
Replacement of bulk water supply pipeline along R102 Road, George, Western Cape

Terrestrial Animal Species:
Site Sensitivity Verification Report and Compliance Statement



Photo credit: J. Dabrowski

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Date: October 2024
Version: Final



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;
- I declare that there are no circumstances that may compromise my objectivity in performing this specialist investigation. I do not necessarily object to or endorse any proposed developments, but aim to present facts, findings and recommendations based on relevant professional experience and scientific data;
- I do not have any influence over decisions made by the governing authorities;
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- This document and all information contained herein is and will remain the intellectual property of Confluent Environmental. This document, in its entirety or any portion thereof, may not be altered in any manner or form, for any purpose without the specific and written consent of the specialist investigators.
- All the particulars furnished by me in this document are true and correct.



Kim Daniels (MSc)

October 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).
- Two overwintering years on Marion Island, with extensive field work as Environmental Conservation Officer and seabird monitor (2018-2019), and a marine mammal ecologist (2022-2023).

Work experience

- 2022-2023: Marine mammal field assistant on sub-Antarctic Marion Island (Marion Island Marine Mammal Programme, University of Pretoria)
- 2016-2018; 2019-2022: Project Coordinator (University of Pretoria) for international Soil Fauna in Africa consortium (funded by the United Kingdom's Royal Society and Department for International Development).
- 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).

Qualifications

- BSc. Environmental Sciences (2011, University of Pretoria)
- BSc. Honours Zoology (with distinction, 2012, University of Pretoria)
- 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
- 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

References

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SUMMARY OF EXPERIENCE AND ABRIDGED CV
- KIM DANIELS

Core skills

- MSc. Biodiversity and Conservation Biology (University of Cape Town) and 3 years of work experience (research assistance and education) for research projects aimed at investigating invertebrate diversity, plant diversity, insect ecology, disease ecology, invasive species, plant systematics, herpetology, and climate change impacts on a variety of taxa.
- Ecological and field work experience before, during, and after postgraduate degrees across a range of environments (mesic savanna, arid savanna, fynbos, succulent karoo, and Nama karoo) and taxa (plants, invertebrates, avifauna, amphibians, and small mammals).
- My postgraduate studies have been focused on vegetation change in the fynbos and parasitic plants as thermal refugia for arid savanna birds.

Work experience

- Visiting academic at the Organization of Tropical Studies' African Ecology and Conservation course
- Teaching assistant at the Organization of Tropical Studies and Roots & Shoots
- Internships in Entomology, Horticulture, and Plant Conservation
- Research assistant at the Centre for Invasion Biology
- Field assistant at Valuing Orchard and Integrated Crop Ecosystem Services Project

Qualifications

- BSc. Biodiversity and Conservation Biology (2018, University of the Western Cape)
- BSc. Hons. Biodiversity and Conservation Biology (2021, University of the Western Cape)
- MSc. Conservation Biology (2023, University of Cape Town)

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
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
WCBS	Western Cape Biodiversity Spatial Plan

1. INTRODUCTION

Confluent Environmental Pty (Ltd) was appointed by Cape EAPrac to provide Terrestrial Animal Specialist inputs for the proposed upgrade or replacement of the bulk water supply pipeline along the R102 road in George, Western Cape.

1.1 General Site Location

The proposed pipeline upgrade will form part of the George Municipality infrastructure development and management mandate and includes the replacement of the existing bulk water supply pipelines on the eastern side of the Gwaing River Bridge to the George Airport. The route for the upgraded pipeline will follow the existing 200mm pipe at the start and end of the proposed route, but the middle section will follow a different route for ca. 1.9 km along the fence line of the road reserve and three privately owned properties (See the general route represented by the white line in Figure. 1). The existing pipeline within the road reserve crosses six properties, and three new properties will be included in the installation of the new proposed pipeline upgrade.



Figure 1. General location (in white) of the proposed upgrade of the bulk water supply pipeline along the R102 road in the George municipality. Topography (5m contours), rivers, and wetlands (NWM5) are also shown.

1.2 Pipeline Upgrade Plan

The proposed development will include upgrading the existing water supply pipeline that runs along the R102 from George to the George Airport. The development plan at the time of this report update was provided in October 2024 by SMEC Engineering. More detail can be

requested from SMEC Engineering or the George Municipality. The proposal according to the Department of Environmental Affairs and Development Planning (DEADP) is stated below:

- The existing pipeline is 200mm in diameter and located within the road reserve of the R102 Provincial Road. A replacement/ upgrade for a section of the existing pipeline is proposed for the following reasons:
 - The existing 200mm diameter pipeline needs to supply water to the airport and cannot be decommissioned until the upgraded pipeline has been commissioned. However, it is understood that the existing pipeline will be left in place, and not be removed. The majority of the pipeline will not run north of the R102 and will therefore not lie adjacent to the existing pipeline. Approximately 3.1km (between 22 000m and 25 100m) of the pipeline will run north of the road, which previously was planned south of the R102.
 - The existing 200mm diameter pipeline has an existing throughput of between 32.73ℓ/s and 34.35ℓ/s. The ultimate flow of the “new pipeline” is expected to be 76.7ℓ/s over the 400mm diameter section of the pipeline, which is approximately 700m in length.

The proposed pipeline upgrade starts (0m) from the east at 25425m along the R102. The following summary was provided for the proposed pipeline route as updated in October of 2024:

1. **Start of the pipeline:** The preferred alternative (and all previous SDPs) starts with the connection of the new pipeline with the scour chamber of Groeneweide Park water pipeline just east of Gwaing River Bridge, south of the R102. The water pipeline will cross the R102 by means of HDD (Horizontal Directional Drilling).
2. **Gwaing Bridge crossing:** All alternatives involve the replacement of the existing water pipe crossing the bridge with a 400mm steel pipe after which the pipeline will enter the 5m building lines of private properties.
 - a. **The preferred alternative**
 - i. Gwaing Bridge option 2 is where the pipeline will remain within the road reserve for approximately 250m from the bridge where it will diagonally enter a private property (Figure. 2).

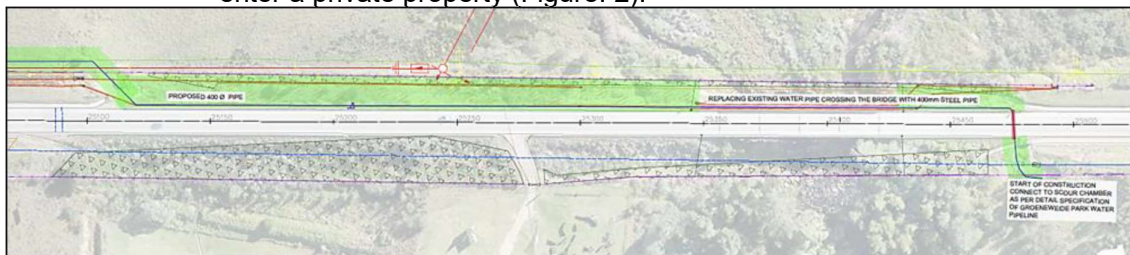


Figure 2: The Gwaing Bridge option 2 section of the preferred SDP, at the start of the upgrade area.

b. The non-preferred alternatives

- i. Gwaing Bridge option 1 is where the upgraded pipeline will go straight from the bridge into a private property.

- ii. Gwaing Bridge option 3 is an alternative where the pipeline will remain within the road reserve for approximately 50m from the bridge where it will diagonally enter a private property.
3. **Norga River crossing options (Culvert crossing):** The water pipeline remains within the 5m building line of private properties, north of the R102, up until a culvert crossing approximately 850m from the Gwaing River Bridge.

a. The preferred alternative

- i. Culvert crossing option 3 is where a proposed 355 ϕ steel pipe within the road reserve will go over the culvert after which the pipeline will cross the R102 (HDD) to be installed within the 5m building line of private properties south of the R102. This pipeline will extend for approximately 300m where it will again cross the R102 (HDD) and proceed within the 5m building line to the north (Figure. 3). This section represents the greatest deviation from the previous layouts presented.



Figure 3: The Norga River culvert crossing option 3. This is the preferred option.

b. The non-preferred alternatives

- i. Culvert Crossing Option 1: The water pipeline (proposed 355 ϕ pipe) will remain within the 5m building line of the private property north of the R102. The pipeline will be installed within the culvert just north of the existing fibre cables.
 - ii. Culvert Crossing Option 2: Proposed 355 ϕ steel pipe within the road reserve over the culvert after which it will return to the 5m building line of the private property.
4. **The end section of the pipeline.** This section involves a tie-in to connect the water pipeline to the existing water network at George Airport. Here, the preferred tie-in is option three presented in Figure. 4.

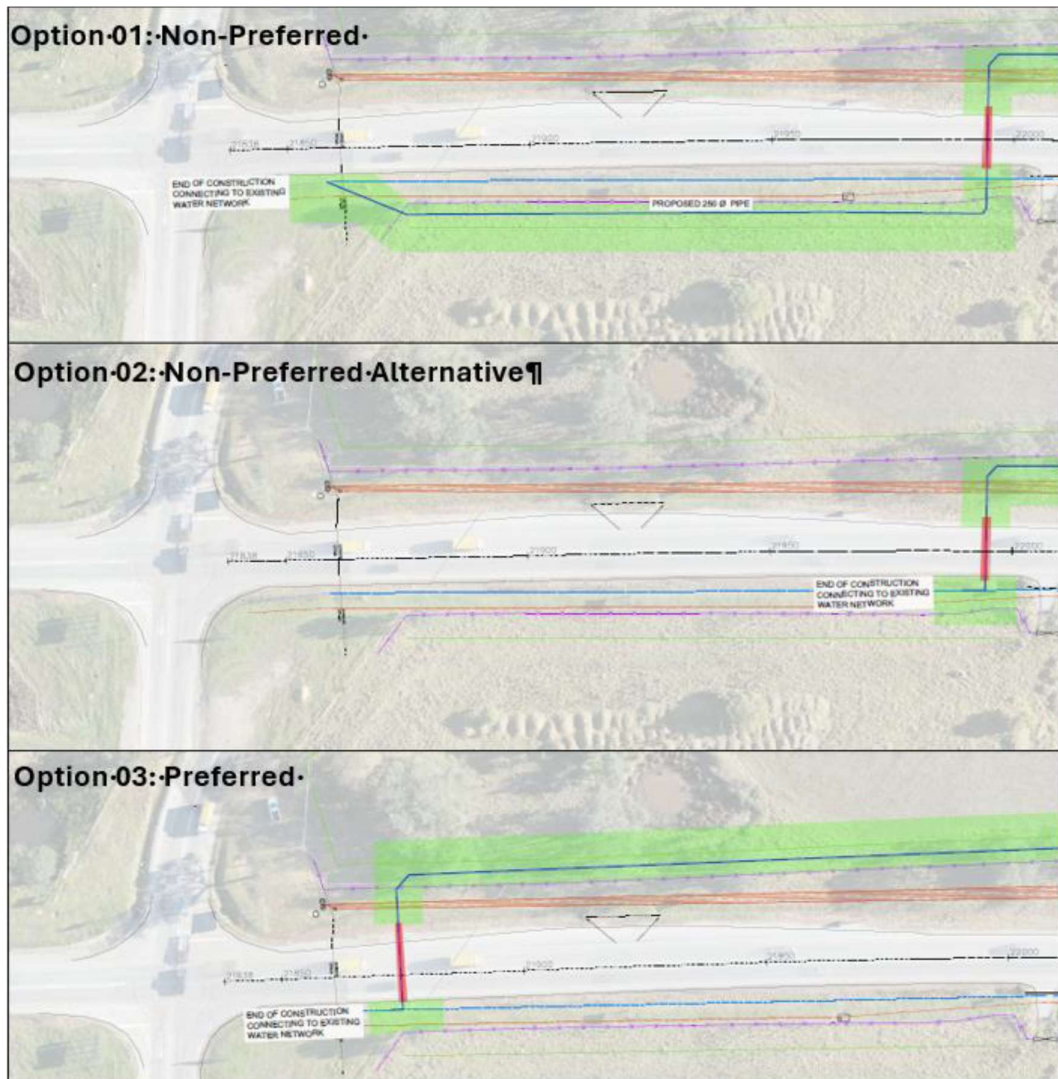


Figure 4: The three alternative pipeline layout options along the end section of the pipeline. Option three is the preferred layout.

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 HIGH and MEDIUM sensitivity for the terrestrial animal species theme across the project area (Figure 5), with several Species of Conservation Concern (SCC) highlighted (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

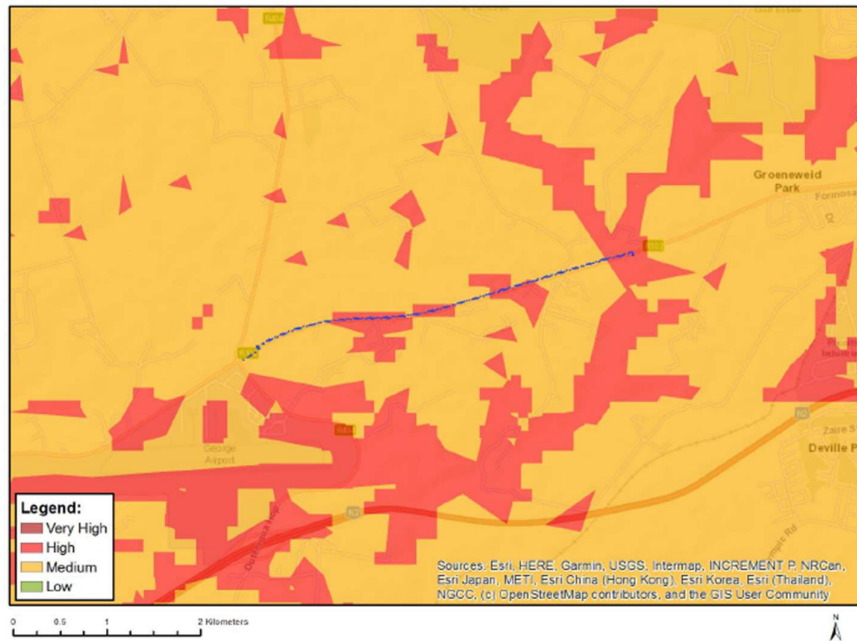


Figure 5. DFFE Online Screening Tool outcome for the terrestrial animal species theme along the bulk water pipeline upgrade footprint. The disturbance footprint is indicated by the blue dashed line.

Table 1. Species of Conservation Concern highlighted by the DFFE Online Screening Tool.

Sensitivity	Classification	Scientific name	Common name	Red list status*
High	Avifauna	<i>Circus ranivorus</i>	Marsh Harrier	Endangered
High	Avifauna	<i>Neotis denhami</i>	Denham’s Bustard	Vulnerable
High	Avifauna	<i>Bradypterus sylvaticus</i>	Knysna Warbler	Vulnerable

Medium	Amphibian	<i>Afrixalus 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 within the disturbance footprint of proposed pipeline 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 Species of Conservation concern 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.

3. DESKTOP ASSESSMENT

3.1 Vegetation, Climate and General Habitat

George, Western Cape is in the Fynbos biome and experiences a temperate climate year-round (Mucina L. &, 2006; Rebelo A. G., 2006). Average temperatures range between 26°C and 6°C, with the hottest days experienced from January to March and peak around 35°C, and the coldest days experienced from June-August and rarely fall below 0°C. Rain occurs throughout the year showing a bimodal pattern with peaks in spring (April) and autumn (October) (Figure 6).

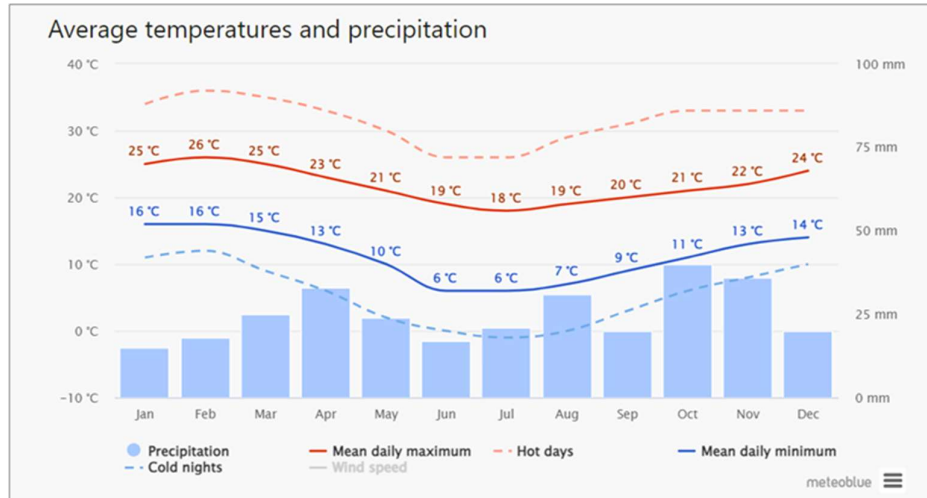


Figure 6. Historical summary of historical climate (modelled) for George Airport (www.meteoblue.com)

The mapped vegetation type for the project area includes Garden Route Granite Fynbos (Critically Endangered), although in reality the project area and surroundings have been significantly transformed due to extensive agricultural practices, alien plant invasions and the existing road infrastructure (Figure 1) - a detailed Botanical and Terrestrial Specialist Assessment is also available for the project area (B. Fouche, Confluent Environmental).

Satellite imagery from Google Earth and Cape Farm Mapper was used to assess elevational gradients and water bodies (Figure 1). The project area along the R102 road crosses the Gwaing River in the east, and a non-perennial river and wetland in the middle section of the site - a detailed aquatic specialist assessment is also available for the project area (J. Dabrowski, Confluent Environmental).

3.2 Western Cape Biodiversity Spatial Plan

Additional mapping layers were applied to the project area to include the Western Cape Biodiversity Spatial Plan (CapeNature, 2017), with Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs) depicted in Figure 7 and explained in Table 2. Mapped layers coincide largely with watercourses in the eastern section of the project area (Gwaing River in the east and the non-perennial river/wetland in the mid-section) which includes mostly ESA1 areas but also a CBA1 and CBA2 layer flagged for the Gwaing River (Figure 7). The western half of the project area falls largely outside of any mapped areas of concern, although some ESA2 are in close proximity to the south of the R102 road.

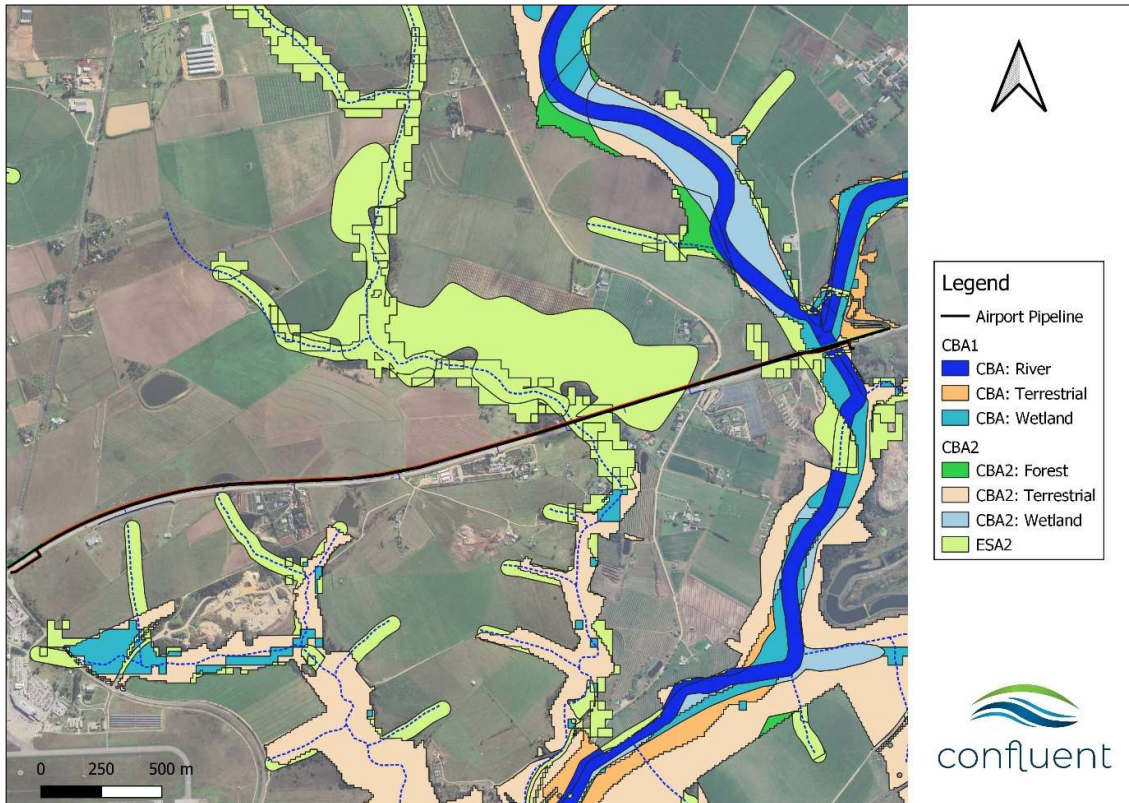


Figure 7. Project area of the pipeline (light blue) in relation to mapped layers for the Western Cape Biodiversity Spatial Plan's Critical Biodiversity Areas (CBA1, CBA2) and Ecological Support Areas (ESA2).

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 functioning and delivering ecosystem services.	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 the underlying biodiversity objectives and ecological functioning are not compromised.

3.3 Historical Assessment of Project Area

The project area is mostly comprised of transformed habitat, with little to no natural vegetation visible in the landscape for the last 88 years (Figure 8). This is largely due to agriculture within the greater landscape evident already in the earliest imagery available from 1936. Since then, agriculture and general disturbance around the R102 road area has intensified, with little to no natural vegetation recovering over time (1936-2022). Alien plant invasion also intensified over time along drainage lines and the Gwaing River, all of which are currently still highly invaded with black wattle (*Acacia mearnsii*) and bugweed (*Solanum mauritianum*).

The R102 Road was constructed in 1939 and has been in existence ever since (85 years). In 1957, excavations for the old landfill site are evident to the east of the project area adjacent to the Gwaing River, and there is also a new road running north along (and crossing) the Gwaing River. In 1974, little to no change is observed with most of the landscape still intensively used for agricultural purposes and some alien tree invasion appears along the Gwaing River and non-perennial stream in the middle of the project area. By 2022, extensive alien plant invasion is seen along the Gwaing River, and the non-perennial river in the middle of the project area has been dammed (north of the R102 road), with the rest of the river experiencing dense alien plant invasions further downstream (to the south).

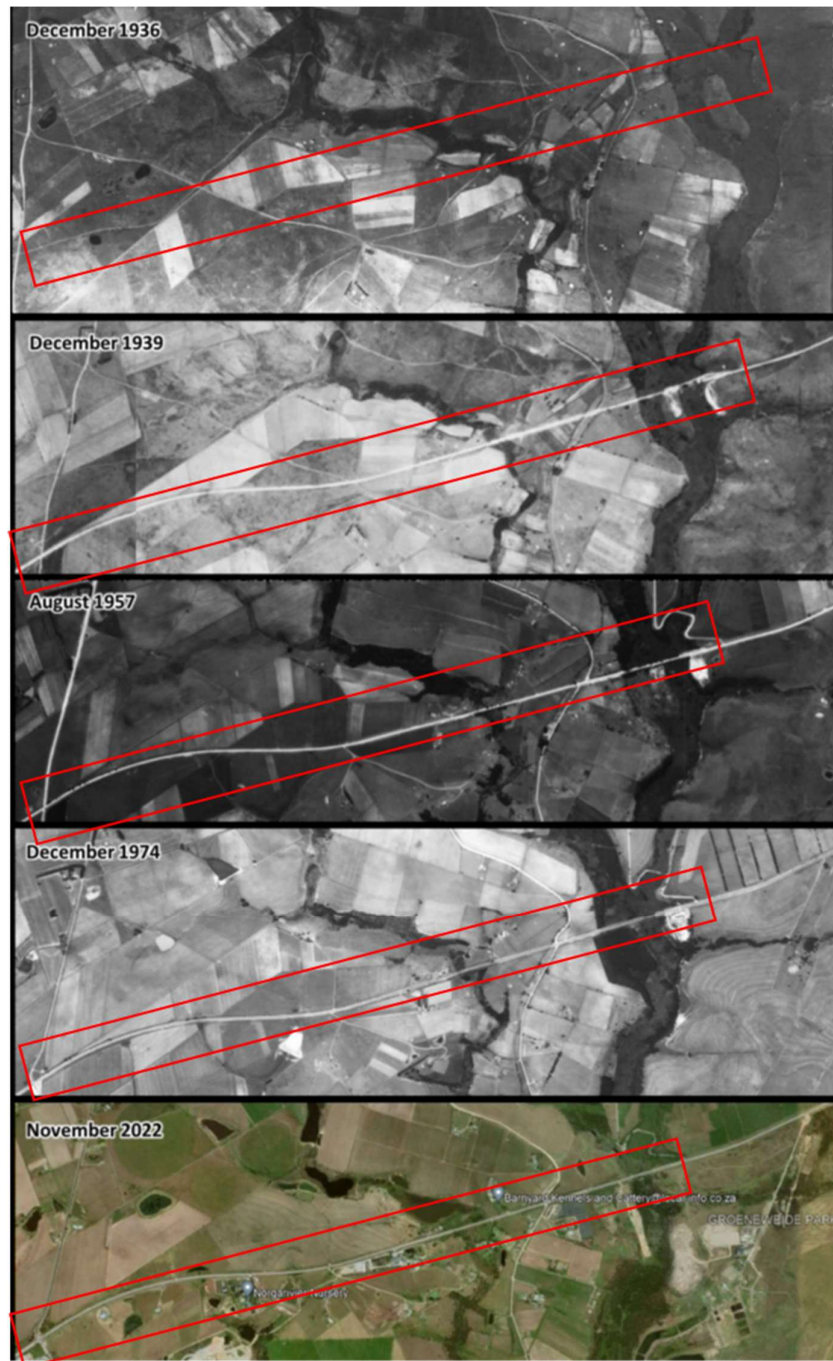


Figure 8. Historical imagery of the approximate project area (red line) for the bulk water pipeline along the R102 road in George. Images are sourced from the CD: NGI geospatial portal and Google Earth.

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 the project area and its immediate surroundings:

1. iNaturalist (all taxa) within 4 km x 1.5 km of the project area ([URL for iNaturalist search area](#)).

2. Virtual Museum for herpetofauna, mammals and invertebrate taxa within the Quarter Degree Square (QDS) 3322CD: DungBeetleMAP, FrogMAP, LacewingMAP, LepiMAP, MammalMAP, OdonataMAP, ReptileMAP, ScorpionMAP, SpiderMAP.
3. South African Bird Atlas Project (SABAP2) for pentads 3355_2220 and 3355_2225.

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 rocky outcrops, all animals reliant on such habitat features for their existence are highly unlikely to occur on site. For the purposes of this report these animals were excluded from further assessment (see also Section 4.1 and Appendix 1 for additional information).

The combined list of SCC (from DFFE Screening Tool and public resources) possibly occurring on the project area 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:

1. Avifauna: Roberts Birds of Southern Africa VII (Roberts, Hockey, Dean, & Ryan, 2005)
2. Mammals: The Mammals of the Southern African Subregion (Skinner, 2005)
3. Invertebrates:
 - Field guide to the insects of South Africa (Picker, Griffiths, & Weaving, 2019)
 - Field guide to the butterflies of South Africa (Woodhall, 2005)
 - Field guide to the spiders of South Africa (Dippenaar-Schoeman, 2023)
4. Amphibians: A complete guide to the frogs of Southern Africa (Du Preez & Carruthers, 2015)
5. 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 terrestrial animal SCC possibly occurring in the project area.

Species	Red list status	Habitat	Breeding	Feeding
AVIFAUNA				
<i>Circus maurus</i> Black harrier ¹	Endangered	<p>-In Western Cape, mostly found in Fynbos, especially montane Fynbos and strandveld. Less common in dry restios and renosterveld. Elsewhere, occurs in dry grassland, Karoo scrub, crop fields (wheat) and grasslands (sometime >3000m elevation).</p> <p>-Many move from Fynbos to Karoo and grasslands during the winter, likely to follow rodent numbers (e.g. capitalise on late summer litter of Sloggett's ice rats in Free State and Lesotho).</p> <p>-Birds move away following fires and don't return for several years.</p>	<p>-Mainly monogamous but some polygamy observed. Mate fidelity is low.</p> <p>-Usually solitary nester and territorial, but in Western Cape some semi-colonial nesting observed with less territorial behaviour.</p> <p>-Nest is a small structure of grass, stems and small twigs. Usually on or just above ground, in rank marsh grasses or near Fynbos bushes and sedges (<i>Juncus</i> spp.).</p> <p>-Nests most often in marshes or next to small streams, but also on damp soil or dry ground. Nest areas reused in successive years (one observation of nest site used for 26 years).</p> <p>-Egg-laying is from June – November.</p>	<p>-Specialist predator of mice and birds. Predominantly rodents (vlei rats, mice) eaten by birds in Fynbos areas and small birds (Common Quail) dominate diet of birds in mountain areas. Also takes reptiles, frogs, insects too lesser extent.</p> <p>-Sometimes caches prey.</p> <p>-Forages most actively on blustery days (windy and rainy), hovers 1-3m above vegetation with buoyant flight.</p> <p>-Flashes into vegetation, hits prey hard and eats on ground. Perch hunting rare.</p>
<i>Circus ranivorus</i> Marsh Harrier ²	Endangered	<p>-Considered a waterbird.</p> <p>-Roosts on taller trees around wetland edges from where it has a good vantage point.</p> <p>-Can adapt to novel wetland habitats such as wastewater treatment works</p>	<p>-Breeding occurs between September and December.</p> <p>-Egg-laying is from August to November in South Africa.</p> <p>-Nests made of grass, reed stems or sticks in reedbeds, short sedge</p>	<p>-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).</p> <p>-Hunts primarily in wetland habitats using various flight methods including</p>

¹ SCC identified from SABAP2 pentad² SCC identified by DFFE Screening Tool

Species	Red list status	Habitat	Breeding	Feeding
			<p>areas or in trees along the water's edge.</p> <ul style="list-style-type: none"> - The same nest is often reused by the same pair in following years. 	<p>soaring, hovering and low flight over wetlands and along the water's edge.</p> <ul style="list-style-type: none"> - May hunt in open grasslands or pastures near wetland areas.
<p><i>Polemaetus bellicosus</i></p> <p>Martial Eagle¹</p>	<p>Endangered</p> <p>TOPS: Endangered (2023 DRAFT)</p> <p>CITES: Appendix II</p>	<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 below the canopy. Rarely uses rocky outcrops. -One egg is laid, with incubation 48-53 days predominantly by female bird. 	<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. Occasionally hunts from perch, especially at waterholes or along game trails. - Prey killed by impact or strangulation and taken to high perch to eat.
<p><i>Bradypterus sylvaticus</i></p> <p>Knysna Warbler²</p>	Vulnerable	<ul style="list-style-type: none"> -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). 	<ul style="list-style-type: none"> -Breeds from August and December coinciding with the greatest abundance of invertebrate species. (BirdLife International, 2016). 	<ul style="list-style-type: none"> -Mostly on ground, creeping through dense, matted vegetation and scratches in humus - Eats mostly grasshoppers, insect larvae, spiders, slugs, worms.
<p><i>Falco biarmicus</i></p> <p>Lanner Falcon¹</p>	Vulnerable	<ul style="list-style-type: none"> - Most frequently in open grassland or cleared woodlands and agricultural lands. -Breeding pairs favour habitat close to cliffs, but will also be found near alternative roosting sites like electricity pylons, buildings, large trees. 	<ul style="list-style-type: none"> -Monogamous, long-term pair bond, territorial. -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. 	<ul style="list-style-type: none"> - Hunts from high perch or from air, using speed to surprise and catch prey but also adept at using cover. - Prey taken in air and on ground. - Pairs can hunt cooperatively. - Prey mostly birds (>80%) but will also take reptiles and insects.

Species	Red list status	Habitat	Breeding	Feeding
<i>Neotis denhami</i> <i>Denham's Bustard</i> ²	Vulnerable A2bcd+3bcd+4bcd; C1 TOPS: Vulnerable (2023 DRAFT) CITES: Appendix II	<ul style="list-style-type: none"> - Inhabit a mosaic of cultivated pastures, agricultural crop-lands and natural vegetation, with seasonal variation in their preferences (Allan, 2003). - 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). - Denham's Bustard 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"> - Male courtship displays occur between August and January, but mainly in September and October (Allan, 2003) - 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. Incubation lasts around 21-24 days. 	<ul style="list-style-type: none"> - Ground-dwelling bird that forages in open grasslands and savannas (Tarboton, 1989) - 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.
<i>Sagittarius serpentarius</i> <i>Secretarybird</i> ¹	Vulnerable A4acd; C1 TOPS: No CITES: Appendix II	<ul style="list-style-type: none"> -Grassland, open savanna, Karoo shrubland with scattered trees. -Can occupy other short-grass areas. -Absent from rocky hills and dense woodlands. 	<ul style="list-style-type: none"> -Monogamous, solitary nester. -Territorial with home ranges usually 50-60 km² around nests, actively defends against conspecifics. -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>). 	<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. -Most prey caught on ground with bill and swallowed whole. -Larger prey killed with downward blows of feet and torn up before swallowing.

Species	Red list status	Habitat	Breeding	Feeding
			<ul style="list-style-type: none"> -Nests can be reused in successive years. -1-3 eggs laid, incubation 40-46 days. 	
<p><i>Stephanoaetus coronatus</i></p> <p>Crowned eagle²</p>	Vulnerable	<ul style="list-style-type: none"> -Forest (including gallery forest), dense woodlands and forested gorges in savannas and grasslands. -Also in <i>Eucalyptus</i> and Pine plantations. -Perches for long periods, resting in canopy. Sometimes soars high over territory, then descends vertically to perch. -Manoeuvres agilely through thick forest, can take off vertically from forest floor. 	<ul style="list-style-type: none"> -Monogamous, possibly long-term pair bond. -Territorial (at least 10 km²), solitary nester. -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. -Nest often reused and added to in consecutive years, can reach up 2-3m diameter, 3m high. -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>) but also <i>Eucalytus</i> and Pine species. -Incubation 49-51 days. 	<ul style="list-style-type: none"> -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 Hadedda Ibis, Egyptian geese and domestic chickens. Reptile prey mainly monitor lizards. -Most prey taken on ground, but occasionally crashes into dense foliage in pursuit. -Frequently still-hunts (stalks prey) and hunts from concealed perches frequently above waterholes in evening waiting for antelope to drink. -Pair sometimes hunt monkeys cooperatively. -Prey struck with downward blow of open foot, massive hind claw penetrates the skull killing instantly. -Large prey that cannot be lifted are partly eaten and dismembered on the ground and then cached in trees.
<p><i>Alcedo semitorquata</i></p> <p>Half-collared Kingfisher¹</p>	Near Threatened A2c; B1b+2b(ii,iii,iv,v); C1	<ul style="list-style-type: none"> -Clear, well-vegetated, fast-flowing perineal streams in forested habitat. -Stream habitat usually narrow and secluded with dense marginal vegetation, near rapids 	<ul style="list-style-type: none"> - Monogamous, solitary nester, territorial. Territory is ca. 1km of river. - Burrows into vertical river banks (usually 1m high) with overhanging vegetation and roots providing screening. Entrance usually 40 cm below top of 	<ul style="list-style-type: none"> - Sits motionless on perch for long time before diving steeply into water. Rarely hovers above water. -Diet mainly fish (3-7 cm in size), carried back to perch to eat. Also consumes crabs, aquatic insects and amphibians.

Species	Red list status	Habitat	Breeding	Feeding
		-Also occurs in estuaries and well-vegetated lake shores but generally avoids dams.	embankment, and sometimes only 15cm above water. Burrow chamber lined with fish bones. - 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.	
<i>Campethera notata</i> Knysna Woodpecker ¹	Near Threatened	-Territorial, occurring in thornveld, Euphorbia thickets, riparian and montane evergreen forests. -Marginal occurrence in Protea communities, coastal white Milkwood (<i>Sideroxylon inerme</i>) thickets and alien trees.	-Monogamous, solitary nester. -Hole in trunk/branch of tree, usually in a dead stem 1.2-6m off the ground. -Holes infrequently reused in successive years, but a new hole can be excavated in the same branch. -Laying from August-November.	-Forages at all levels of trees, especially mid-canopy - Pecks and probes for ants and termites on dead branches, but occasionally forages on ground.
<i>Grus paradiseus</i> Blue Crane ¹	Near Threatened TOPS: Protected (2023 DRAFT) CITES: Appendix II	-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>Oxyura maccoa</i> Maccoa Duck ¹	Near Threatened (Regionally), Endangered (Globally)	-Deep inland waterbodies with emergent vegetation. -Prefers permanent wetlands but also uses farm dams, provided that a rich benthic community of invertebrates is present. -Almost exclusively aquatic, coming onto land only occasionally to preen and sleep.	- Breeding has been documented in farm dams, but relies on emergent vegetation (rushes and sedges) and good feeding habitat. - Polygynous, with no pair bond. -Nest built by female in emergent reeds/sedges (<i>Phragmites</i> , <i>Typha</i> , <i>Cyperaceae</i> spp.) in deep water. Nests sometimes	- Feeds by diving and sifts through bottom muds for invertebrates. - Feeds on small invertebrates and includes small midge larvae, ostracods, gastropods, <i>Daphnia</i> spp and some seeds and roots.

Species	Red list status	Habitat	Breeding	Feeding
			<p>concealed by adjacent vegetation pulled downwards to form a partial dome.</p> <p>-Laying dates in Western Cape: Jul-Mar. Incubation 25-27 days.</p> <p>-Facultative nest parasite, occasionally including hosts of Fulvous Whistling Duck, Egyptian Goose, Hottentot Teal and Red-Knobbed Coot.</p>	
<p><i>Buteo trizonatus</i></p> <p>Forest Buzzard¹</p>	<p>Least Concern (Regional),</p> <p>Near Threatened (Global)</p>	<p>-Afromontane forests and plantations (mainly Pine, but also <i>Eucalyptus</i>).</p> <p>-Generally unobtrusive, perching on large branches partially concealed under canopy, sometimes perching in open at the edge of forest edge.</p>	<p>-Monogamous, territorial, solitary nester.</p> <p>-Nest is platform of sticks, cup-lined with green leaves. Nests in plantations are smaller than in native forests.</p> <p>-Laying dates from August-November.</p> <p>-Breeding is confined to the Western Cape and Eastern Cape Provinces.</p>	<p>-Forages along forest edges and within (also plantations). Hunts mainly from perch.</p> <p>-Diet consists of small mammals (mice and moles), small birds, snakes, lizards, frogs and invertebrates.</p>
MAMMALS				
<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>-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 SCC identified by Virtual Museum QDS

Species	Red list status	Habitat	Breeding	Feeding
			<p>-Oestrous lasts 7 days during which male and female copulate frequently.</p> <p>-Gestation 106 days and cubs remain with mother for 12months after which siblings remain together for a further 2-3 months.</p>	
Sensitive Species 8 ²	Vulnerable	<p>-Specialised habitat requirements within a home range of approximately 0.75 ha.</p> <p>- Strong habitat preference for dense vegetation with good undergrowth providing good cover in which to retreat.</p> <p>-Forest, thicket, dense coastal bush, independent of water.</p> <p>-Can inhabit forest edges and transitional zones.</p> <p>-Requires diverse plant community with variety of tree and shrub species.</p> <p>-Can adapt to fragmented habitat given sufficient cover and food availability.</p> <p>-Actively avoids open grasslands, and areas with human disturbance.</p>	<p>-Breeds throughout the year.</p> <p>-Males establish territories and exhibit aggressive behaviours towards other males and to attract females.</p>	<p>- Highly selective feeders, often feeding on food below troops of monkeys or frugivorous birds which drop lots of material.</p> <p>- Preference for fruit, but also fallen leaves, flowers and insects. Seldom actively browse.</p> <p>-Active in the early morning and late afternoon, foraging for around 8 hours a day within their territory.</p>
<i>Amblysomus corriae</i> Fynbos Golden Mole ³	Near Threatened	<p>-Sandy soils and soft loams in Mountain Fynbos, Grassy Fynbos and Renosterveld of South West Cape. Also Afromontane forest and</p>	<p>-Probably breeds aseasonally because pregnant females have been captured in August, May, and December.</p>	<p>-Insectivorous, mainly feeding on earthworms and insects.</p>

Species	Red list status	Habitat	Breeding	Feeding
		southern African moist savanna along the southern Cape coast. -Favours richer and wetter soils preferring forest fringes and associated fynbos. -Thrives in gardens, cultivated lands, golf courses and livestock paddocks. Can be present in exotic plantations, but at lower densities.	-Mean litter size is two; young are altricial and hairless at birth	
<i>Poecilogale albinucha</i> African Striped Weasel ³	Near Threatened	-Rare in range and easily overlooked. -Predominantly nocturnal and well adapted to subterranean lifestyle. -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).	-Breeding season during spring and summer months in southern Africa. -Usually only one litter per season, comprises of 1-3 pups, fully grown at 20 weeks.	-Small mammal specialist, up to own body weight in size, but occasionally takes birds also. -Has fast metabolism and requires an abundance of prey in territory (Child <i>et al.</i> 2016). -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).
TERRESTRIAL INVERTEBRATES				
<i>Aneuryphymus montanus</i> Yellow-winged Agile Grasshopper ²	Vulnerable	-Very low area of occupancy between 100 and 1 000 km ² . Threatened by declining habitat due to invasion by aliens and habitat transformation. -Strong association with sclerophyllous fynbos vegetation on the southern slopes of the Outeniqua mountains, post-fire. -Threats to the species include habitat transformation and invasion by alien plants.	-Little is known about the feeding requirements of this species.	-Little is known about the reproductive habits or requirements for this species.

Species	Red list status	Habitat	Breeding	Feeding
<i>Ceratogomphus triceraticus</i> Cape Thorntail Dragonfly ³	Near Threatened TOPS: No CITES: No	-Wide range throughout the Western Cape. - Pools in streams, and occasionally in reservoirs. Rocky, shallow rivers, with deposition pools, and possibly farm dams. -Usually in fairly open or hilly country side. -Main threat is invasive alien trees, loss of habitat, water pollution and to lesser extent agriculture. Clearing of alien trees greatly benefits species.	Not known.	- Little is known, but taxon is insectivorous.
<i>Ecchlorolestes nylephtha</i> Queen Malachite Damselfly ³	Near Threatened TOPS: No CITES: No	-Known from streams near Storms River and in the Tsitsikamma Forest (Western Cape and Eastern Cape) (Samways 2006 in press). -Endemic to South Africa. -Occupies a very specific microhabitat inhabits small, fern-fringed streams in the deep shade of the forest at relatively southerly latitudes (ca 34°S).	-Little known, but the Genus typically lays eggs on tender green shoots of vegetation overhanging streams	- Little is known, but taxon is insectivorous.
AMPHIBIANS				
<i>Afrixalus knysnae</i> Knysna Leaf-folding Frog ²	Endangered	- 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.	- 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 (De Lange F. , 2019).	- 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.

Species	Red list status	Habitat	Breeding	Feeding
		<p>-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>).</p> <p>-It requires a habitat with diverse plant species, including shrubs, grasses, and ferns, providing shelter and breeding sites (De Lange & Du Preez, 2018).</p>	<p>- Breeding takes place near deeper parts of the waterbody, but still close to the water's edge.</p>	<p>- Primarily active at night, relying on its vision to locate and capture prey in the darkness.</p>

4. FIELD ASSESSMENT

4.1 Assumptions and Limitations

1. 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 highly unlikely to occur on site) are overlooked in this process.
2. The site visit took place during daylight hours so the likelihood of encountering nocturnal species was limited.
3. The site visit coincided with late summer of the project area. This may be of consequence for SCC showing seasonal variation in breeding and activity patterns and thereby either increasing or decreasing their likelihood of detection. For the frog SCC the site visit fell outside its breeding season and decreased its likelihood of detection. However, this is the optimal time of year to detect the presence golden moles, which are generally most active in warmer and wetter conditions.
4. Given the highly disturbed nature (mostly along the road edge), much of the project area was visually inspected by means of slowly driving a car along the R102 road to assess habitat structure. In areas where more natural/complex habitat was encountered inspections took place on foot. While this inspection method is deemed sufficient for assessment of the habitat suitability for terrestrial animal species within this project area given its highly transformed nature, it is possible that some signs or evidence of animals was overlooked in the process.

4.2 Site Inspection Details and Methods

A site inspection was conducted on the 25 March 2024 whereby the entire length of the pipeline project area along the R102 road was slowly driven in a vehicle to inspect various habitats, with some areas containing more natural/complex habitats inspected on foot (i.e. bridges crossing wetlands/rivers). Given the highly transformed nature of the project area (mostly within the maintained road reserve or within very close proximity thereto) no dedicated sampling was conducted for most SCC given the lack of natural or suitable habitat and the highly unlikely occurrence of SCC so close to the busy road or human disturbance. Two 5-minute bird counts were however conducted (one at the Gwaing River Bridge; one at the non-perennial river in the middle of the project area), with 12 species of birds observed (See Appendix 2).

4.3 Habitat Types of Project Area

The majority of the project area for the pipeline consists of highly transformed habitat due to its proximity to the R102 road verge, which is actively mowed/maintained (i.e. the pipeline falls either within the road reserve or just outside it). Other habitat modifications observed are due to dense alien plant invasion and agriculture (cattle farming). Habitat types seen along the project area and immediate surroundings are depicted in Figure 9 below (sourced from Botanical Specialist Report, B. Fouche) and include: River valley and drainage line with dense alien plant vegetation (A, E); Short grassy vegetation either due to livestock grazing or active mowing/maintenance of R102 road reserve (B, C, D, I, K); Wetland habitats due to storm water runoff from the R102 road (F, G) or along a non-perennial river within the spillway of a dam (H); Small artificial (farm) dams for livestock (J).

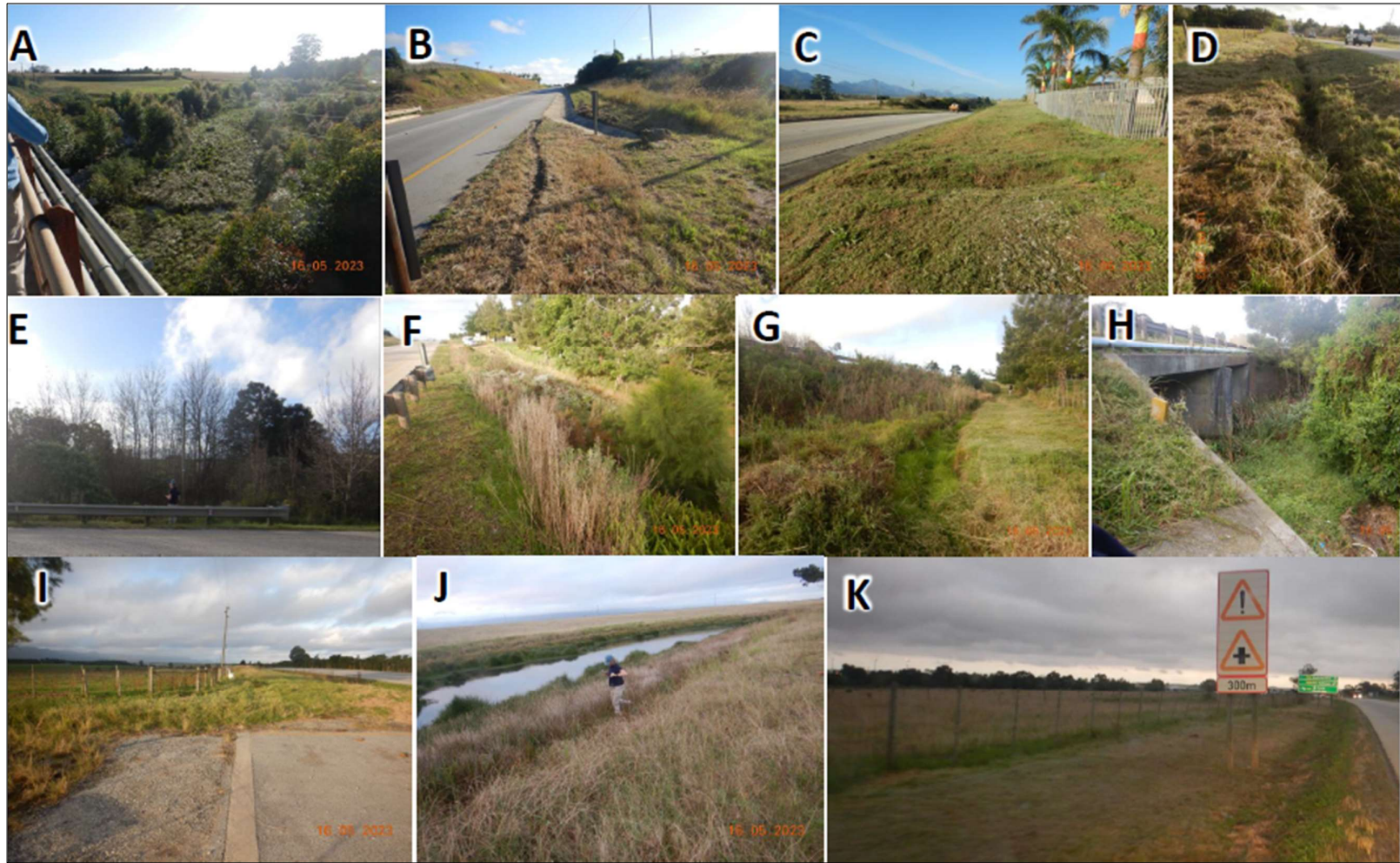


Figure 9. Habitat structure along the pipeline project area of the R102 road in George, Western Cape. Images sourced from Botanical Specialist Report (B. Fouche, Confluent Environmental).

4.4 Likelihood of Occurrence for SCC

Following the site inspection, the possible SCC occurring in the project area 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 those listed as having a low likelihood of detection (SANBI, 2020), and therefore this table should only be used as a guideline.

Table 4. Likelihood of occurrence for terrestrial fauna SCC in project area.

Species	Red list status	Observed on site	Suitable habitat	Likelihood of occurrence	Reason
AVIFAUNA					
<i>Circus maurus</i> Black Harrier	Endangered	No	No	Low	No suitable natural fynbos habitat.
<i>Circus ranivorus</i> Marsh Harrier	Endangered	No	No	Low	No suitable marshland vegetation within immediate surroundings to be attractive for this SCC.
<i>Polemaetus bellicosus</i> Martial Eagle	Endangered	No	No	Low	Rare visitor to the region with a preference for savanna, karoo shrubland and semi-desert environments. Limited suitable habitat, and close proximity to busy R102 road unlikely to be attractive to SCC.
<i>Bradypterus sylvaticus</i> Knysna Warbler	Vulnerable	No	Possible	Low	The non-perennial river and associated wetland vegetation in the middle of the project area may be suitable habitat for the SCC, however, given the non-perennial nature of the stream, alien invasion in surrounding areas and lack of typical tangled woodland habitat, this SCC is given a low likelihood of occurrence. Occurrence within project area is especially low given the proximity to the busy R102 road and modified vegetation within the project footprint.
<i>Falco biarmicus</i> Lanner Falcon	Vulnerable	No	No	Low	While SCC could possibly use agricultural fields within the wider surrounding areas for foraging, there is no suitable natural habitat. SCC is unlikely to occur in close proximity to the project footprint due to the busy R102 road and associated human disturbances.
<i>Neotis denhami</i> Denham's Bustard	Vulnerable	No	No	Low	While SCC could possibly use agricultural fields within the wider surrounding areas for foraging, there is no suitable natural habitat. SCC is unlikely to occur in close proximity to the project footprint due to the busy R102 road and associated human disturbances.

Species	Red list status	Observed on site	Suitable habitat	Likelihood of occurrence	Reason
<i>Sagittarius serpentarius</i> Secretarybird	Vulnerable	No	No	Low	While SCC could possibly use agricultural fields within the wider surrounding areas for foraging, there is no suitable natural habitat. SCC is unlikely to occur in close proximity to the project footprint due to the busy R102 road and associated human disturbances.
<i>Stephanoaetus coronatus</i> Crowned Eagle	Vulnerable	No	No	Low	No suitable forest habitat within project area. Only Gwaing River contains marginally suitable habitat with some large trees, although this area is heavily invaded with alien vegetation and the pipeline footprint follows the existing bridge infrastructure.
<i>Alcedo semitorquata</i> Half-collared Kingfisher	Near Threatened	No	No	Low	No suitable perineal river/stream habitat.
<i>Campethera notata</i> Knysna Woodpecker	Near Threatened	No	No	Low	No suitable natural dense forest/thicket vegetation.
<i>Grus paradiseus</i> Blue Crane	Near Threatened	No	No	Low	While SCC could possibly use agricultural fields within the wider surrounding areas for foraging, there is no suitable natural habitat. SCC is unlikely to occur in close proximity to the project footprint due to the busy R102 road and associated human disturbances.
<i>Oxyura maccoa</i> Maccoa Duck	Near Threatened	No	No	Low	While SCC could use dams in wider surrounding areas, the SCC is unlikely to occur in the project area or in close proximity thereto given the lack of suitable waterbodies.
<i>Buteo trizonatus</i> Forest Buzzard	Least Concern (Regional), Near Threatened (Global)	No	No	Low	While SCC could possibly use alien tree invasions within the wider surrounding areas, there is no suitable natural habitat. SCC is unlikely to occur in close proximity to the project footprint due to the busy R102 road and associated human disturbances.
MAMMALS					
<i>Panthera pardus</i> Leopard	Vulnerable	No	No	Low	While SCC could possibly use dense alien tree invasions within the wider surrounding areas, there is no suitable natural habitat and SCC is unlikely

Species	Red list status	Observed on site	Suitable habitat	Likelihood of occurrence	Reason
					to occur in close proximity to the project footprint due to the busy R102 road and associated human disturbances.
Sensitive Species 8	Vulnerable	No	No	Low	No suitable natural habitat. No forest or sufficient thicket vegetation for SCC.
<i>Amblysomus corriae</i> Fynbos Golden Mole	Near Threatened	No	Possible	Low	Limited suitable habitat and no natural fynbos habitat in project area. The majority of the project area falls within the heavily modified and maintained R102 road reserve which decreases the SCC's likelihood of occurrence.
<i>Poecilogale albinucha</i> African Striped Weasel	Near Threatened	No	Possible	Low	No suitable natural habitat and proximity to busy R102 road likely to deter SCC.
TERRESTRIAL INVERTEBRATES					
<i>Aneuryphymus montanus</i> Yellow-winged Agile Grasshopper	Vulnerable	No	No	Low	No suitable sclerophyllous fynbos habitat.
<i>Ceratogomphus triceraticus</i> Cape Thorntail Dragonfly	Near Threatened	No	Possible	Low	No typical aquatic habitat for SCC in project area and a lot of alien vegetation observed in drainage lines/streams which decreases likelihood of occurrence.
<i>Ecchlorolestes nylephtha</i> Queen Malachite Damselfly	Near Threatened	No	No	Low	No typical aquatic habitat for SCC in project area.
AMPHIBIANS					
<i>Afrixalus knysnae</i> Knysna Leaf-folding Frog	Endangered	No	No	Low	No suitable endorheic wetland habitat in project area.

5. SITE SENSITIVITY VERIFICATION AND COMPLIANCE STATEMENT

Based on the information in this report during the desktop and field assessment, the site sensitivity for the terrestrial animal theme of the project area is determined to be **LOW** in contrast to the high and medium sensitivities highlighted by the DFFE Screening tool.

The following reasons support this finding:

- Very little natural vegetation and habitat exists within the project footprint. Most of the site consists of highly transformed and modified areas within the R102 road reserve and adjacent areas heavily transformed due to active mowing, livestock grazing (agriculture) or alien plant invasion. The greater landscape within which the project area falls has experienced significant human disturbance and alterations over the last 88 years.
- The limited footprint of the project area within which excavations or HDD activities will take place (10m working space) is unlikely to cause changes to the existing habitat structure, which is currently already highly modified.
- The low likelihood of occurrence of terrestrial animal SCC within the project footprint, given the transformed nature of the habitat and limited extent of the footprint (10 m working area).
- While some SCC may occur within the greater areas surrounding the project area (e.g. Denham's Bustard and Blue Crane possibly using the surrounding agricultural fields), it is highly unlikely that the SCC will occur in close proximity to the project footprint given the high levels of human disturbance already existing and likely deterring SCC (e.g. traffic, people walking, cattle herding and maintenance activities along the R102 road and adjacent fence lines).
- The temporary nature of the excavation or HDD activities (disturbance) associated with the project, as well as its proximity to existing infrastructure and disturbance regimes (i.e. busy R102 road), is unlikely to cause additional or significant disturbance to terrestrial animal species.

As per the Published Government Notice No. 1150, Government Gazette 43855 (30 October 2020), the **LOW** sensitivity allows for a Terrestrial Animal Species Compliance statement to be issued.

6. RECOMMENDATIONS

- Layout options which are in close proximity to existing infrastructure (i.e. close to R102 road, existing pipes/underground infrastructure, pipeline along bridge infrastructure) are preferred over options further away from the R102 road or following new routes.
- Recommendation made within the Aquatic Specialist Report (J. Dabrowski, Confluent Environmental) should be implemented to minimize impacts to any aquatic environments, thereby reducing impacts to associated fauna species.
- Recommendations made by the Botanical Specialist Report (B. Fouche, Confluent Environmental) should be implemented to reduce the impacts to native vegetation and thereby associated fauna species. Recommendations regarding the clearing of alien

vegetation is also highly recommended given the benefits for biodiversity, fire-risk and water resource management.

- General recommendation and best practice guidelines should be followed for all animal species encountered (regardless of whether they are SCC or not) during any stage of development on a site. These are summarised in Box 1 below:

BOX 1: Best practice principles for ALL fauna encountered during construction or operational phases of projects.

If any animals are seen on site, a photo or video should be taken if at all possible (to assist in identification) and all fauna encountered on site should be reported to the ECO immediately. This is particularly important when:

- An animal is harmed or compromised in any way during construction.
- Ground-dwelling animals, their nests or eggs are unearthed during earthworks (e.g. moles, tortoise eggs, terrapins/frogs estivating).
- Any animal with limited mobility is found on site (e.g. tortoises, moles, chameleons).
- Any potentially dangerous animal is encountered. This includes any potentially venomous animal (e.g. snakes, scorpions) or any medium-large animal that has become cornered in a room/enclosed area such that it cannot escape (e.g. porcupines, monkeys, baboons, antelope). It is critical in the case of snakes/scorpions to get pictures/videos to aid in identification and appropriate treatment of anyone needing medical assistance.
- Any animal that shows reluctance to escape or move away from the construction site, thereby increasing its exposure to harm or increasing the risk of injuring people on site.

The ECO should provide guidance or assistance to get all animals to safety, treating any injured animals and issuing instructions on when to continue with construction (once they are satisfied that all animals have been removed from site) or put additional mitigation measures in place to protect animals on the site from harm.

Some helpful contact details numbers for the ECO's disposal include:

For any injured animals or animals to be removed from site (domestic or wild):

A local SPCA can collect and treat most animals, and should be a first point of call for assistance. If they cannot directly assist, they will revert and notify the relevant authorities/vets. In the Garden Route please contact:

SPCA George: 044 878 1990

SPCA Mossel Bay: 044 693 0824

For any assistance with snake removals/relocations, identifications, or bite treatment:

African Snakebite Institute (all details available on www.africansnakebiteinstitute.com)

General Enquiries: +27 73 186 9176

Snakebite Emergencies: +27 82 494 2039

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APPENDIX 1: SCC IDENTIFIED FROM PUBLIC PLATFORMS FOR THE QUARTER DEGREE SQUARE, SABAP2 PENTAD AND INATURALIST SEARCH AREA FOR THE PROJECT.

SCC were included or excluded from further analysis in this report based on expert interpretation for the presence/absence of key habitat features on site. See Section 4.1 Assumptions and Limitations for more information.

Species	Common name	Regional Assessment, Global Assessment	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>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	Y
<i>Ciconia abdimii</i>	Abdim's Stork	NT, LC	SABAP2	N
<i>Circus maurus</i>	Black Harrier	EN, EN	SABAP2	Y
<i>Circus ranivorus</i>	African Marsh Harrier	EN, LC	SABAP2	Y
<i>Coracias garrulus</i>	European Roller	NT, LC	SABAP2	N
<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 Griffon	EN, VU	iNaturalist	N
<i>Leptoptilos crumenifer</i>	Marabou Stork	NT, LC	SABAP2	N
<i>Neotis denhami</i>	Denham's Bustard	VU, NT	SABAP2	Y
<i>Oxyura maccoa</i>	Maccoa Duck	NT, EN	SABAP2	Y
<i>Polemaetus bellicosus</i>	Martial Eagle	EN, EN	SABAP2	Y
<i>Sagittarius serpentarius</i>	Secretarybird	VU, EN	iNaturalist	Y
<i>Sarothrura affinis</i>	Striped Flufftail	VU, 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 ocularis</i>	Spectacled African Dormouse	NT	Virtual Museum	N
<i>Panthera pardus</i>	Leopard	VU	Virtual Museum	Y
<i>Pelea capreolus</i>	Vaal Rhebok	NT	Virtual Museum	N
<i>Poecilogale albinucha</i>	African Striped Weasel	NT	Virtual Museum	Y
Invertebrates				
<i>Ceratogomphus triceraticus</i>	Cape Thorntail	NT	Virtual Museum	Y
<i>Ecchlorolestes nylephtha</i>	Queen Malachite	NT	Virtual Museum	Y
<i>Thestor barbatus</i>	Bearded skolly	CR	Virtual Museum	N

APPENDIX 2: PRELIMINARY LIST OF AVIFAUNA SPECIES OBSERVED ON PROJECT AREA

Common name	Scientific name
Black Saw-wing	<i>Psalidoprocne pristoptera</i>
Cape Bulbul	<i>Pycnonotus capensis</i>
Cape Robin-Chat	<i>Cossypha caffra</i>
Cape Turtle (Ring-necked) Dove	<i>Streptopelia capicola</i>
Cape White-eye	<i>Zosterops virens</i>
Grey Heron	<i>Ardea cinerea</i>
Hadada Ibis	<i>Bostrychia hagedash</i>
Helmeted Guineafowl	<i>Numida meleagris</i>
Red-eyed Dove	<i>Streptopelia semitorquata</i>
Southern Boubou	<i>Laniarius ferrugineus</i>
Southern Fiscal	<i>Lanius collaris</i>
Western Cattle Egret	<i>Bubulcus ibis</i>