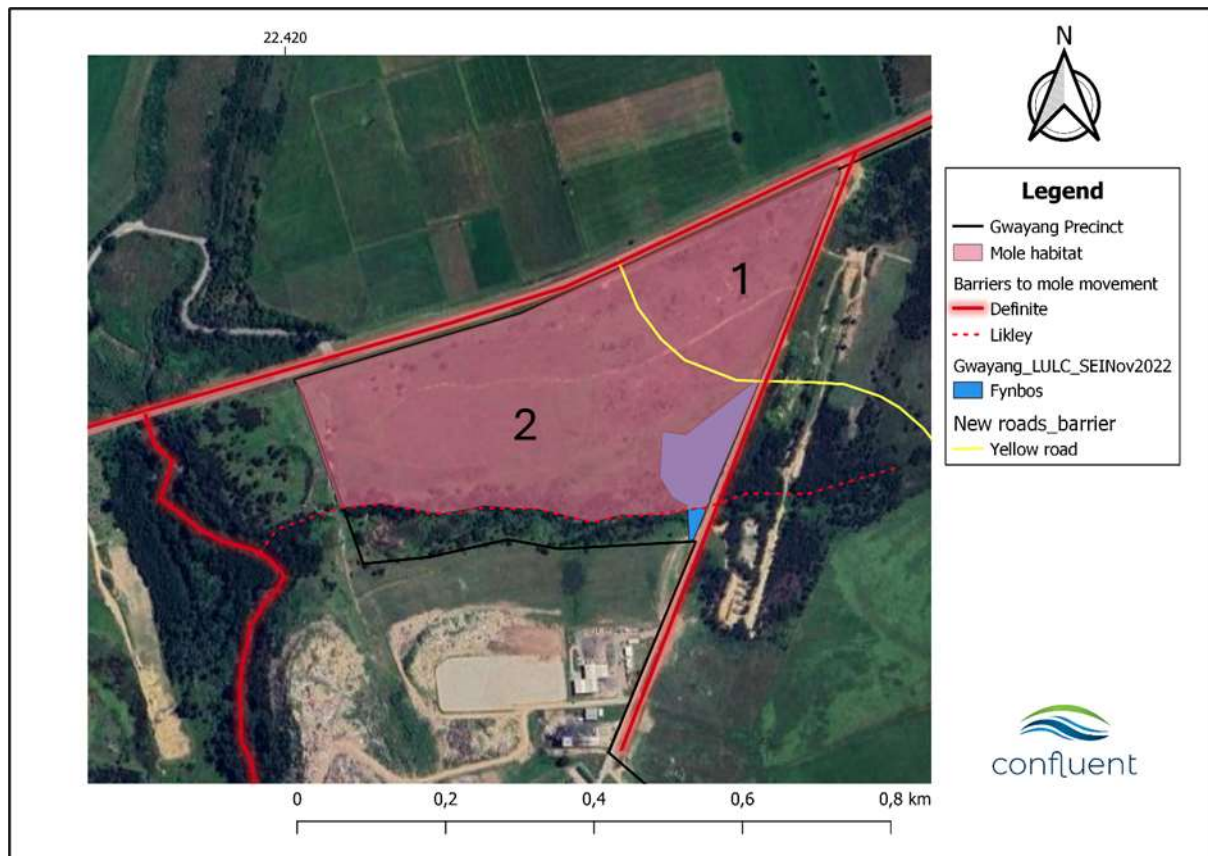


Figure 20: Development of yellow road will fragment the mole habitat in two: Habitat 1 = 3.9 ha; Habitat 2 = 13.9 ha.

Consequences of impact:

Habitat 1 will be separated from the fynbos patch, the only remaining natural vegetation and likely a core area for sustaining the mole population.

Habitat 1 moles are at increased risk of mortality and reduced persistence due to reduced habitat size (reduced food availability, limited ability to escape disturbances/danger), isolation from moles in adjacent larger area to west (leading to genetic isolation, possibly reduced breeding success, and decreased long-term viability) and isolation from the natural fynbos patch (disconnected from likely core habitat).

Mitigation:

Allocate habitat 1 to development and relocate any moles found by mole catchers to habitat 2 (see Harm to Fauna Due to Earthworks, Road Construction, and Construction of Big Block Development 7.3.2). This option allows 13.9 ha. as mole habitat (Figure 20).

7.2.3 Preservation of Habitat for Wetland Dependent Faunal Species

Description: One wetland in the north of the site is possibly suitable habitat for the Knysna Leaf-Folding frog (*A. knysnae*) and resulted in a VERY HIGH SEI rating site. The wetland/tributary to the Gwaing River in the north of the site is suspected (although marginal) habitat for the endangered Long-tailed Forest Shrew (*M. longicaudatus*). The area is therefore given a MEDIUM SEI rating and development/footprints here should be minimized as far as possible.

Consequences of impact:

Proceeding with the initial development plan would lead to the destruction of habitats for SCC species. This could lead to population declines and local extinction.

Mitigation:

The alternative development plan accommodates this by moving the main access road to avoid sensitive wetland sites, reducing its footprint in a critical biodiversity area (see Aquatic Scoping Report (J. Dabrowski, Confluent Environmental)).

The Knysna Leaf-folding frog SCC's presence cannot be confirmed until a species-specific assessment is done during the frog's breeding season (Sep-Nov) when its presence or absence is more reliably detected.

All wetland habitats highlighted within the Aquatic Specialist Report (by J. Dabrowski, Confluent Environmental) must be accommodated to allow for the continued functioning of these habitats and minimize the impacts on associated fauna

Culverts used at river crossings must be large enough (height a minimum of 1m above ground level) to be used by wetland fauna to promote habitat connectivity.

Measures that reduce stormwater runoff and promote infiltration should be implemented to maintain the habitat for fauna. Refer to the Aquatic Specialist Report (by J. Dabrowski, Confluent Environmental) for further detail on mitigation measures.

7.3 Construction Phase Impacts

The construction phase will have the highest impacts on fauna species due to increased moving vehicles, noise, and habitat destruction associated with these activities. It is imperative that an Environmental Control Officer (ECO) be appointed for the duration of the construction phase and ensure compliance with mitigation measures. It is imperative that an ECO is present on site at the onset of a new construction phase, at the start of any earthworks and twice a week thereafter during the construction phase.

7.3.1 *Negative Impacts to Habitat and Fauna Could Be Excessive Due to Poor Management*

Description: The management of materials, staff, vehicles, roads, and activities on the site is an important impact of development. If managed properly, many accidents and unanticipated negative impacts on fauna and the surrounding environment can be avoided. If improperly managed, the footprint of disturbance could be larger than necessary.

Consequences of impact:

Contamination of habitat or harm to fauna.

Litter and pollution of the natural environment.

Potential health and safety hazards (for staff and fauna) on the site and in the surrounding environment.

Mitigation measures:

All staff must be briefed about the layout of the construction site and must be made aware of the no-go areas as the surrounding environment is sensitive.

Construction vehicles should be checked daily for leaks and other faults. All oil spills must be cleaned up and contaminated soil removed by a registered hazardous waste service provider. Vehicles with leaks and other problems are not allowed to operate on the site.

No littering, waste dumping or burning is allowed on the site or in the surrounding environment. All waste is to be collected in designated bins with lids that can be secured. All waste is to be transported to a registered waste disposal facility off site.

Mixing areas for concrete, cement and plaster must be clearly defined and be on areas that will become hard surfaces on the site. They must be surrounded by an impermeable material prevent any runoff and absorption into the surrounding soils.

All stockpiles of fine textured building materials must be covered by a geotextile or plastic covering, which must also be bunded (e.g. with sandbags) when not in use (Figure 21).

Clear signs for “no-go” areas for vehicles and personnel should be placed strategically on the site and along access roads. No-go areas are anywhere outside of the direct area of influence of the construction phase.

All vehicles, construction or inspection, must only access the sites via the planned, single track access roads as per the SDP (no additional roads, tracks to be made in the environment). These access roads are to be clearly marked.

Where vegetation will be cleared to make way for construction, filled sandbags, silt socks or a silt fence must be used to reduce the intensity of water runoff and flow over the site and thereby reduce erosion potential. This is especially important in areas suspected of being Knysna leaf-folding frog habitat.



Figure 21: Stockpiles of fine textured building materials and soils covered with geotextile/plastic covering and banded with sandbags when not in use.

7.3.2 Harm to Fauna Due to Earthworks, Road Construction, and Construction of Big Block Development

Description: Fauna may occur on site and be killed or seriously harmed during construction related activities. Cryptic and ground-dwelling species, like the golden mole SCC, are difficult to detect and are limited in their mobility, rendering them vulnerable to earthmoving and construction activities.

Consequences of impact:

Injury or loss of animals from falling into excavated holes or contact with machinery or human activities.

Mitigation measures:

A phased approach should be used as far as possible so that construction-related activities are confined to one area at a time on the property and faunal impacts can be appropriately managed.

Dedicated “mole catchers” (one per earth-moving machine) must be present when earthworks commence to be overseen by the ECO. Moles in good condition must be released in the natural fynbos habitat. Injured animals are to be taken to a vet (e.g. George Animal Hospital) for treatment. Moles can be temporarily housed in a black tote bin with soil in it. Once recovered, these individuals should be released in the natural fynbos habitat.

Before construction commences for any new earthworks at the start of a new phase, an ECO should do a walk-through of the demarcated area and access roads that will be used to look for fauna. These animals should be removed from the demarcated area to a safe location.

7.3.3 *Displacement of Fauna within the Footprint of the Proposed Development Due to Construction.*

Description: The proposed development and associated access roads will result in the permanent loss of habitat space on the property, displacing fauna. Fauna run the risk of being seriously harmed or killed due to collisions with vehicles on road infrastructure.

Consequences of impact:

Loss of access to suitable habitat for fauna leading to displacement and increased human conflict as animals attempt to move elsewhere (e.g. roadkill).

Death/Harm to any animal species (small insects to larger mammals) because of collisions with vehicles, particularly animals with limited mobility.

Decline in population size of local fauna populations.

Mitigation measures:

Prior to construction beginning on the site the R102 should be fenced off. This should be done with solid temporary fencing such as steel fencing with shade cloth up to 1m. The same should be done along the access road to the dump where vehicles often travel at high speed.

Speed limits should be imposed and monitored on the site at the discretion of the ECO. Signs should be put up along the roads to remind people of speed limits.

Speed bumps should be introduced to reduce vehicle speeds.

Working at night should be prohibited as visibility is reduced which poses a risk for nocturnal animals.

All animals found on site to be reported to the ECO for removal.

Speed limits must be strictly enforced along all roads on the property. This speed limit should be reduced in areas where road-side visibility is reduced (i.e. due to dense vegetation). Speedbumps or other speed reducing techniques can be incorporated into the road design to assist in keeping speeds to a minimum.

7.3.4 *Conclusion of construction phase*

The conclusion of any project is an essential, but often overlooked aspect of projects. This relates primarily to the cleaning up of the site once construction has concluded.

Construction sites must be cleared of all waste material, rubble, and debris associated with the construction phase at regular intervals.

Revegetation of bare soil with indigenous plant species following construction is an essential part of concluding the construction phase of the project.

All drainage structures must be checked to ensure that there are no blockages or pollution that is blocking the free flow of water over the site.

7.4 Operational Phase Impacts

7.4.1 Effects of Light Pollution on Fauna

Description: Light pollution is of global concern given that our night skies are getting lighter due to urban development.

Consequences of impact:

Insects are attracted to or disorientated by artificial lights, leading to aggregations at such point sources. This interferes with their natural behaviour (e.g. feeding), associated ecosystem services they provide (e.g. pollination) and often has fatal consequences for individuals unable to escape the 'light trap'.

Many animals are specifically adapted to dark night skies for navigation, foraging and behavioural aspects (i.e. sleep, hunting).

Mitigation:

Keep artificial lighting along roads and around infrastructure to a minimum. This is particularly relevant to development adjacent to the fynbos area and watercourses.

The impacts of lighting must be reduced through the selection of the colour/brightness (select yellow, dim lights which are less attractive to insects than bright white or blue lights) and design elements (lights facing down towards the ground rather than facing up towards the sky).

7.4.2 Alien Plants Altering Habitat Structure and Water Quality

Description: Currently the site experiences alien plant invasions which have negative consequences for the ecological functioning of the properties. If managed and implemented appropriately alien plant management can have positive impacts for the surrounding landscape.

Consequences of impact:

Uncontrolled alien plants can completely transform natural habitats, in this context wetlands, leading to a loss in associated flora and fauna biodiversity.

Alien plants alter water resources (see Aquatic Scoping Report, J. Dabrowski), which negatively impacts biodiversity dependent on it as a habitat, for foraging, or as a nursery.

Mitigation measures:

It is a requirement by law than an alien and invasive plant management plan be developed and implemented on the properties - refer to the National Environmental Management: Biodiversity Act (NEMBA, Act No. 10 of 2004) and the Conservation of Agricultural Resources Act (CARA, Act No. 43 of 1983).

7.4.3 Harm/ Death to Wildlife Due to Collisions with Vehicles.

Description: Fauna run the risk of being seriously harmed or killed due to collisions with vehicles on road infrastructure. The Endangered Wildlife Trust (EWT) has an entire programme aimed at tracking the impacts of roadkill and monitoring the effectiveness of various mitigation measures (<https://ewt.org.za/what-we-do/saving-species/wildlife-and-transport/>), illustrating the severity of this impact on fauna. Roadkill can be particularly detrimental to populations of threatened species within an area (i.e. putting them at risk of local extinction) and to animals with limited mobility which are at a higher risk of injury or death due to their limited ability to escape moving vehicles.

Consequences of impact:

Death/Harm to any animal species (small insects to larger mammals) because of collisions with vehicles, particularly animals with limited mobility.

Decline in population size of local fauna populations.

Mitigation measures:

Speed limits must be strictly enforced along all roads on the property. This speed limit should be reduced in areas where road-side visibility is reduced (i.e. due to dense vegetation). Speedbumps or other speed reducing techniques can be incorporated into the road design to assist in keeping speeds to a minimum.

In areas where there is dense vegetation along the road verges, a narrow road margin (i.e. maximum of 1m on each side of road) must be cleared. In addition to a speed limit, this can assist in preventing roadkill.

7.5 Cumulative Impacts

Anticipated impacts and mitigation measures outlined in the Aquatic Scoping Report (J. Dabrowski, Confluent Environmental) are applicable to fauna, as two SCC highlighted depend on wetlands to live, forage, and breed (Long-tailed forest shrew, Knysna leaf folding frog).

Reduction in pasture could have an impact on Denham's bustard and Blue Crane, both of which depend on pasture lands as their habitat. This land use is common in the region therefore the loss of pasture to the development should not have a big effect.

Rodenticide used on site may be consumed by rodents which are prey items for raptor SCCs such as Forest Buzzard. Additionally, with the introduction of an alien management plan, it is unlikely that Forest Buzzards would use this area for forage since high perches would be even more scarce than they are.

7.6 Assessment of No-Go Alternative

Under the No-Go scenario the precinct would continue to be used primarily for agricultural activities. The golden mole SCC would benefit since this is a lower impact activity than the proposed development and limited habitat would be lost. There would also be fewer barrier to movement for the species. There would also be Blue cranes and Denham's bustard are also well adapted to crop lands and pastures. Raptors would continue being able to forage at the site since rodent species would not show a decline.

It is important to note that in this scenario alien plant invasions would continue to spread near watercourses. This could change habitat structure with the colonisation of larger shrubs and tree species, potentially increasing the habitat's utility for forest buzzard. For SCC like Knysna leaf folding frog and long-tailed forest shrew Grasshopper alien plant invasions would, however, be detrimental.

8. INFORMATION REQUIREMENTS FOR THE DETAILED ENVIRONMENTAL IMPACT ASSESSMENT PHASE

Knysna leaf folding frog has a VERY HIGH SEI rating at a wetland in the north of the site. Presence of this SSC should be confirmed in a species-specific assessment during the frog's breeding season when it is more reliably detected. If not detected the precautionary principle should be applied and the area should be avoided to avoid local extinction of the population.

Surveys to ascertain which species of Golden Mole is present at the site would be beneficial for knowledge of the species. This information, however, would not affect any impacts outlined in this report since both species of golden mole found in the region are highlighted in the IUCN Red List.

The stormwater management plan for the development would be essential to review.

The electrical plan including the layout of all lighting services should be made available to ensure lighting impacts are minimised per this report.

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APPENDIX 1: SCC IDENTIFIED FROM PUBLIC PLATFORMS FOR THE PROJECT AREA.

SCC were included or excluded from further analysis in this report based on expert interpretation for the presence/absence of key landscape and habitat features on site. See Section 4.2 Assumptions and Limitations for more information. Conservation status is abbreviated: Least Concern (LC), Near Threatened (NT), Vulnerable (VU), Endangered (EN), Critically Endangered (CR).

Species	Common name	Regional, Global Conservation Status	Source	Assessed
Avifauna				
<i>Alcedo semitorquata</i>	Half-collared Kingfisher	NT, LC	SABAP2	Y
<i>Aquila verreauxii</i>	Verreaux's Eagle	VU, LC	SABAP2	N
<i>Ardenna grisea</i>	Sooty Shearwater	NT, NT	SABAP2	N
<i>Bradypterus sylvaticus</i>	Knysna Warbler	VU, VU	SABAP2	Y
<i>Buteo trizonatus</i>	Forest Buzzard	LC, NT	SABAP2	Y
<i>Campethera notata</i>	Knysna Woodpecker	NT, NT	SABAP2	N
<i>Ciconia abdimii</i>	Abdim's Stork	NT, LC	SABAP2	N
<i>Circus maurus</i>	Black Harrier	EN, EN	SABAP2	N
<i>Circus ranivorus</i>	African Marsh Harrier	EN, LC	SABAP2	Y
<i>Coracias garrulus</i>	European Roller	NT, LC	SABAP2	Y
<i>Crithagra leucoptera</i>	Protea Canary	NT, NT	SABAP2	N
<i>Falco biarmicus</i>	Lanner Falcon	VU, LC	SABAP2	Y
<i>Grus paradisea</i>	Blue Crane	NT, VU	SABAP2	Y
<i>Gyps coprotheres</i>	Cape Vulture	EN, VU	iNaturalist	N
<i>Leptoptilos crumenifer</i>	Marabou Stork	NT, LC	SABAP2	N
<i>Morus capensis</i>	Cape Gannet	VU, EN	SABAP2	N
<i>Neotis denhami</i>	Denham's Bustard	VU, NT	SABAP2	Y
<i>Oxyura maccoa</i>	Maccoa Duck	NT, EN	SABAP2	N
<i>Phalacrocorax capensis</i>	Cape Cormorant	EN, EN	SABAP2	N
<i>Polemaetus bellicosus</i>	Martial Eagle	EN, EN	SABAP2	Y

Species	Common name	Regional, Global Conservation Status	Source	Assessed
<i>Procellaria aequinoctialis</i>	White-chinned Petrel	VU, VU	SABAP2	N
<i>Sagittarius serpentarius</i>	Secretarybird	VU, EN	SABAP2	Y
<i>Sarothrura affinis</i>	Striped Flufftail	VU, LC	SABAP2	N
<i>Stephanoaetus coronatus</i>	Crowned Eagle	VU, NT	SABAP2	Y
<i>Stercorarius antarcticus</i>	Brown Skua	EN, LC	SABAP2	N
Mammals				
<i>Amblysomus corriae</i>	Fynbos Golden Mole	NT	Virtual museum	Y
<i>Damaliscus pygargus pygargus</i>	Bontebok	VU	Virtual museum	N
<i>Dendrohyrax arboreus</i>	Southern Tree Hyrax	EN	Virtual Museum	N
<i>Graphiurus ocellaris</i>	Spectacled African Dormouse	NT	Virtual museum	N
<i>Myosorex longicaudatus</i>	Long tailed forest shrew	EN	iNaturalist	Y
<i>Panthera pardus</i>	Leopard	VU	Virtual museum	Y
<i>Pelea capreolus</i>	Vaal Rhebok	NT	Virtual museum	N
<i>Philantomba monticola</i>	Blue Duiker	VU	Virtual museum	Y
<i>Poecilogale albinucha</i>	African Striped Weasel	NT	Virtual museum	Y
Invertebrates				
<i>Aloeides pallida littoralis</i>	Knysna Pale Copper	NT	Virtual Museum	N
<i>Aloeides trimeni southeyae</i>	Trimen's Copper	EN	Virtual Museum	N
<i>Ceratogomphus triceraticus</i>	Cape Thorntail	NT	Virtual Museum	Y

Species	Common name	Regional, Global Conservation Status	Source	Assessed
<i>Ecchlorolestes nylephtha</i>	Queen Malachite	NT	Virtual Museum	Y
<i>Thestor barbatus</i>	Bearded skolly	CR	Virtual Museum	N

APPENDIX 2: PRELIMINARY AVIFAUNA SPECIES LIST - OBSERVED DURING SITE VISITS TO GWAYANG PRECINCT

SCC indicated in red and WWTW species indicated in blue.

Common name	Scientific name
African Darter	<i>Anhinga rufa</i>
African Palm Swift	<i>Cypsiurus parvus</i>
African Sacred Ibis	<i>Threskiornis aethiopicus</i>
African Spoonbill	<i>Platalea alba</i>
African Stonechat	<i>Saxicola torquatus</i>
Amethyst Sunbird	<i>Chalcomitra amethystina</i>
Barn Swallow	<i>Hirundo rustica</i>
Black Crake	<i>Zapornia flavirostra</i>
Black Saw-wing	<i>Psalidoprocne pristoptera</i>
Black-headed Heron	<i>Ardea melanocephala</i>
Blacksmith Lapwing	<i>Vanellus armatus</i>
Booted Eagle	<i>Hieraaetus pennatus</i>
Brown-hooded Kingfisher	<i>Halcyon albiventris</i>
Cape Crow	<i>Corvus capensis</i>
Cape Longclaw	<i>Macronyx capensis</i>
Cape Robin-Chat	<i>Cossypha caffra</i>
Cape Weaver	<i>Ploceus capensis</i>
Cape White-eye	<i>Zosterops virens</i>
Common House Martin	<i>Delichon urbicum</i>

Common Moorhen	<i>Gallinula chloropus</i>
Common Starling	<i>Sturnus vulgaris</i>
Common Waxbill	<i>Estrilda astrild</i>
Crowned Lapwing	<i>Vanellus coronatus</i>
Diederik Cuckoo	<i>Chrysococcyx caprius</i>
Egyptian Goose	<i>Alopochen aegyptiaca</i>
Forest Buzzard	<i>Buteo trizonatus</i>
Fork-tailed Drongo	<i>Dicrurus adsimilis</i>
Greater Double-collared Sunbird	<i>Cinnyris afer</i>
Greater Striped Swallow	<i>Cecropis cucullata</i>
Hadada Ibis	<i>Bostrychia hagedash</i>
Helmeted Guineafowl	<i>Numida meleagris</i>
Jackal Buzzard	<i>Buteo rufofuscus</i>
Karoo Prinia	<i>Prinia maculosa</i>
Kelp Gull	<i>Larus dominicanus</i>
Levaillant's Cisticola	<i>Cisticola tinniens</i>
Long-crested Eagle	<i>Lophaetus occipitalis</i>
Pied Crow	<i>Corvus albus</i>
Red-billed Teal	<i>Anas erythrorhyncha</i>
Red-eyed Dove	<i>Streptopelia semitorquata</i>
Red-knobbed coot	<i>Fulica cristata</i>
Reed Cormorant	<i>Microcarbo africanus</i>
Rock Dove	<i>Columba livia</i>
Sombre Greenbul	<i>Andropadus importunus</i>
Southern Fiscal	<i>Lanius collaris</i>
Speckled Mousebird	<i>Colius striatus</i>
Speckled Pigeon	<i>Columba guinea</i>
Spur-winged Goose	<i>Plectropterus gambensis</i>
Three-banded Plover	<i>Charadrius tricollaris</i>

Western Cattle Egret	<i>Bubulcus ibis</i>
White-breasted Cormorant	<i>Phalacrocorax lucidus</i>
White-necked Raven	<i>Corvus albicollis</i>
Yellow Bishop	<i>Euplectes capensis</i>
Yellow-billed Duck	<i>Anas undulata</i>
Yellow-billed Kite	<i>Milvus aegyptius</i>

APPENDIX 3: PRELIMINARY MAMMAL SPECIES LIST - OBSERVED DURING SITE VISITS TO GWAYANG PRECINCT

SCC indicated in red text.

Order	Family	Common name	Scientific name	Notes
Afrosoricida	Chrysochloridae	Fynbos Golden Mole	<i>Amblysomus corriae</i>	Sub-terranean tunnels found typical of golden moles.
Artiodactyla	Bovidae	Cape Bushbuck	<i>Tragelaphus sylvaticus</i>	Suspected from dung found
Rodentia	Bathyergidae	Mole-rat	-	Mole-hills seen across site
Rodentia	Muridae	Four striped field mouse	<i>Rhabdomys pumilio</i>	Found in Sherman trap
Rodentia	Muridae	South African Vlei Rat	<i>Otomys irroratus</i>	Found in Sherman trap

APPENDIX 4: PRELIMINARY INVERTEBRATE SPECIES LIST - OBSERVED DURING SITE VISITS TO GWAYANG PRECINCT

Order	Family	Scientific name	Scientific name
Arachnida	Araneidae	<i>Neoscona sp.</i>	
Arachnida	Salticidae	<i>Thyene sp.</i>	
Coleoptera	Chrysomelidae	<i>Monolepta bioculata</i>	Two-Eye Leafbeetle
Coleoptera	Coccinellidae	<i>Micraspis comma</i>	Cape Comma Coccinellid
Diptera	Cecidomyiidae	<i>Dasineura rubiformis</i>	Black Wattle Gall Midge
Hemiptera	Membracidae	-	Typical Treehoppers
Hemiptera	Miridae	-	
Hemiptera	Pentatomidae	<i>Eysarcoris ventralis</i>	White-spotted Stink Bug
Hemiptera	Pentatomidae	-	Stink Bugs
Hemiptera	Scutelleridae	<i>Sphaerocoris testudogrisea</i>	Brownspeckled Shield Bug
Hymenoptera	Eupelmidae	-	
Hymenoptera	Formicidae	<i>Crematogaster peringueyi</i>	Black Cocktail Ant
Hymenoptera	Formicidae	<i>Camponotus sp.</i>	Carpenter Ants
Hymenoptera	Vespidae	<i>Delta cafferum</i>	
Lepidoptera	Erebidae	-	Tussock Moths
Lepidoptera	Nymphalidae	<i>Cassionympha cassius</i>	Rainforest Brown
Lepidoptera	Nymphalidae	<i>Pseudonympha magus</i>	Silver-bottom Brown
Lepidoptera	Nymphalidae	<i>Telchinia rahira</i>	
Lepidoptera	Papilionidae	<i>Papilio demodocus</i>	Citrus swallowtail
Orthoptera	Acrididae	<i>Paracinema tricolor</i>	Vlei Grasshopper
Orthoptera	Pyrgomorphidae	<i>Zonocerus elegans</i>	Elegant grasshopper
Thysanoptera	Phlaeothripidae	-	Tube-tailed Thrips

APPENDIX 5: SEI CALCULATIONS

The site ecological importance (SEI) is defined and calculated as highlighted as per the Species Environmental Assessment Guideline (SANBI 2020), where SEI is a function of biodiversity importance (BI) and receptor resilience (RR) such that: $SEI = BI + RR$.

BI is further defined as a function of conservation importance (CI) and habitat functional integrity (FI), with $BI = CI + FI$, and is determined by means of a matrix (Table 5.1)

SEI can therefore be fully understood as $SEI = (CI + FI) + RR$, where:

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. *Most features included in CI are provided by the screening tool but are evaluated at a finer scale following field work at the site.

Functional Integrity (FI): A measure of the ecological condition of the impact receptor (i.e., habitat type) as determined by its remaining intact and functional area, its connectivity to other natural areas and the degree of current persistent ecological impacts.

Receptor Resilience (RR): The intrinsic capacity of the receptor (i.e., habitat type or SCC) to resist major damage from disturbance and/or to recover to its original state with limited or no human intervention.

Table 5.1. Matrix to calculate the biodiversity importance (BI) of a given habitat type identified from desktop and field assessments.

Biodiversity Importance		Conservation Importance				
		Very High	High	Medium	Low	Very Low
Functional Integrity	Very High	Very High	Very High	High	Medium	Low
	High	Very High	High	Medium	Medium	Low
	Medium	High	Medium	Medium	Low	Very Low
	Low	Medium	Medium	Low	Low	Very Low
	Very Low	Medium	Low	Very Low	Very Low	Very Low

The SEI is derived for each habitat type or SCC within a project site by making use of two matrixes: first to calculate the BI (Table 5.1) and then the SEI (Table 5.2).

SEI is therefore specific to the proposed development and can only be compared between alternative layouts for the same proposed development, but not between different developments.

Table 5.2. Matrix to calculate site ecological importance (SEI) of a given habitat type identified from desktop and field assessments.

Site Importance	Ecological Importance	Biodiversity Importance				
		Very High	High	Medium	Low	Very Low
Receptor Resilience	Very High	Very High	Very High	High	Medium	Low
	High	Very High	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