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# Moquini Hotel Development on Erf 14796, Mossel Bay, Western Cape

Terrestrial Animal Species Specialist Assessment:  
Site Sensitivity Verification and  
Amendment for Changes to Site Development Plan



**Prepared For:** Cape EAPrac  
**Author:** Monica Leitner (MSc)  
Confluent Environmental Pty (Ltd)  
7 St. Johns Street,  
Dormehls Drift,  
George, 6529  
**SACNASP:** Professional Natural Scientist (Ecological  
Sciences), 166055  
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## 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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- All the particulars furnished by me in this document are true and correct.



Monica Leitner (MSc)

May 2024

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## 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

**SACNASP Registration** - Professional Natural Scientist (Ecological Sciences), 166055.

### References

- Dr. Michelle Thompson – Former colleague on Marion Island and University of Pretoria  
M2 Environmental Connections  
Email: [ml.thompson89@gmail.com](mailto:ml.thompson89@gmail.com); Tel: +27 71 869 9042
- Prof. Mark Robertson – Previous employer (Soil Fauna in Africa Research Consortium)  
Department of Zoology and Entomology, University of Pretoria  
E-mail: [mrobertson@zoology.up.ac.za](mailto:mrobertson@zoology.up.ac.za); Tel: +27 84 718 5484

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## ABBREVIATIONS AND ACCRONYMS

<b>CBA</b>	Critical Biodiversity Area
<b>CD:NGI</b>	Chief Directorate: National Geo-spatial Information
<b>DFFE</b>	Department of Forestry, Fisheries, and the Environment
<b>ESA</b>	Ecological Support Area
<b>EWT</b>	Endangered Wildlife Trust
<b>NEMA</b>	National Environmental Management Act
<b>SANBI</b>	South African National Biodiversity Institute
<b>SCC</b>	Species of Conservation Concern
<b>SDP</b>	Site Development Plan
<b>SSVR</b>	Site Sensitivity Verification Report
<b>WCBSP</b>	Western Cape Biodiversity Spatial Plan

## 1. INTRODUCTION

Confluent Environmental Pty (Ltd) was appointed by Cape EAPrac to provide Terrestrial Animal Specialist inputs for the amendment of the Site Development Plan (SDP) for the proposed Moquini Hotel development on Erf 14796, Mossel Bay, Western Cape.

### 1.1 General Site Location

Erf 14796 is ca. 4.6 hectares in extent and located to the south-west of Dana Bay in the Mossel Bay Municipality, Western Cape (Figure 1). The site is accessed via a security checkpoint (gate with access control) off Heide Road and is continuous with the Fisherman's Village Coastal Estate to the west of the site.

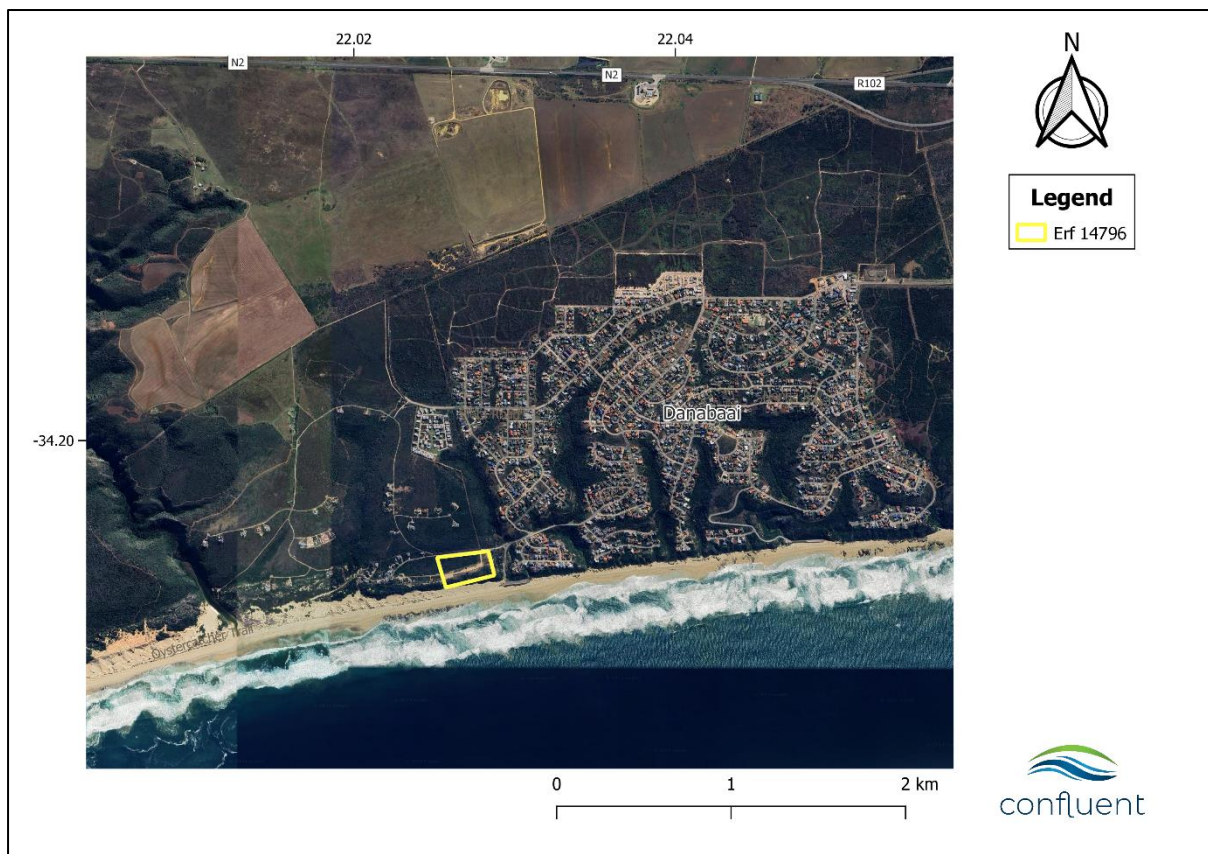


Figure 1. General site location of Erf 14796, Mossel Bay, Western Cape.

### 1.2 Development Layout

At the time of writing this report the proposed Moquini Hotel development layout had undergone through various SDP layouts that were revised taking botanical recommendations into account (previous botanical reports and recommendations provided by Regalis Environmental Services in 2007 and 2010; see Figure 2). It is the understanding of the author at the time of writing this report that Environmental Authorisation had been granted for the development layout option (top right in Figure 2) and that the property developers now wish to seek approval for a revised layout (bottom left in Figure 2) by means an amendment.

The newly proposed SDP intends for construction to occur in 11 phases and consists of 2-story apartment buildings with basements, some central facilities and associated road/parking

infrastructure. In total, 144 apartments are planned with 215 parking spaces (open and basement parking for residents and guests).

The difference in footprints between the approved SDP and the newly revised SDP are illustrated in Figure 3, and equates to a proposed 0.6 ha increase in SDP footprint related to the addition of natural/garden areas beyond the buildings in the north (thicket-facing) and south (sea-facing) (Figure 3).

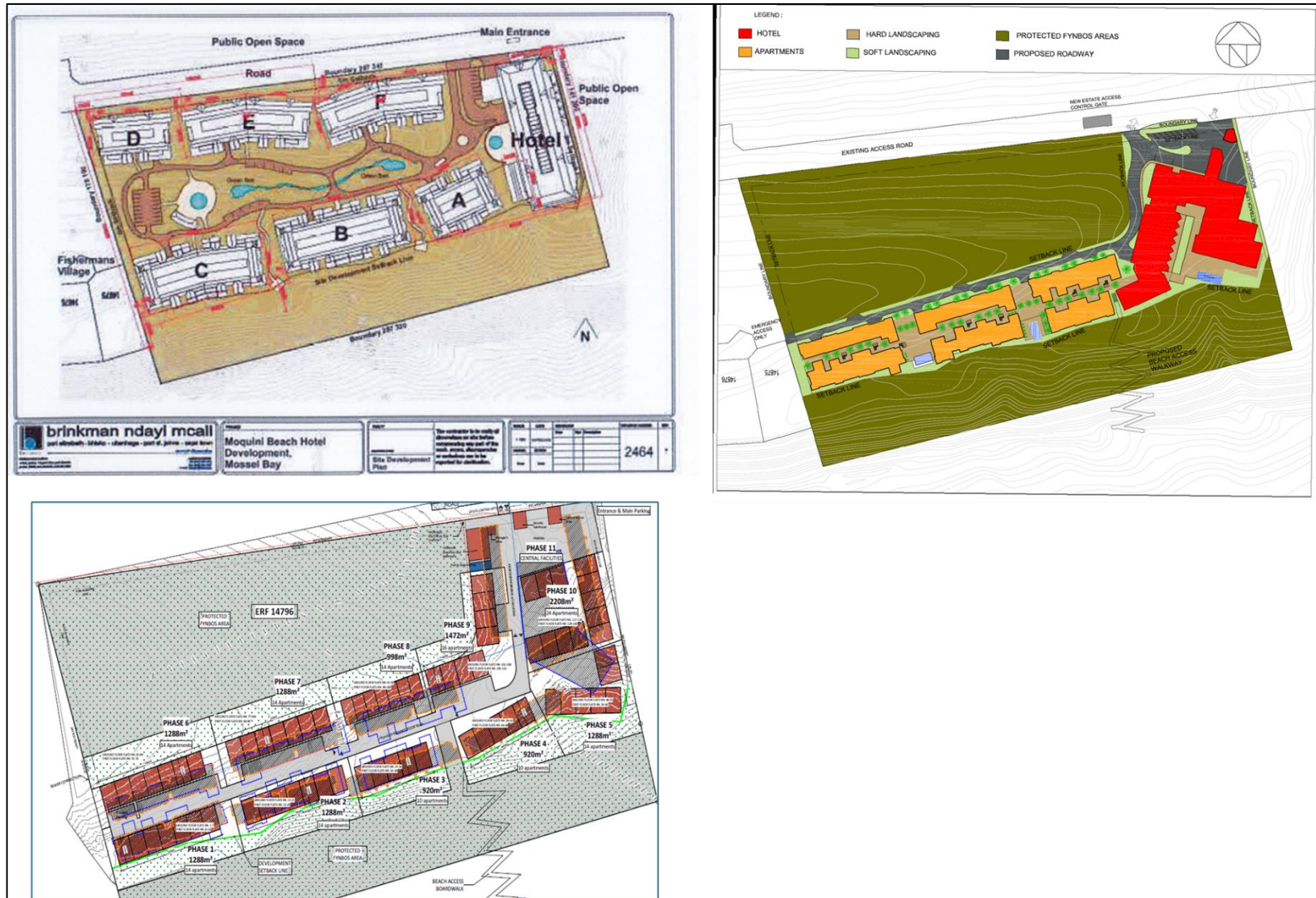


Figure 2. Iterations of changes to the SDP layouts on Erf 14796. Initial SDP layout provided by landowner/developer (top left), revised layout with environmental authorisation (top right), newly proposed SDP layout to be considered in this report (bottom left).

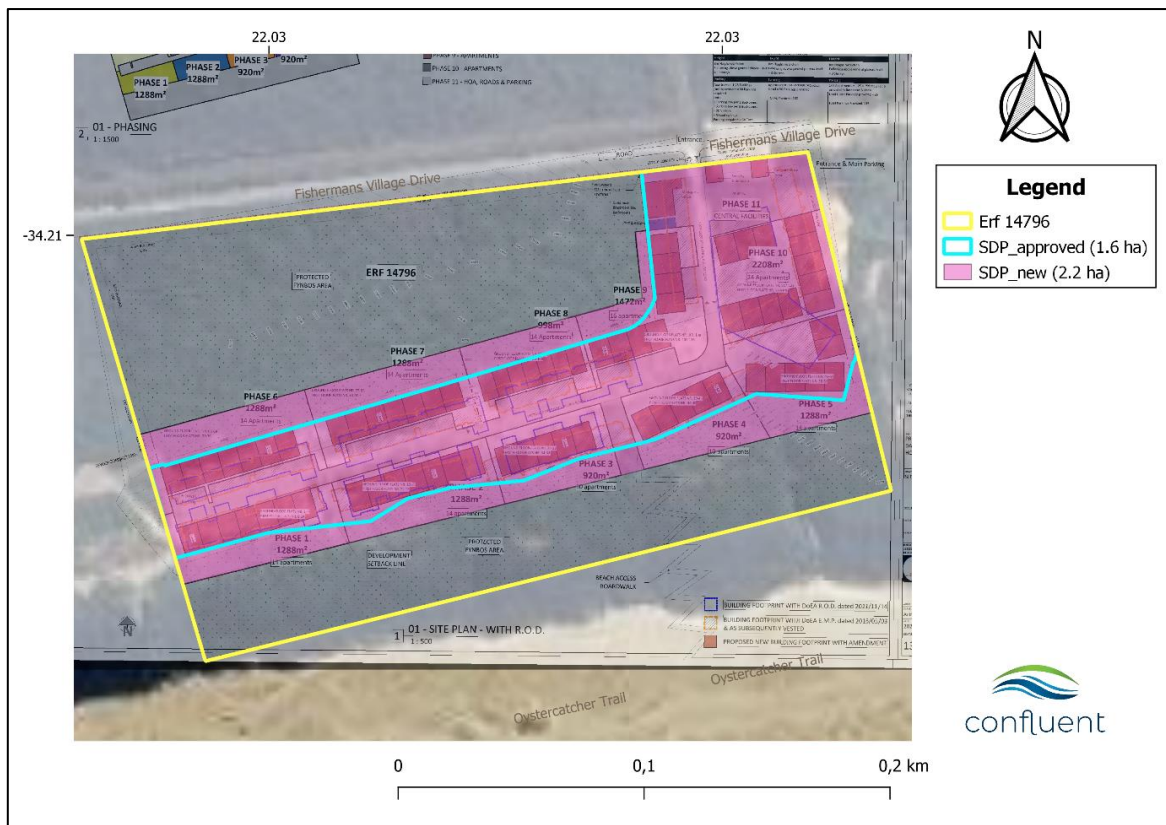
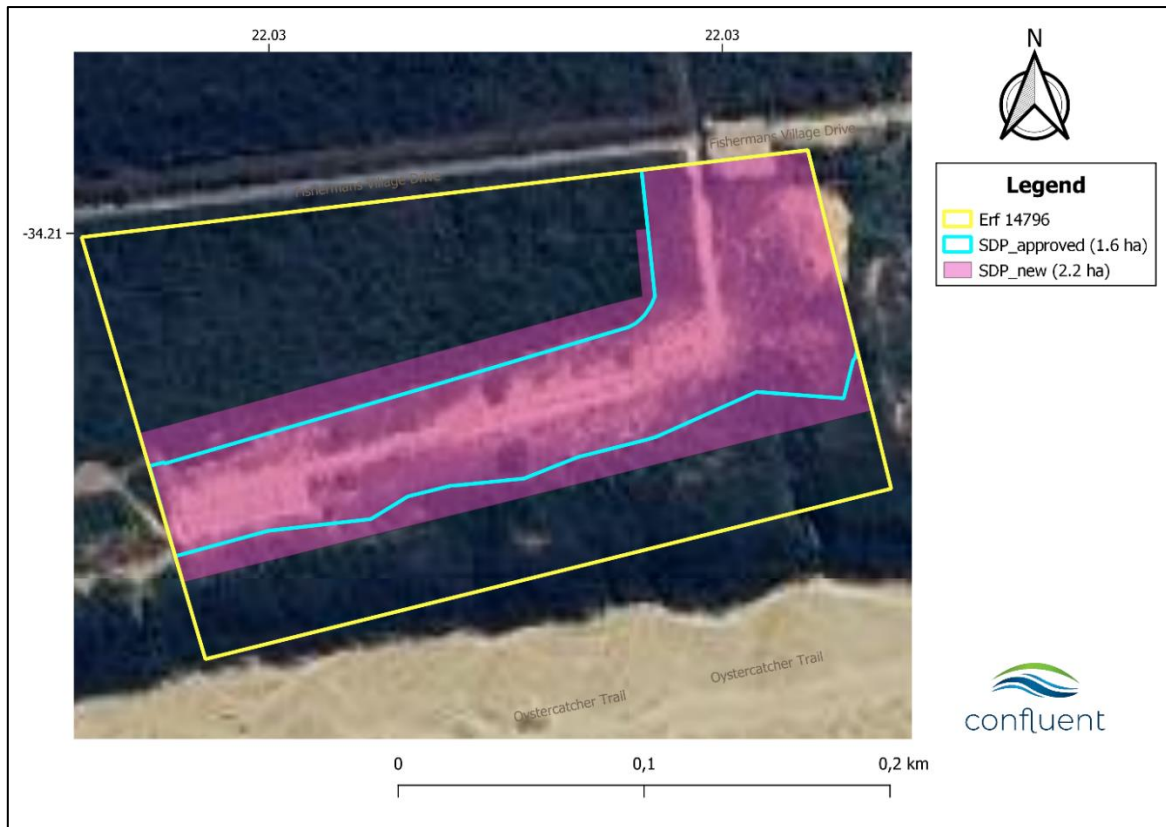


Figure 3. Comparison between the previously approved SDP footprint (blue outline) and the newly proposed SDP footprint (pink shading) on Erf 14796. Top figure shows SDPs in relation to satellite imagery and habitats on site. Bottom figure shows SDPs with reference building drawings to illustrate gardens around the buildings as being the reason for the increased footprint.

## 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 MEDIUM sensitivity for the terrestrial animal species theme across Erf 14796 (Figure 4), with only one 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 **MEDIUM** sensitivity rating indicates:

- 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.
- 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 4. DFFE Online Screening Tool outcome for the terrestrial animal species theme for Erf 14796, Mossel Bay. The property boundary is indicated by the blue dashed line.

Table 1. Species of Conservation Concern highlighted by the DFFE Online Screening Tool for Erf 14796, Mossel Bay.

Sensitivity	Classification	Scientific name	Common name	Red list status
Medium	Invertebrate	<i>Aneuryphymus montanus</i>	Yellow-winged Agile Grasshopper	Vulnerable

## 2.2 Scope of work

This report begins by verifying the site sensitivity of Portion Erf 21796 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). This was deemed necessary since a previous Animals Species Assessment was not conducted as part of the original environmental authorization process. The site sensitivity verification aspect includes:

1. 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. This is not deemed necessary for the purposes of this report aimed at comparing layout options for the development and its possible impacts on fauna in the area. This is done with the understanding of previous environmental authorization being granted for the previous development layout.
  - 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.
2. 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.
3. 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.

Since Environmental Authorization has already been granted for the development based on a previous SDP layout, this assessment specifically aims to determine whether the additional footprint of the revised SDP layout will have a significant effect on terrestrial animals. Specifically, this report will:

- i. Assess all impacts related to the proposed change in SDP layout;
- ii. Discuss advantages and disadvantages associated with the proposed change in layout;
- iii. Discuss/recommend measures to ensure avoidance, management, and mitigation of impacts associated with such proposed change; and
- iv. Recommend (if necessary) any changes to the EMP.

### 3. DESKTOP ASSESSMENT

#### 3.1 Vegetation, Climate and General Habitat

Mossel Bay, Western Cape falls within the Fynbos biome of South Africa and experiences a temperate climate year-round (Mucina and Rutherford 2006, Rebelo, *et al.* 2006). The mapped vegetation type at the site includes Hartenbos Dune Thicket (Endangered), with a recent botanical specialist assessment available (B. Fouche, Confluent Environmental, 2024) in addition to some previous botanical sensitivity assessments done for the site (J. Vlok, Regalis Environmental Services, 2007 and 2010). Average temperatures range between 2°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 minimum temperatures of 0°C. Rain occurs throughout the year in a bimodal pattern with peaks in autumn (April) and spring (October-November) (Figure 5).

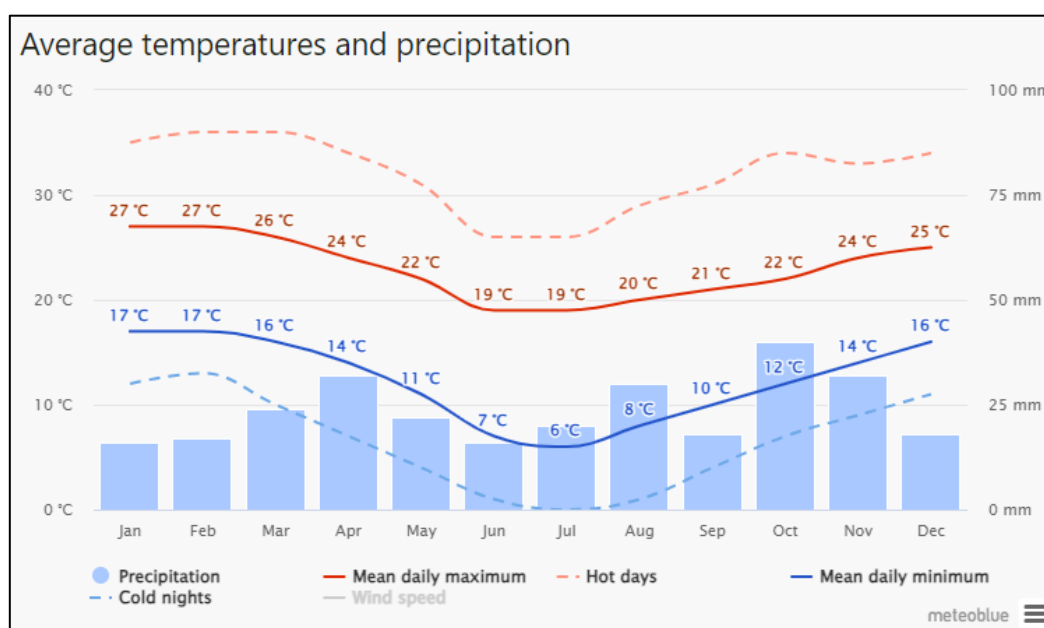


Figure 5. Summary of historical climate (modelled) for Brenton on Sea ([www.meteoblue.com](http://www.meteoblue.com)).

Satellite imagery from Google Earth and Cape Farm Mapper was used to assess general vegetation structure, elevational gradients and mapped water bodies within the project area (Figure 6). The property mainly comprises of dense (thicket) vegetation, except for a road running from the north-eastern corner towards the south and then west of the property (ending in the south-west corner), and some areas surrounding the road indicating past disturbance by being sparsely vegetated. The property generally has a gentle southerly slope, with a steep drop along the foredune towards the coastline along the southern boundary. No mapped watercourses are present on the property but a seep wetland is observed along a valley to the east (Figure 6).



Figure 6. Satellite imagery, 5m contours mapped watercourses (NWM5) sourced from Cape Farm Mapper for Erf 14796, Mossel Bay.

### 3.2 Western Cape Biodiversity Spatial Plan

Additional mapping layers were applied to Erf 14796 to include the Western Cape Biodiversity Spatial Plan (CapeNature 2017), with Critical Biodiversity Areas (CBAs), Ecological Support Areas (ESAs) and Other Natural Areas (ONA) assessed in Figure 7 and Table 2. The property falls within the Gouritz Cluster Biosphere Reserve and is entirely mapped as a ONA (as are the rest of the surrounding areas/properties). ESA1 and ESA2 layers are present to the east (aquatic features in the valley) and south of the property (terrestrial features along the beachfront) (Figure 7). The reason for these assignments is due to the property and surrounding areas containing the following mapped layers flagged for protection:

- Bontebok Extended Distribution Range
- Canca Limestone Fynbos
- Cape Seashore Vegetation
- Coastal Habitat Type

- Foredune
- South Coast Limestone Fynbos Channelled Valley Bottom Wetland
- Groot Brak Dune Strandveld
- Threatened Bird
- Watercourse protection- Southern Coastal Belt

A Terrestrial Specialist Assessment is also available for the property (B. Fouche, Confluent Environmental 2024).



Figure 7. Erf 14796, Mossel Bay with layers for the Western Cape Biodiversity Spatial Plan's Other Natural Areas (ONA) and Ecological Support Areas (ESA) sourced from Cape Farm Mapper.

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

WCBSP Category	Definition	Management Objective
Ecological Support Area 1 (ESA 1)	Areas that are not essential for meeting biodiversity targets, but that play an important role in supporting the functioning of PAs or CBAs, and are often vital for delivering ecosystem services.	Maintain in a functional, near-natural state. Some habitat loss is acceptable, provided the underlying biodiversity objectives and ecological functioning are not compromised.
Ecological Support Area 2 (ESA 2, Restore)	Areas severely degraded or have no natural cover and ecological functioning severely impaired. Not essential for meeting biodiversity targets but support	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 and delivering ecosystem services.	ecological functioning are not compromised.
Other Natural Areas (ONA)	Areas not currently identified as a priority, but retain most of their natural character and perform a range of biodiversity and ecological infrastructure functions. Although not prioritised, they are still an important part of the natural ecosystem.	Minimize habitat and species loss and ensure ecosystem functionality through strategic landscape planning. Offers flexibility in permissible land-uses, but some authorisation may still be required for high-impact land-uses.

### 3.3 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 Erf 14796 and its immediate surroundings:

1. iNaturalist (all taxa) within 1 km x 2 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) 3422AA: DungBeetleMAP, FrogMAP, LacewingMAP, LepiMAP, MammalMAP, OdonataMAP, ReptileMAP, ScorpionMAP, SpiderMAP.
3. South African Bird Atlas Project (SABAP2) for pentad 3410\_2200.

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 waterbodies, 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 4.2 and Appendix 1 for additional information).

The combined list of SCC (from DFFE Screening Tool and public resources) possibly occurring on Erf 14796, 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:

1. Avifauna: Roberts Birds of Southern Africa VII (Roberts, et al. 2005)
2. Mammals: The Mammals of the Southern African Subregion (Skinner 2005)
3. 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)
4. Amphibians: A complete guide to the frogs of Southern Africa (Du Preez and 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 animal SCC potentially occurring on Erf 14796, Mossel Bay. Bold text indicates SCC highlighted by DFFE Online Screening Tool.

Red list status	Species	Habitat	Breeding	Feeding
<b>AVIFAUNA</b>				
Near Threatened C1	<i>Campethera notata</i> Knysna Woodpecker	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.
Near Threatened C1	<i>Certhilauda brevirostris</i> Agulhas Long-billed Lark	Sparsely vegetated shrubs and agricultural fields. Less common in fynbos, with favouring sandy areas with restios. Endemic to Western Cape Province and largely restricted to the Agulhas Plain and Overberg wheatbelt, east of the Hottentots Holland Mountains.	Presumed to be monogamous. Males defend non-overlapping territories. Nest is a cup of dry grass lined with fine grass and roots located on the ground under cover of shrubs. Laying dates September-October.	Forages on ground, digging with bill or pulling vegetation with feet. Diet includes mostly insects with some seeds.
<b>MAMMALS</b>				
Vulnerable C1	<i>Panthera pardus</i> Leopard	Wide habitat tolerance, but generally associated with rocky outcrops, hills, mountains and forests. Manage to persist in areas of development provided there is adjacent cover of rocky hills or forest.	Solitary animals with males and females holding territories and defend against same sex. 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). Oestrous lasts 7 days during which male and female copulate frequently. Gestation 106 days and cubs remain with mother for 12months after which siblings remain together for a further 2-3 months.	Nocturnal, solitary hunter. 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. Usually drags larger prey items into cover (dense shrubs) or up trees.
<b>INVERTEBRATES</b>				

Red list status	Species	Habitat	Breeding	Feeding
Vulnerable B2ab(iii,v)	<b>Aneuryphymus montanus</b>  <b>Yellow-winged Agile Grasshopper</b>	Very low area of occupancy between 100 and 1 000 km <sup>2</sup> . 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.	Not known.	Not known.
Vulnerable	<i>Circellium bacchus</i>  Flightless dung beetle	Endemic to South Africa, on the Southern coastline in the winter and bimodal rainfall regions. Habitat types include the Albany Thicket and Fynbos biome, including vegetation units in Shale Renosterveld (FRs), Limestone Fynbos (FFI), Sandstone Fynbos (FFs), Sand Fynbos (FFd), Strandveld (FS). No association known for particular soil type (Davis et al. 2020). Abundant in dense shrub/woodland on sandy soils; most uncommon in adjacent disturbed open vegetation. Flightless, ectothermic and diurnal with maximal activity between 18–26°C, particularly after rainfall (Davis et al. 2020).	In Addo Elephant National Park: Buffalo and cattle dung preferred for breeding, but also recorded on dung of monkey, human, rhinoceros, hare, ostrich (Davis et al. 2020).	Elephant dung preferred for feeding but also recorded on dung of monkey, human, rhinoceros, hare, ostrich (Davis et al. 2020).
Near Threatened Criterion B	<i>Aloeides pallida littoralis</i>  Knysna Pale Copper Butterfly	Endemic taxon to the Western Cape Province. Relatively flat terrain near the coast, coastal Fynbos.	Little known, but <i>Lepisiota capensis</i> ants are hosts for subspecies <i>A. p. grandis</i> .	Little is known, but larval food for the subspecies <i>A. p. pallida</i> and <i>A. p. jonathani</i> feed on <i>Aspalathus</i> species. The larvae of subspecies <i>A. p. grandis</i> are fed by trophallaxis by <i>Lepisiota capensis</i> ants and feed on these ant eggs.

## 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 Erf 14796.*

Taxa	Field methods	Public platform where observations were reported
Avifauna	<ul style="list-style-type: none"> <li>• Meander* across site for direct observations.</li> <li>• 3 point counts (5-minute bird counts).</li> </ul>	Birdlasser (species lists), iNaturalist (photos)
Mammals	<ul style="list-style-type: none"> <li>• Meander* across site for direct observations, tracks, scats and signs.</li> </ul>	iNaturalist (photos)
Invertebrates	<ul style="list-style-type: none"> <li>• Meander* across site for direct observations.</li> <li>• Active searching.</li> <li>• Sweep netting.</li> </ul>	iNaturalist (photos)

\* Meandering involves slow walking across the site through various habitat types 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

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 represents 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. One field visit took place to the site for the faunal assessment. While this increased the likelihood of detecting animal species, this still only represents a “snap-shot” in time and it is possible that SCC occurring on site were not observed during these visits. These results should therefore be interpreted with this in mind and 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.

4. The site visit coincided with autumn on the site. This may be of consequence for some species showing seasonal variation in breeding and activity patterns either increasing or decreasing their likelihood of detection on site. These seasonal variations in detection likelihood are discussed and the precautionary principle applied where relevant in the report.
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.
6. This report is based on the understanding that environmental authorization has been granted for a previous layout of the development and it is assumed that relevant environmental concerns were addressed and approved during that application process (i.e. amount of habitat transformation lost to development in past version of SDP layout was deemed acceptable). As such, this report aims to compare the 'approved layout' with the 'newly proposed layout' with regards to any additional impacts to terrestrial animal species.

### 4.3 Site Inspection Details

One site visit took place to Erf 14796 on 6<sup>th</sup> May 2025 and the weather was sunny and warm. Habitat types found on the site consist mainly of natural vegetation (thicket) with areas in the south experiencing moderate invasion by Rooikrans (*Acacia cyclops*); and more open grassy areas on dune crests (Figure 8). Some vegetation was cleared for a road on the site. An effort was made to cover the project area with the meander and to conduct taxa specific sampling techniques across a range of suitable habitats for potential SCC (Figure 9).



Figure 8. Habitat types identified on Erf 14796, Mossel Bay, including thicket vegetation across the majority of the site and the sea-facing dune slopes (A), and dune crests with sparse vegetation (B). Image C shows some road infrastructure and image D shows invasion on the dune crests of Rooikrans shrubs (*Acacia cyclops*).



Figure 9. Habitats found on Erf 14796, Mossel Bay with GPS track and sampling from the site visit in May 2024.

#### 4.4 Results

##### 4.4.1 Avifauna

No SCC was encountered during the site visit. Three bird counts were conducted across the property, in addition to opportunistic sightings noted throughout the meander. A total of 13 bird species were identified during the site visit on the property, with African Oyster Catchers seen along the beach-front (outside but adjacent) to property (See Appendix 2, Figure 10).



Figure 10. Bird species seen during a site visit to Erf 14796, Mossel Bay. Bar-throated Apalis (*Apalis thoracica*) and Helmeted Guinea fowl (*Numida meleagris*) found to occur on property, with African Oystercatchers (*Haematopus moquini*) seen on the beach-front adjacent to the property.

#### 4.4.2 Mammals

No SCC were found during the site visits. Bushbuck were observed on site, with their dung and footprints seen across the site including on the steep fore-dune towards the seashore indicating that they use the entire property (Figure 11). One animal was also on the northern neighbouring property walking up and down the fence line trying to access the site (Figure 11). One Cape Striped Fieldmouse (*Rhabdomys pumilio*) was seen in the fore-dune thicket habitat, and other rodent burrows were observed in the open habitat on the dune crests towards the eastern portion of the site near the entrance gate (not possible to identify this species). See Appendix 3 for the list of mammals observed on site.



Figure 11. Southern Bushbuck (*Tragelaphus sylvaticus*) seen on Erf 14796 (left image) and northern adjacent property walking along the fence line (middle image). Spoor (right image) for this species was observed across the site, including the steep fore-dune indicating this as an access route and movement between properties/across the surrounding areas.

#### 4.4.3 Terrestrial Invertebrates

No SCC was found during the site visit and no suitable sclerophyllous fynbos habitat was observed for the SCC *Aneuryphymus montanus*. There was however suitable sandy soils and ample dung (from Bushbuck) seen across the site indicating suitable habitat and food availability for the dung beetle SCC *Circellium bacchus*. A search on iNaturalist for the SCC revealed sightings within the urban developments to the north-east (2km) and west (4km) of the site and given the suitable habitat this SCC is highly likely to occur on site. Invertebrates from 9 Families were observed on site (see Figure 12 and Appendix 4).



Figure 12. Invertebrates seen during site visit to Erf 14796, Mossel Bay.

#### 4.4.4 Amphibians

No SCC were highlighted for the property by the DFFE Screening Tool or online databases. As such no targeted searching took place for this taxon.

#### 4.4.5 Reptiles

No SCC were highlighted for the property by the DFFE Screening Tool or online databases. As such no targeted searching took place for this taxon.

#### 4.4.6 Likelihood of Occurrence for SCC

Following the terrestrial fauna desktop survey and site inspection, the possible SCC occurring on Erf 14796, Mossel Bay 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 those listed as having a low likelihood of detection (SANBI 2020), and therefore this table should only be used as a guideline.

Table 5. Likelihood of occurrence for terrestrial fauna SCC on Erf 14796, Mossel Bay.

Red list status	Species	Observed on site	Suitable habitat	Likelihood of occurrence,
<b>AVIFAUNA</b>				
Near Threatened C1	<i>Campethera notata</i> Knysna Woodpecker	No	No	<b>LOW</b> No suitable tree habitat for SCC on site or immediate surroundings.
Near Threatened C1	<i>Certhilauda brevirostris</i> Agulhas Long-billed Lark	No	No	<b>LOW</b> No suitable open shrubland habitat for SCC on site or immediate surroundings.
<b>MAMMALS</b>				
Vulnerable C1	<i>Panthera pardus</i> Leopard	No	No	<b>LOW</b> Not sufficient tall dense vegetation or trees to provide shelter/cover for SCC.
<b>INVERTEBRATES</b>				
Vulnerable B2ab(iii,v)	<b>Aneuryphymus montanus</b> <b>Yellow-winged Agile Grasshopper</b>	No	No	<b>LOW</b> No suitable fynbos vegetation for SCC.
Vulnerable	<i>Circellium bacchus</i> Flightless dung beetle	No	Yes	<b>HIGH</b> Suitable dense vegetation on sandy soils present on site. Antelope and dung observed across site indicating food source. Observations of SCC reported on public platforms nearby.
Near Threatened Criterion B	<i>Aloeides pallida littoralis</i> Knysna Pale Copper Butterfly	No	No	<b>LOW</b> No coastal fynbos, no suspected host plant or ant species observed on site.

## 5. SITE SENSITIVITY VERIFICATION

After the site visit and fauna surveys, it is determined that the site sensitivity for the terrestrial animal theme of Erf 14796 is **HIGH** in contrast to the medium sensitivity highlighted by the DFFE Screening tool.

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

- The highly likely occurrence of the Cape Flightless Dung Beetle (*Circellium bacchus*) listed as Vulnerable due to suitable habitat, landscape connectivity and nearby sightings of the SCC.

As per the Published Government Notice No. 1150, Government Gazette 43855 (30 October 2020), the **HIGH** sensitivity of the site requires a Terrestrial Animal Species Specialist Assessment to be conducted.

This assessment is conducted, bearing in mind that Environmental Authorization has already been granted for the original SDP layout, and that the following assessment is based on the revised SDP layout and additional impacts associated with this.

## 6. SITE ECOLOGICAL IMPORTANCE

While site sensitivity (highlighted by the DFFE Screening Tool and then confirmed/disputed by the site sensitivity verification process) determines the necessity and requirements for specialist reporting, the Site Ecological Importance (SEI) metric provides a site-based method to spatially identify different areas of importance for species in relation to a proposed development.

The Site Ecological Importance (SEI) is determined for habitats within the property, taking associated fauna SCC into account (Table 5). Table 6 provides the SEI calculations for each habitat type (see Appendix 5 for SEI methods) and Figure 13 illustrates the SEI results for the property. 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 and/or locations for the development.

The entire property has a **MEDIUM** SEI rating (Figure 13). According to the guidelines for interpreting SEI ratings in terms of development (Table 7, (SANBI 2020)), a medium SEI indicates that minimization and restoration mitigation measures should be implemented, with development activities of medium impact considered acceptable. In light of this, it is imperative that mitigation measures are adhered to and that all measures are taken to reduce the developmental footprint wherever possible to minimize negative impacts on the faunal community, reduce the amount of habitat lost and maintain connectivity within the greater landscape.

Table 6. Site Ecological Importance assessment for Erf 14796, Mossel Bay. 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)
<b>Thicket vegetation and dune crests</b>  SCC: <i>C. bacchus</i>	<b>HIGH</b> Highly likely occurrence of <i>C. bacchus</i> (Vulnerable, EOO > 10km <sup>2</sup> ) on site.	<b>MEDIUM</b> Habitat connectivity exists with surrounding natural areas with ecological corridors but fence lines and roads are present around the property decreasing functionality of corridors generally. Site is	<b>MEDIUM</b>	<b>MEDIUM</b> Thicket vegetation could recover in about 10 years and by association most fauna can be expected to return soon as well. Fauna SCC has a moderate likelihood of remaining on site during disturbances, or has a moderate likelihood of	<b>MEDIUM</b> BI = MEDIUM RR = MEDIUM

Habitat and associated SCC	Conservation Importance (CI)	Functional Integrity (FI)	Biodiversity Importance	Receptor Resilience (RR)	Site Ecological Importance (SEI)
		small < 5ha in extent and some current negative impacts present with alien plant invasion on dune crests. No signs of major past disturbance.		returning to site after disturbance.	

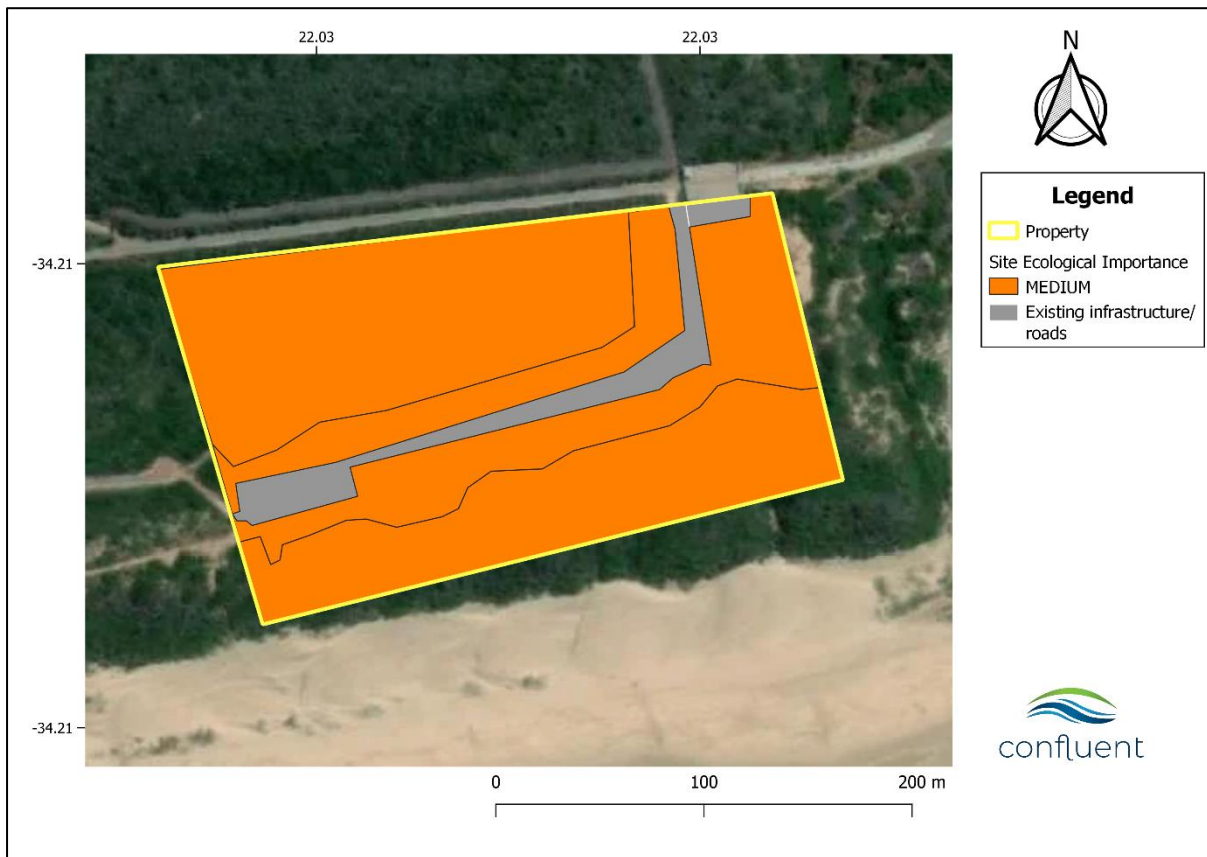


Figure 13. Site Ecological Importance for terrestrial fauna on Erf 14796, Mossel Bay.

Table 7. Guidelines for interpreting Site Ecological Importance for proposed developments (SANBI 2020).

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

## 7. IMPACT ASSESSMENT FOR PROPOSED CHANGES TO SDP LAYOUT

This impact assessment is based on the two SDP options available at the time of writing this report (the approved SDP and the newly proposed/revised SDP) and will need to be reassessed if the revised layout changes in the future.

This section covers the following topics:

- i. Assess all impacts related to the proposed change in SDP layout. Given that no previous faunal assessment was conducted, impacts for the previously approved SDP are scored retrospectively and then compared to the revised SDP, with both SDP options assessed pre- and post-mitigation. Results are presented in Table 8, with the methods explained in Appendix 6.
- ii. Discuss/recommend measures to ensure avoidance, management, and mitigation of impacts associated with such proposed change. Recommend (if necessary) any changes to the EMPr
- iii. Discuss advantages and disadvantages associated with the proposed change in layout – See Discussion and Conclusion Section

### 7.1 Mitigation hierarchy

The principles of the mitigation hierarchy (Ekstrom *et al.*, 2015) are applied during an impact assessment. Potential impacts on biodiversity are preferentially managed through preventative, rather than remediative, measures (Figure 14). This is achieved by suggesting avoidance or minimization methods wherever possible. Alternatively, if the impacts of a development cannot be adequately managed through the preventative measures of avoidance and minimization, then restoration and, as a last resort, offsets are considered.

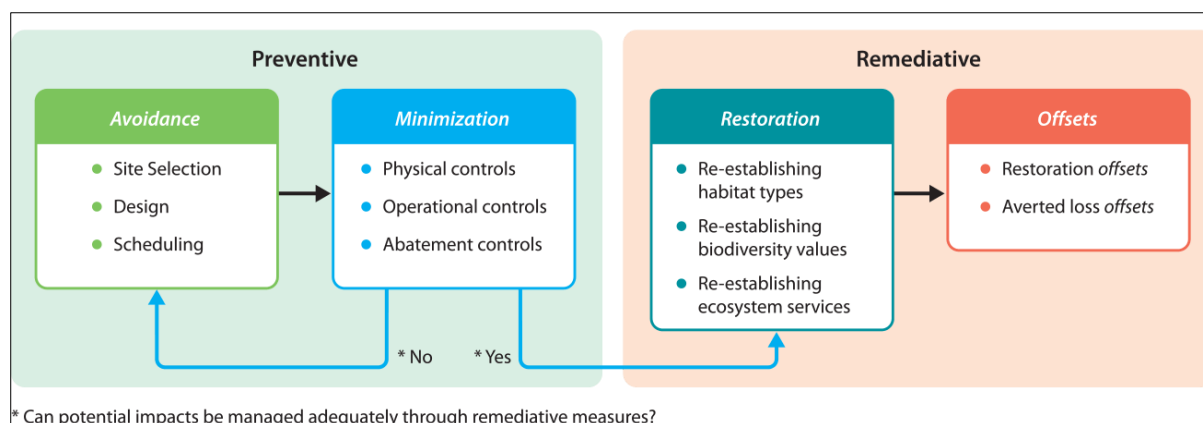


Figure 14. The iterative process of minimising predicted impacts on biodiversity and ecosystem services, as described in the mitigation hierarchy (Ekstrom et al., 2015).

## 7.2 Reference to be made to Botanical Specialist report

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'. In addition to the measures highlighted throughout the next sections, it is imperative that the Botanical Specialist report (B. Fouche, Confluent Environmental) also be consulted, and these mitigation measures adhered to, to reduce the impact of the development on plant species, since fauna rely heavily on plants for resources (food, shelter, etc.) and suitable habitat.

## 7.3 Current Impacts

**Moderate levels of alien plant invasion (*Acacia cyclops*)**, most prevalent on the dune crests, but also noted in the thicket habitat to the north. Habitat transformation through alien plant invasions can impact fauna through altered fire regimes (increased frequency and intensity), loss of suitable habitat and usually a reduction in food resources (plants, prey species).

- It is highly recommended an alien plant management plan be developed and implemented on the property before any development is permitted to take place. This pre-construction mitigation measure will benefit habitat quality and aid in reducing fire risk on the property as well as in the greater landscape.

**Interruption of wildlife movement across the landscape by fence line** to the north of the property (with the neighbouring property to the north, see Figure 11 for Bushbuck observed walking along northern fence line trying to access property).

- Consideration to be given for discussions with northern neighbour to allow for possible crawl spaces or some small open sections of fence (1m width) to increase wildlife movement across the landscape, although this will need to be balanced with the need for security.
- To maintain connectivity and corridors for animal movement across the greater landscape, it is recommended that the property remains (as is currently the case) unfenced, or that fencing occurs in close proximity around the infrastructure/buildings on site leaving natural spaces open as far as possible. Connectivity will be especially

important between the remaining thicket patch in the middle/north of the site and the western neighbouring property, as this patch is small and risks becoming isolated and ecologically degraded over time.

#### 7.4 Layout and design phase

While this assessment serves largely as a comparison between two SDP layouts (approved and now revised), there are some additional considerations within the layout and design phase of the project which can reduce the impact of the development on fauna and their habitat within the property.

1. Keep artificial lighting along roads and around infrastructure to a minimum and consider lighting colour, brightness and design options with minimal impact on biodiversity. This is particularly relevant to development within this largely natural area, where the potential for impacts on the native faunal diversity can be large. Light pollution is of global concern given that our night skies are getting lighter due to urban development and that many animals are specifically adapted to dark night skies for navigation, foraging and behavioural aspects (i.e. sleep, hunting). A common impact is that many insects are attracted to or disorientated by artificial lights, leading to aggregations at such point sources. This interferes with their natural behaviour (i.e. feeding), associated ecosystem services they provide (e.g. pollination) and often has fatal consequences for individuals unable to escape the 'light trap'. There is also the cumulative impact of attracting predators to light sources (e.g. birds, frogs, small mammals) and exposing them to risks in these areas as well.
  - a. Wherever possible in the designing phase consider 'no lighting' options to encourage dark areas and reduce light pollution.
  - b. Where this is not possible, the impacts of lighting can 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).
2. The approved (and revised) SDP layout interrupts the connectivity within the greater landscape by separating and effectively isolating the north and south habitats. As such, all efforts should be made to retain connectivity between these natural areas with those on neighbouring properties. This is possible through minimising fencing wherever possible to allow for wildlife corridors and movement between properties.
3. Access roads and parking spaces for non-heavy machinery could make use of open pavers that are planted with non-invasive grasses, like *Cynodon dactylon* (the Cape Royal variety), or *Stenotaphrum secundatum* (Buffalo grass). Open pavers should also be considered around any areas where water might be channelled and cause erosion around the houses (i.e. at the base of gutter outlets or overflow zones around water tanks). Open pavers reduce surface water runoff intensity through improved infiltration and can reduce erosion often associated with infrastructure (Figure 15).



Figure 15. Examples of open pavers to use for parking areas, access roads or underneath gutters/water tank overflow areas to improve water infiltration and prevent soil erosion.

## 7.5 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 that aim to minimize impacts on fauna and natural habitat. It is imperative that an ECO is present on site at the onset of a new construction phase and at the start of any earthworks during the construction phase.

### 7.5.1 Loss of natural habitat for fauna within the footprint of the proposed development

**Description:** The proposed development and associated access roads will result in the permanent loss of natural habitat on the property. The initial (approved SDP) has a disturbance footprint of ca. 1.6 ha (in line with previous botanical suggestions for proposed acceptable limit of habitat transformation on site; ca. 35% habitat loss on property), while the newly proposed SDP increases this footprint to ca. 2.2 ha (0.6 ha increase, total of ca. 48% habitat loss on property). Although the increase in the new SDP corresponds “open space or planned gardens” around the permanent infrastructure (Figure 3), this is still likely to result in the loss of natural vegetation and habitat for fauna. These impacts are assessed and compared between SDP layouts in Table 8.

#### Consequences of impact:

1. Habitat loss within an endangered habitat type.
2. Loss of suitable habitat for fauna SCC to live, forage and breed.
3. Loss of species with which SCC has obligatory relationships (i.e. dung beetle relies on dung from other animal species (e.g. antelope, hares) for food and breeding purposes).

#### Mitigation measures:

1. The disturbance footprint of the new SDP is related to the establishment of gardens/green space around the buildings. This should be minimised as far as possible

given that the thicket vegetation type is Endangered and habitat loss should be limited as far as possible. All gardens/open space can be reduced in size (at least halved) or removed all together from the development (as per the previous approved SDP) to limit the amount of habitat loss. Another suggestion is that the north row of apartments (thicket facing) retain some garden/green space while the south row of apartments (with a sea-view), should forfeit garden space altogether (as per the original SDP) due to the steep fore-dune landscape being unlikely to serve a functional/usable garden space and these areas should be kept as natural and undisturbed as possible to reduce the footprint of the development. Additionally, gardens/open space can also be achieved by developing such communal features between buildings or in other open spaces within the original footprint of disturbance (original SDP) to maximise the use of this area, rather than disturb additional habitat for this purpose.

2. All gardens/green space should retain as much indigenous, locally occurring thicket species as far as possible. Lawns to be planted only with non-invasive grasses, like *Cynodon dactylon* (the Cape Royal variety), or *Stenotaphrum secundatum* (Buffalo grass).
3. Prior to construction, the disturbance footprint of proposed roads and houses should be clearly defined and demarcated to prevent unnecessary additional damage to the surrounding environment:
  - a. Construction netting or fencing must be used to clearly indicate construction areas (see example in Figure 16). Access roads must be clearly marked so there is no confusion as to where the tracks are or how wide the road is.
  - b. 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.
  - c. All vehicles, construction or inspection, must only access the house 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 to prevent drivers getting lost and creating additional tracks or unnecessarily widening the access road. A turning area for construction vehicles should be demarcated within the existing footprint of the house.
  - d. For any adhoc deliveries or visitors to site, clear signs on the nearby roads should be put up to guide drivers to the construction sites, thus avoiding drivers getting lost and causing unnecessary damage to the environment.



Figure 16. Example of construction fencing to be used to demarcate construction areas.

4. 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 (Figure 17). This should be placed around the perimeter of the downslope disturbance footprint and needs regular inspection and adaptive management to ensure the integrity of the system for reducing erosion. This is pertinent for the house in the south of the property against a slope of the dune where the risk of runoff is expected to be greatest.



Figure 17. Examples of silt socks (left) and a silt fence (right) placed perpendicular to the flow of water. These methods reduce the force of water flow, erosion and can prevent unwanted sedimentation a site.

5. Protection and reuse of topsoil can be critical for the success of rehabilitation of natural vegetation following construction processes as it contains valuable seedbank of indigenous plants that regenerate after the soil is replaced. Topsoil removed during construction should be treated with care for all the proposed developments on the property.
  - a. Topsoil from vegetation on the site (excluding topsoil under dense stands of alien invasive plants) in new excavation areas must be stripped to a depth of 30cm, or in cases where the bedrock is shallower than this, then the entire soil

layer is to be removed. Topsoil is to be kept in designated piles of maximum 1 m in height, to prevent anaerobic conditions from smothering seeds and rendering them inviable, and must be suitably covered with shade cloth (or another breathable material with a fine mesh) to prevent any additional invasive species seeds from falling in and establishing in the soil.

- b. If the SDP of a proposed development does not have enough space for the storage and protection of topsoil within the disturbance footprint, then the ECO must identify an alternative temporary stockpile area that is already transformed and where it can easily be retrieved for post-construction rehabilitation.
- c. The topsoil piles must be clearly labelled so that it does not mix with subsoils excavated or any other construction material for the site.

#### *7.5.2 Harm/Death of fauna, particularly invertebrates and soil dwelling animals, due to earthworks and construction related activities.*

**Description:** Fauna may occur on site and be killed or seriously harmed during construction related activities. Cryptic and ground-dwelling species (e.g. any rodents, mole-rats) are difficult to detect and are limited in their mobility, as is the flightless dung beetle SCC, rendering them vulnerable to earthmoving and construction activities. This impact is assessed in Table 8.

#### **Consequences of impact:**

1. Loss of threatened species and a shift towards a negative change in the conservation status of the SCC and other indigenous species affected by the development.
2. Loss of genetic diversity from remaining fauna populations.
3. General loss of biodiversity.

#### **Mitigation measures:**

1. Construction should happen in phases, such that construction related activities are confined to one area at a time on the property and can be monitored for faunal impacts appropriately:
  - a. Before construction commences for any new earthworks at the start of new phase, an ECO should do a walk-through of the demarcated area and access roads that will be used to look fauna with limited mobility. These animals should be removed from the demarcated area to an adjacent location, and where appropriate a Fauna Specialist contacted for assistance or guidance. Construction/Earthworks for this new phase can commence thereafter.
  - b. At any point during the day (during construction), if an animal with limited mobility (particular attention given to the Dung Beetle SCC) is observed on site, this should be reported to the ECO and construction temporarily halted. Construction can commence once the ECO is satisfied that all such fauna are removed from the construction area.
  - c. Speed limits should be imposed and monitored during construction phase, as collisions with vehicles (roadkill) pose a significant threat to many fauna species. Recommended speeds include 40 km/hour on main access roads with

good visibility into the road verges, and 20 km/hour on smaller access roads with narrow or overgrown verges where visibility is reduced. Signs should be put up along the roads to remind people of speed limits, as well as warnings to look out for small animals on the roads (see examples in Figure 18).



Figure 18. Road sign reminding drivers to look out for dung beetles (left) and tortoises (right). Can be applied to all sensitive fauna.

### 7.5.3 *Habitat and fauna negatively affected by the management of the construction site (i.e., staff, stockpiles, and equipment).*

**Description:** The management of materials and staff on the site is also an important impact of development. If managed properly, many accidents and unanticipated negative impacts on fauna and the surrounding environment can be avoided. This impact is assessed in Table 8.

#### **Consequences:**

1. Loss of habitat or harm to fauna outside of designated construction areas.
2. Litter and pollution of natural environment.
3. Potential health and safety hazards (for staff and fauna) on the site and in the surrounding environment.

#### **Mitigation measures:**

1. All new 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 and must not be disturbed. Staff must be made aware what the dung beetle SCC looks like and to report all fauna occurring on site to the ECO.
2. Construction vehicles should be checked daily, prior to construction at the start of each day for leaks and other faults.
  - a. Sandbags or sawdust should be available and accessible on the site to ensure that any accidental oil spills are contained and stopped quickly.

- b. Any contaminated soil on the site must be removed by a registered hazardous waste service provider (e.g. Spill Tech, Interwaste, EnviroServ., etc.).
    - c. Vehicles with leaks and other problems are not allowed to operate on the site until they have been repaired.
  3. 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 or stored in a secure area when construction is not taking place (evenings, weekends, holidays, etc.) to prevent interference by animals (i.e. baboons). All waste is to be transported to a registered waste disposal facility off site.
  4. Adequate ablution facilities must be provided for every construction project.
    - a. Portable toilets will need to be used in remote areas like this site, and these must be placed on a level platform before construction starts within the footprint of the access roads or housing sites.
    - b. Ablution facilities must be regularly maintained and cleaned.
    - c. At least one toilet per ten to fifteen construction staff should be available – refer to SHEQ guidelines.
  5. Concrete, cement, plastering, and painting:
    - a. Mixing areas be clearly defined on the site and must be surrounded by an impermeable material (i.e. create a temporary coffer dam with sandbags and thick plastic sheeting) to prevent any runoff and absorption into the surrounding soils.
    - b. The designated mixing areas should be limited to areas that will become future hard surfaces on the site, or that are already transformed and likely to remain transformed.
    - c. No concrete and cement mixing is allowed in areas outside the site development plans (SDPs).
    - d. Cleaning of cement, plastering & paint equipment must be done into a designated, bunded & lined slurry sump or container to avoid contaminating the environment.
  6. All stockpiles of fine textured building materials and soils must be covered by a geotextile or plastic covering, which must also be bunded (e.g. with sandbags) when not in use (Figure 19). This will prevent material being lost to the environment and fauna from accessing stockpiles and possibly subjecting them to harm during construction.



Figure 19. Stockpiles of fine textured building materials and soils covered with geotextile/plastic covering and banded with sandbags when not in use.

7. Any small items or building materials which can be carried away by medium-large animals (i.e. baboons) should be safely stored in containers or locked away in a designated area to prevent interference from animals, causing possible harm to them and preventing them from removing such items from site.
8. All food waste (leftovers, bones, pips, apple cores) are to be disposed of in designated bins and NOT to be disposed of in the surrounding environment within or outside the designated construction areas. Food sources serve as a major attractant for fauna and will expose them to unnecessary harm in the vicinity of the construction site. All food waste should be removed from site on a daily basis and disposed of appropriately.
9. Construction should take place during daylight hours so that the site can be adequately monitored for fauna during work hours, and also to prevent the use of artificial lighting at night which attracts many animal species (predominantly insects and associated predators) and subjects them to the risks of construction.

## 7.6 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.

1. Construction sites must be cleared of all waste material, rubble, and debris associated with the construction phase at regular intervals during, and at the conclusion of the construction phase.
2. Revegetation of bare soil following construction is an essential part of concluding the construction phase of the project. This should be done with indigenous plant species that occur naturally in the surrounding environment on the property.
3. 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; these checks will prevent erosion during and after the construction phase that could have potentially far-reaching implications beyond the footprint for the proposed development.

## 7.7 Operational Phase Impacts

### 7.7.1 *Loss of habitat for fauna during maintenance activities for roads and housing infrastructure.*

**Description:** The development on the site could alter the disturbance regime of the large natural area on the property through changes in fire regimes (possibly increasing if alien plants are not controlled) and vegetation clearing associated with the maintenance and operation of housing and road infrastructure.

If the management adopts ecologically friendly approaches in the long-term, the development can have many positive (rather than only negative) outcomes for the environment. For example, the removal of the alien plants on site and the active control thereof reduces a significant existing threat to the habitat on site and the surrounding environment i.e. increase in natural habitat, reducing the risk of fires (reduced frequency and intensity). The owner of the property will need to develop an alien invasive management and eradication plan. The impact is assessed in Table 8.

#### **Consequences of impact:**

1. A general loss of habitat for plants and fauna by vegetation clearing around houses and roads. The mismanagement of materials during routine maintenance of infrastructure can also cause habitat loss (i.e. stockpiling/long term storage of materials on site rather than removing from site).
2. Uncontrolled alien plants can completely invade and transform natural habitats leading to a loss in associated biodiversity. Alien plants also increase fire frequency and intensity, which negatively impacts biodiversity either directly through hotter more frequent fires, or indirectly through changes in habitat (vegetation) structure.

#### **Mitigation measures:**

1. Vegetation clearing along road verges should be kept to a minimum, and avoided in areas where it poses no risk to vehicles. Where essential, vegetation along the road verges should only be cleared up to a maximum width of 1m on either side of the road. Cut vegetation should not be consolidated (gathered into piles) and left next to the side of the road where clearing took place. Instead, the cut vegetation should either be removed from site, or disposed of in a scattered/spread-out manner within the immediate surrounding of where it was cut, so as not to smother other plants or create concentrated fuel loads for fire.
2. During routine maintenance of infrastructure on the property, adequate management of materials should be implemented to reduce any unnecessary habitat loss. For example, all new building materials should be stored in areas within the disturbance footprint of the developments as far as possible to reduce additional damage to the natural (undisturbed) surroundings. Any old/removed building materials or rubble should be removed from site as soon as possible during maintenance activities and disposed of appropriately off-site. This will reduce the amount of additional space (natural surrounding habitat) lost or damaged for unnecessary storage of materials (Figure 20).



Figure 20. Inappropriate disposal or storage of pavers used during road maintenance activities.

3. It is a requirement by law that an alien and invasive plant management plan be developed and implemented on the property – see Botanical Specialist Report by B. Fouche (Confluent Environmental) for details, and 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).
4. A fire management plan can greatly aid in managing fire risks, with controlled, planned burns effectively promoting biodiversity and preventing damage to infrastructure. It is also highly recommended that property owners join a local Fire Protection Association (as advised by the National Veld and Forest Fires Act No. 101 of 1998), which aids in sound fire management protocols and can have insurance benefits through removing the presumption of guilt through negligence in the event of a fire spreading to neighbouring properties.
5. No insect zappers should be allowed on site, nor the general application of insecticides around infrastructure. Ecofriendly repellents are readily available (i.e. citronella oil/lotions) and should be used instead.
6. Emergency & cleaning supplies for waste spillage or fires should be accessible at each development proposed development on the property (e.g., keep lime, spades, first aid, fire extinguishers, etc. handy). Rainwater tanks can also be a useful source of water to aid in extinguishing fires, provided the water is readily accessible.
7. All staff and guests to the property must be properly trained and made aware of activities that are not allowed on the property.
8. Limited additional vegetation clearing should take place on the property for activities, even if these are low impact, as the cumulative effects can be substantial (i.e. camping grounds, mountain biking/hiking trails, picnic areas).
9. The establishment of indigenous gardens or the complete absence of gardens (i.e. fully rehabilitating any disturbed areas) within the footprints of the development will promote natural biodiversity. It is also highly recommended that indigenous, locally

occurring, fire resistant vegetation be planted around the house to aid in protecting buildings in the event of a fire (i.e. some indigenous species can be planted to form a fire-proof hedge).

### 7.7.2 *Disturbance of fauna due to noise and lighting associated with residential units.*

**Description:** The development on the site will alter the disturbance regime of the natural area on the property through changes in noise and artificial lighting levels. For the most part, these disturbances will be restricted to the immediate surroundings of the roads (i.e. traffic noise) and houses (i.e. people talking/shouting, music). However, this can have a significant impact on biodiversity and alter the way fauna use the landscape (i.e. the creation of a landscape of fear resulting in animals avoiding certain habitats/areas around human disturbances; insects attracted to lights decreases their survival, negatively impacts on the ecosystem services they provide and has negative knock-on consequences for their associate predators). This impact is assessed in Table 8.

#### **Consequences of impact:**

1. The creation of a landscape of fear for fauna where areas of the property are avoided due to excessive anthropogenic activity, predominantly noise.
2. Light pollution, as discussed in Layout and Design Phase 7.4 above, acts as an attractant to many insects and associated predators, putting all at risk.

#### **Mitigation measures:**

1. Light pollution must be reduced and avoided wherever possible during the operational phase of the project. White LED lights have the worst negative effects for the environment, therefore dimmer lights with more natural warm light colours must be used, and no bright torches used outside the house at night unnecessarily.
2. Permanent lighting along roads must be minimised as far as possible to reduce avoidable impacts on biodiversity, particularly increasing the risk of roadkill.
3. Noise should be minimised on the site and loud sirens/alarms should not be permitted unless there is an emergency.

### 7.7.3 *Human-wildlife conflict*

**Description:** Some wild animals are attracted to human developments, usually due to the presence of a resource that has become available within the footprint of the development (i.e. food attracting baboons, leftover scraps attracting wild animals if disposed in the surrounding environment). If any animal becomes habituated or loses their fear of humans, they risk becoming pests and problem animals (sometimes even posing a risk to humans) and often require control, in severe cases resulting in their harm or death. Keeping pets on the premises can also increase the potential for human-wildlife conflict as pets can fight or kill animals (i.e. cats are known to be devastating for indigenous wildlife, especially birds, small mammals and reptiles). Pets also run the risk of being harmed by wildlife (i.e. snake bites) which can lead to owners wanting to control or harm the natural fauna of the area. The impact is assessed in Table 8.

#### **Consequences of impact:**

1. Intentional harm or death of problem or pest animals due to their negative effects on the people (or pets) living on the property.
2. Unintentional harm or death of animals due to them consuming waste/food products which are bad for their health.
3. Pets causing death/harm to indigenous wildlife.
4. Changes in natural foraging and movement patterns of fauna across habitats within the landscape due to the presence of a favourable resource (usually food) near the development. This can have knock-on effects for the ecosystem services they provide and their associated predators.

**Mitigation measures:**

1. No feeding of wildlife is permitted, and no disposal/discarding of any food waste (bones, scraps, fruit pips/cores) within the surrounding environment is allowed.
2. All food waste or general waste should be kept in a secure location (i.e. a lockup cage or sealed outside room) which is not accessible to any wildlife.
3. All waste should be stored in a double-container fashion, in such a way that it does not serve as an attractant to wildlife attempting to access the secure location (i.e. all waste products put into closed/sealed rubbish bags/containers and then placed within larger sealed containers/bins).
4. Given that the waste area is secured against wildlife accessing it, allowances should still be made for the unlikely event that an animal does access the waste storage area, so that the waste is not easily accessed (i.e. use wildlife-proof dustbins/containers or lock the lids of larger containers). The double-container storage of waste (mentioned above) also prevents easy access of waste products to fauna, with all rubbish bags to be stored inside more solid containers. Examples of wildlife-proof bins are suggested in Figure 21.
5. All waste, particularly food waste, should be regularly removed from the property and disposed of appropriately to prevent the scent of old products increasing the attractiveness to the disposal area and surrounding development for wildlife.
6. Residents on the property should be limited in their ability to keep pets (i.e. how many pets and what types of pets). It is highly recommended that no cats be allowed on the property as they are known to actively hunt small animals and can have detrimental effects on the wildlife of an area (see Figure 22).

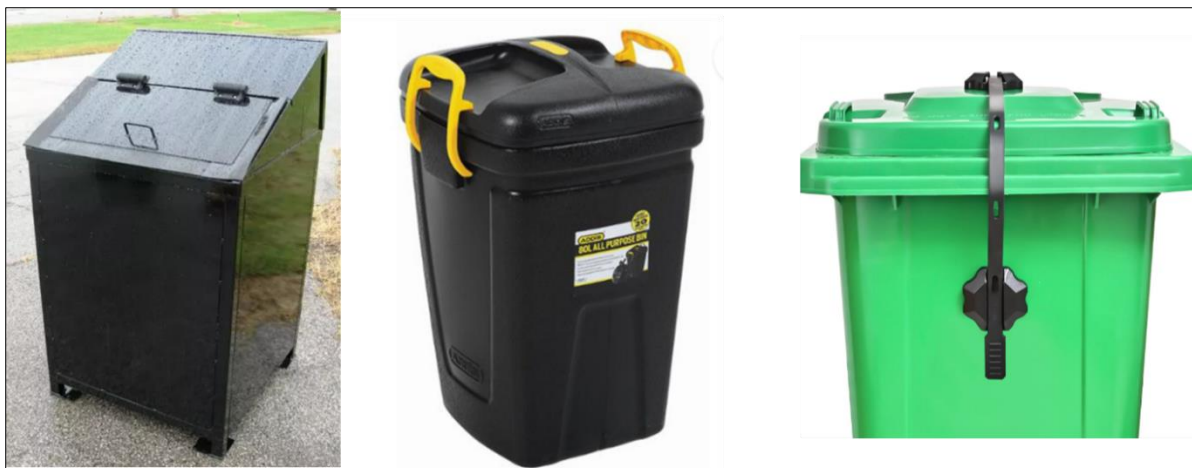


Figure 21. Wildlife-proof garbage disposal container options. Large containers with a one-way shoot to dispose of garbage (left): the top lid is connected to a smaller container which swivels up when the lid is opened to block access to the larger bin and its contents below, but when the lid is closed this bin swivels down to drop the garbage into the larger container. Locking mechanisms and handles on bins (middle and right) can also be used to successfully keep wildlife out.



Figure 22. Animals killed by one house cat in one year. Article published in National Geographic (<https://www.nationalgeographic.co.uk/animals/2020/09/the-232-animals-in-this-photo-were-killed-by-house-cats-in-just-one-year>).

#### 7.7.4 Harm/Death to wildlife due to collisions with vehicles.

**Description:** All fauna (from butterflies to large mammals) 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. The impact is assessed in Table 8.

**Consequences of impact:**

1. Death/Harm to any animal species (small insects to larger mammals) as a result of collisions with vehicles, particularly animals with limited mobility.
2. Decline in population size of local fauna populations, particularly that of threatened species (i.e. listed as vulnerable or endangered, etc.) which may increase their conservation status or risk of extinction.

**Mitigation measures:**

1. The strict enforcement of speed limits 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.

*Table 8. Impact assessment results for impacts of the approved SDP and newly proposed SDP for Erf 14796, Mossel Bay. The description, consequences and mitigation measures for each impact can be found in text under Sections 7.5 and 7.7 above. The differences between the SDPs were not enough to cause a change in the impact assessment outcomes following the methodology described in Appendix 8. As such, this table presents the results for both SDP options (approved and new) presented in this report. See Section 8 below for further information regarding the implications of the SDP options for habitat transformation and terrestrial fauna impacts.*

Project phase	Impact	Without mitigation						With mitigation					
		Nature	Duration	Extent	Intensity	Probability	Significance	Nature	Duration	Extent	Intensity	Probability	Significance
Construction	7.5.1 Habitat loss for dung beetle SCC and fauna	Negative	Permanent	Limited	Very high	Certain / definite	Moderate - negative	Negative	Permanent	Limited	Very high	Certain / definite	Moderate - negative
Construction	7.5.2 Harm/Death of soil-dwelling fauna due to construction/earthworks	Negative	Short term	Very limited	High	Likely	Minor - negative	Negative	Brief	Very limited	Low	Unlikely	Negligible - negative
Construction	7.5.3 Habitats/fauna affected by poor site management	Negative	Short term	Local	Very high	Almost certain / Highly probable	Minor - negative	Negative	Immediate	Very limited	Very low	Rare / improbable	Negligible - negative
Operation	7.7.1 Loss of habitat due to maintenance activities	Negative	On-going	Local	High	Almost certain / Highly probable	Moderate - negative	Negative	Immediate	Very limited	Very low	Unlikely	Negligible - negative
Operation	7.7.2 Disturbance of fauna due to noise/light pollution	Negative	On-going	Local	Moderate	Almost certain / Highly probable	Moderate - negative	Negative	Brief	Very limited	Low	Probable	Negligible - negative
Operation	7.7.3 Human-wildlife conflict	Negative	On-going	Local	High	Almost certain / Highly probable	Moderate - negative	Negative	Immediate	Very limited	Negligible	Rare / improbable	Negligible - negative
Operation	7.7.4 Harm/death of fauna due to vehicle collisions	Negative	On-going	Limited	High	Likely	Minor - negative	Negative	Brief	Very limited	Low	Rare / improbable	Negligible - negative

## 8. DISCUSSION AND CONCLUSION

Erf 14796, Mossel Bay is largely covered with natural thicket vegetation (mapped as Endangered Hartenbos Dune Thicket) and is connected to a greater landscape of WCBSA's Other Natural Areas within the surrounding landscape (Figure 7). Antelope and other fauna currently utilize the property extensively, and one invertebrate SCC (*Circellium bacchus*) is expected to occur on site. The site ecological importance (SEI) across the site was determined to be 'Medium' (Figure 13) and following the guidelines of a Medium SEI rating (Table 7), it is recommended that the footprint of development and permanent habitat alterations be minimized wherever possible.

The newly proposed SDP increases the development footprint by adding gardens or green space around the apartment buildings (Figure 3), ultimately resulting in ca. 2.2 ha (48%) of natural habitat being lost on the property compared to the previously approved SDP which had 1.6 ha (35%) habitat loss.

While the addition of gardens to the development is likely to make this more attractive for prospective tenants, this advantage from a development perspective needs to be balanced with the need to protect an endangered ecosystem type and fauna SCC likely occurring on site. Previous botanical assessments recommended that development be limited on site to ca. 1.6 ha (J. Vlock, 2007 and 2010 botanical assessments), which was in line with the previously approved SDP, however this newly proposed SDP exceeds this recommendation. See also a recent Terrestrial and Botanical Assessment (B. Fouche, Confluent Environmental) for further details and SDP comparisons for the property.

While the increase in habitat loss from the new SDP was not significant enough to cause a change in the impact assessment outcomes/ratings following the methods outlined in Appendix 6 (Table 8), any additional habitat loss (as presented by the new SDP) places additional strain on SCC and other fauna within the landscape, specifically those occurring within the already isolated patch of thicket in the north of the site. In light of the isolated nature of this thicket patch (resulting from the development layout previously approved), all efforts should be made to retain its size and connectivity with adjacent natural areas on neighbouring properties to encourage the persistence of natural biodiversity ecological functioning.

It is the specialist's opinion that the mitigation hierarchy should be applied to the consideration of this new SDP layout (Figure 14): the first step to maximize benefits to biodiversity would be to avoid additional habitat loss (i.e. no proposed gardens); in the event that this is not feasible or possible for the development, it is suggested that minimization efforts be employed. It is the specialist's opinion that various design efforts can be made to minimize habitat loss to gardens/open space in this new SDP in the event that it is deemed critical to the success of this development. For example, additional habitat loss in this newly proposed SDP can almost be halved by forfeiting gardens around apartments facing the sea-side, or by making use of open spaces between buildings within the already approved SDP footprint for this purpose (see additional Mitigation measures suggested in Section 7.5.1). Protecting natural habitat is one of the best ways to protect indigenous fauna, particularly those with a high conservation status (i.e. at greater risk of extinction) and should be seriously considered in this case where both an endangered ecosystem (Hartenbos Dune Thicket) and a Vulnerable invertebrate SCC (*Circellium bacchus*) are concerned.

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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.

Species	Common name	Regional Assessment status	Source	Assessed in report Y/N
<b>AVIFAUNA</b>				
<i>Ardenna grisea</i>	Sooty Shearwater	NT	Virtual Museum	N
<i>Bradypterus sylvaticus</i>	Knysna Warbler	VU	Virtual Museum	N
<i>Campethera notata</i>	Knysna Woodpecker	NT	Virtual Museum	Y
<i>Certhilauda brevirostris</i>	Agulhas Long-billed Lark	NT	Virtual Museum	Y
<i>Circus maurus</i>	Black Harrier	EN	Virtual Museum	N
<i>Falco biarmicus</i>	Lanner Falcon	VU	Virtual Museum	N
<i>Grus paradisea</i>	Blue Crane	NT	Virtual Museum	N
<i>Morus capensis</i>	Cape Gannet	VU	Virtual Museum	N
<i>Neotis denhami</i>	Denham's Bustard	VU	Virtual Museum	N
<i>Phalacrocorax capensis</i>	Cape Cormorant	EN	Virtual Museum	N
<i>Phoenicopterus roseus</i>	Greater Flamingo	NT	Virtual Museum	N
<i>Polemaetus bellicosus</i>	Martial Eagle	EN	Virtual Museum	N
<i>Procellaria aequinoctialis</i>	White-chinned Petrel	VU	Virtual Museum	N
<i>Spheniscus demersus</i>	African Penguin	EN	Virtual Museum	N
<i>Damaliscus pygargus pygargus</i>	Bontebok	VU	Virtual Museum	N
<i>Kogia breviceps</i>	Pygmy Sperm Whale	DD	Virtual Museum	N
<i>Kogia sima</i>	Dwarf Sperm Whale	DD	Virtual Museum	N
<i>Mesoplodon densirostris</i>	Blainville's Beaked Whale	DD	Virtual Museum	N
<i>Mesoplodon grayi</i>	Gray's Beaked Whale	DD	Virtual Museum	N
<i>Mesoplodon mirus</i>	True's Beaked Whale	DD	Virtual Museum	N
<b>MAMMALS</b>				
<i>Panthera pardus</i>	Leopard	VU	Virtual Museum	Y

<i>Poecilogale albinucha</i>	African Striped Weasel	NT	Virtual Museum	N
<i>Sensitive Species 8</i>	-	VU	Virtual Museum	N
INVERTEBRATES				
<i>Aloeides pallida littoralis</i>	Knysna Pale Copper	NT	Virtual Museum	Y
<i>Aloeides trimeni southeyae</i>	Trimen's Copper	EN	Virtual Museum	N
<i>Ceratogomphus triceraticus</i>	Cape Thorntail	NT	Virtual Museum	N
<i>Circellium bacchus</i>	Flightless dung beetle	VU	Virtual Museum	Y
<i>Lepidochrysops littoralis</i>	Coastal Nimble Blue	EN	Virtual Museum	N

## APPENDIX 2: AVIFAUNA SPECIES OBSERVED DURING SITE VISIT ERF 14796, MOSSEL BAY

Common name	Scientific name	Notes
African Oystercatcher	<i>Haematopus moquini</i>	Outside property boundary – seen on beach/shore line
Bar-throated Apalis	<i>Apalis thoracica</i>	
Cape Bulbul	<i>Pycnonotus capensis</i>	
Cape Robin-Chat	<i>Cossypha caffra</i>	
Cape Sparrow	<i>Passer melanurus</i>	
Cape Spurfowl	<i>Pternistis capensis</i>	
Fiscal Flycatcher	<i>Melaenornis silens</i>	
Greater Double-collared Sunbird	<i>Cinnyris afer</i>	
Helmeted Guinea fowl	<i>Numida meleagris</i>	Feathers found on site
Karoo Prinia	<i>Prinia maculosa</i>	
Kelp Gull	<i>Larus dominicanus</i>	
Sombre Greenbul	<i>Andropadus importunus</i>	
Southern Boubou	<i>Laniarius ferrugineus</i>	
Streaky-headed Seedeater	<i>Crithagra gularis</i>	

## APPENDIX 3: MAMMAL SPECIES OBSERVED DURING SITE VISIT TO ERF 14796, MOSSEL BAY

Order	Family	Common name	Scientific name	Notes
Artiodactyla	Bovidae	Southern Bushbuck	<i>Tragelaphus sylvaticus</i>	Seen on site
Rodentia	Muridae	Cape Striped Fieldmouse	<i>Rhabdomys pumilio</i>	Seen on site
Rodentia	-	-	-	Burrows seen on open, sandy dune habitat.

#### APPENDIX 4: PRELIMINARY INVERTEBRATE SPECIES LIST, OBSERVED DURING SITE VISIT TO ERF 14796, MOSSSEL BAY

Order	Family	Common name	Scientific name
Araneae	Nephilidae	Blackleg Orbweaver	<i>Trichonephila fenestrata</i>
Charadriiformes	Haematopodidae	African Oystercatcher	<i>Haematopus moquini</i>
Coleoptera	Coccinellidae	Variegated Lady Beetle	<i>Hippodamia variegata</i>
Diptera	Muscidae	Common House Fly	<i>Musca domestica</i>
Hymenoptera	Apidae	Western Honey Bee	<i>Apis mellifera</i>
Lepidoptera	Nymphalidae	Painted Lady	<i>Vanessa cardui</i>
Lepidoptera	Pieridae	Eastern Dotted Border	<i>Mylothris agathina</i>
Orthoptera	Acrididae	Lamenting Grasshopper	<i>Eyprepocnemis plorans</i>
Stylommatophora	Helicidae	White Garden Snail	<i>Theba pisana</i>

## APPENDIX 5: SITE ECOLOGICAL IMPORTANCE METHODS

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 9).

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 9. 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 (using Table 9) and then the SEI (Table 10).

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

Site 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

## APPENDIX 6: IMPACT ASSESSMENT METHODS

Criteria are ascribed for each predicted impact. These include the intensity (size or degree scale), which also includes the type of impact, being either a positive or negative impact; the duration (temporal scale); and the extent (spatial scale), as well as the probability (likelihood). The methodology is quantitative, whereby professional judgement is used to identify a rating for each criterion based on a seven-point scale (Table 11) and the significance is auto-generated using a spreadsheet through application of the calculations.

For each predicted impact, certain criteria are applied to establish the likely **significance** of the impact, firstly in the case of no mitigation being applied and then with the most effective mitigation measure(s) in place.

These criteria include the **intensity** (size or degree scale), which also includes the **nature** of impact, being either a positive or negative impact; the **duration** (temporal scale); and the **extent** (spatial scale). These numerical ratings are used in an equation whereby the **consequence** of the impact can be calculated. Consequence is calculated as follows:

**Consequence = type x (intensity + duration + extent)**

To calculate the significance of an impact, the **probability** (or likelihood) of that impact occurring is applied to the consequence.

**Significance = consequence x probability**

Depending on the numerical result, the impact would fall into a significance category as negligible, minor, moderate or major, and the type would be either positive or negative.

When assessing impacts, broader considerations are also considered. These include the level of confidence in the assessment rating; the reversibility of the impact; and the irreplaceability of the resource as set out in (Table 12, Table 13, and Table 14), respectively.

Table 11. Assessment criteria for the evaluation of impacts

Criteria	Numeric Rating	Category	Description
Duration	1	<b>Immediate</b>	Impact will self-remedy immediately
	2	<b>Brief</b>	Impact will not last longer than 1 year
	3	<b>Short term</b>	Impact will last between 1 and 5 years
	4	<b>Medium term</b>	Impact will last between 5 and 10 years
	5	<b>Long term</b>	Impact will last between 10 and 15 years
	6	<b>On-going</b>	Impact will last between 15 and 20 years
	7	<b>Permanent</b>	Impact may be permanent, or in excess of 20 years
Extent	1	<b>Very limited</b>	Limited to specific isolated parts of the site
	2	<b>Limited</b>	Limited to the site and its immediate surroundings
	3	<b>Local</b>	Extending across the site and to nearby settlements
	4	<b>Municipal area</b>	Impacts felt at a municipal level
	5	<b>Regional</b>	Impacts felt at a regional level
	6	<b>National</b>	Impacts felt at a national level
	7	<b>International</b>	Impacts felt at an international level
Intensity	1	<b>Negligible</b>	Natural and/ or social functions and/ or processes are negligibly altered
	2	<b>Very low</b>	Natural and/ or social functions and/ or processes are slightly altered

Criteria	Numeric Rating	Category	Description
	3	Low	Natural and/ or social functions and/ or processes are somewhat altered
	4	Moderate	Natural and/ or social functions and/ or processes are moderately altered
	5	High	Natural and/ or social functions and/ or processes are notably altered
	6	Very high	Natural and/ or social functions and/ or processes are majorly altered
	7	Extremely high	Natural and/ or social functions and/ or processes are severely altered
Probability	1	Highly unlikely / None	Expected never to happen
	2	Rare / improbable	Conceivable, but only in extreme circumstances, and/or might occur for this project although this has rarely been known to result elsewhere
	3	Unlikely	Has not happened yet but could happen once in the lifetime of the project, therefore there is a possibility that the impact will occur
	4	Probable	Has occurred here or elsewhere and could therefore occur
	5	Likely	The impact may occur
	6	Almost certain / Highly probable	It is most likely that the impact will occur
	7	Certain / Definite	There are sound scientific reasons to expect that the impact will definitely occur

Table 12. Definition of confidence ratings.

Category	Description
Low	Judgement is based on intuition
Medium	Determination is based on common sense and general knowledge
High	Substantive supportive data exists to verify the assessment

Table 13. Definition of reversibility ratings.

Category	Description
Low	The affected environment will not be able to recover from the impact - permanently modified
Medium	The affected environment will only recover from the impact with significant intervention
High	The affected environmental will be able to recover from the impact

Table 14. Definition of irreplaceability ratings.

Category	Description
Low	The resource is not damaged irreparably or is not scarce
Medium	The resource is damaged irreparably but is represented elsewhere
High	The resource is irreparably damaged and is not represented elsewhere