



## forestry, fisheries & the environment

Department:  
Forestry, Fisheries and the Environment  
**REPUBLIC OF SOUTH AFRICA**

Private Bag X447, Pretoria, 0001, Environment House, 473 Steve Biko Road, Pretoria, 0002 Tel: +27 12 399 9000, Fax: +27 86 625 1042

**Ref: 14.7.8.2.3.147**

**Enquiries: Mr Stiaan Kotze**

**Tel: (021) 441 2816 Email: SKotze@dffe.gov.za**

Sharples Environmental Services  
Unit 17 Cathedral Square  
Cathedral Street  
**GEORGE**  
6530

Attention: Michael Jon Bennett

Email: michael@sescs.net

Dear Mr Bennett

**INVASIVE SPECIES MONITORING, CONTROL AND ERADICATION PLAN OF FOR "THE PROPOSED INSTALLATION OF A BULK SEWERAGE PIPELINE, SEWERAGE BY-PASS PIPELINE AND STORMWATER OUTLETS ON RE/8662, STREET PARCEL RE/8581, RE/464, RE/8596, ERF 3645 AND STREET PARCEL RE/23074 IN ROSEMOOR, GEORGE, WESTERN CAPE PROVINCE.**

1. I refer to the following:
  - 1.1. Invasive Species Monitoring, Control and Eradication Plan of for the Proposed Installation Of A Bulk Sewerage Pipeline, Sewerage By-Pass Pipeline And Stormwater Outlets On Re/8662, Street Parcel Re/8581, Re/464, Re/8596, Erf 3645 And Street Parcel Re/23074 In Rosemoor, George, Western Cape submitted to the Department of Forestry, Fisheries and the Environment (DFFE) on 01 April 2026 compiled by Michael Jon Bennett. The plan was prepared for George Municipality.
2. Having reviewed the Invasive Species Monitoring, Control and Eradication Plan I have noted the following:
  - 2.1. The plan includes the entire property.
  - 2.2. The listed invasive plant species present on your property and their categories.
  - 2.3. The combined integrated control methods (mechanical, chemical and biological) will be used to control listed invasive species on your property.
  - 2.4. The Invasive Species Monitoring, Control and Eradication Plan will be implemented for three (3) years and all invasive plant species will be under control by end 2029; and there after annual follow up is recommended to keep the portion clean.



**Batho pele – putting people first**

Departement van Bosbou, Visserie en die Omgewing • Department of Forestry, Fisheries and the Environment • UmNyango wezamaHlathi, zokuThiya neBhoduluko • iSebe lezamaHlathi, ezokuLoba noKusingqongileyo • Umnyango WezamaHlathi, Ezokudoba Nezemvelo • Kgoro ya Dithokgwa, Boreahlapi le Tikologo • Lefapha la Meru, Botshwasi ba dithapi le Tikoloho • Lefapha la Dikgwa, Dithapi le Tikologo • Litiko Letemahlatsi, Tinhlanti Netendzawo • Muhasho wa zwa Vhusima-maqaka, Vhureakhovhe na Mupo • Ndzawulo ya Swihlahla, Vunjoveri na Mbango. The processing of personal information by the Department of Forestry, Fisheries and the Environment is done lawfully and not excessively for the purpose of processing in compliance with the POPI Act, any codes of conduct issued by the Information Regulator in terms of the POPI Act, and/or relevant legislation providing appropriate security safeguards for the processing of personal information of others.

**THE PROPOSED INSTALLATION OF A BULK SEWERAGE PIPELINE, SEWERAGE BY-PASS PIPELINE AND STORMWATER OUTLETS ON RE/8662, STREET PARCEL RE/8581, RE/464, RE/8596, ERF 3645 AND STREET PARCEL RE/23074 IN ROSEMOOR, GEORGE, WESTERN CAPE PROVINCE"**

3. In view of the above background, the Department is satisfied that the submitted Invasive Species Monitoring, Control and Eradication plan meets the requirements of such plans as provided in Chapter 4, sub section 76 of the National Environmental Management Biodiversity Act, 2004 (Act 10 of 2004) and the Alien and Invasives Species Regulations, 2020.
4. A progress report must be submitted to the DFFE every year or at the completion of each management unit to outline the progress that has been made. Moreover, a close out report must be submitted to the department after clearing have been completed.  
The close out report must, among other things include:
  - a. Description of the control methods used and the way they were implemented
  - b. Assessment including fixed-point photography of the cleared areas; and
  - c. Management, utilisation or disposal of plant materials (biomass) after clearing.
5. Should you wish to correspond further on this matter kindly quote Reference:14/2/8/2/3/147. Enquiries may be directed to the contact person highlighted at the top of this correspondence.

Yours sincerely



Mr Stiaan Kotze  
Environmental Management Inspector  
Department of Forestry, Fisheries and the Environment  
Designation: Control Biodiversity Officer: Competent Authority  
Branch: Regulatory Compliance and Monitoring  
Date: 05/05/2026





**GEORGE****TEL:** +27 (0) 44 873 4923 **FAX:** +27 (0) 44 874 5953**EMAIL:** info@sescs.net **WEBSITE:** www.sescs.net**ADDRESS:** Unit 17 Cathedral Square,

Cathedral Street, George, 6530

**PO BOX:** 9087, George, 6530**CAPE TOWN****TEL:** +27 (0) 21 554 5195 **FAX:** +27 (0) 86 575 2869**EMAIL:** betsy@sescs.net **WEBSITE:** www.sescs.net**ADDRESS:** Tableview, Cape Town, 7441**PO BOX:** 443, Milnerton, 7435

# **SITE SPECIFIC ALIEN AND INVASIVE SPECIES MANAGEMENT PROGRAMME**

## **FOR THE**

## **THE PROPOSED INSTALLATION OF A BULK SEWERAGE PIPELINE, SEWERAGE BY-PASS PIPELINE AND STORMWATER OUTLETS ON RE/8662, STREET PARCEL RE/8581, RE/464, RE/8596, ERF 3645 AND STREET PARCEL RE/23074 IN ROSEMOOR, GEORGE, WESTERN CAPE PROVINCE**

Produced as part of a Basic Assessment EIA Application for Environmental Authorisation in terms of the National Environmental Management Act (Act 107 of 1998) and the amended (April 2017) Environmental Impact Assessment Regulations, 2014

**SUBMITTED TO STIAAN KOTZE (skotze@dffe.gov.za) FOR APPROVAL**

**PREPARED FOR:** George Municipality  
P.O Box 19  
George  
6530

**DATE:** 31 March 2026

**SES REF NO:** AMP/RSU/GRG/03/26  
**DEA&DP REF.NO.:** 16/3/3/6/7/1/D2/47/0443/25



## **Table of Contents:**

|                                                                  |    |
|------------------------------------------------------------------|----|
| PROJECT DETAILS.....                                             | 3  |
| PURPOSE OF THIS ALIEN AND INVASIVE SPECIES MANAGEMENT PLAN ..... | 5  |
| LEGISLATIVE CONTEXT .....                                        | 5  |
| SITE DESCRIPTION.....                                            | 7  |
| ALIEN SPECIES IDENTIFIED ON SITE.....                            | 19 |
| MANAGEMENT OBJECTIVES .....                                      | 20 |
| CLEARING METHODOLOGY .....                                       | 23 |
| IMPLEMENTATION PROGRAMME .....                                   | 25 |
| MONITORING AND REPORTING .....                                   | 25 |
| RESPONSIBILITIES .....                                           | 26 |

## **Appendices:**

**Appendix A1: C.V of Author**

**Appendix A2: EAPASA Registration of Author**

**Appendix B1: Terrestrial Biodiversity Compliance Statement and Assessment - Sewer**

**Appendix B2: Terrestrial Biodiversity Compliance Statement and Assessment - Stormwater**

**Appendix C: DFFE Pesticide Policy**

|         |   |                 |
|---------|---|-----------------|
| Section | 1 | PROJECT DETAILS |
|         |   |                 |

| PROJECT DETAILS:                                  |                                                                                                                                                                                                                                                                                        |                                      |
|---------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Project Name:                                     | The proposed installation of a bulk sewerage pipeline, sewerage by-pass pipeline and stormwater outlet structures on RE/8662, Street Parcel RE/8581, RE/464, RE/8596, Erf 3645, Street Parcel RE/23074, Erf 23052, Erf 23068 and Erf 23069 in Rosemoor, George, Western Cape Province. |                                      |
| DEADP Reference Number:                           | 16/3/3/6/7/1/D2/47/0443/25                                                                                                                                                                                                                                                             |                                      |
| Erf Name and Portion Number:                      | <ul style="list-style-type: none"> <li>RE/8662</li> <li>Street Parcel RE/8581</li> <li>RE/464</li> <li>RE/8596</li> <li>Erf 3645</li> <li>Street Parcel RE/23074</li> </ul>                                                                                                            |                                      |
| SG Codes:                                         | RE/8662                                                                                                                                                                                                                                                                                | C02700020000866200000                |
|                                                   | Street Parcel RE/8581                                                                                                                                                                                                                                                                  | C02700020000858100000                |
|                                                   | RE/464                                                                                                                                                                                                                                                                                 | C02700020000046400000                |
|                                                   | RE/8596                                                                                                                                                                                                                                                                                | C02700020000859600000                |
|                                                   | Erf 3645                                                                                                                                                                                                                                                                               | C02700020000364500000                |
|                                                   | Street Parcel RE/23074                                                                                                                                                                                                                                                                 | C02700020002307400000                |
| GPS Co-ordinates of Pipeline Route:               | Starting point co-ordinates                                                                                                                                                                                                                                                            | 34 ° 3' 4.01" S<br>22° 12' 59.52" E  |
|                                                   | Middle point co-ordinates                                                                                                                                                                                                                                                              | 34° 2' 37.75" S<br>22° 13' 7.42" E   |
|                                                   | End point co-ordinates                                                                                                                                                                                                                                                                 | 34° 2' 22.32" S<br>22° 12' 51.14" E  |
| GPS Co-ordinates of Pipeline Route:               | Starting point co-ordinates                                                                                                                                                                                                                                                            | 33° 58' 16.97" S<br>22° 29' 3.52" E  |
|                                                   | Middle point co-ordinates                                                                                                                                                                                                                                                              | 33° 58' 19.58" S<br>22° 29' 5.88" E  |
|                                                   | End point co-ordinates                                                                                                                                                                                                                                                                 | 33° 58' 20.66" S<br>22° 29' 6.86" E  |
| GPS Co-ordinates of Stormwater Outlet Structures: | SO 1                                                                                                                                                                                                                                                                                   | 33° 58' 49.79" S<br>22° 28' 40.86" E |
|                                                   | SO 2                                                                                                                                                                                                                                                                                   | 33° 58' 54.29" S<br>22° 28' 49.80" E |
|                                                   | SO 3                                                                                                                                                                                                                                                                                   | 33° 58' 57.77" S<br>22° 28' 55.04" E |
|                                                   | SO 4                                                                                                                                                                                                                                                                                   | 33° 58' 57.37" S<br>22° 28' 56.04" E |
|                                                   | SO 5                                                                                                                                                                                                                                                                                   | 33° 58' 54.11" S<br>22° 28' 56.84" E |
|                                                   | SO 6                                                                                                                                                                                                                                                                                   | 33° 58' 54.59" S<br>22° 28' 58.12" E |
|                                                   | SO 7                                                                                                                                                                                                                                                                                   | 33° 58' 58.33" S<br>22° 28' 58.43" E |
|                                                   | SO 8                                                                                                                                                                                                                                                                                   | 33° 58' 59.38" S<br>22° 29' 3.02" E  |
|                                                   | SO 9                                                                                                                                                                                                                                                                                   | 33° 59' 1.17" S<br>22° 29' 0.71" E   |
| Municipality:                                     | George Municipality                                                                                                                                                                                                                                                                    |                                      |
| Province:                                         | Western Cape                                                                                                                                                                                                                                                                           |                                      |
| Applicant:                                        | George Municipality                                                                                                                                                                                                                                                                    |                                      |
| EAP:                                              | Sharples Environmental Services cc<br>EAP: Michael Jon Bennett (EAPASA: 2021/3163)<br>Candidate EAP: Christiaan Smit (EAPASA: 2024/8297)                                                                                                                                               |                                      |
| Date:                                             | 25 March 2026                                                                                                                                                                                                                                                                          |                                      |
| Conditions of Use:                                | This report is the intellectual property of Environmental Services cc (SES), who may make allowance to publish it, in whole provided that:                                                                                                                                             |                                      |

|  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|--|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <p>a) Approval for copy is obtained from SES.</p> <p>b) SES is acknowledged in the publication.</p> <p>c) SES is indemnified against and claim for damages that may result from publication of specifications, recommendations or statements that is not administered or controlled by SES.</p> <p>d) That approval is obtained from SES if this report is to be used for the purposes of sale, publicity or advertisement.</p> <p>SES accepts no responsibility for failure to follow the recommended program.</p> |
|--|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

**Section****2****PURPOSE OF THIS ALIEN AND INVASIVE SPECIES MANAGEMENT PLAN**

This Alien and Invasive Species Management Plan has been prepared for the George Municipality, for the construction and post construction rehabilitation activities associated with the proposed installation of a bulk sewerage pipeline, sewerage by-pass pipeline and stormwater outlet structures on RE/8662, Street Parcel RE/8581, RE/464, RE/8596, Erf 3645, Street Parcel RE/23074, Erf 23052, Erf 23068 and Erf 23069 in Rosemoor, George, Western Cape Province.

This Alien and Invasive Species Management Plan has been compiled in accordance with:

- The National Environmental Management: Biodiversity Act (Act 10 of 2004);
- The Alien and Invasive Species Regulations, 2014 (as Amended);
- And the EMPr.

The purpose of this Alien and Invasive Species Management Plan is to:

- Identify listed alien invasive species present on site;
- Provide a method statement for clearing of alien and invasive species;
- Prevent further spread of alien and invasive species;
- Ensure legal compliance;
- Promote indigenous vegetation recovery.

**Section****3****LEGISLATIVE CONTEXT**

This plan complies with:

- **The Constitution of South Africa:**

Section 4 of the Constitution guarantees everyone the right to an environment that is not harmful to their health or well-being. The constitution also mandates that the environment be protected for present and future generations through reasonable legislative and other measures, which includes preventing pollution and degradation. It promotes sustainable development and, where appropriate, the sustainable use of natural resources to ensure "ecologically sustainable development".

- **The National Environmental Management Act, 1998 (Act No. 107 of 1998):**

The Duty of Care is contained in Section 28 of the National Environmental Management Act, 1998 (Act 107 of 1998). In terms of Section 28(1), every person who causes, has caused, or may cause significant pollution or environmental degradation has a legal obligation to take reasonable measures to prevent such pollution or degradation from occurring, continuing, or recurring. Where harm to the environment cannot be prevented, Section 28(2) requires that reasonable measures be taken to minimise and rectify the pollution or degradation.

- **The National Environmental Management: Biodiversity Act (Act No. 10 of 2004):**

In terms of Section 73 of the National Environmental Management: Biodiversity Act (NEMBA), the landowner or person in control of land has a legal duty of care to take reasonable steps to prevent the spread of listed invasive species occurring on the property and to control or eradicate such species in accordance with the Alien and Invasive Species Regulations. Failure to comply with this obligation may result in enforcement action by the competent authority.

The implementation of this Alien and Invasive Species Management Plan is intended to give effect to the landowner's statutory duty under Section 73 of NEMBA.

- **NEMBA: Alien Species Regulations:**

**Category 1a Listed Invasive Species:**

- (1) Category 1a Listed Invasive Species are those species listed as such by notice in terms of section 70(1)(a) of the Act as species which must be combatted or eradicated.
- (2) A person in control of a Category 1a Listed Invasive Species must—
- (a) immediately take steps to combat or eradicate listed invasive species in compliance with sections 75(1), (2) and (3) of the Act; and
- (b) allow an authorised official to inspect a property as provided for in terms of section 31K of the National Environmental Management Act and to monitor, assist with or implement the combatting or eradication of the listed invasive species.
- (3) If an Invasive Species Management Programme has been developed in terms of section 75(4) of the Act, a person must combat or eradicate the listed invasive species in accordance with such programme.

**Category 1b Listed Invasive Species**

- (1) Category 1b Listed Invasive Species are those species listed as such by notice in terms of section 70(1)(a) of the Act as species which must be controlled.
- (2) A person in control of a Category 1b Listed Invasive Species must control the listed invasive species in compliance with sections 75(1), (2) and (3) of the Act.
- (3) If an Invasive Species Management Programme has been developed in terms of section 75(4) of the Act, a person must control the listed invasive species in accordance with such programme.
- (4) A person contemplated in sub-regulation (2) must allow an authorised official to inspect a property as provided for in terms of section 31K of the National Environmental Management Act and to monitor, assist with or implement the control of the listed invasive species, or compliance with the Invasive Species Management Programme contemplated in section 75(4) of the Act.
- (5) The Minister may require any person to develop a Category 1b Control Plan for one or more Category 1b species, which plan must be submitted to the Minister for approval, and such Control Plan must include the following:
- (a) species identification;
- (b) extent of invasion;
- (c) control measures to be used;
- (d) an action plan or schedule including time-frames for the clearing of each species;
- (e) whether or not any species can be utilised as biomass; and
- (g) any other information which the Minister may require.

**Category 2 Listed Invasive Species**

- (1) Category 2 Listed Invasive Species are those species listed by notice in terms of section 70(1)(a) of the Act as species which require a permit to carry out a restricted activity within an area specified in the Notice or an area specified in the permit, as the case may be.
- (2) Unless otherwise indicated in the Notice, no person may carry out a restricted activity in respect of a Category 2 Listed Invasive Species without a permit.
- (3) A person in control of a Category 2 Listed Invasive Species, or person in possession of a permit, must ensure that the specimens of the species do not spread outside of the land or the area specified in the Notice or permit.
- (4) Unless otherwise specified in the Notice, any species listed as a Category 2 Listed Invasive Species that occurs outside the specified area contemplated in sub-regulation (1), must, for purposes of these regulations, be considered to be a Category 1b Listed Invasive Species and must be managed according to Regulation 3.
- (5) Notwithstanding the specific exemptions relating to existing plantations in respect of Listed Invasive Plant Species, any person or organ of state must ensure that the specimens of such Listed Invasive Plant Species do not spread outside of the land over which they have control, or the specified area on such land, where any restricted activity is authorised in respect of any Listed Invasive Plant Species

**Category 3 Listed Invasive Species**

- Category 3 Listed Invasive Species are species that are listed by notice in terms of section 70(1)(a) of the Act, as species which are subject to exemptions in terms of section 71(3) and prohibitions in terms of section 71A of Act, as specified in the Notice.
- (2) Any plant species identified as a Category 3 Listed Invasive Species that occurs in riparian areas, must, for the purposes of these regulations, be considered to be a Category 1b Listed Invasive Species and must be managed according to regulation 3.



- **Regulation 7 (Control of listed invasive species)**

Regulation 7 of the Alien and Invasive Species Regulations under the National Environmental Management: Biodiversity Act requires that listed invasive species must be controlled in a manner that reduces their population, prevents their spread, and minimizes their ecological and socio-economic impacts.

Control measures must be appropriate to the species concerned and may include mechanical, chemical or biological methods, implemented in accordance with best environmental practice and applicable permit conditions. Ongoing monitoring and follow-up clearing are required to ensure that regrowth is addressed and long-term control is achieved.

The implementation of this Management Plan ensures compliance with the control obligations prescribed under Regulation 7.

| Section |                         |
|---------|-------------------------|
| 4       | <b>SITE DESCRIPTION</b> |

**Locality and Project Description:**

Sharples Environmental Services cc (SES) have been appointed by Lyners Engineers on behalf of the George Municipality to compile the Basic Assessment Report of the proposed installation of a sewerage pipeline, sewerage by pass line, and additional stormwater outlet structures in Rosemoor, George, Western Cape. Please refer to the figures below for the locality of the proposed pipeline routes and stormwater outlet structures.



**Figure 1: Locality Map of Bulk Sewerage Pipeline.**

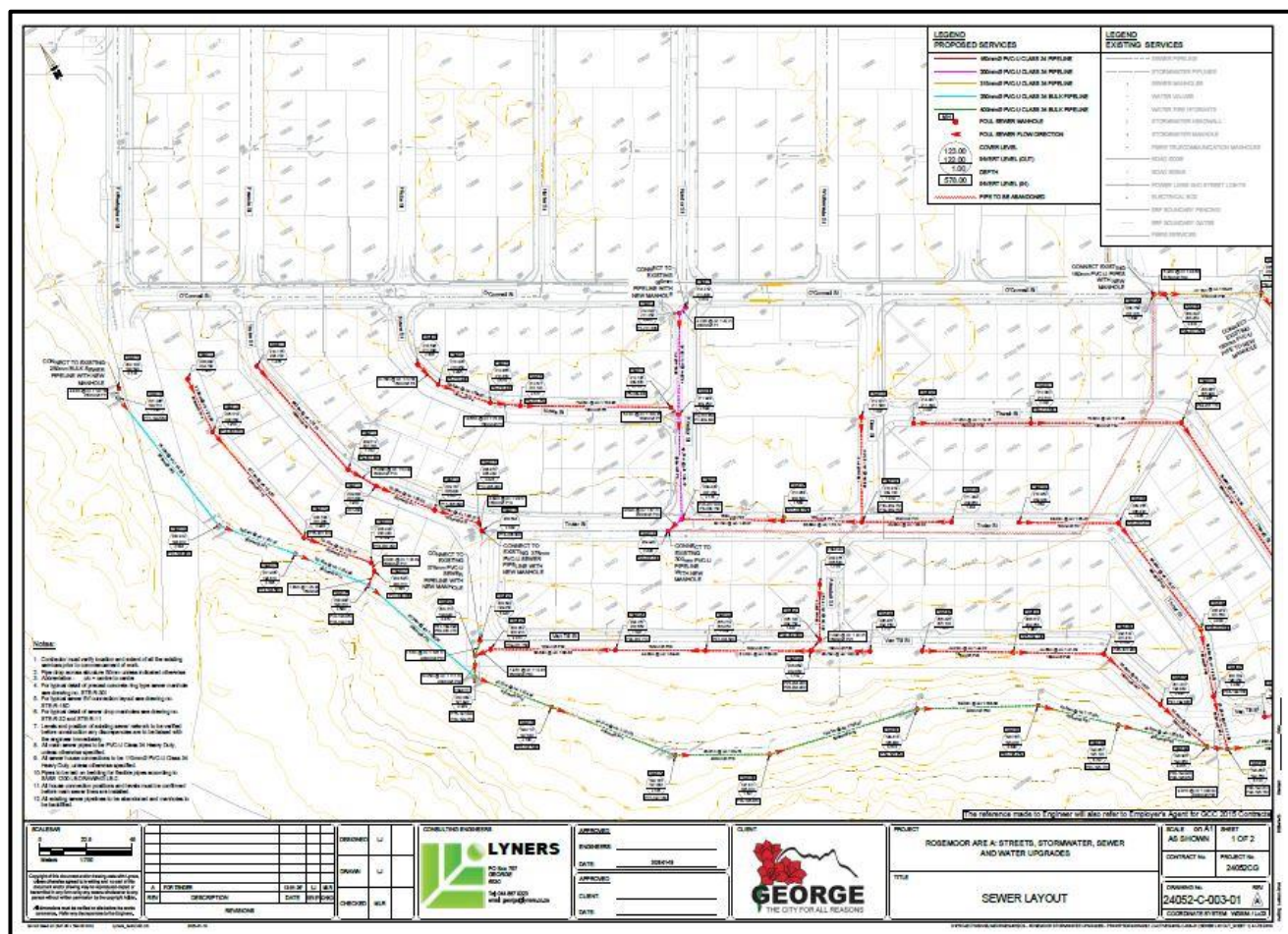




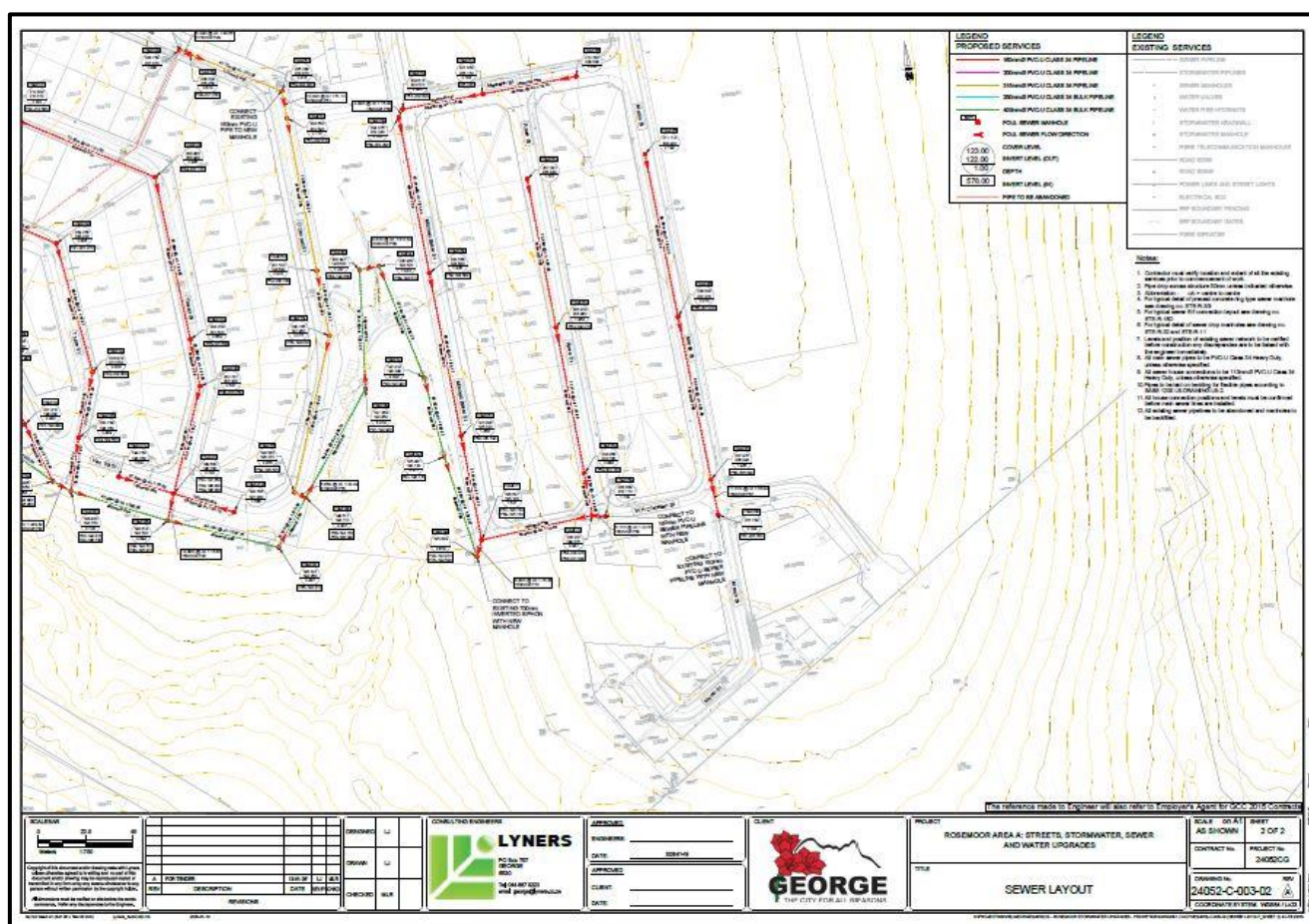
**Figure 2: Close-up Locality Map of Bulk Sewerage Pipeline.**

The pipeline will be approximately 1038m in length with varying diameters (250mm and 400mm). Approximately 230m of the pipeline will have a diameter of 250mm and approximately 808m of the pipeline will have a diameter of 400mm. The pipeline will also connect to adjoining manholes which are part of the sewerage upgrades for Rosemoor (these will occur within existing roads). Please refer to the Figures below for the layout plans of the Rosemoor Sewer Upgrades and Sewerage Pipeline.





**Figure 3: Proposed Sewerage Upgrades for Rosemoor.**



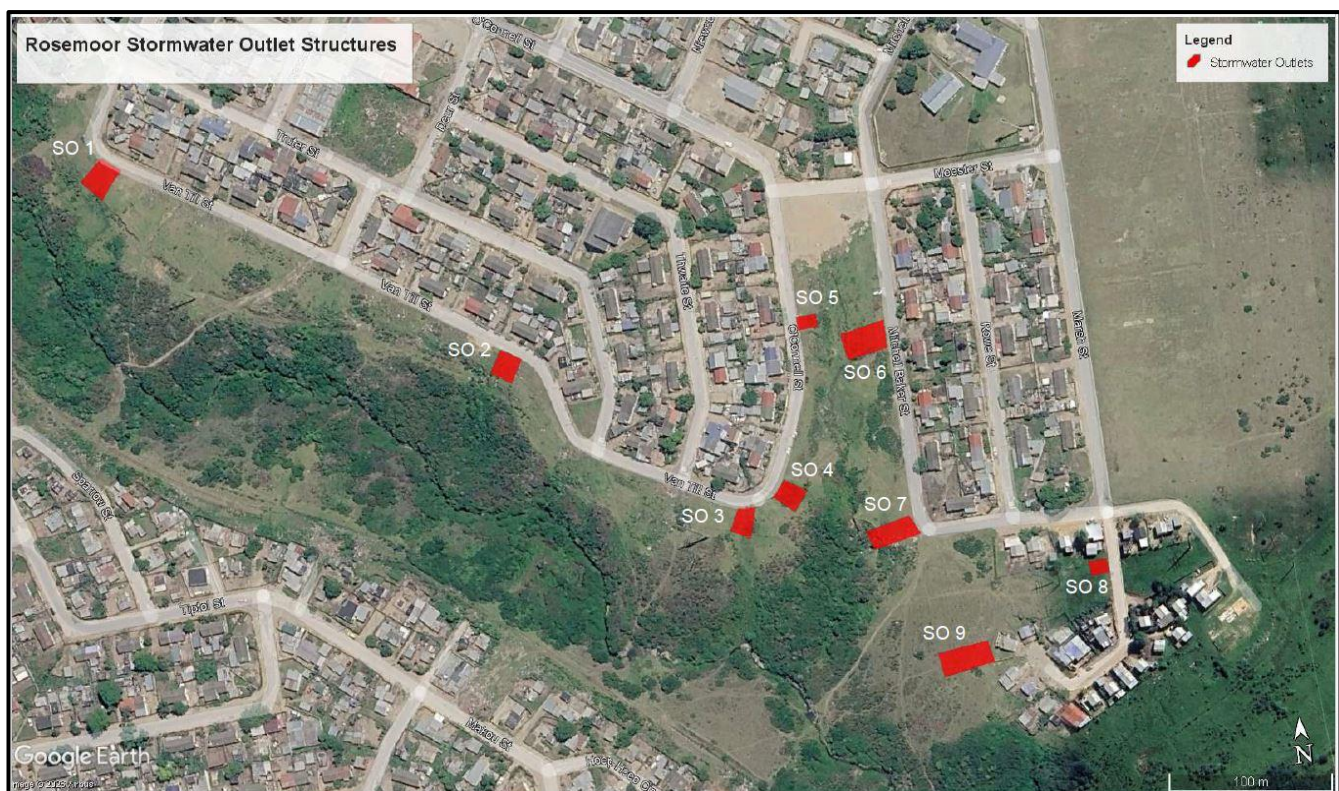
**Figure 4: Proposed Sewerage Upgrades for Rosemoor.**





**Figure 5: Proposed Sewerage By-Pass Line.**

The proposed sewerage by-pass pipeline will be approximately 142m in length with a diameter of 500mm.



**Figure 6: Proposed Stormwater Outlet Structures.**



Nine stormwater outlet structures are proposed to be constructed, as illustrated in Figure 6 above. The stormwater outlet structures will each have a development footprint of approximately 36m<sup>2</sup>, which will equal a total development footprint of 324m<sup>2</sup>.

#### **Vegetation on Site:**

Jamie Pote was appointed to compile a Terrestrial Biodiversity Compliance Statement and Assessment Report for the project as part of the Basic Assessment Report process being undertaken by Sharples Environmental Services cc. The specialist has determined the following regarding the site:

- **Baseline Biodiversity Description:**

The site is located within a transformed developed urban area on slopes adjacent to somewhat incised watercourses, draining in a southerly direction. The only remaining vegetation cover is comprised of a narrow band of vegetation along the banks of the watercourses, as well as some grassed and landscaped gardens within the suburbs (Figure 7 to Figure 24).

The site is comprised predominantly of transformed areas which include the dwellings, surfaced roads, sidewalks and landscaped gardens (Figure 1-6). The areas having 'natural' vegetation cover are generally confined to the undeveloped areas surrounding the watercourse which runs west to east on the south side of the project area. The proposed sewer infrastructure is generally located within these areas, where leaks due to inadequate infrastructure can be discharging into the watercourses.

Several different main habitats can be differentiated within the vegetated area:

1. Transformed: Includes hardened surfaces such as paved roads, sidewalks, landscaped gardens and grassed areas including parks and road verges (Figure 7 to Figure 10). Comprises almost the entire 160mm & 315 mm sewer pipeline component.
2. Degraded Riverine: Historically would have contained riparian and riverine elements associated with the watercourse, but significantly degraded 'natural' vegetation composed predominantly of kikuyu grass, ruderal weeds, garden escapees, as well as occasional pioneer shrubs, herbs, grasses and some remnant small trees (Figure 11 to Figure 20).
3. Secondary (Grassy): Portion of sewer on eastern side, was likely historically Garden Route Granite Fynbos, but was at some stage transformed to what appears to have been for cultivation use. Vegetation is currently a secondary grassy vegetation.
4. Watercourse: Watercourses are significantly degraded (Figure 21 to Figure 22) and modified. Only a small crossing on the east side is required and it is significantly modified at crossing point and also has an existing sewer present.

#### **Transformed Areas:**

Transformed areas (Figure 7 to Figure 10) are comprised of hardened surfaces within the inhabited area and includes paved roads, sidewalks, landscaped gardens (not affected) and road verges. No indigenous terrestrial vegetation is present in these areas, other than planted trees on sidewalks and road verges that include predominantly exotic species and some gardens around the adjacent dwelling. Any small, vegetated areas that are present, generally comprised of Kikuyu grass (*Cenchrus clandestinus*, previously *Pennisetum clandestinum*) and Kweek (*Cynodon dactylon*) as well as several creeping ruderal weeds such as *Arctotheca prostrata* (Prostrate Cape Milkweed). More often than not, any unsurfaced areas are comprised of bare soils as a result of human, animal and vehicular traffic compaction.



Figure 7: Typical urban street



Figure 8: Typical urban street



Figure 9: Typical urban street



Figure 10: Typical urban street

### **Vegetated areas:**

Vegetated areas (Figure 11 to Figure 20) along the slopes adjacent to watercourses are significantly disturbed and vegetation cover is comprised primarily of exotic Kikuyu grass (*Cenchrus clandestinus*, previously *Pennisetum clandestinum*) and *Senecio angulatus* (Cape Ivy) as groundcovers, with a range of ruderal and invasive weed species including herbs and shrubs *Ricinus communis* (Castor Oil plant), Bugweed (*Solanum mauritianum*), *Canna indica*, Inkberry (*Cestrum laevigatum*), *Lantana camara*, *Nidorella ivifolia*, *Amaranthus* spp. (Amaranth), *Verbena bonariensis*, *Iris pseudacorus*, *Cirsium vulgare* (Thistle), *Senna didymobotrya* (Peanut-Butter Cassia), *Phytolacca octandra* (Inkweed), *Urtica urens* (Nettle) and *Vinca major* (Periwinkle) and *Rubus* sp. (Bramble). Common trees include *Sambucus nigra* (European Black Elderberry) and *Acacia mearnsii* (Black Wattle), as well as *Leptospermum scoparium* (Broom tree), *Sesbania punicea* (Sesbania), *Acacia melanoxylon* (Blackwood), and *Melia azedarach* (Syringa). Clumps of *Cortaderia selloana* (Pampas Grass) is also common along the water courses. A wide range of garden escapees are also present, likely coming from dumped garden waste, or the nearby gardens mostly non-indigenous species (Delicious Monster).

Remnant indigenous elements include *Arctotheca prostrata* (Prostrate Cape Milkweed), *Carpobrotus deliciosus* (Sourfig), Wild Dagga (*Leonotis leonurus*), Arum lily (*Zantedeschia aethiopica*), *Senecio angulatus* and *Searsia rehmanniana*. While *Senecio angulatus* is an indigenous species, it can become invasive in disturbed areas and the creeping vine-like growth from allows it to effectively smother other vegetation.

The percentage of natural vegetation within this habitat is likely between 5 and 10 % comprising a few scratted elements. The vegetation present is not representative of the Critically Endangered Garden Route Granite Fynbos.



Figure 11: Typical vegetated watercourse bank (Kikuyu).



Figure 12: Typical vegetated watercourse bank (Kikuyu).



Figure 13: Typical vegetated watercourse bank (Kikuyu).



Figure 14: Typical vegetated watercourse bank (Kikuyu).



Figure 15: Typical vegetated area (Kikuyu).



Figure 16: Typical vegetated area (Kikuyu).





Figure 17: Typical vegetated area (Kikuyu).



Figure 18: Typical vegetated area (Cape Ivy).



Figure 19: Typical vegetated area (Kikuyu & weeds).



Figure 20: Typical vegetated area (Kikuyu & weeds).

### **Watercourses**

Watercourses (Figure 21 to Figure 22) are significantly disturbed and/or modified with vegetation also comprised predominantly of exotic and invasive species. Cover is primarily also exotic Kikuyu grass (*Cenchrus clandestinus*, previously *Pennisetum clandestinum*) and *Senecio angulatus* (Cape Ivy), as well as *Cortaderia selloana* (Pampas Grass) and *Sambucus nigra* (European Black Elderberry) trees and the reed *Arundo donax* (Giant Reed). Riparian vegetation is not easily distinguished from surrounding vegetation due to the proliferation of weeds that are common to both habitats.

Remnant indigenous elements are occasional and include the odd tuft of Arum lily (*Zantedeschia aethiopica*), clumps of *Typha capensis* (Bulrushes), occasional indigenous reeds (*Phragmites australis*) and occasional tufts of remnant sedges, including *Juncus effusus*, *Cyperus polystachyos* and *Cyperus textilis*.



Figure 21: Watercourse at crossing point.



Figure 22: Watercourse at crossing point.

### **Secondary (Grassy)**

Secondary (Grassy) vegetation is present along a portion of the eastern end of the sewer (Figure 23 to Figure 24), where the sewer exits the watercourse area onto a small ridge outside of what would have been riverine vegetation. The section was likely the only portion of the route that would have historically had Garden Route Granite Fynbos vegetation. However, it is now comprised of secondary grassy vegetation and was likely cultivated in the past (pre-2003) and was possibly originally part of a garden or small holding. No indigenous terrestrial vegetation representative of Garden Route Granite Fynbos is present. Grassy vegetation is comprised of Kikuyu grass (*Cenchrus clandestinus*, previously *Pennisetum clandestinum*), Kweek (*Cynodon dactylon*) and Weeping lovegrass (*Eragrostis curvula*).



Figure 23: Secondary (Grassy) vegetation.



Figure 24: Secondary (Grassy) vegetation.

The proposed development is unlikely to have any significant impact on any 'intact' or natural indigenous vegetation of any significant ecological value.

### **Present Ecological State:**

In summary the following general observations can be noted regarding the site:

- The area in and around the site is completely transformed and or degraded as a result of urban development and associated processes including dumping of refuse and garden waste and other pollution sources, with the occasional remnant scattered indigenous species. No elements of species typical to Garden Route Granite Fynbos were observed within vegetated areas along the watercourses.
- Alien invasion and weeds are high to very high, comprising most of the vegetation along the watercourses and surrounding vegetated areas.
- Ecological processes are thus primarily significantly modified within the sewer servitude, as natural and indigenous vegetation elements are largely absent from within the site.
- Fauna species include mainly species typical of urbanized and transformed areas, perhaps having the occasional visit from less common species that typically occur in natural areas that are in transit through urban area or are acclimated to the urbanized environment.

### **Vegetation and Ecological Processes and Corridors:**

Landscape corridors are a combination of Critical Biodiversity Areas (areas required to meet conservation targets) and Ecological Support Areas that link habitats, as well as linking inland mountains to the coastline (and therefore beyond municipal boundaries). Rivers and their associated riparian or riverbank habitats often provide the basis for many of these large-scale (landscape level) ecological processes.

Critical Biodiversity Areas (CBA) are generally regarded as being critical for meeting conservation objectives for vegetation units in an optimal manner. Where a vegetation unit is not under threat (i.e Least Concern status), there is some flexibility, i.e. alternatives; however, as conservation status increases (a vegetation unit is under threat due to high levels of transformation), alternative options to meet conservation targets are significantly reduced. CBA1 areas are generally natural or near natural, whereas



CBA 2 are degraded and/or transformed areas where restoration would be required and/or recommended.

Ecological Support areas (ESA) are supporting zones or areas which must be safeguarded as they are needed to prevent degradation of Critical Biodiversity Areas and formal Protected Areas. Although many ESA's consist of natural veld, there are areas of land – partially or wholly transformed or degraded – that have been classified as ESA even though they are no longer in a natural state. Although these areas are heavily degraded or transformed they still play an important role in supporting ecological processes. This is particularly the case with riparian areas, some key catchment areas, and key pieces of corridors. ESA 1 areas are generally natural or near natural, whereas ESA 2 are degraded and/or transformed areas where restoration would be required and/or recommended. An ESA that is vegetated but not natural or near natural can still serve to retain some connectivity and support ecological processes, but in a significantly reduced manner. For example, trees in an apple orchard will provide perches for some birds and grassy groundcover will still allow for movement of some small animals such as rodents and reptiles. Certain species are significantly more at risk, as they may not be able to adapt to a modified environment, whereas others may not be affected.

While the site falls within a broader important ecologically connected area along the watercourses, the specific site is significantly transformed and surrounded by developed erven and paved roads. Remnant vegetation along watercourse is significantly degraded and transformed and thus provides limited 'natural' ecological value in its current state. It will serve limited connectivity support but does not and is not likely to support any substantial populations of at-risk species of conservation concern that are not adaptable to modified environments, nor provide ecological services and processes typically associated with the Critically Endangered Garden Route Granite Fynbos that occurs in the broader area. The watercourse corridors will however serve as broad level artificial habitat corridors for general movement faunal species around the broader area, but since no flora species typical of the unit are present, flora related ecological processes (such as pollination and seed dispersal) would be absent. The proposed activity, having a negligible footprint within significantly modified habitat, is thus unlikely to significantly impact or disturb these processes nor likely to alter current species composition from current baseline levels, as it will be a temporary activity and will likely return to a pre-construction state within two years.

#### **Flora & Fauna:**

No endemic and range restricted species were recorded to be present. Several species are known from the surrounding area, but unlikely to be affected by the proposed activity. The proposed activity, having a negligible footprint within a significantly modified habitat, is thus unlikely to significantly impact any species population or current species composition from current baseline levels, as it will be a temporary activity and will likely return to a pre-construction state within two years.

**Table 1: Flora Species of Special Concern:**

| SCIENTIFIC NAME         | STATUS       | COMMENT/PRESENCE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|-------------------------|--------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Diosma passerinoides    | NEST (M), Vu | Total population size estimated to be <5 000 mature individuals, based on records of 18 out of 25 subpopulations where species is indicated to be rare, uncommon, or only a few plants present, and with survey data of seven subpopulations indicating that the largest subpopulation consists of no more than 500 mature individuals. These populations are declining due to a number of different threats such as invasive alien plants, habit degradation in the form grazing and habitat loss due to protea cultivation. Not recorded on site and no known localities in close proximity that suggest high likelihood of a local occurrence. |
| Lampranthus pauciflorus | NEST (M), En | EOO 1270 km <sup>2</sup> , four known locations remain after most of this species' habitat has been transformed for coastal development. Habitat loss continues, especially around                                                                                                                                                                                                                                                                                                                                                                                                                                                                |

|                             |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|-----------------------------|--------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                             |              | Plettenberg Bay, Mossel Bay and Knysna. Not recorded on site and no known localities in close proximity that suggest high likelihood of a local occurrence.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <i>Leucospermum glabrum</i> | NEST (M), En | Somewhat widespread distribution including a population in the northern areas of George. A restricted endemic with an extent of occurrence (EOO) ranging between 1620 and 1642 km <sup>2</sup> , and an area of occupancy (AOO) of between 152 and 156 km <sup>2</sup> . This species occurs as scattered small subpopulations with the total population not exceeding 2500 mature individuals, and each subpopulation having fewer than 250 plants. The mountains where this species occurs have been extensively surveyed. Road verges and significantly disturbed watercourses do not provide suitable habitat for this species. Not recorded on site, which is not typical of preferred habitat. |
| Sensitive species 1024      | NEST (M), En | A range-restricted and very rare species known from four small, severely fragmented subpopulations. It has an extent of occurrence (EOO) of 971 km <sup>2</sup> . The population consists of 2 500 mature individuals, and the largest subpopulation has less than 200 plants. Not recorded on site and no known localities in close proximity that suggest high likelihood of a local occurrence.                                                                                                                                                                                                                                                                                                   |
| Sensitive species 1032      | NEST (M), Vu | Somewhat widespread distribution including a population in the northern areas of George. Not recorded on site but found in surrounding area. Road verges and significantly disturbed watercourses do not provide suitable habitat for this species.                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Sensitive species 500       | NEST (M), En | Somewhat widespread distribution. Not recorded on site and no known localities in close proximity that suggest high likelihood of a local occurrence.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Sensitive species 800       | NEST (M), Vu | Formerly a very common species, now remaining mostly as small, isolated subpopulations on fragments of natural vegetation within its lowland distribution range. Not recorded on site and no known localities in close proximity that suggest high likelihood of a local occurrence.                                                                                                                                                                                                                                                                                                                                                                                                                 |

As per Table 1 above, no Endangered or Critically Endangered flora species were confirmed to be [resent nor are known to be present in the affected area. Most likely species that do occur in the broader surrounding area include *Leucospermum glabrum* & Sensitive Species 1032, however non were observed on the site. The species *Disoma passerinoides*, *Lampranthus pauciflorus*, Sensitive Species 1024, Sensitive Species 500 & Sensitive Species 800 have records in a much broader area and no records indicate a local presence.

Site observations also confirmed none being present, also confirmed to not be the typical habitat for several of the species, hence the footprint does not provide suitable habitat for these species.

### **Alien Invasive Species:**

On 18 September 2020, the Minister of Environmental Affairs published the Alien and Invasive Species Regulations ("the Regulations") which came into effect on the 18 October 2020 in a bid to curb the negative effects of IAPs. The Regulations call on landowners and sellers of land alike to assist the Department of Environmental Affairs to conserve our indigenous fauna and flora and to foster sustainable use of our land. Non-adherence to the Regulations by a landowner or a seller of land can result in a criminal offense punishable by a fine of up to R 5 million (R10 million in case of a second offence) and/or a period of imprisonment of up to 10 years.

- Category 1a and 1b listed invasive species must be controlled and eradicated.

- Category 2 plants may only be grown if a permit is obtained, and the property owner ensures that the invasive species do not spread beyond his or her property.
- The growing of category 3 species is subject to various exemptions and prohibitions.

Some invasive plants are categorized differently in different provinces. For example: The Spanish Broom plant is categorized as a category 1b (harmful) invasive plant in the Eastern Cape and Western Cape, but it is a category 3 (less harmful) invasive plant in the other seven provinces.

Invasive alien plants have a significant negative impact on the environment by causing direct habitat destruction, increasing the risk and intensity of wildfires, and reducing surface and sub-surface water. Landowners are under legal obligation to control alien plants occurring on their properties. Alien Invasive Plants require removal according to the Conservation of Agricultural Resources Act 43 of 1983 (CARA) and the National Environmental Management: Biodiversity Act (10 of 2004; NEMBA): Alien and Invasive Species Lists (GN R598 and GN R599 of 2014). Alien control programs are long-term management projects and a clearing plan, which includes follow up actions for rehabilitation of the cleared area, is essential. This will save time, money, and significant effort. Collective management and planning with neighbours allow for more cost-effective clearing and maintenance considering aliens seed as easily dispersed across boundaries by wind or water courses. All clearing actions should be monitored and documented to keep track of which areas are due for follow-up clearing. A general rule of thumb is to first target lightly infested areas before tackling densely invaded areas and prioritize sensitive areas such as riverbanks and wetlands. Alien grasses are among the worst invaders in lowland ecosystems adjacent to farms but are often the most difficult to detect and control.

Many exotic invasive and other weed species were noted within the site and surrounding area. Proliferation of weedy and exotic species often indicate disturbance especially during or after construction. A list of species is included in Table .. During construction it is highly likely that species currently not on site could be introduced through the construction process. A weed management (Alien Management Plan) is recommended after construction to counter the weed proliferation that would be expected after construction.



The following alien species were identified by the specialist as occurring on site:

**Table 2: Alien Invasive and Other Weed Species and Status:**

| SCIENTIFIC NAME                        | COMMON NAME                  | FAMILY         | STATUS  | PRESENCE            |
|----------------------------------------|------------------------------|----------------|---------|---------------------|
| <i>Acacia mearnsii</i>                 | Black Wattle                 | Fabaceae       | CARA 1b | Present, common     |
| <i>Acacia melanoxylon</i>              | Blackwood                    | Fabaceae       | CARA 2  | Present, common     |
| <i>Canna Indica</i>                    | Indian shot                  | Cannaceae      | CARA 1b | Present, common     |
| <i>Cenchrus clasdestinus</i>           | Kikuyu Grass                 | Poaceae        | CARA 1b | Present, common     |
| <i>Cestrum (Pennisetum) laevigatum</i> | Inkberry                     | Solanaceae     | CARA 1b | Present, dominant   |
| <i>Cirsium vulgare</i>                 | Scotch thistle               | Asteraceae     | CARA 1b | Present, common     |
| <i>Cortaderia selloana</i>             | Pampas grass                 | Poaceae        | CARA 1b | Present, common     |
| <i>Iris pseudacorus</i>                | Yellow flag                  | Iridaceae      | CARA 1a | Present, occasional |
| <i>Lantana camara</i>                  | Lantana                      | Verbenaceae    | CARA 1b | Present, occasional |
| <i>Leptospermum scoparium</i>          | Australian myrtle (Tea tree) | Asteraceae     | CARA 1b | Present, common     |
| <i>Melia azedarach</i>                 | Syringa                      | Meliaceae      | CARA 1b | Present, common     |
| <i>Phragmites australis</i>            | Spanish reed                 | Poaceae        | CARA 1b | Present, common     |
| <i>Phytolacca americana</i>            | Pokeweed                     | Phytolaccaceae | CARA 2  | Present, occasional |
| <i>Ricinus communis</i>                | Castor Oil Plant             | Euphorbiaceae  | CARA 2  | Present, common     |
| <i>Rubus cuneifolius</i>               | Bramble                      | Rosaceae       | CARA 1b | Present, common     |
| <i>Sambucus nigra</i>                  | European elder               | Adoxaceae      | CARA 1b | Present, common     |
| <i>Senna didymobotrya</i>              | Peanut Butter Cassia         | Fabaceae       | CARA 1b | Present, occasional |
| <i>Sesbania punicea</i>                | Sesbania                     | Fabaceae       | CARA 1b | Present, occasional |
| <i>Solanum mauritianum</i>             | Bugweed                      | Solanaceae     | CARA 1b | Present, common     |
| <i>Solanum sisymbriifolium</i>         | Wild tomato                  | Solanaceae     | CARA 1b | Present, occasional |
| <i>Urtica urens</i>                    | Nettle                       | Urticaceae     | Weed    | Present, occasional |
| <i>Verbena bonariensis</i>             | Wild verbena                 | Verbenaceae    | CARA 1b | Present, occasional |
| <i>Vinca major</i>                     | Greater periwinkle           | Apocynaceae    | CARA 1b | Present, occasional |

**OBJECTIVE 1: ERADICATE CATEGORY 1B SPECIES:**

Category 1b species identified on site must be controlled and eradicated in terms of the Alien and Invasive Species Regulations.

**Management Actions:**

|                       |                                                                                                                                                                                                                                                                                                                                                                                                     |
|-----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. Baseline Survey    | <ul style="list-style-type: none"> <li>Conduct a site walk-through prior to vegetation clearing.</li> <li>Identify and map all Category 1b species.</li> <li>Record density and extent (GPS and photo record).</li> </ul>                                                                                                                                                                           |
| 2. Control Methods    | <ul style="list-style-type: none"> <li>Control methods must adhere to Section 7 of this Alien Management Plan.</li> <li>Chemical treatment (registered herbicides only) applied to cut stumps where required. It is important to note that Chemical treatment (pesticides and herbicides) must adhere to the DFFE Pesticide Policy attached as Appendix C to this Alien Management Plan.</li> </ul> |
| 3. Timing of Clearing | <ul style="list-style-type: none"> <li>Prioritise removal before seed set.</li> <li>Avoid clearing during heavy rainfall periods to prevent soil erosion.</li> </ul>                                                                                                                                                                                                                                |
| 4. Disposal           | <p>All plant material must be:</p> <ul style="list-style-type: none"> <li>Removed from site, or</li> <li>Stacked and dried in a demarcated area (if safe), or</li> <li>Disposed of at a registered waste facility where necessary.</li> <li>No dumping in natural areas or watercourses.</li> </ul>                                                                                                 |
| 5. Monitoring         | <ul style="list-style-type: none"> <li>Clearing activities to be supervised by the ECO.</li> <li>Monthly monitoring during construction.</li> <li>Biannual monitoring post-construction (recommended for 3 years).</li> </ul>                                                                                                                                                                       |

**OBJECTIVE 2: PREVENT REGROWTH**

Regrowth is common due to seed banks and stump resprouting.

**Management Actions:**

|                         |                                                                                                                                                                                                                               |
|-------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. Follow-Up Clearing:  | <ul style="list-style-type: none"> <li>First follow-up within 6–8 weeks of initial clearing.</li> <li>Subsequent follow-ups every 3–6 months during first year.</li> <li>Thereafter annually for at least 3 years.</li> </ul> |
| 2. Stump Treatment:     | <ul style="list-style-type: none"> <li>Immediate application of systemic herbicide to cut surfaces.</li> <li>Ensure no untreated stumps remain.</li> </ul>                                                                    |
| 3. Seed Bank Management | <ul style="list-style-type: none"> <li>Disturbed soil areas must be stabilised quickly.</li> <li>Avoid unnecessary soil disturbance.</li> </ul>                                                                               |
| 4. Record Keeping:      | <ul style="list-style-type: none"> <li>Maintain register of cleared areas.</li> </ul>                                                                                                                                         |

|                                                                                              |                                                                                                                                                                                                                           |
|----------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                              | <ul style="list-style-type: none"> <li>Record regrowth hotspots and treatment dates.</li> </ul>                                                                                                                           |
| <b>OBJECTIVE 3: PREVENT SPREAD TO ADJACENT NATURAL VEGETATION</b>                            |                                                                                                                                                                                                                           |
| Special care must be taken to protect surrounding indigenous vegetation and aquatic buffers. |                                                                                                                                                                                                                           |
| <b>Management Actions:</b>                                                                   |                                                                                                                                                                                                                           |
| 1. Demarcation:                                                                              | <ul style="list-style-type: none"> <li>Clearly demarcate approved development footprint.</li> <li>No clearing outside approved areas.</li> </ul>                                                                          |
| 2. Vehicle & Equipment Hygiene:                                                              | <ul style="list-style-type: none"> <li>Construction vehicles must arrive free of soil and plant material.</li> <li>No storage of contaminated soil near natural vegetation</li> </ul>                                     |
| 3. Stockpile Management:                                                                     | <ul style="list-style-type: none"> <li>No stockpiling within 10–20 m of watercourses or buffers.</li> <li>Prevent wind or water dispersal of seeds.</li> </ul>                                                            |
| 4. Stormwater Control                                                                        | <ul style="list-style-type: none"> <li>Install erosion control measures.</li> <li>Prevent runoff transporting invasive seeds.</li> </ul>                                                                                  |
| 5. Immediate Removal                                                                         | <ul style="list-style-type: none"> <li>Any new alien growth in buffer areas must be removed immediately.</li> </ul>                                                                                                       |
| <b>OBJECTIVE 4: RESTORE INDIGENOUS VEGETATION</b>                                            |                                                                                                                                                                                                                           |
| Rehabilitation reduces invasion risk and promotes ecological stability.                      |                                                                                                                                                                                                                           |
| <b>Management Actions:</b>                                                                   |                                                                                                                                                                                                                           |
| 1. Topsoil Management:                                                                       | <ul style="list-style-type: none"> <li>Strip and stockpile topsoil separately.</li> <li>Replace topsoil during rehabilitation phase.</li> </ul>                                                                           |
| 2. Revegetation:                                                                             | <ul style="list-style-type: none"> <li>Encourage natural regeneration where feasible.</li> <li>Supplement with locally indigenous species if required.</li> <li>Avoid planting invasive or ornamental species.</li> </ul> |
| 3. Erosion Control:                                                                          | <ul style="list-style-type: none"> <li>Use brush packing where appropriate.</li> <li>Install silt fencing and berms where necessary.</li> </ul>                                                                           |
| 4. Rehabilitation Monitoring:                                                                | <ul style="list-style-type: none"> <li>Assess vegetation cover percentage.</li> <li>Ensure no new alien dominance.</li> </ul>                                                                                             |
| 5. Success Criteria:                                                                         | <ul style="list-style-type: none"> <li>No Category 1b regrowth.</li> <li>Indigenous vegetation cover stabilised.</li> <li>No active erosion.</li> </ul>                                                                   |
| <b>OBJECTIVE 5: ENSURE COMPLIANCE WITH DFFE CONDITIONS</b>                                   |                                                                                                                                                                                                                           |
| The Alien Management Plan forms part of the EMP and must comply with DFFE requirements.      |                                                                                                                                                                                                                           |
| <b>Management Actions:</b>                                                                   |                                                                                                                                                                                                                           |
| 1. Integration into EMP:                                                                     | <ul style="list-style-type: none"> <li>This Alien Management Plan forms part of the approved EMP.</li> <li>Binding on the Applicant and all contractors.</li> </ul>                                                       |
| 2. ECO Monitoring:                                                                           | <ul style="list-style-type: none"> <li>Monthly monitoring during construction.</li> <li>Post-construction monitoring every 6 months for 3 years (recommended).</li> </ul>                                                 |
| 3. Reporting:                                                                                | <ul style="list-style-type: none"> <li>Alien clearing activities to be included in ECO reports.</li> <li>Non-compliance to be recorded and corrective action implemented immediately.</li> </ul>                          |
| 4. Training:                                                                                 | <ul style="list-style-type: none"> <li>Contractors and workers must receive environmental induction.</li> <li>Awareness of listed invasive species and legal obligations.</li> </ul>                                      |



|                      |                                                                                                                                                                                                                                                |
|----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 5. Legal Compliance: | <ul style="list-style-type: none"> <li>• Compliance with: <ul style="list-style-type: none"> <li>◦ NEMBA (Act 10 of 2004)</li> <li>◦ Alien &amp; Invasive Species Regulations</li> <li>◦ NEMA Duty of Care (Section 28)</li> </ul> </li> </ul> |
| 6. Responsibility:   | <ul style="list-style-type: none"> <li>• The Applicant remains legally responsible for ongoing control of invasive species.</li> </ul>                                                                                                         |

**Management measures for the site**

All vegetation clearance must be undertaken with utmost care to ensure that only that vegetation, which needs to be removed, is removed.

Eradication of alien plants must be completed in such a manner that indigenous vegetation is not damaged.

It is important to remove both young plants (saplings) and old trees that are seed bearing. Different strategies can be employed to remove different species, but all methods will involve manual labour as mechanical means other than chain saws and brush cutters, should be used where necessary. It is important to tackle the smaller, more dispersed plants first, and then the larger stands of alien vegetation.

To ease the removal of the alien plants present on the site, it is recommended that all alien plants be removed during the initial site clearing activities at the start of the construction process rather than during the operational phase of the development.

**1. Clearing of small alien plants**

The best method of clearing small plants is by hand pulling them. They must then be stacked for removal to a recognised waste site, or alternatively mulched on site. Mulched material can be used as a ground cover where necessary.

**2. Clearing of alien trees**

Alien trees must be cut down with chain saws and then chopped into smaller portions. Some species of alien plants like Black Wattle trees are coppicing species and will re-grow from roots and stumps. This means that a chemical such as Roundup or Garlon will need to be used to prevent the trees from re-sprouting. These chemicals can either be sprayed onto the stump with a knapsack sprayer or painted on with a paintbrush. Another alternative to prevent re-growth is to strip the bark from the remaining part of the stump.

**3. Methods for controlling alien vegetation**

Biological control, chemical control, mechanical clearing, and burning have all been used with varying results. Each method has been successful but nearly all require follow-up control. The most successful clearing projects have included an integrated approach to account for initial clearing and continued management.

**3.1 Mechanical control:**

- Mature non-coppicing trees must be cut as low as possible and no herbicide treatment is needed on the cut stumps.
- Debris may be removed immediately from site to be burned in a safe area, mulched or used as firewood.
- Large branches should be used as firewood.
- Smaller branches should be mulched.
- Alien material containing seed must be removed from the site and burned.
- Should debris be left on site:
- In sparser areas, where felled debris will not hinder follow-up operations, plants can be felled and left in situ.
- In dense areas, stack debris in rows five metres apart parallel to the contours to facilitate follow-up operations.
- Low density seedling regeneration must be hand pulled.

- important so as to not damage indigenous vegetation pockets.

### 3.2 Chemical control

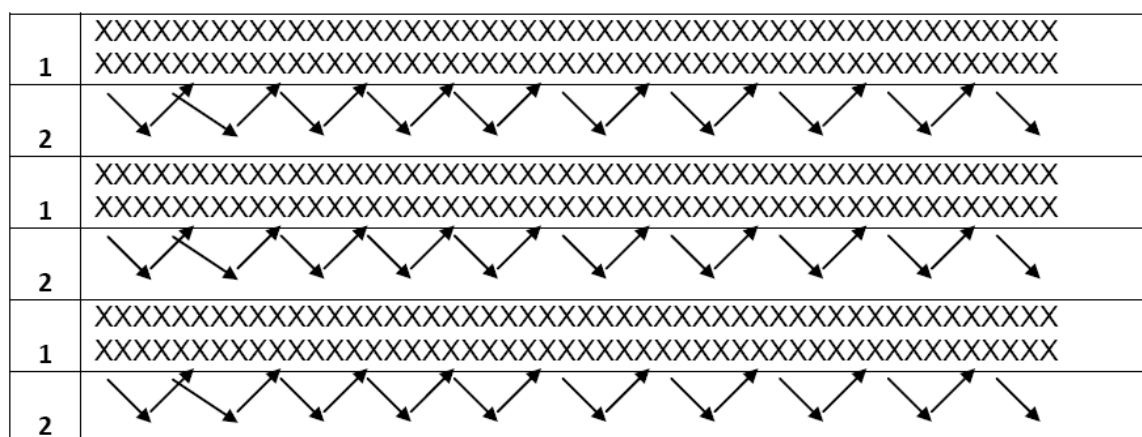
- Follow-up visitation no later than three months after initial operation.
- Follow-up control will be needed because soil stored seed may stay dormant in soil for up to 50 years.
- Follow-up control will involve a combination of hand pulling and foliar spraying.
- Seedlings, saplings and coppice can be foliar sprayed.
- Follow-up spray operation when sufficient regeneration has taken place.
- Blanket or foliar spray.
- All chemical control must adhere to the DFFE Pesticide Policy attached as Appendix C to this report.

### 3.3 Tools

- Loppers, bow saws and chainsaws
- 12 –15 litre back pack spray units
- Flat fan nozzles or solid cone and 1 bar constant flow valves.

### 3.4 Team composition

- 6 persons, each being equipped with a lopping shear, bow saw and herbicide applicator, must first sweep through the area in individual lanes 5 metres apart. These persons target all plants less than 8 cm in basal diameter, felling, stacking and applying herbicide. De-branching should only be used to facilitate stacking of larger branches.
- 2 chainsaw operators thereafter follow through these lanes felling all plants more than 8 cm in basal diameter. Two assistants are responsible for stacking and herbicide application.
- For the denser areas, methodology must follow the illustration below. All rows are five metres wide. Swathes labelled 1 must be cut first and the debris placed back into these swathes. Thereafter debris generated in swathes labelled 2, must be placed into swathes labelled 1.



### 3.5 Follow up

Once the source of the problem has been removed, namely the seed bearing trees, it is important to follow up on any seedlings and saplings that may have grown in the interim. If this is



not done the effort of the removal of the adult trees will have been wasted, as the alien vegetation problem will intensify.

|          |                                 |
|----------|---------------------------------|
| Section  | <b>IMPLEMENTATION PROGRAMME</b> |
| <b>8</b> |                                 |

| Phase                                  | Activity                              | Timeframe                       |
|----------------------------------------|---------------------------------------|---------------------------------|
| Construction Phase                     | Initial clearing                      | Construction duration - ongoing |
| Post Construction Rehabilitation Phase | Follow up clearing and rehabilitation | 3 months post construction      |
| Monitoring Phase                       | Annual monitoring                     | 1-3 years post construction     |

|          |                                 |
|----------|---------------------------------|
| Section  | <b>MONITORING AND REPORTING</b> |
| <b>9</b> |                                 |

Monitoring of alien clearing activities will be undertaken by the appointed Environmental Control Officer (ECO) during the monthly ECO site inspections conducted for the duration of the construction phase. This Alien and Invasive Species Management Plan forms part of the Environmental Management Programme (EMPr) and will be implemented and monitored as part of the broader environmental compliance monitoring framework for the project.

During construction, the ECO will:

- Verify that clearing is undertaken in accordance with the approved methodology;
- Confirm correct herbicide application and disposal of plant material;
- Record areas cleared and any regrowth observed;
- Include findings and recommendations in the monthly ECO compliance reports.

Post-construction monitoring will also be undertaken by the ECO. It is recommended that the ECO be appointed to monitor and report on the implementation of the Alien and Invasive Species Management Plan at least once every six (6) months for a minimum period of three (3) years following completion of construction.

Post-construction monitoring will focus on:

- Identification and treatment of regrowth;
- Monitoring of seed bank emergence;
- Verification of rehabilitation success;
- Ensuring no new infestations establish on site.

Where regrowth is identified, follow-up clearing shall be undertaken promptly to ensure long-term control and compliance with Section 73 of the National Environmental Management: Biodiversity Act.

**Applicant – George Municipality**

George Municipality, as the Applicant and landowner (or authority responsible for the project), shall:

- Ensure implementation of this Alien and Invasive Species Management Plan;
- Allocate adequate financial and human resources for clearing and follow-up activities;
- Appoint a suitably qualified contractor to undertake alien clearing;
- Appoint an independent Environmental Control Officer (ECO) to monitor compliance;
- Ensure that clearing operations comply with the approved EMPr, NEMBA, and AIS Regulations;
- Ensure post-construction monitoring is undertaken for a minimum period of three (3) years;
- Ensure corrective action is taken where non-compliance or regrowth is identified.

**Contractor**

The appointed Contractor shall:

- Implement clearing strictly in accordance with this Management Plan;
- Ensure workers are informed of alien species identification and control methods;
- Apply herbicides in accordance with manufacturer specifications and legal requirements;
- Prevent the spread of seeds or vegetative material during clearing;
- Dispose of cleared biomass responsibly;
- Undertake follow-up clearing where instructed;
- Maintain records of clearing activities for submission to the ECO.

**Environmental Control Officer (ECO)**

The appointed ECO shall:

- Monitor implementation of this Plan during monthly construction site visits;
- Verify that clearing methods are appropriate and legally compliant;
- Record areas cleared and any regrowth observed;
- Include compliance findings in monthly ECO reports;
- Conduct post-construction monitoring at least once every six (6) months for three (3) years;
- Provide recommendations for corrective action where necessary.

**Environmental Assessment Practitioner (EAP)**

The EAP shall:

- Ensure this Plan forms part of the approved EMPr;
- Provide guidance where amendments are required;
- Assist the Applicant in ensuring compliance with regulatory requirements where necessary.

## **Appendix A1: CV of Author**



**GEORGE**  
TEL: +27 (0) 44 873 4923 FAX: +27 (0) 44 874 5953  
EMAIL: info@sesc.net WEBSITE: www.sesc.net  
ADDRESS: Unit 17 Cathedral Square,  
Cathedral Street, George, 6530  
PO BOX: 9087, George, 6530

**CAPE TOWN**  
TEL: +27 (0) 21 554 5195 FAX: +27 (0) 86 575 2869  
EMAIL: betsy@sesc.net WEBSITE: www.sesc.net  
ADDRESS: Tableview, Cape Town, 7441  
PO BOX: 443, Milnerton, 7435

# CURRICULUM VITAE

## MICHAEL JON BENNETT

### PERSONAL

---

**Profession:** Principle Environmental Assessment Practitioner and Senior Environmental Control Officer, Sharples Environmental Services cc, George

**Possion:** Director – George

**Nationality:** South African

**Date of Birth:** 22 October 1985

**Languages:** English (read, write and speak) & Afrikaans (read, write and speak)

**Marital Status:** Single

**Drivers License:** Code B

**Health:** Excellent

**EAPASA Reg:** 2021/3163

**IAIASA Membership:** 7334

### WORK EXPERIENCE

---

**2014 – Present:** Sharples Environmental Services cc, George, WC  
*Environmental Assessment Practitioner*

I have gained extensive experience in assessments and monitoring and have worked on a variety of multidisciplinary projects and am proficient in:

- Basic Assessments Reports
- Water Use Authorisation Applications
- Environmental Monitoring and Reporting
- Environmental Management Programmes
- Environmental Control Officer Training
- Conducting Outeniqua Sensitive Coastal Area licensing applications

**2016 – 2017:** Sharples Environmental Services cc, Cape Town, WC  
*Intrim Office Manager, Environmental Assessment Practitioner*

**2011 – 2014:** Peninsula Permits & NCC Group, Cape Town, WC  
*Environmental Control Officer*

### TERTIARY EDUCATION

---

**2010** University of Cape Town

- I hold a Bachelor of Science Degree specialising in Environmental and Geographic Science & Ocean and Atmospheric Science



## PROJECTS

---

- |             |                                                                                                                                                                                                                                                                                                                                       |                                  |
|-------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|
| <b>2024</b> | George                                                                                                                                                                                                                                                                                                                                | George Municipality              |
| ▪           | Basic Assessment Report for the proposed upgrade of the Gwaing wastewater treatment works on the remainder of erf 464, George, Western Cape                                                                                                                                                                                           |                                  |
| <b>2024</b> | George                                                                                                                                                                                                                                                                                                                                | 3MP Sales and Education Services |
| ▪           | Basic Assessment Report for the proposed mixed-use development on erf 998 and the remainder of the farm zandhoogte no. 139, Tergniet, Mossel Bay, Western Cape                                                                                                                                                                        |                                  |
| <b>2024</b> | Mossel Bay                                                                                                                                                                                                                                                                                                                            | Hartland lifestyle estate        |
| ▪           | Part II amendment of the appeal environmental authorisation issued on 18 august 2009 (as amended) and the EMPr for the proposed residential development on a portion of the farm vaale valley 219, Mossel Bay - Hartland lifestyle estate                                                                                             |                                  |
| <b>2024</b> | George                                                                                                                                                                                                                                                                                                                                | George Municipality              |
| ▪           | Basic Assessment Report for the proposed upgrading of the Herold's Bay pump station and associated rising main as well as the development of new associated infrastructure on erf 116, remainder of erf 95, remainder of farms 236 and 237 and portions 10, 35 and 37 of farm brakfontein no. 236, Herold's Bay, George, Western Cape |                                  |
| <b>2024</b> | George                                                                                                                                                                                                                                                                                                                                | George Municipality              |
| ▪           | Part II Amendment of Environmental Authorisation for proposed development of a Photovoltaic Solar Plant on erf 2819, George, Western Cape                                                                                                                                                                                             |                                  |
| <b>2024</b> | George                                                                                                                                                                                                                                                                                                                                | George Municipality              |
| ▪           | Basic Assessment Report for the proposed repair and rehabilitation of flood damage along the Camphersdrift River in the Van Riebeeck Park (Project 28(3)), George, Western Cape                                                                                                                                                       |                                  |
| <b>2024</b> | Plettenberg Bay                                                                                                                                                                                                                                                                                                                       | The More Family Collection       |
| ▪           | Basic Assessment Report for the proposed expansion of the Milkwood Manor and parking on erf 10190, remainder of erf 2066 and the remainder of erf 706, Plettenberg Bay, Western Cape                                                                                                                                                  |                                  |

- 2023**                      George                      Urban Country Estate (Pty) Ltd
- Basic Assessment Report for the proposed residential development on erf 19374 (remainder erf 6182, erven 6179 and 6156), George, Western Cape
- 2023**                      George                      George Municipality
- Basic Assessment Report for the Upgrading of the Eden Pumpstation, George, Western Cape
- 2023**                      Mossel Bay                      Paprenax Trading 6 cc
- Amendment of Environmental Authorisation (Part 2, Substantive amendment) for the proposed establishment of a filling station and associated business infrastructure on a portion of erf 13996, Kwanonqaba, Mossel Bay, Western Cape
- 2023**                      George                      George Municipality
- Basic Assessment Report for proposed upgrade of the Schaapkop Pumpstation rising main on remainder of erf 464 and erf 13486, George, Western Cape
- 2023**                      George                      Garden Route Gateway Plaza
- Basic Assessment Report for proposed mixed-use development on portions 278 and 282 of farm Kraaibosch no. 195, George, Western Cape
- 2023**                      George                      George Municipality
- Basic Assessment Report for proposed development of a Photovoltaic Solar Plant on erf 2819, George, Western Cape
- 2023**                      George                      EARP Construction
- Basic Assessment Report for the proposed commercial development on portion 49 of Farm Hansmoeskraal 202, George, Western Cape
- 2022**                      George                      Pieter Koen Development Company
- Basic Assessment Report for the proposed residential development on Portion 21 of the Farm Kraaibosch No. 195 (Pieter Koen), George, Western Cape
- 2022**                      Mossel Bay                      Dalmar
- Amendment of Environmental Authorisation (Part 2, Substantive amendment) for the Proposed Residential Development On A Portion Of The Farm Vaale Valley 219, Mossel Bay (Hartenbos Landgoed II), Western Cape

- 2022** George Dalmar
- Amendment of Environmental Authorisation Proposed Development of Herold's Bay Country Estate on A Portion of Portion 7 of The Farm Buffelsfontein No. 204, Herold's Bay, Western Cape
- 2022** George Pieterkoen Trust
- Basic Assessment Report for the proposed residential development on Portion 21 of the Farm Kraaibosch No. 195 (Pieter Koen), George, Western Cape
- 2022** Still Bay W. Nel & Irma Oosthuizen Trust IT 1596/2008
- Basic Assessment Report for the development of 5 residential units on erven 4139, 4140, 4141, 4142, 4143, 4144, 4145 (Erf 3997), Still Bay West, Western Cape
- 2022** George Octo Trading 377 cc
- Section 24 G Retrospective Environmental Authorisation for the alleged unlawful construction of a road clearance of vegetation to establish a house on remainder of Farm Holle Kloof 91 and Portion 1 of the Farm Plattekleof 131, Waboomskraal, George, Western Cape
- 2022** Knysna CapeNature
- Basic Assessment Report for the Proposed development on Portions 38 and 39 of Farm 205 and Remainder of Farm 211, Goukamma Nature Reserve, Knysna, Western Cape
- 2021** Prince Albert Jurie Klue
- Section 24 G Retrospective Environmental Authorisation for the alleged unlawful clearance of vegetation on Farm Angliers Bosch (Fernkloof), Remainder of Farm 157, Klaarstroom, Prince Albert, Western Cape
- 2021** Mossel Bay Mossel Bay Municipality
- Basic Assessment Report for the proposed Dana Bay Emergency Access Road on Remainder of Portion 7 of the Farm 225, Dana Bay, Mossel Bay, Western Cape
- 2021** Willowmore LEZMIN 2087cc
- Basic Assessment Report for the proposed development of Portion 1 of the Farm Matjiesfontein No. 206, Baviaanskloof, Division Willowmore, Eastern Cape
- 2020** Sedgefield Knysna Municipality
- Basic Assessment Report for the proposed housing development on erven 3861, 3865, 3866, 3917, 3918 and 5010 in Sedgefield, Knysna, Western Cape

- 2020** Mossel Bay Paprenax Trading 6 cc
- Basic Assessment Report for the proposed establishment of a filling station and associated business infrastructure on a portion of erf 13996, Kwanonqaba, Mossel Bay, Western Cape
- 2020** Ladismith Department of Transport and Public Works
- Maintenance Management Plan for the periodic maintenance of Trunk Road 31, section 4, km 30.8 to km 76.06, Barrydale to Ladismith, Western Cape
- 2020** Knysna Knysna Municipality
- Maintenance Management Plan for the Maintenance of the potable water pipeline system on Erven 4197, RE/1352, RE/1351, RE/1146 and 1316 in Knysna, Western Cape
- 2020** Humansdorp Kouga Municipality
- Environmental Control Officer for the Phase 1A of New municipal 66kV double circuit overhead line between the Melkhout substation at Humansdorp and the main intake substation at Jefferys Bay, Eastern Cape
- 2020** Humansdorp Kouga Municipality
- Environmental Control Officer for the Construction of a new 22kv overhead powerline between Melkhout substation and Allison Street, Humansdorp, Eastern Cape
- 2020** Knysna Knysna Municipality
- Environmental Control Officer for the Charlesford raw water pumping scheme: Upgrade and refurbishment of pumpstation: Mechanical and electrical, Knysna, Western Cape
- 2020** Seweweekspoort, Department of Transport & Public Works
- Amendment of Environmental Authorisation (Part 2, Substantive amendment) for the flood damage repairs to road structures on MR309 in Seweweekspoort, Western Cape
- 2019 – 2021** Seweweekspoort, Department of Transport & Public Works
- Environmental Control Officer for the flood damage repairs to road structures on MR309 in Seweweekspoort, Western Cape
- 2019** George George Municipality
- Environmental Control Officer for the Raising of the Garden Route Dam Spillway on Portion 3/352, Remainder of 536 of Erf 221, Erf 3055 and Erf 3056, George, Western Cape



- 2019**                      Laingsburg                      Department of Agriculture
- Environmental Control Officer for the Construction Of Erosion Prevention Structures Within The One In Ten Year Flood Line Of The Buffels River, Laingsburg, Western Cape
- 2019**                      Williston                      Williston Municipality
- Environmental Control Officer for the Upgrading of bulk water network in Williston – Phase 3, Williston, Northern Cape
- 2019**                      George                      George Municipality
- Environmental Control Officer for the construction of new 66kV overhead line between Ballots Bay and Glanwood substations, George, Western Cape
- 2019**                      Oudtshoorn                      Department of Transport & Public Works
- Environmental Control Officer for the Periodic maintenance of Trunk Road 31, Section 6, km 23.3 to km 47.8 Calitzdorp to Oudtshoorn, Western Cape
- 2019**                      Kleinbrak                      Mossel Bay Municipality
- Environmental Control Officer for the Upgrading of Beyers Street, Klienbrak River, Western Cape
- 2019**                      George                      Outeniqua Eye Clinic Body Corporate
- Environmental Control Officer for the proposed expansion of parking area on erf 5950 and part of remainder erf 464, George, Western Cape
- 2019**                      Mossel Bay                      Hey Innovations
- Basic Assessment Report for the proposed establishment of a residential development on Erf 2839, Great Brak River, Western Cape
- 2019**                      Oudtshoorn                      Oudtshoorn Municipality
- Environmental Management Programme for the Blossoms Emergency Supply Scheme, Oudtshoorn, Western Cape
- 2019**                      Humansdorp                      Clinkscapes Maughan-Brown
- Environmental Management Programme for the proposed construction of a new 22kV overhead powerline between Melkhout Substation and Allison Street, Humansdorp, Eastern Cape
- 2019**                      George                      PN&MR Lotter Family Trust
- Addendum to the Environmental Management Programme for the Establishment of a Township (Rivendale) on Portions 5, 15, 16 and 31 of the Farm Hansmoeskraal 202, Western Cape

- 2019** Oudtshoorn Department of Transport and Public Works
- Basic Assessment Report for the Proposed Maintenance Activities of Trunk Road 33/4 between km 4.6 and km 14.4, Meiringspoort, Western Cape
- 2019** George Dynarc Capital
- Substantive amendment of environmental authorisation for the proposed Development of Portion 130, 131 and 132 of the Farm Gwayang 208
- 2019** George Department of Transport & Public Works
- Basic Assessment Report for the proposed Upgrading of Bridge No. 2221 on Trunk Road 2/9 at km 15.1 over the Maalgate River.
- 2018 - 2019** Oudtshoorn Department of Transport and Public Works
- Maintenance Management Plan for the proposed periodic maintenance of Trunk Road 31, section 6, km 23.3 to km 47.8, Western Cape
- 2018 - 2019** Humansdorp Clinkscapes Maughan-Brown
- Applicability of the EIA regulations Checklist for the proposed new 22kV overhead line between Melkhout Substation and Allison Street, Eastern Cape
- 2018 - 2019** Knysna Knysna local Municipality
- Applicability of the EIA regulations Checklist for the proposed Rheenendal infill housing, subdivision and rezoning of portions of erf 42, 36 and 387 as well as erven 535, 536, 553, 54, 393, 406, 672, 673 and 68, Rheenendal, Western Cape
- 2018 - 2019** Knysna Knysna local Municipality
- Applicability of the EIA regulations Checklist for the proposed infill housing and subdivision of erven in Welsyndorp and the rezoning and subdivision of erven in Bosdorp, Karatara, Western Cape.
- 2018** Port Elizabeth ACSA P.E.
- Applicability of the EIA regulations Checklist for the proposed ACSA Port Elizabeth Airport Photovoltaic Plant, Eastern Cape Province
- 2018** Mossel Bay TopUp Prop Inv.
- Applicability of the EIA regulations Checklist for the proposed Farm Stall Centre and filling Station on Portion 65 of the Farm Hartenbosch 217, Hartenbos

- 2018** George Outeniqua Eye Clinic Body Corporate
- Basic Assessment Report for the proposed expansion of parking area on erf 5950 and part of remainder erf 464
- 2018** Beaufort West Beaufort West Municipality
- Environmental Control Officer for the First and Second Environmental Audit for the provision of adequate water supply within the jurisdiction of the Beaufort West municipality
- 2018** Mossel Bay Element Consulting Engineers
- Environmental Management Programme update for the replacement of 22kV overhead powerline between Power Town and Hartenbos and between Hartenbos and the Hartenbos sewage substation and the construction of a new 22kV overhead power line between the Midbrak and Kleinbrak Substations.
- 2018** Mossel Bay Element Consulting Engineers
- Environmental Control Officer for the construction of a new 22kV overhead power line between the Midbrak and Kleinbrak Substations
- 2018** Mossel Bay Element Consulting Engineers
- Environmental Control Officer for the Upgrade of Amy Searle Canal – Phase 5, Great Brak River
- 2018** Gouritsmond Hessequa Consulting Engineers
- Environmental Control Officer for the Upgrade and expansion of the Gouritsmond Water Treatment Works on remainder of erf 140, Gouritsmond
- 2018** George Biprops 14
- Environmental Control Officer for the residential development on portion 5 of the farm Kraaibosch No. 195, Groenkloof Woods: Phase C & D
- 2018** Knysna Knysna Municipality
- Environmental Control Officer for upgrading of Knysna bulk water supply scheme: phase 2B
- 2018** Plettenberg Bay Bitou Municipality
- Environmental Control Officer for the upgrade of the Kranshoek Bulk Water Supply Scheme: Construction of Pipelines, reservoirs and associated infrastructure near Plettenberg Bay.
- 2018** Mossel Bay SMEC
- Environmental Control Officer for the Upgrade of Kusweg and associated infrastructure in Rheeboek

- 2017**                      George                                      EARP Construction
- Invasive Alien Management Plan for the proposed residential development on portions 21, 23, 24 & 48 of Farm Hansmoeskraal 202 near George
- 2017**                      Mossel Bay                                      Mossel Bay Municipality
- Environmental Control Officer for the development of the new Mossel Bay municipal cemetery on erf 2001/0
- 2017**                      Knysna                                      Knysna Municipality
- Environmental Control Officer for the remedial work to prevent further settlement of the low-lift pump sump and retaining wall at Gouna River Pump Station
- 2017**                      Knysna                                      Knysna Municipality
- Environmental Control Officer for upgrading of Knysna bulk water supply scheme: phase 1
- 2017**                      George                                      Biprops 14 (Pty) Ltd
- Environmental Control Officer for the residential development on portion 5 of the farm Kraaibosch No. 195
- 2017**                      Still Bay                                      Hessequa Municipality
- Environmental Control Officer for the construction of a reservoir, booster pump station and associated infrastructure in Melkhoutfontein near Still Bay
- 2016 - 2017**              Heidelberg      Department of Transport & Public Works
- Environmental Control Officer for the flood damage repairs to structures in the Central Eden District Municipality Region, Heidelberg North
- 2016 - 2017**              Riversdale      Department of Transport & Public Works
- Environmental Control Officer for the flood damage repairs to structures in the Central Eden District Municipality Region, Riversdale East area
- 2016 - 2017**              Still Bay              Department of Transport & Public Works
- Environmental Control Officer for the upgrade of main road 332 near Still Bay
- 2016 - 2017**              Mossel Bay                                      The South Cape College
- Environmental Control Officer for the extension of the South Cape College: Phase 3, Mossel Bay Campus

- 2016 - 2017**      Klein Brak      Mossel Bay Municipality
- Environmental Control Officer for the removal of obstructions in the lower floodplain of the Klein Brak River Estuary
- 2016**      Prince Albert      Milway Trade and Invest 1014cc
- Basic Assessment for the proposed guest lodge on remainder of Farm Rietpoort 13
- 2016**      Plettenberg Bay      Bitou Municipality
- Basic Assessment for the proposed Qolweni phase 5 development near Plettenberg Bay
- 2016**      Mossel Bay      Element Consulting Engineers
- Environmental Management Programme for the replacement of 22kV overhead powerline between Power Town and Hartenbos and between Hartenbos and the Hartenbos sewage substation
- 2016**      George      SMEC
- Environmental Policy for the resurfacing of York Street, George
- 2016**      Mossel Bay      Department of Transport & Public Works
- Maintenance Management Plan for proposed upgrade of Louis Fourie Road.
- 2016**      George      Oaklands Bridge Country Estate HOA
- Maintenance Management Plan for proposed repair and maintenance of the riverbank at Oaklands Bridge Country Estate in Heather Park
- 2016**      Gouritz      Department of Transport & Public Works
- Update of the Maintenance Management Plan for proposed repair and maintenance of the Gouritz River Bridge bank protection along the R325 near Gouritzmond
- 2016**      George      Ivorybell Investment (Pty) Ltd
- Outeniqua Sensitive Coastal Area Environmental Impact Report for the proposed new house on erf 379 in Heralds Bay
- 2016**      George      George Municipality
- Environmental Assessment Report for the substantive amendment of environmental authorisation of the proposed upgrade and extension of the overhead power lines and associated substations
- 2016**      Oudtshoorn      SA Army Infantry School
- Environmental Control Officer for the construction of a fighting in built up areas (FIBUA) range on portion 10 of the farm Blaauwtjes Drift 110 in Oudtshoorn



- 2015 - 2016**      Gouritz      Department of Transport & Public Works
- Environmental Control Officer for the repair and maintenance of the Gouritz River Bridge bank protection along the R325 near Gouritzmond
- 2015 - 2016**      Albertinia      Garden Route Game Lodge (Pty) Ltd
- Environmental Control Officer for the five new units at the Garden Route Game Lodge
- 2015 - 2016**      Mossel Bay      Element Consulting Engineers
- Environmental Control Officer for the replacement of 22kV overhead powerline between Power Town and Hartenbos and between Hartenbos and the Hartenbos sewage substation
- 2014 - 2016**      Plettenberg Bay      Chauke Quantity Surveyers
- Environmental Control Officer for the Qolweni and Kwanokuthula High Density Units and engineering services
- 2016**      Plettenberg Bay      Bitou Municipality
- Environmental Control Officer for the civil engineering works for Kwanokuthula Phase 4 and the extension of Sishuba Street
- 2014 - 2016**      Mossel Bay      The South Cape College
- Environmental Control Officer for the extension of the South Cape College, Mossel Bay Campus
- 2016**      George      SMEC
- Environmental Control Officer for the resurfacing of York Street
- 2014 - 2015**      Mossel bay      The Muller Murray Trust
- Environmental Control Officer for the construction of gravity pipeline from the Nautilus take-off to the Boggomsbaai Reservoir phase 2
- 2015**      Swellendam      Casidra SOC Ltd
- Environmental Control Officer for the Grootvaderbos Groynes in the Buffeljags River
- 2015**      George      Element Consulting Engineers
- Environmental Control Officer for the upgrading and extension of overhead power lines and substations: construction of a new 66kV overhead line between Protea and Ballots Bay substation

- 2014 - 2015**      George      Department of Transport & Public Works
- Environmental Control Officer for the flood damage repair projects in the George and Knysna local municipal areas
- 2015**      George      BDE Consulting Engineers (Pty) Ltd
- Environmental Control Officer for the photovoltaic solar plant for the ACSA George Airport
- 2015**      Heidelberg      Bergstan South Africa
- Environmental Control Officer for the Duiwenhoks River stabilization works: Sites B31, B38 and B39
- 2015**      Krakeel      Element Consulting Engineers
- Environmental Control Officer for the construction of filling station at SSK Tuinrote Agri on portion 5 of the farm no. 320
- 2014 - 2015**      Herbertsdale      SMEC
- Environmental Control Officer for the flood damage repairs to structures in the Eden region: Herbertsdale area
- 2014 - 2015**      George      Department of Transport & Public Works
- Environmental Control Officer for the flood damage repair projects in the George and Knysna local municipal areas
- 2015**      George      SMEC
- Environmental Control Officer for the improvements to the Pacaltsdorp interchange and new pedestrian bridge
- 2014 - 2015**      Still Bay      De Villiers & Moore Consulting Engineers
- Environmental Control Officer for the Still Bay 66kV substation and overhead powerline
- 2014**      Beaufort West      Worley Parsons Consulting Engineers
- Environmental Control Officer for the Nelspoort bulk water supply scheme northeast of Nelspoort

## **Appendix A2: EAPASA REGISTRATION OF AUTHOR:**

**Environmental Assessment  
Practitioners Association  
of South Africa**



**Registration No. 2021/3163**

**Herewith certifies that**  
**MICHAEL JON BENNETT**  
**is registered as an**  
**Environmental Assessment Practitioner**

**Registered in accordance with the prescribed criteria of Regulation 15. (1)  
of the Section 24H Registration Authority Regulations  
(Regulation No. 849, Gazette No. 40154 of 22 July 2016, of the  
National Environmental Management Act (NEMA), Act No. 107 of 1998, as amended).**

**Effective: 01 April 2026**

**Expires: 31 March 2027**

*Chairperson*

*Registrar*



## **Appendix B1: Terrestrial Biodiversity Compliance Statement and Assessment - Sewer**





# Terrestrial Biodiversity Compliance Statement and Assessment

## Rosemoor Sewer Infrastructure

Date: 23/03/2026  
Version: Draft  
Author: J. Pote

# Terrestrial Biodiversity Compliance Statement and Assessment

## Rosemoor Sewer Infrastructure

Compiled by: **Jamie Pote** (Pr. Sci. Nat.)

Postnet Suite 57, Private Bag X13130, Humewood, Port Elizabeth, 6013, South Africa  
[jamiepote@live.co.za](mailto:jamiepote@live.co.za) +27 (0)76 888 9890

Compiled for: **Sharples Environmental Services**

Date of report: **23/03/2026**

## Draft Report

This Report has been prepared with all reasonable skill, care and diligence within the scope of appointment by Mr Jamie Pote, with consideration to the resources devoted to it by agreement with the client, incorporating our Standard Terms and Conditions of Business.

This Report is prepared exclusively for use by the client, and the author disclaims any liability in respect of its use by any party other than the client and for the purpose for which it was written. The Report is subject to all the copyright and intellectual property laws and practices of South Africa and contains intellectual property and proprietary information that is protected by such copyright in favour of the author. No person, other than the client, may reproduce, distribute to any third party, or rely on the content of any portion of this report, without the prior written consent of the author.

The author accepts no responsibility of whatsoever nature to third parties to whom this Report, or any part thereof, is made known. Any such persons or parties rely on the report at their own risk.

## Revisions

| Report/Revision Version | Date:      | Approved by: |
|-------------------------|------------|--------------|
| First Draft             | 2026/03/23 | Jamie Pote   |
| Revisions/Comments      |            |              |
| Final Draft             |            |              |
| IAP comments            |            |              |
| Final Version           |            |              |

# Table of Contents

|                                                                                 |     |
|---------------------------------------------------------------------------------|-----|
| Revisions .....                                                                 | ii  |
| Table of Contents .....                                                         | i   |
| List of Figures .....                                                           | iii |
| List of Tables .....                                                            | iv  |
| 1 Introduction & Background .....                                               | 1   |
| 1.1 Background.....                                                             | 1   |
| 1.2 Purpose of Report .....                                                     | 1   |
| 1.3 Activity Description .....                                                  | 2   |
| 1.4 Methodology and Approach.....                                               | 3   |
| 1.5 Data sources and references .....                                           | 4   |
| 1.5.1 Site visit .....                                                          | 5   |
| 1.5.2 Assumptions, Uncertainties and Gaps in Knowledge.....                     | 5   |
| 2 Policy .....                                                                  | 5   |
| 2.1 Legislation Framework.....                                                  | 5   |
| 2.2 Systematic Planning Frameworks .....                                        | 7   |
| 2.2.1 National Environmental Screening Tool.....                                | 9   |
| 2.2.2 Vegetation of Southern Africa .....                                       | 10  |
| 2.2.3 Western Cape Biodiversity Spatial Plan (WCBSP, 2023) – Terrestrial .....  | 12  |
| 2.2.4 Protected areas .....                                                     | 13  |
| 2.2.5 Key Biodiversity Areas.....                                               | 14  |
| 2.2.6 Important Bird Areas.....                                                 | 14  |
| 2.2.7 Garden Route Biodiversity Sector Plan (2010).....                         | 15  |
| 2.2.8 Rivers, Watercourses and Wetlands.....                                    | 15  |
| 3 Biodiversity Risk Identification and Assessment .....                         | 16  |
| 3.1 Baseline Biodiversity Description .....                                     | 16  |
| 3.1.1 Present Ecological State .....                                            | 23  |
| 3.1.2 Vegetation and Ecological Processes and Corridors .....                   | 23  |
| 3.1.3 Flora & Fauna .....                                                       | 24  |
| 3.1.4 Aquatic Habitat.....                                                      | 29  |
| 3.1.5 Terrestrial Vegetation Sensitivity Assessment .....                       | 29  |
| 3.1.6 No-Go Areas .....                                                         | 31  |
| 3.1.7 Potential Development Footprints.....                                     | 31  |
| 3.2 Risks and Potential Impacts to Biodiversity .....                           | 34  |
| 3.2.1 Summary of actions, activities, or processes that require mitigation..... | 34  |
| 3.2.2 Potential Terrestrial Biodiversity Impacts (Indirect) .....               | 34  |
| 3.2.3 Potential Terrestrial Biodiversity Impacts (Direct) .....                 | 34  |
| 3.3 Assessment of Risks and Impacts to Biodiversity .....                       | 35  |
| 3.3.1 Methodology to determine the significance ratings.....                    | 35  |
| 3.3.2 Assessment of Terrestrial Biodiversity Impacts.....                       | 37  |
| 3.3.3 Potential Terrestrial Biodiversity Impacts (Cumulative) .....             | 50  |
| 3.3.4 Terrestrial Biodiversity Impact Reversibility .....                       | 50  |
| 3.3.5 Impacts and Risks to Irreplaceable Biodiversity Resources.....            | 51  |

|       |                                                                                                                                                        |     |
|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| 3.3.6 | Residual Risks and Uncertainties .....                                                                                                                 | 51  |
| 3.4   | Findings, Outcomes and Recommendations .....                                                                                                           | 51  |
| 3.4.1 | Summary of Findings .....                                                                                                                              | 51  |
| 3.4.2 | Recommendations & Mitigation Measures .....                                                                                                            | 51  |
| 3.5   | Site Preparation and Vegetation Clearing Plan .....                                                                                                    | 52  |
| 3.6   | Open Space Management/Conservation Plan .....                                                                                                          | 53  |
| 3.7   | Maintenance Management Plan .....                                                                                                                      | 53  |
| 4     | Organizational Capacity and Competency .....                                                                                                           | 53  |
| 5     | Emergency Preparedness and Response .....                                                                                                              | 53  |
| 6     | Stakeholder Engagement .....                                                                                                                           | 53  |
| 7     | Monitoring and Review .....                                                                                                                            | 53  |
| 8     | Appendices .....                                                                                                                                       | 54  |
| 8.1   | Appendix A: References .....                                                                                                                           | 54  |
| 8.2   | Appendix B: Abbreviations & Glossary .....                                                                                                             | 57  |
| 8.2.1 | Abbreviations .....                                                                                                                                    | 57  |
| 8.2.2 | Glossary .....                                                                                                                                         | 58  |
| 8.3   | Appendix C: Biodiversity Environmental Management Plan .....                                                                                           | 65  |
| 8.3.1 | Protection of Flora and Fauna .....                                                                                                                    | 65  |
| 8.3.2 | Alien and Invasive Plan Management Plan .....                                                                                                          | 66  |
| 8.3.3 | Fires .....                                                                                                                                            | 66  |
| 8.3.4 | Soil Aspects .....                                                                                                                                     | 67  |
| 8.3.5 | Dust .....                                                                                                                                             | 67  |
| 8.3.6 | Infrastructural Requirements .....                                                                                                                     | 67  |
| 8.3.7 | Rehabilitation Plan .....                                                                                                                              | 69  |
| 8.3.8 | Monitoring and Reporting .....                                                                                                                         | 71  |
| 8.3.9 | Closure objectives and extent of alignment to pre-construction environment .....                                                                       | 71  |
| 8.4   | Appendix D: General Impact Rating Scale .....                                                                                                          | 72  |
| 8.4.1 | The Severity/ Beneficial Scale .....                                                                                                                   | 72  |
| 8.4.2 | Spatial and Temporal Scales .....                                                                                                                      | 73  |
| 8.4.3 | The Degree of Certainty and the Likelihood Scale .....                                                                                                 | 73  |
| 8.4.4 | The Environmental Significance Scale .....                                                                                                             | 74  |
| 8.4.5 | Absence of Data .....                                                                                                                                  | 75  |
| 8.5   | Appendix E: Declaration, Specialist Profile and Registration .....                                                                                     | 76  |
| 8.6   | Appendix F: Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Biodiversity ..... | 90  |
| 8.7   | Site Sensitivity Verification Report .....                                                                                                             | 99  |
| 8.7.1 | Background .....                                                                                                                                       | 99  |
| 8.7.2 | Purpose of Report .....                                                                                                                                | 99  |
| 8.7.3 | Data sources and references .....                                                                                                                      | 100 |
| 8.7.4 | Site visit .....                                                                                                                                       | 101 |
| 8.7.5 | Assumptions, Uncertainties and Gaps in Knowledge .....                                                                                                 | 101 |
| 8.7.6 | National Environmental Screening Tool .....                                                                                                            | 101 |
| 8.7.7 | Findings, Outcomes and Recommendations .....                                                                                                           | 103 |
| 8.7.8 | Conclusions .....                                                                                                                                      | 106 |

## List of Figures

|                                                                                                                                                                                                                                                                                                                                             |     |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| Figure 1: Site locality.....                                                                                                                                                                                                                                                                                                                | 1   |
| Figure 2: Proposed Rosemoor Sewer Infrastructure. ....                                                                                                                                                                                                                                                                                      | 2   |
| Figure 3: Terrestrial Biodiversity Sensitivity.....                                                                                                                                                                                                                                                                                         | 9   |
| Figure 4: Plant Species Sensitivity .....                                                                                                                                                                                                                                                                                                   | 9   |
| Figure 5: Animal Species Sensitivity.....                                                                                                                                                                                                                                                                                                   | 9   |
| Figure 6: Aquatic Sensitivity.....                                                                                                                                                                                                                                                                                                          | 9   |
| Figure 7: National Biodiversity Assessment Vegetation Type and Conservation Status (NBA, 2018).<br>Darker shaded areas indicative of remnant vegetation.....                                                                                                                                                                                | 11  |
| Figure 8: Western Cape Biodiversity Spatial Plan (WCBSP, 2023) –The site does overlap with some<br>designated CBA 1, CBA 2 and ESA 2 areas. ....                                                                                                                                                                                            | 12  |
| Figure 9: Protected Areas. ....                                                                                                                                                                                                                                                                                                             | 14  |
| Figure 10: Garden Route Biodiversity Sector Plan (2007) vegetation designation and CBA/ESA status.....                                                                                                                                                                                                                                      | 15  |
| Figure 11: Rivers, Wetlands and Estuaries associated with the site. ....                                                                                                                                                                                                                                                                    | 16  |
| Figure 12: Aerial photo of the site.....                                                                                                                                                                                                                                                                                                    | 17  |
| Figure 13: Typical urban street. ....                                                                                                                                                                                                                                                                                                       | 18  |
| Figure 14: Typical urban street.....                                                                                                                                                                                                                                                                                                        | 18  |
| Figure 15: Typical urban street. ....                                                                                                                                                                                                                                                                                                       | 19  |
| Figure 16: Typical urban street.....                                                                                                                                                                                                                                                                                                        | 19  |
| Figure 17: Typical vegetated watercourse bank (Kikuyu). ....                                                                                                                                                                                                                                                                                | 19  |
| Figure 18: Typical vegetated watercourse bank (Kikuyu). ....                                                                                                                                                                                                                                                                                | 19  |
| Figure 19: Typical vegetated watercourse bank (Kikuyu). ....                                                                                                                                                                                                                                                                                | 20  |
| Figure 20: Typical vegetated watercourse bank (Kikuyu).....                                                                                                                                                                                                                                                                                 | 20  |
| Figure 21: Typical vegetated area (Kikuyu). ....                                                                                                                                                                                                                                                                                            | 20  |
| Figure 22: Typical vegetated area (Kikuyu). ....                                                                                                                                                                                                                                                                                            | 20  |
| Figure 23: Typical vegetated area (Kikuyu).....                                                                                                                                                                                                                                                                                             | 20  |
| Figure 24: Typical vegetated area (Cape Ivy).....                                                                                                                                                                                                                                                                                           | 20  |
| Figure 25: Typical vegetated area (Kikuyu).....                                                                                                                                                                                                                                                                                             | 20  |
| Figure 26: Typical vegetated area (Kikuyu).....                                                                                                                                                                                                                                                                                             | 20  |
| Figure 27: Watercourse at crossing point. ....                                                                                                                                                                                                                                                                                              | 21  |
| Figure 28: Watercourse at crossing point. ....                                                                                                                                                                                                                                                                                              | 21  |
| Figure 29: Secondary (Grassy) vegetation. ....                                                                                                                                                                                                                                                                                              | 21  |
| Figure 30: Secondary (Grassy) vegetation. ....                                                                                                                                                                                                                                                                                              | 21  |
| Figure 31: Mapped vegetation of the site (Overview).....                                                                                                                                                                                                                                                                                    | 22  |
| Figure 32: Distribution records of flora and fauna Species of Conservation Concern (GBIF, 26 July 2024)<br>with known records in the vicinity of the site. NOTE some distribution records may have an offset for<br>biosecurity purposes and/or accuracy errors but will non the less give an indication of general locality.<br>.....      | 24  |
| Figure 33: Distribution records of flora and fauna Species of Conservation Concern (GBIF, 26 July 2024)<br>with known records from the broader area. NOTE some distribution records may have an offset for<br>biosecurity purposes but will non the less give an indication of general locality (i.e. locality records in<br>the sea). .... | 26  |
| Figure 34: Vegetation Sensitivity of proposed site (Overview).....                                                                                                                                                                                                                                                                          | 32  |
| Figure 35: Site locality.....                                                                                                                                                                                                                                                                                                               | 99  |
| Figure 36: Terrestrial Biodiversity Sensitivity.....                                                                                                                                                                                                                                                                                        | 101 |
| Figure 37: Plant Species Sensitivity.....                                                                                                                                                                                                                                                                                                   | 101 |
| Figure 38: Animal Species Sensitivity .....                                                                                                                                                                                                                                                                                                 | 102 |

|                                                                                                                                         |     |
|-----------------------------------------------------------------------------------------------------------------------------------------|-----|
| Figure 39: Aquatic Sensitivity .....                                                                                                    | 102 |
| Figure 40: Western Cape Biodiversity Spatial Plan (2023). The site does overlap with some designated CBA 1, CBA 2 and ESA 2 areas. .... | 104 |
| Figure 41: Protected Areas and NPAES in vicinity. ....                                                                                  | 105 |
| Figure 42: Rivers, FEPAs & SWSA's. ....                                                                                                 | 106 |

## List of Tables

|                                                                                                        |     |
|--------------------------------------------------------------------------------------------------------|-----|
| Table 1: Summary of Regional Planning Biodiversity features. ....                                      | 8   |
| Table 2: Summary of Screening tool designations. ....                                                  | 9   |
| Table 3: Criteria defining Critical Biodiversity Areas (Source: WC BSP, 2023) .....                    | 12  |
| Table 4: Flora Species of Special Concern .....                                                        | 25  |
| Table 5: Fauna Species of Special Concern (SCC) .....                                                  | 26  |
| Table 6: Alien (exotic) invasive and other weed species and status. ....                               | 28  |
| Table 7: Potential Impacts to Terrestrial Biodiversity. ....                                           | 34  |
| Table 10: Specific Mitigation Measures and Recommendations .....                                       | 52  |
| Table 11: Summary of Screening tool designations. ....                                                 | 102 |
| Table 12: Terrestrial Biodiversity Features flagged in the National Environmental Screening Tool. .... | 103 |



# 1 Introduction & Background

## 1.1 Background

Sharples Environmental Services cc (SES) has been appointed by Lyners Engineers on behalf of the George Municipality (applicant), to conduct the Environmental Impact Assessment process for the proposed upgrading of sewer infrastructure in Rosemoor, George, Western Cape (Figure 1). As part of this application, a Terrestrial Biodiversity, Plant & Animal Specialist Assessment is required. This report has been updated to include additional infrastructure added to the layout in 2026.



Figure 1: Site locality.

## 1.2 Purpose of Report

The “Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of sections 24 (5) (a) and (h) and 44 of the Act, when applying for Environmental Authorisation”, as published on 20 March, 2020 in National Gazette, No. 43110 in terms of NEMA (Act 107 of 1998) sections 24(5)(a), (h) and 44, lists protocols and minimum report requirements for environmental impacts on terrestrial biodiversity and provides the criteria for the assessment and reporting of impacts on terrestrial biodiversity for activities requiring environmental authorisation. The assessment and minimum reporting requirements of this protocol are associated with a level of environmental sensitivity identified by the National web based Environmental Screening Tool. Prior to commencing with a specialist assessment, the current use of the land and the environmental sensitivity of the site under consideration, identified by the screening tool, must be confirmed by undertaking a **site sensitivity verification**, which must include the following.

1. The site sensitivity verification must be undertaken by an environmental assessment practitioner or a specialist.

2. The site sensitivity verification must be undertaken through the use of:
  - a. a desk top analysis, using satellite imagery.
  - b. a preliminary on-site inspection; and
  - c. any other available and relevant information.
3. The outcome of the site sensitivity verification must be recorded in the form of a report that:
  - a. confirms or disputes the current use of the land and environmental sensitivity as identified by the screening tool.
  - b. contains a motivation and evidence of either the verified or different use of the land and environmental sensitivity; and
  - c. is submitted together with the relevant assessment report prepared in accordance with the requirements of the Environmental Impact Assessment Regulations.

The National Web Based Screening Tool was used to generate the potential environmental sensitivity of the site which has then been compared to various online and other databases and information sources in order to verify and confirm the validity of the screening tool findings. This was further supported with on-site observations and analysis of most recent aerial photography.

This terrestrial biodiversity site verification has been undertaken as per the requirements of the Procedures for the assessment and minimum criteria for reporting on identified environmental themes in terms of sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, when applying for environmental authorisation (GN 320, 20 March 2020).

### 1.3 Activity Description

The blue (160mm), red (dashed line - 315mm & solid line – 250mm), orange (400mm) and grey (500mm) lines in Figure 2 below show the proposed sewer infrastructure that will be upgraded. The 160 and 315mm lines will mostly be within existing roads and road reserve, whereas the 250mm, 400mm and 600 mm will be within vegetated areas including in proximity to or traversing watercourses.

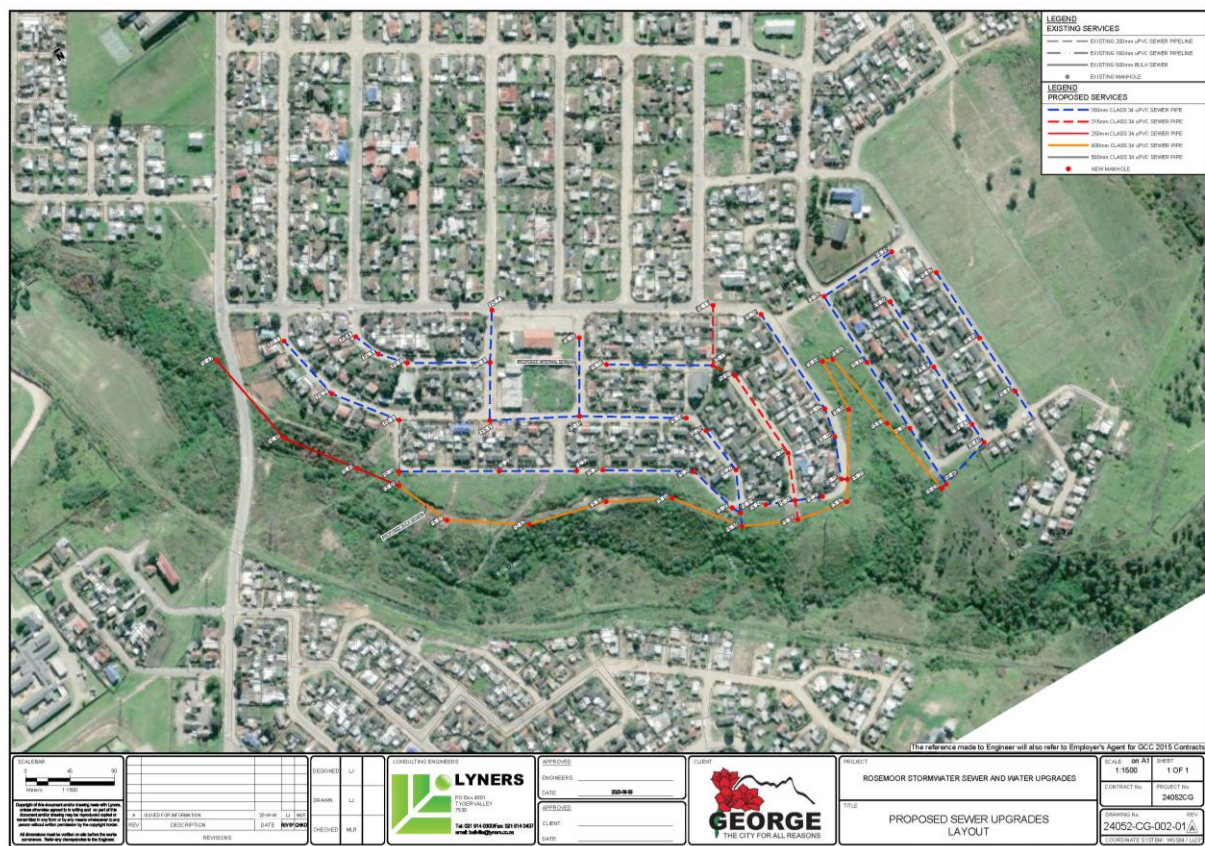


Figure 2: Proposed Rosemoor Sewer Infrastructure.





Figure 3: Proposed Rosemoor Sewer Infrastructure (additional northern section).

An additional pipeline was added to the layout in 2026 (Figure 3), and the report has been updated to reflect the additional section.

Portions of the proposed sewer pipeline will be installed adjacent to existing sewer infrastructure that broadly follows the same route. The construction activity (simplified) will include the excavation of a trench along the proposed route, installation of pipeline, construction of manhole covers and other concrete infrastructure, infill of excavated material, after which the sewer will be operational. Note: Since the installation of the pipeline is a temporary activity the 'operational phase is deemed to also be equivalent to the Site Closure and Rehabilitation Phase. The activity would thus be deemed to be temporary, other than manhole covers, which will be permanent but cover a small visible footprint. During the active lifetime of the sewer, ad hoc maintenance may be required which could require excavation, removal and replacement of defective component, followed by infill of excavation and would likely be limited to a small section of defective pipeline.

## 1.4 Methodology and Approach

The proposed methodology and approach followed in this assessment are outlined below:

- Conduct a comprehensive desktop study and identify potential risks relating to vegetation and flora of the site and surrounding area, for a Terrestrial Biodiversity Assessment Report. This will include the relevant Regional Planning and legislated frameworks, which will also be represented in a series of associated maps.
- Conduct a detailed site visit to assess the following:
  - Detailed field survey of vegetation, flora and habitats present.

- Comprehensive species list, highlighting species that are of special concern, threatened, Red Data species and species requiring permits for destruction/relocation in terms of NEMBA and the Provincial Nature Conservation Ordinance No. 19 of 1974.
- Detailed mapping of the various habitat units and assessment of habitat integrity, ecological sensitivity, levels of degradation and transformation, alien invasion and Species of Conservation Concern, the outcome being a detailed sensitivity map ranked into high, medium or low classes.
- Reporting will be comprised of a preliminary summary, with identification of anticipated impacts and risks for any scoping phase report (where applicable), a draft detailed Assessment Report (for public review and comment) and a Final Assessment Report for submission. The draft and final detailed reports will include the following:
  - Indicate any assumptions made and gaps in available information. Assessment of all the vegetation types and habitat units within the relevant Regional Planning Frameworks.
  - A detailed species list highlighting the various Species of Conservation Concern categories (endemic, threatened, Red Data species and other protected species requiring permits for destruction/relocation and invasive/exotic weeds).
  - Description and assessment of the habitat units and site sensitivities ranked into high, medium or low classes based on sensitivity and conservation importance. A standard methodology has been developed based on other projects in the specific area.
  - Assessment of Impacts and Mitigation Measure, as well as specific measure that may be required for alternative development plans.
  - A comprehensive EMPr for inclusion in the reports and EMP with specific management actions for construction and Operation.
  - A habitat sensitivity map will be compiled, indicating the sensitivities as described above.
  - A map indicating buffers (if required) to accommodate Regional Planning and any other requirements.

This terrestrial biodiversity compliance statement and assessment has been undertaken as per the requirements of the Procedures for the assessment and minimum criteria for reporting on identified environmental themes in terms of sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, when applying for environmental authorisation (GN 320, 20 March 2020).

## 1.5 Data sources and references

Data sources that were utilised for this report include the following:

- National (DFFE) Web Based Screening Tool – to generate the sites potential environmental sensitivity.
- National Vegetation Map 2018 (NVM, 2018), Mucina & Rutherford (2006) and National Biodiversity Assessment or Red Listed Ecosystems (NBA/RLE, 2022) – description of vegetation types, species (including endemic) and most recent vegetation unit conservation status.
- National and Regional Legislation including Provincial Nature Conservation Ordinance (P.N.C.O). NEM:BA Threatened or Protected Species (ToPS).
- Botanical Database of Southern Africa (BODATSA) and New Plants of Southern Africa (POSA) – lists of plant species and potential species of concern found in the general area (SANBI.)
- International Union for Conservation of Nature (IUCN) - Red List of Threatened Species.
- Animal Demography Unit Virtual Museum (VM) – potential faunal species.
- Global Biodiversity Information Facility (GBIF) – potential flora & faunal species distributions.
- National Red Books and Lists - mammals, reptiles, frogs, dragonflies & butterflies.
- National Freshwater Ecosystem Priority Areas assessment (NFEPA, 2011) - important catchments.
- National Protected Areas Expansion Strategy (NPAES, 2018) and South Africa Protected Area database (2020) – protected area information.

- SANBI BGIS – All other biodiversity GIS datasets.
- Western Cape Biodiversity Spatial Plan (2023) and any other relevant bioregional plans.
- Aerial Imagery – Google Earth, ESRI, Chief Surveyor General (<http://csg.dla.gov.za>).
- Cadastral and other topographical country data - Chief Surveyor General (<http://csg.dla.gov.za>).
- Other sources may include peer-reviewed journals, regional and local assessments, and studies in the general location of the project and its area of influence, landscape prioritization schemes (Key Biodiversity Areas), systematic conservation planning assessments and plans (as above), and any pertinent masters and doctoral theses, among others.

This terrestrial biodiversity assessment has been undertaken as per the requirements of the Procedures for the assessment and minimum criteria for reporting on identified environmental themes in terms of sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, when applying for environmental authorisation (GN 320, 20 March 2020).

### 1.5.1 Site visit

A site inspection was conducted on **04 December 2025**, during late spring/early summer and a follow up site visit (early autumn) for additional infrastructure. The site falls within a temperate climate with rainfall occurring throughout the year but is often higher in winter. For the purposes of this report, a single site visit is deemed to be adequate, specifically due to the disturbed nature of the site.

### 1.5.2 Assumptions, Uncertainties and Gaps in Knowledge

The findings and recommendations of this report may be susceptible to the following uncertainties and limitation:

- No assessment has been made of aquatic aspects relating to any wetlands, pans, and rivers/seeps and/or estuaries or marine ecosystems outside of the scope of a terrestrial biodiversity report. Refer to separate reporting.
- Any botanical surveys based upon a limited sampling time-period, may not reflect the actual species composition of the site due to seasonal variations in flowering times. Additionally, the composition of fire adapted vegetation may vary depending on level of maturity or time since last burn. As far as possible, site collected data has been supplemented with desktop and database-centred distribution data.
- As far as possible, site collected data has been supplemented with desktop and database-centred distribution data as well as previous studies undertaken in the area.

## 2 Policy

### 2.1 Legislation Framework

In terms of NEMA EIA Regulations (07 April 2014, as amended), the following is applicable<sup>1</sup>:

- In terms of section 52 of NEMBA (Activity (a)(i)), the vegetation unit Garden Route Granite Fynbos, has a **Critically Endangered** status as per National Biodiversity Assessment (2022).
- In terms of the Western Cape Biodiversity Spatial Plan (WCBSP, 2023), designated Critical Biodiversity Area 1 & 2 and Ecological Support Area 2 overlaps partially with the site.

<sup>1</sup> The listed activities itemized are only those with Biodiversity relevance to this report and is not a complete list.



**Listing Notice 1:**

Activity 12: The development of—

(xii) infrastructure or structures with a physical footprint of 100 square metres or more.

where such development occurs—

(c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse: —

excluding—

(dd) where such development occurs within an urban area; or

(ee) where such development occurs within existing roads or road reserves.

The proposed activity is located within an urban area; hence the activity is not applicable.

Activity 19: The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse.

but excluding where such infilling, depositing, dredging, excavation, removal or moving—

~~i. will occur behind a development setback.~~

The proposed activity will exceed the excavation of more than 10 cubic meters from within 32m of a watercourse, hence will be triggered.

Activity 27: The clearance of an area of 1 hectare or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for—

(i) the undertaking of a linear activity; or

~~(ii) maintenance purposes undertaken in accordance with a maintenance management plan.~~

The proposed activity is linear, hence not applicable.

**Listing Notice 2:**

None are applicable.

**Listing Notice 3:**

Activity 10: The development and related operation of infrastructure exceeding 1000 metres in length for the bulk transportation of sewage, effluent, process water, waste water, return water, industrial discharge or slimes –

(i) with an internal diameter of 0,36 metres or more; or

(ii) with a peak throughput of 120 litres per second or more;

excluding where—

(a) such infrastructure is for bulk transportation of sewage, effluent, process water, waste water, return water, industrial discharge or slimes inside a road reserve; or

(b) where such development will occur within an urban area.

The proposed activity is located within an urban area; hence the activity is not applicable.

Activity 12: The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan.

(a) In Eastern Cape, Free State, Gauteng, Limpopo, North-West and Western Cape provinces:

i. Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or ~~prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004.~~

ii. Within critical biodiversity areas identified in bioregional plans.

The proposed activity will potentially exceed clearing of more than 300m<sup>2</sup> of indigenous vegetation from within designated Critical Biodiversity Areas as well as designated Critically Endangered vegetation, resulting from excavations and installation of sewer pipelines and associated infrastructure.

Activity 14: The development of—

(ii) infrastructure or structures with a physical footprint of 10 m<sup>2</sup> or more, where such development occurs—

(c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse



(f) In Western Cape:

i. Outside urban areas, in:

(ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans.

The proposed activity will include structures of more than 10m<sup>2</sup> within 32m of a watercourse within designated Critical Biodiversity Area and Ecological Support Areas, however, is situated within an urban area.

In terms of the EIA Listing Notices, listing notice 3, the proposed sewer pipeline activity triggers the need for a Basic Assessment process. This Terrestrial Biodiversity Assessment will primarily deal with the activities triggering listed activities 12 (LN 1) and 14 (LN 3) in terms of ecological and terrestrial biodiversity aspects.

Other potentially relevant legislation, which will be evaluated as required, includes the following:

- Liability for any environmental damage, pollution, or ecological degradation: Arising from all -related activities occurring inside or outside the area to which the permission/right/permit relates is the responsibility of the rights holder. The National Water Act and NEMA both oblige any person to take all reasonable measures to prevent pollution or degradation from occurring, continuing, or reoccurring (polluter pays principle). Where a person/company fails to take such measures, a relevant authority may direct specific measures to be taken and, failing that, may carry out such measures and recover costs from the person responsible.
- Public participation: Public consultation and participation processes prior to granting licences or authorisations can be an effective way of ensuring that the range of ways in which the activities impact on the environment, social and economic conditions are addressed, and considered when the administrative discretion to grant or refuse the licence is made.
- Constitution of Republic of South Africa (1996): Section 24(a) of the Constitution states that everyone has the right 'to an environment that is not harmful to their health or well-being'. Construction activities must comply with South African constitutional law by conducting their activities with due diligence and care for the rights of others.
- Western Cape Nature and Environmental Conservation Ordinance 19 of 1974: Lists Protected species, requiring permits for removal (Department of Economic Development, Environmental Affairs and Tourism).
- Water Use Authorisations: The National Water Act (No. 36 of 1998): Requires that provision is made both in terms of water quantity and quality for 'the reserve', namely, to meet the ecological requirements of freshwater systems and basic human needs of downstream communities. It is essential in preparing an EMP that any impacts on water resources be they surface water or groundwater resources, and/ or impacts on water quality or flow, are carefully assessed, and evaluated against both the reserve requirement and information on biodiversity priorities. This information will be required in applications for water use licenses or permits and/or in relation to waste disposal authorisations.
- Conservation of Agricultural Resources Act 43 of 1993: Lists Alien invasive species requiring removal.

## 2.2 Systematic Planning Frameworks

A screening of Systematic Planning Framework for the region has been undertaken (summarised in Table 1), that included the following features:

- National Environmental Screening Tool
- Critically Endangered, Endangered and Vulnerable Ecosystems
- Critical Biodiversity and Ecological Support Areas
- River and Wetland Freshwater Ecosystem Priority Areas (FEPAs) and buffers
- Protected Areas (and buffers) and National Protected Area Expansion Strategy areas (NPAES).

- Critical Habitat for listed endemic or protected species.

Table 1: Summary of Regional Planning Biodiversity features.

| FEATURE <sup>2</sup>                                             | DESCRIPTION                                                                                                                                                                         | IMPLICATIONS/COMMENT                                                                                                                                    |
|------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| National Environmental Screening Tool (Terrestrial Biodiversity) | Very High Terrestrial Biodiversity<br>Low, Medium & High Plant & Animal Species sensitivities<br>Very High Aquatic sensitivity                                                      | CBA 1 & 2, ESA 2, Critically Endangered ecosystem & SWSA<br>Several Plant & Animal Species flagged by the screening tool.<br><br>CBA 1, SWSA & Wetlands |
| National Vegetation Map (NVM, 2024)                              | Garden Route Granite Fynbos                                                                                                                                                         | Critically Endangered                                                                                                                                   |
| Critically Endangered and Endangered Ecosystems (NBA 2022)       | Garden Route Granite Fynbos                                                                                                                                                         | Assessment to determine risks.                                                                                                                          |
| Vulnerable Ecosystems (NBA)                                      | None                                                                                                                                                                                | N/A                                                                                                                                                     |
| Western Cape Biodiversity Spatial Plan (2023)                    | Critical Biodiversity Area 1 & 2                                                                                                                                                    | Assessment to determine risks.                                                                                                                          |
| Protected Areas (SAPAD, 2025)                                    | None                                                                                                                                                                                | N/A                                                                                                                                                     |
| Protected Areas (WC BSP, 2025)                                   | None                                                                                                                                                                                | N/A                                                                                                                                                     |
| NPAES (Draft 2018)                                               | None                                                                                                                                                                                | N/A                                                                                                                                                     |
| NPAES (2010)                                                     | None                                                                                                                                                                                | N/A                                                                                                                                                     |
| Strategic Water Source Areas (SWSA)                              | Outeniqua SWSA                                                                                                                                                                      | Impacts to site may have risks to downstream water sources. Refer to aquatic assessment.                                                                |
| Freshwater Ecosystem Priority Areas (FEPA's)                     | None                                                                                                                                                                                | Refer to aquatic assessment.                                                                                                                            |
| Regional Hotspots & Regions of Endemism                          | Cape Floristic Region Hotspot                                                                                                                                                       | Specific activity and site unlikely to pose any risk to broader biodiversity hotspot.                                                                   |
| Important Bird Areas (IBA's)                                     | None                                                                                                                                                                                | N/A                                                                                                                                                     |
| Key Biodiversity Areas (KBA's)                                   | None                                                                                                                                                                                | N/A                                                                                                                                                     |
| Marine/Coastal areas                                             | None                                                                                                                                                                                | N/A                                                                                                                                                     |
| RAMSAR sites                                                     | None                                                                                                                                                                                | N/A                                                                                                                                                     |
| Within 32 m of Watercourse                                       | Sewer will be within 32m of watercourses                                                                                                                                            | Refer also to aquatic assessment.                                                                                                                       |
| Within 100 m of River                                            | None.                                                                                                                                                                               | N/A                                                                                                                                                     |
| Estuary                                                          | None                                                                                                                                                                                | N/A                                                                                                                                                     |
| Within 500 m of Wetland                                          | Valley Bottom Wetlands are associated with the watercourses in the area.                                                                                                            | May have impacts to associated terrestrial flora and fauna. Refer to aquatic assessment.                                                                |
| Forest                                                           | None                                                                                                                                                                                | N/A                                                                                                                                                     |
| Surrounding Land Uses                                            | Surrounding land primarily used for urban dwellings.                                                                                                                                | Site and surrounding area are transformed and/or with scattered secondary vegetation elements.                                                          |
| Critical Habitat for listed endemic/ protected species           | No specific populations of threatened species were identified within the footprint, and the affected footprint is largely disturbed or comprised of secondary vegetation. There are |                                                                                                                                                         |

<sup>2</sup> Refer to Figure 8 to Figure 12.

| FEATURE <sup>2</sup> | DESCRIPTION                                                                                                                                                            | IMPLICATIONS/COMMENT |
|----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|
|                      | several red listed species in the surrounding area and vegetation units that are known to have limited distributions, however none were recorded within the footprint. |                      |

## 2.2.1 National Environmental Screening Tool

The DFFE Screening Tool indicates the following, summarised in Table 1:

- Terrestrial Biodiversity is Very High (Figure 4).
- Plant species sensitivity is Low & Moderate (Figure 5).
- Animal Species sensitivity is Moderate & High (Figure 6).
- Aquatic Sensitivity is Very High (Figure 7).

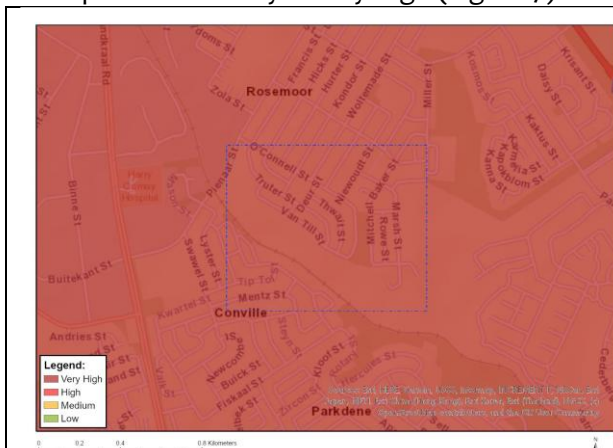


Figure 4: Terrestrial Biodiversity Sensitivity

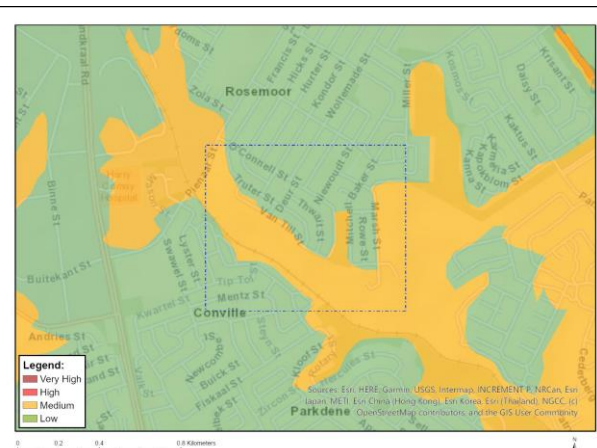


Figure 5: Plant Species Sensitivity

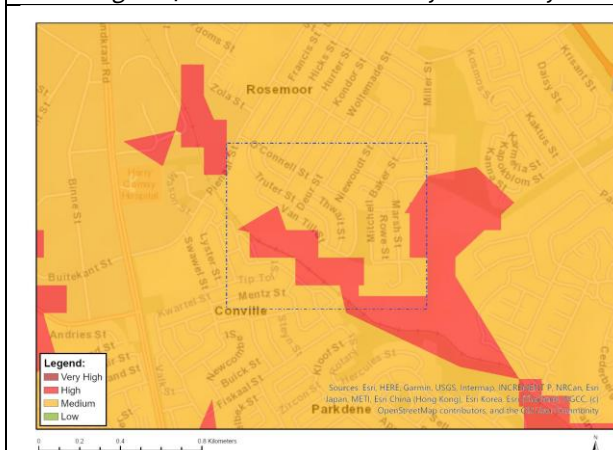


Figure 6: Animal Species Sensitivity

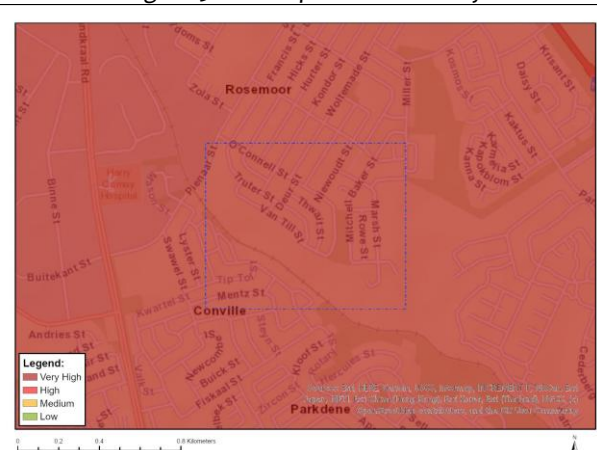


Figure 7: Aquatic Sensitivity

Table 2: Summary of Screening tool designations.

| Terrestrial Sensitivity | Feature(s) in proximity                                                                                       |
|-------------------------|---------------------------------------------------------------------------------------------------------------|
| Very High               | CBA 1: Terrestrial, CBA2: Terrestrial, SWSA (Outeniqua) & Garden Route Granite Fynbos (Critically Endangered) |
| High                    | None                                                                                                          |
| Medium                  | None                                                                                                          |
| Low                     | Present                                                                                                       |
| Plant Sensitivity       |                                                                                                               |
| Very High               | None                                                                                                          |
| High                    | None                                                                                                          |

|                            |                                                                                                                                           |
|----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| Medium                     | <i>Lampranthus pauciflorus</i> , <i>Leucospermum glabrum</i> , <i>Diosma passerinoides</i> , Sensitive species 1024, 1032, 800 & 500.     |
| Low                        | Present                                                                                                                                   |
| <b>Animal Sensitivity</b>  |                                                                                                                                           |
| Very High                  | None                                                                                                                                      |
| High                       | <i>Circus ranivorus</i> & <i>Bradypterus sylvaticus</i> (Birds)                                                                           |
| Medium                     | <i>Afrivalus knysnae</i> (Amphibian), <i>Chlorotalpa duthieae</i> , Sensitive species 8 (Mammal) & <i>Aneuryphymus montanus</i> (Insects) |
| Low                        | Present                                                                                                                                   |
| <b>Aquatic Sensitivity</b> |                                                                                                                                           |
| Very High                  | CBA: Wetland, SWSA (SW Outeniqua) & Wetlands (Unchanneled Valley-bottom)                                                                  |
| High                       | None                                                                                                                                      |
| Medium                     | None                                                                                                                                      |
| Low                        | None                                                                                                                                      |

**NOTE:** as per point 1.5 of the Terrestrial Biodiversity Specialist Assessment and Minimum Report Content Requirements:

*'If any part of the proposed development footprint falls within an area of 'very high' sensitivity, the assessment and reporting requirements prescribed for the 'very high' sensitivity apply to the entire footprint, excluding linear activities for which impacts on terrestrial biodiversity are temporary and the land in the opinion of the terrestrial biodiversity specialist, based on the mitigation and remedial measures, can be returned to the current state within two years of the completion of the construction phase, in which case a compliance statement applies. Development footprint in the context of this protocol means the area on which the proposed development will take place and includes any area that will be disturbed.'* The terrestrial biodiversity sensitivity for such features is thus deemed low.

This site assessment will physically screen for the presence of the listed, and other possible species or sensitivities that are not identified in the screening tool. Not all features are directly affected, but being in proximity, the risks associated with the activity will be investigated further and addressed in the report.

## 2.2.2 Vegetation of Southern Africa

The National Vegetation Type (NBA, 2018, Figure 8) indicated for the site and surrounding area are Garden Route Granite Fynbos, having a *Critically Endangered* status, as per National Biodiversity Red Listed Ecosystems Assessment (NBA/RLE, 2022).

### Garden Route Granite Fynbos (FFg 5)

VT 46 Coastal Renosterbosveld (70%) (Acoks 1953). South Coast Renosterveld (22%) (Moll & Bossi 1983). LR 2 Afromontane Forest (67%) (Low & Rebelo 1996). BHU 100 Knysna Afromontane Forest (64%), BHU 28 Blanco Fynbos/Renosterveld Mosaic (36%) (Cowling et al. 1999b, Cowling & Hejnis 2001).

**Distribution:** Western Cape Province: Garden Route. Three main blocks south of the Outeniqua Mountains on the coastal plain from Botterberg west of Brandwaghoogte (south of Robinson Pass) to Groot Brak River; the largest block from Groot Brak River to Woodfield near the Wilderness (with a few strips along the coast from Bothastrand to the Wilderness); lastly, north of the lakes from Woodville to Hoogekraal Pass, west of Karatara.

**Altitude:** 0–300 m.

**Vegetation & Landscape Features:** Moderately undulating plains and undulating hills on the coastal forelands. Dense proteoid and ericoid shrubby grassland. Proteoid and graminoid fynbos are dominant with ericaceous fynbos in seeps. In the west, most remnants of this type are dominated by proteas. Eastwards graminoid and ericaceous fynbos are dominant on the flat plateaus, with proteas confined to the steep slopes.



**Geology & Soils:** George Batholith of the Cape Granite Suite. Deep, prismacutanic- and pedocutanic-dominated soils typical of Db land types (mainly).

**Climate:** MAP 350–880 mm (mean: 600 mm), with a slight low in early winter. Mean daily maximum and minimum temperatures 27.8°C and 6.8°C for January–February and July, respectively. Frost incidence 2 or 3 days per year.

**Important Taxa:** Tall Shrubs: *Passerina corymbosa* (d), *Cliffortia serpyllifolia*, *Protea coronata*, *P. lanceolata*, *P. neriifolia*. Low Shrubs: *Erica discolor* variant ‘speciosa’ (d), *E. peltata* (d), *Phyllica confusa* (d), *Syncarpha paniculata* (d), *Agathosma ovata*, *Anthospermum prostratum*, *Aspalathus asparagoides*, *Cliffortia falcata*, *Cullumia bisulca*, *Erica canaliculata*, *E. diaphana*, *E. formosa*, *Eriocephalus africanus*, *Hermannia angularis*, *Leucadendron salignum*, *Lobelia tomentosa*, *Metalasia pungens*, *Mimetes cucullatus*, *Pelargonium fruticosum*, *Relhania calycina*. Succulent Shrub: *Lampranthus sociorum*. Semiparasitic Shrubs: *Osyris compressa*, *Thesium virgatum*. Semiparasitic Epiphytic Shrub: *Viscum capense*. Geophytic Herb: *Schizaea pectinata*. Graminoids: *Tetraria cuspidata* (d), *Brachiaria serrata*, *Eragrostis capensis*, *Ficinia nigrescens*, *Heteropogon contortus*, *Pentaschistis eriostoma*, *Restio triticeus*, *Themeda triandra*.

**Conservation:** Critically Endangered (2022). Target 23%. Only about 1% conserved in the proposed Garden Route National Park. About 70% has been transformed for, cultivation (56%), pine plantations (7%) and by urban development (6%). Remnants are largely confined to isolated pockets on steeper slopes.

**Erosion:** Moderate and High. Very few patches of this type remain in a pristine condition as most of it has been converted to pasture by liming, bush-cutting and frequent burning, and augmented with pasture grasses. Western remnants suggest that proteoid fynbos might have been dominant historically. It is easily converted to graminoid fynbos by regular fires and augmentation with pasture grasses.

**References:** Drews (1980b), Hoare et al. (2000).

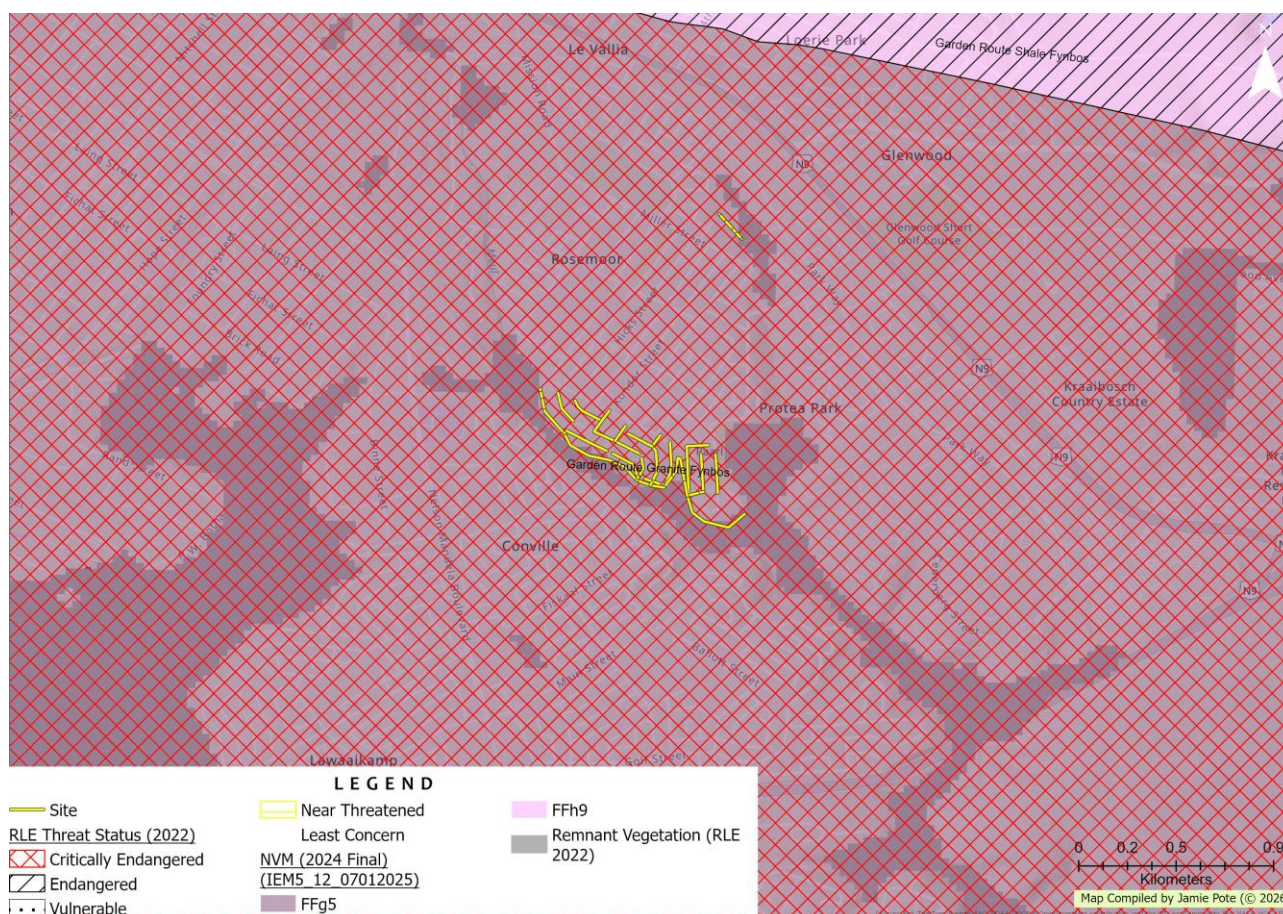


Figure 8: National Biodiversity Assessment Vegetation Type and Conservation Status (NBA, 2018). Darker shaded areas indicative of remnant vegetation.



### 2.2.3 Western Cape Biodiversity Spatial Plan (WCBSP, 2023) – Terrestrial

The Western Cape Biodiversity Spatial Plan (2023, Figure 9) indicates that most of the proposed Sewer pipeline footprints fall within transformed roads and road reserves, with predominantly the 250mm & 400 mm lines within areas designated CBA 1 & 2 and ESA 2, which are associated with the watercourses and surrounding vegetation that are undeveloped within the urban area.

The Biodiversity Spatial Plan indicates areas of land as well as aquatic features which must to be safeguarded in their natural state if biodiversity is to persist and ecosystems are to continue functioning. Land in this category is referred to as a Critical Biodiversity Area. CBAs incorporate:

- I. areas that need to be safeguarded in order to meet national biodiversity thresholds.
- II. areas required to ensure the continued existence and functioning of species and ecosystems, including the delivery of ecosystem services; and/or
- III. important locations for biodiversity features or rare species.

Ecological Support Areas (ESAs) are supporting zones required to prevent the degradation of Critical Biodiversity Areas and Protected Areas. An ESA may be an ecological process area that connects and therefore sustains Critical Biodiversity Areas or a terrestrial feature. None are present with the site or immediate vicinity. Defining criteria and recommended activities are summarised in Table 3 below.

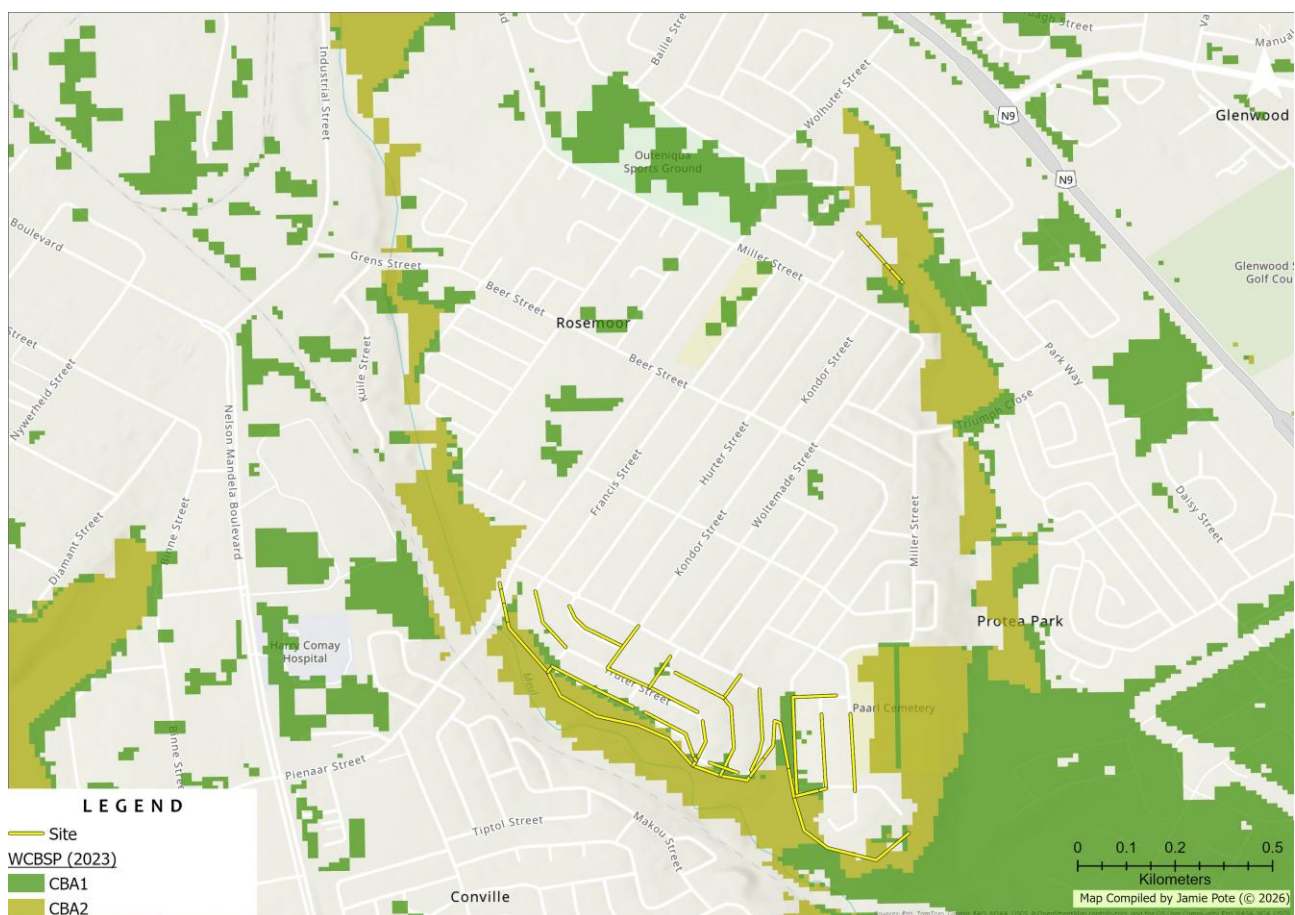


Figure 9: Western Cape Biodiversity Spatial Plan (WCBSP, 2023) – The site does overlap with some designated CBA 1, CBA 2 and ESA 2 areas.

Table 3: Criteria defining Critical Biodiversity Areas (Source: WC BSP, 2023)

| CBA MAP CATEGORY:                | DEFINING CRITERIA                                                                      |
|----------------------------------|----------------------------------------------------------------------------------------|
| Protected Areas<br>(Not Present) | Areas that are proclaimed as protected areas under national or provincial legislation. |

| CBA MAP CATEGORY:                                   | DEFINING CRITERIA                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|-----------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                     | Must be kept in a natural state, with a management plan focused on maintaining or improving the state of biodiversity. A benchmark for biodiversity.                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Critical Biodiversity Areas 1 (CBA)<br>(Present)    | Areas in a natural condition that are required to meet biodiversity targets, for species, ecosystems or ecological processes and infrastructure.<br>Maintain in a natural or near natural state, with no further loss of habitat. Degraded areas should be rehabilitated. Only low-impact, biodiversity-sensitive land uses are appropriate.                                                                                                                                                                                                                                  |
| Critical Biodiversity Areas 1 (CBA 2)<br>(Present)  | Areas in a degraded or secondary condition that are required to meet biodiversity targets, for species, ecosystems or ecological processes and infrastructure.<br>Maintain in a functional, natural, or near-natural state, with no further loss of natural habitat. These areas should be rehabilitated.                                                                                                                                                                                                                                                                     |
| Ecological Support Areas 1 (ESA 1)<br>(Not Present) | Areas that are not essential for meeting biodiversity targets, but that play an important role in supporting the functioning of PA's or CBA's and are often vital for delivering ecosystem services.<br>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 Areas 2 (ESA 2)<br>(Not Present) | Areas that are not essential for meeting biodiversity targets, but that play an important role in supporting the functioning of PA's or CBA's and are often vital for delivering ecosystem services.<br>Restore and/or manage to minimise impact on ecological infrastructure functioning; especially soil and water-related services.                                                                                                                                                                                                                                        |
| Other Natural Areas (ONA)<br>(Present)              | Areas that have not been identified as a priority in the current systematic biodiversity plan but retain most of their natural character and perform a range of biodiversity and ecological infrastructure functions. Although they have not been prioritised for biodiversity, they are still an important part of the natural ecosystem.<br>Minimise 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. |
| No Natural Area Remaining (NNAR)<br>(Present)       | Areas that have been modified by human activity to the extent that they are no longer natural, and do not contribute to biodiversity targets. These areas may still provide limited biodiversity and ecological infrastructure functions, even if they are never prioritised for conservation action.<br>Manage in a biodiversity-sensitive manner, aiming to maximise ecological functionality. Offers the most flexibility regarding potential land uses, but some authorisation may still be required for high impact land uses.                                           |

## 2.2.4 Protected areas

The South Africa Protected Areas Database (SAPAD) database, a comprehensive database of various protected area categories, is updated on a quarterly basis, and provides a comprehensive source of all national and private nature reserves, world heritage sites and other formal legally protected conservation areas situated within South Africa (Figure 10).

When projects are located in legally protected and internationally recognized areas, clients should ensure that project activities are consistent with any national land use, resource use, and management criteria (including Protected Area Management Plans, National Biodiversity Strategy and Action Plans (NBSAP's), or similar documents).

The proposed site does not overlap with any SAPAD designated Protected Areas and is unlikely to have any impacts of significance to any species or processes associated with any nearby Protected Areas. Nearest Protected Areas within 10 km of the site include Blydskap Private Nature Reserve (4.6 km SE), Cape Floral Kingdom Protected Areas (4.6 km NW), Garden Route National Park (4.2 km NE), George



Private Nature Reserve (3.8 km SE), Katrivier Nature Reserve (1.6 km N), Van Kervel Nature Reserve (2.6 km NW), Kwelanga Private Nature Reserve (6.4 km S), Kleinbaai Private Nature Reserve (6 km SE), Kaaimans River Gorge Private Nature Reserve (5.7 km NE). The watercourses associated with the proposed sewer infrastructure are subsidiaries of the Meul River, which flows in a southerly direction and passes along the southern boundary of the George Private Nature Reserve.

The site is not within or in proximity to any designated NPAES areas, where any impacts may arise.

Activities that improve water quality, due to reduction in leaks and discharge by increasing capacity, are likely to have a positive indirect impact in the downstream areas including protected areas.

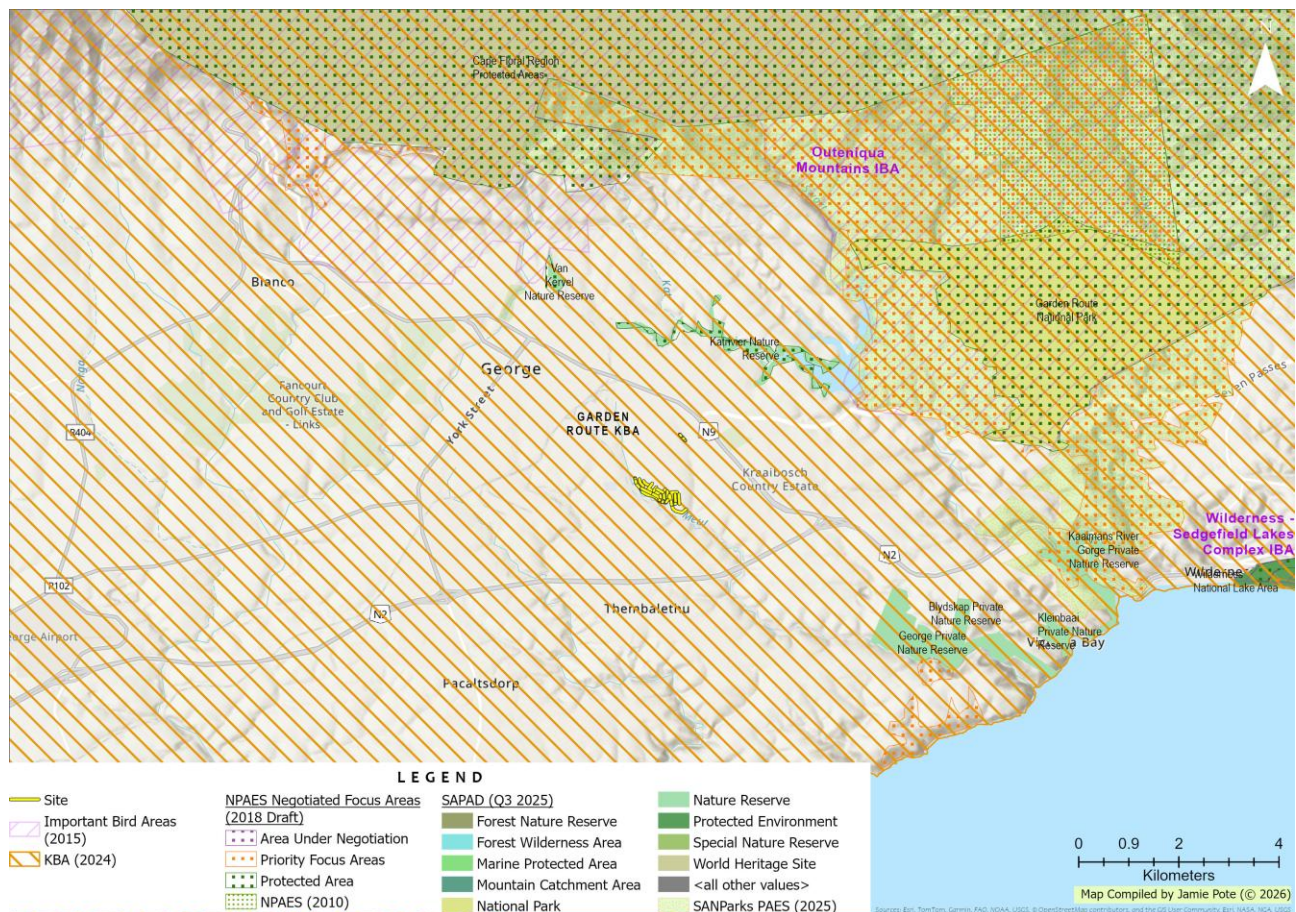


Figure 10: Protected Areas.

### 2.2.5 Key Biodiversity Areas

The site is situated within the Garden Route KBA, which covers an extensive area within the eastern and western Cape provinces. Subsequently, while 132 potential triggers (habitat and species) are flagged within the KBA, most are localised and thus only applicable to a small area within the boundary of the designated KBA area which includes terrestrial, marine, freshwater habitat and species. The specific triggers that are relevant to this site are addressed in the respective sections pertaining to the vegetation unit and species of conservation concern.

### 2.2.6 Important Bird Areas

The site is not situated within or near any designated Important Bird Area (Figure 10). The nearest IBA is the Outeniqua mountains IBA situated just over 3 km to the north and east. While the surrounding area

may have transient bird species visitors that are associated with the IBA, it is unlikely that the specific activity, within an urban and significantly transformed and degraded area is likely to have any impact of significance to such occurrences.

### 2.2.7 Garden Route Biodiversity Sector Plan (2010)

The Garden Route BSP (GRBSP, 2007, Figure 11) identified the vegetation as being **Grassy Fynbos** (associated with the slopes) and **Rivers & Floodplain** (associated with the watercourses). The Garden Route BSP further indicates that portions of the site partially intersect with designated Critical Biodiversity Area along the watercourses and possibly representing historically intact or remnant vegetation. The Garden Route BSP is largely integrated with and/or superseded by the Western Cape BSP and National Vegetation Map, which is also updated to represent changing land use, but indicates that the later plans are broadly aligned with the earlier GRBSP.



Figure 11: Garden Route Biodiversity Sector Plan (2007) vegetation designation and CBA/ESA status.

### 2.2.8 Rivers, Watercourses and Wetlands

The site is situated within along roads within an urban area, on slopes that drain into the adjacent slightly incised watercourses. The slopes directly adjacent to the watercourses are generally undeveloped and have vegetation cover, although mostly secondary with grasses, weeds and other pioneer annual species. The condition and status of the vegetation cover, including riparian vegetation, is included in the vegetation description section below. The non-perennial watercourses associated with the Rosemoor area drain in a southerly direction into the Meul River, which flows southwards to the coast.



Wetlands potentially comprise Valley bottom wetlands that are associated with the local watercourses. Aquatic assessment is outside the scope of this assessment but will consider aspects that relate to terrestrial processes and species.

Upgrading of sewer infrastructure implemented correctly is likely to reduce leakages along riverbanks and ease discharge of effluent into the watercourse. Within the urban context, wetlands in the vicinity of the site may be subject to effluent discharge due to inadequate sewer infrastructure and are likely already modified and/or affected by sewerage discharge from leaks and are thus unlikely to be affected above baseline levels.

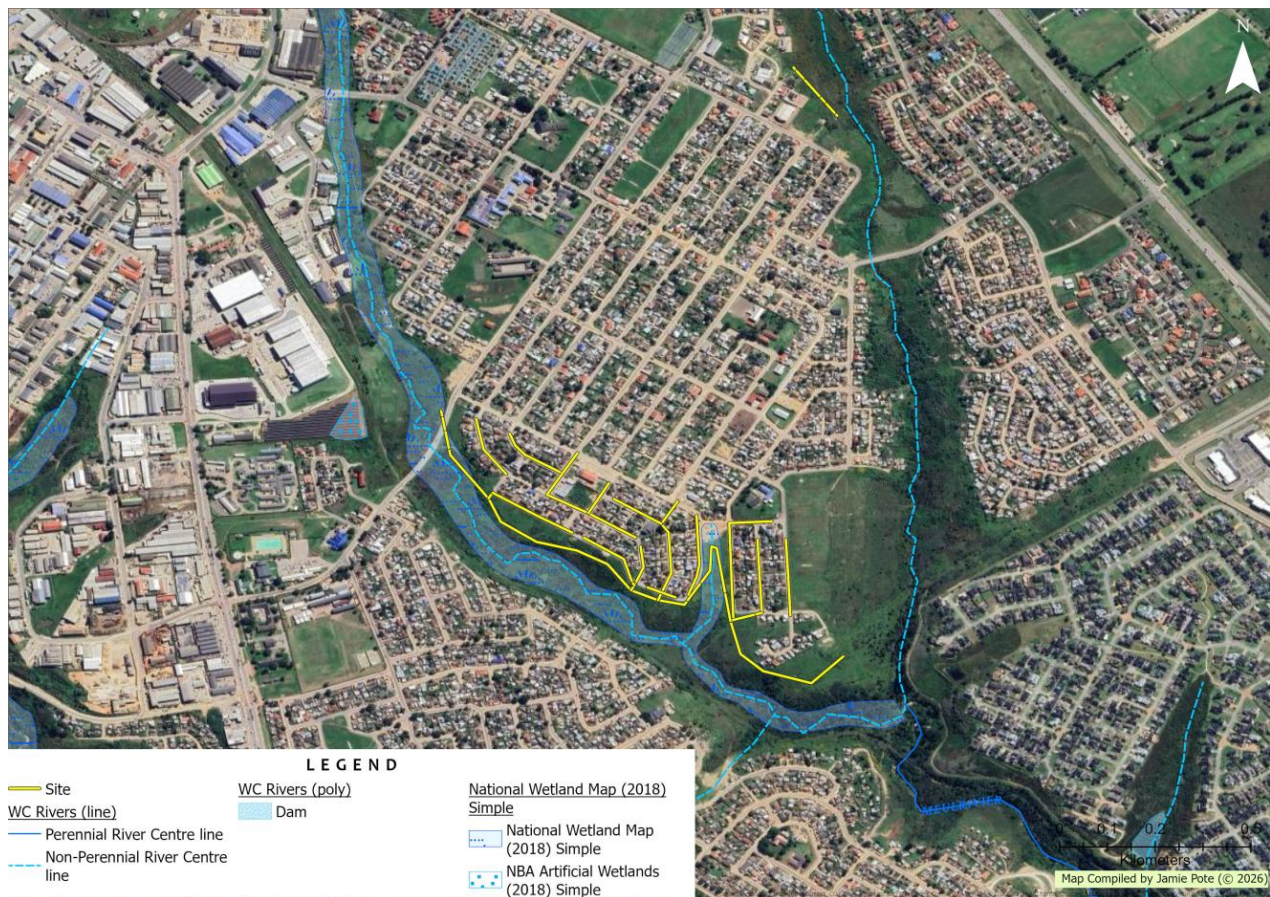


Figure 12: Rivers. Wetlands and Estuaries associated with the site.

### 3 Biodiversity Risk Identification and Assessment

#### 3.1 Baseline Biodiversity Description

The site is located within a transformed developed urban area on slopes adjacent to somewhat incised watercourses, draining in a southerly direction. The only remaining vegetation cover is comprised of a narrow band of vegetation along the banks of the watercourses, as well as some grassed and landscaped gardens within the suburbs (Figure 15 to Figure 30).

The site is comprised predominantly of transformed areas which include the dwellings, surfaced roads, sidewalks and landscaped gardens (Figure 33). The areas having 'natural' vegetation cover are generally confined to the undeveloped areas surrounding the watercourse which runs west to east on the south



side of the project area. The proposed sewer infrastructure is generally located within these areas, where leaks due to inadequate infrastructure can discharging into the watercourses.

Several different main habitats can be differentiated within the vegetated area:

1. Transformed: Includes hardened surfaces such as paved roads, sidewalks, landscaped gardens and grassed areas including parks and road verges (Figure 15 to Figure 18). Comprises almost the entire 160mm & 315 mm sewer pipeline component.
2. Degraded Riverine: Historically would have contained riparian and riverine elements associated with the watercourse, but significantly degraded 'natural' vegetation composed predominantly of kikuyu grass, ruderal weeds, garden escapees, as well as occasional pioneer shrubs, herbs, grasses and some remnant small trees (Figure 19 to Figure 28).
3. Secondary (Grassy): Portion of sewer on eastern side, was likely historically Garden Route Granite Fynbos, but was at some stage transformed to what appears to have been for cultivation use. Vegetation is currently a secondary grassy vegetation.
4. Watercourse: Watercourses are significantly degraded (Figure 29 to Figure 30) and modified. Only a small crossing on the east side is required and it significantly modified at crossing point and also has an existing sewer present.

Figure 15 to Figure 30 provide a general overview of the site.

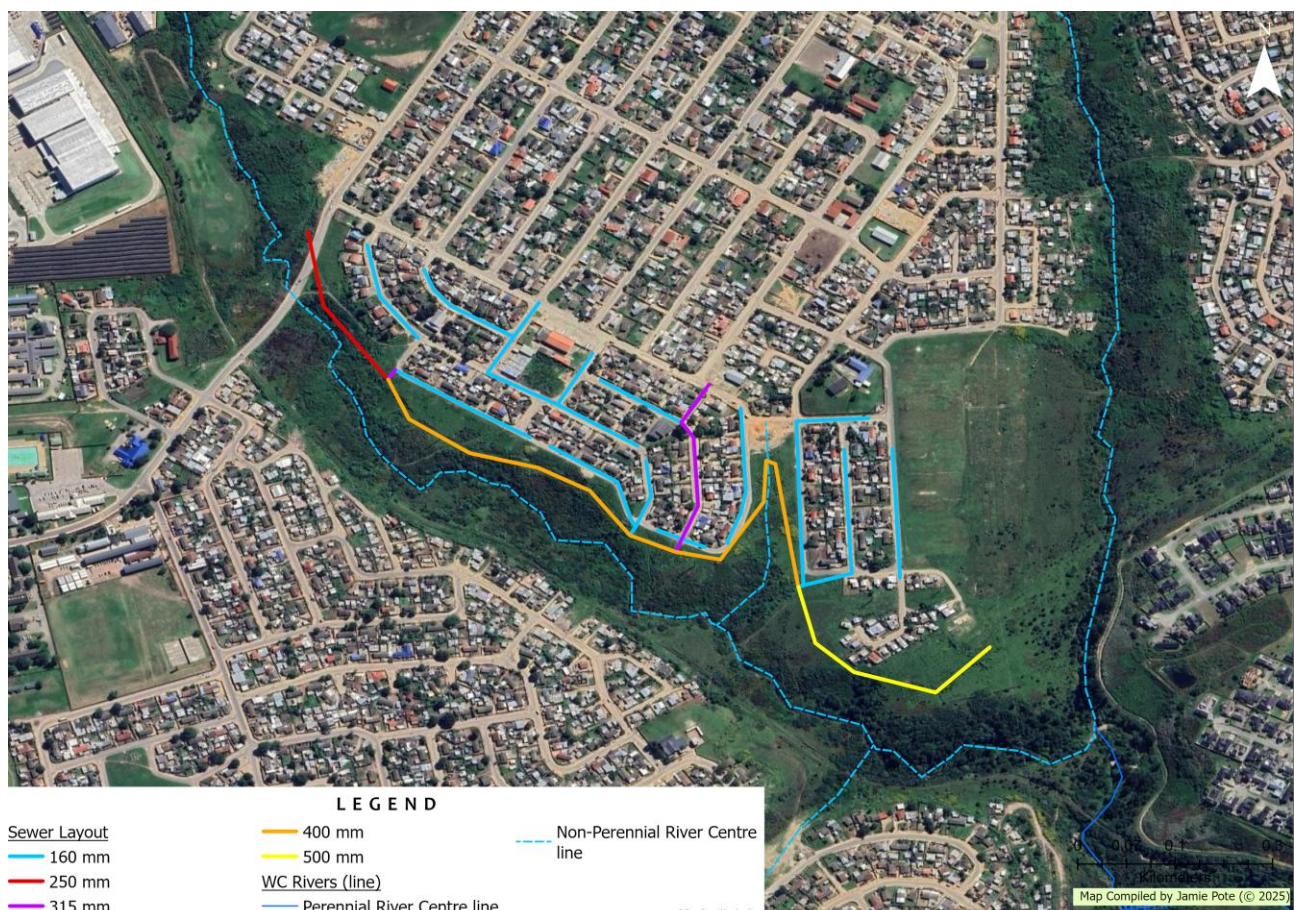


Figure 13: Aerial photo of the site.





Figure 14: Aerial photo of the site (additional northern section).

### Transformed

Transformed areas (Figure 15 to Figure 18) are comprised of hardened surfaces within the inhabited area and includes paved roads, sidewalks, landscaped gardens (not affected) and road verges. No indigenous terrestrial vegetation is present in these areas, other than planted trees on sidewalks and road verges that include predominantly exotic species and some gardens around the adjacent dwelling. Any small, vegetated areas that are present, generally comprised of Kikuyu grass (*Cenchrus clandestinus*, previously *Pennisetum clandestinum*) and Kweek (*Cynodon dactylon*) as well as several creeping ruderal weeds such as *Arctotheca prostrata* (Prostrate Cape Milkweed). More often than not, any unsurfaced areas are comprised of bare soils as a result of human, animal and vehicular traffic compaction.



Figure 15: Typical urban street.

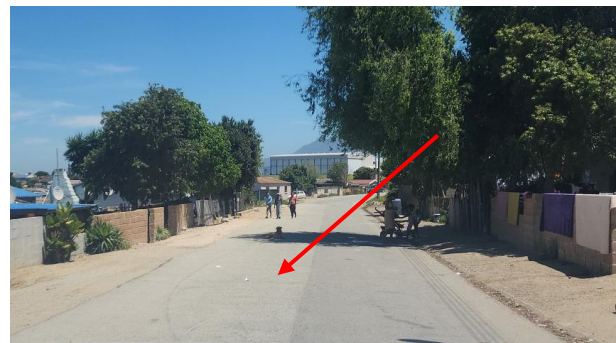


Figure 16: Typical urban street.





Figure 17: Typical urban street.



Figure 18: Typical urban street.

### Vegetated Areas

Vegetated areas (Figure 19 to Figure 28) along the slopes adjacent to watercourses are significantly disturbed and vegetation cover is comprised primarily of exotic Kikuyu grass (*Cenchrus clandestinus*, previously *Pennisetum clandestinum*) and *Senecio angulatus* (Cape Ivy) as groundcovers, with a range of ruderal and invasive weed species including herbs and shrubs *Ricinus communis* (Castor Oil plant), Bugweed (*Solanum mauritianum*), *Canna indica*, Inkberry (*Cestrum laevigatum*), *Lantana camara*, *Nidorella ivifolia*, *Amaranthus* spp. (Amaranth), *Verbena bonariensis*, *Iris pseudacorus*, *Cirsium vulgare* (Thistle), *Senna didymobotrya* (Peanut-Butter Cassia), *Phytolacca octandra* (Inkweed), *Urtica urens* (Nettle) and *Vinca major* (Periwinkle) and *Rubus* sp. (Bramble). Common trees include *Sambucus nigra* (European Black Elderberry) and *Acacia mearnsii* (Black Wattle), as well as *Leptospermum scoparium* (Broom tree), *Sesbania punicea* (Sesbania), *Acacia melanoxylon* (Blackwood), and *Melia azedarach* (Syringa). Clumps of *Cortaderia selloana* (Pampas Grass) is also common along the water courses. A wide range of garden escapees are also present, likely coming from dumped garden waste, or the nearby gardens mostly non-indigenous species (Delicious Monster).

Remnant indigenous elements include *Arctotheca prostrata* (Prostrate Cape Milkweed), *Carpobrotus deliciosus* (Sourfig), Wild Dagga (*Leonotis leonurus*), Arum lily (*Zantedeschia aethiopica*), *Senecio angulatus* and *Searsia rehmanniana*. While *Senecio angulatus* is an indigenous species, it can become invasive in disturbed areas and the creeping vine-like growth from allows it to effectively smother other vegetation.

The percentage of natural vegetation within this habitat is likely between 5 and 10 % comprising a few scattered elements. The vegetation present is not representative of the Critically Endangered Garden Route Granite Fynbos.



Figure 19: Typical vegetated watercourse bank (Kikuyu).

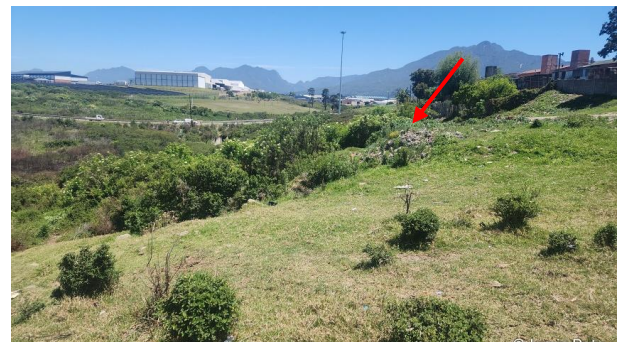


Figure 20: Typical vegetated watercourse bank (Kikuyu).





Figure 21: Typical vegetated watercourse bank (Kikuyu).



Figure 22: Typical vegetated watercourse bank (Kikuyu).



Figure 23: Typical vegetated area (Kikuyu).



Figure 24: Typical vegetated area (Kikuyu).



Figure 25: Typical vegetated area (Kikuyu).



Figure 26: Typical vegetated area (Cape Ivy).



Figure 27: Typical vegetated area (Kikuyu & weeds).



Figure 28: Typical vegetated area (Kikuyu & weeds).

### Watercourses

Watercourses (Figure 29 to Figure 30) are significantly disturbed and/or modified with vegetation also comprised predominantly of exotic and invasive species. Cover is primarily also exotic Kikuyu grass (*Cenchrus clandestinus*, previously *Pennisetum clandestinum*) and *Senecio angulatus* (Cape Ivy), as well as *Cortaderia selloana* (Pampas Grass) and *Sambucus nigra* (European Black Elderberry) trees and the reed



*Arundo donax* (Giant Reed). Riparian vegetation is not easily distinguished from surrounding vegetation due to the proliferation of weeds that are common to both habitats.

Remnant indigenous elements are occasional and include the odd tuft of Arum lily (*Zantedeschia aethiopica*), clumps of *Typha capensis* (Bulrushes), occasional indigenous reeds (*Phragmites australis*) and occasional tufts of remnant sedges, including *Juncus effusus*, *Cyperus polystachyos* and *Cyperus textilis*.



Figure 29: Watercourse at crossing point.



Figure 30: Watercourse at crossing point.

### Secondary (Grassy)

Secondary (Grassy) vegetation is present along a portion of the eastern end of the sewer (Figure 15 to Figure 18), where the sewer exits the watercourse area onto a small ridge outside of what would have been riverine vegetation. The section was likely the only portion of the route that would have historically had Garden Route Granite Fynbos vegetation. However, it is now comprised of secondary grassy vegetation and was likely cultivated in the past (pre-2003) and was possibly originally part of a garden or small holding. No indigenous terrestrial vegetation representative of Garden Route Granite Fynbos is present. Grassy vegetation is comprised of Kikuyu grass (*Cenchrus clandestinus*, previously *Pennisetum clandestinum*), Kweek (*Cynodon dactylon*) and Weeping lovegrass (*Eragrostis curvula*).



Figure 31: Secondary (Grassy) vegetation.



Figure 32: Secondary (Grassy) vegetation.

The proposed development is unlikely to have any significant impact on any 'intact' or natural indigenous vegetation of any significant ecological value.



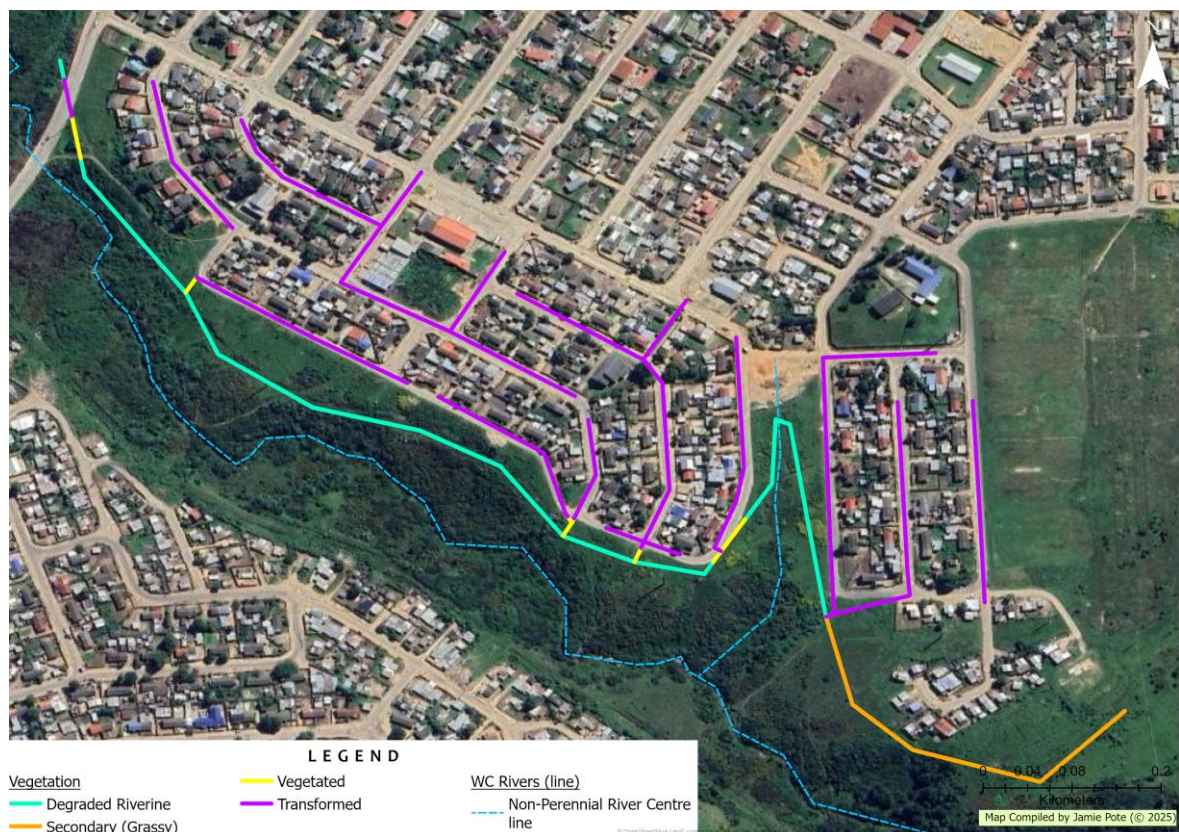


Figure 33: Mapped vegetation of the site (Overview).



Figure 34: Mapped vegetation of the site (Overview) – additional northern section.



### 3.1.1 Present Ecological State

In summary, the following general observations can be noted regarding the site:

- The area in and around the site is completely transformed and or degraded as a result of urban development and associated processes including dumping of refuse and garden waste and other pollution sources, with the occasional remnant scattered indigenous species. No elements of species typical to Garden Route Granite Fynbos were observed within vegetated areas along the watercourses
- Alien invasion and weeds are high to very high, comprising most of the vegetation along the watercourses and surrounding vegetated areas.
- Ecological processes are thus primarily significantly modified within the sewer servitude, as natural and indigenous vegetation elements are largely absent from within the site.
- Fauna species include mainly species typical of urbanised and transformed areas, perhaps having the occasional visit from less common species that typically occur in natural areas that are in transit through urban area or are acclimated to the urbanised environment.

### 3.1.2 Vegetation and Ecological Processes and Corridors

Landscapes corridors are a combination of Critical Biodiversity Areas (areas required to meet conservation targets) and Ecological Support Areas that link habitats, as well as linking inland mountains to the coastline (and therefore beyond municipal boundaries). Rivers and their associated riparian or riverbank habitats often provide the basis for many of these large-scale (landscape level) ecological processes.

Critical Biodiversity Areas (CBA) are generally regarded as being critical for meeting conservation objectives for vegetation units in an optimal manner. Where a vegetation unit is not under threat (i.e. Least Concern status), there is some flexibility, its alternatives; however, as conservation status increases (a vegetation unit is under threat due to high levels of transformation), alternative options to meet conservation targets are significantly reduced. CBA 1 areas are generally natural or near natural, whereas CBA 2 are degraded and/or transformed areas where restoration would be required and/or recommended.

Ecological Support Areas (ESA) are supporting zones or areas which must be safeguarded as they are needed to prevent degradation of Critical Biodiversity Areas and formal Protected Areas. Although many ESA's consist of natural veld, there are areas of land - partially or wholly transformed or degraded - that have been classified as ESA even though they are no longer in a natural state. Although these areas are heavily degraded or transformed, they still play an important role in supporting ecological processes. This is particularly the case with riparian areas, some key catchment areas, and key pieces of corridors. ESA 1 areas are generally natural or near natural, whereas ESA 2 are degraded and/or transformed areas where restoration would be required and/or recommended. An ESA that is vegetated but not natural or near natural can still serve to retain some connectivity and support ecological processes, but in a significantly reduced manner. For example, trees in an apple orchard will provide perches for some birds and grassy groundcover will still allow for movement of some small animals such as rodents and reptiles. Certain species are significantly more at risk, as they may not be able to adapt to a modified environment, whereas others may not be affected.

While the site falls within a broader important ecologically connected area along the watercourses, the specific site is significantly transformed and surrounded by developed erven and paved roads. Remnant vegetation along watercourse is significantly degraded and transformed and thus provides limited

'natural' ecological value in its current state. It will serve limited connectivity support but does not and is not likely to support any substantial populations of at-risk species of conservation concern that are not adaptable to modified environments, nor provide ecological services and processes typically associated with the Critically Endangered Garden Route Granite Fynbos that occurs in the broader area. The watercourse corridors will however serve as broad level artificial habitat corridors for general movement faunal species around the broader area, but since no flora species typical of the unit are present, flora related ecological processes (such as pollination and seed dispersal) would be absent. The proposed activity, having a negligible footprint within significantly modified habitat, is thus unlikely to significantly impact or disturb these processes nor likely to alter current species composition from current baseline levels, as it will be a temporary activity and will likely return to a pre-construction state within two years.

### 3.1.3 Flora & Fauna

No endemic and range restricted species were recorded to be present. Several species are known from the surrounding area, but unlikely to be affected by the proposed activity. The proposed activity, having a negligible footprint within significantly modified habitat, is thus unlikely to significantly impact any species population or current species composition from current baseline levels, as it will be a temporary activity and will likely return to a pre-construction state within two years.

#### Red Listed, Endemic and Protected Flora

The site falls within the general distribution range of several endemic species and other species with a highly localised distribution, some of which are Critically Endangered, Endangered, Vulnerable or Rare. Some of these species are also only from a single or a few populations.

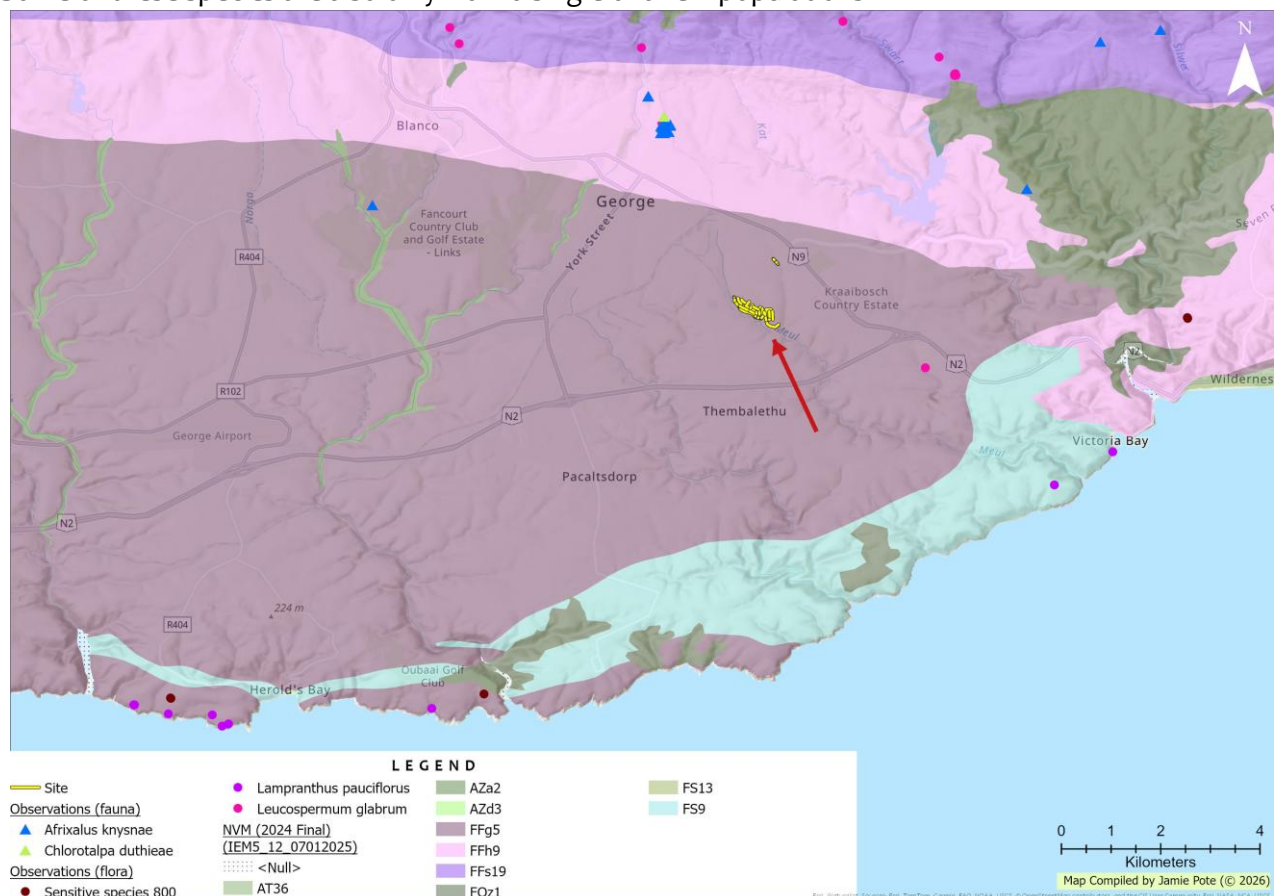


Figure 35: Distribution records of flora and fauna Species of Conservation Concern (GBIF, 26 July 2024) with known records in the vicinity of the site. NOTE some distribution records may have an offset for biosecurity purposes and/or accuracy errors but will non the less give an indication of general locality.



Table 4: Flora Species of Special Concern

| SCIENTIFIC NAME                | STATUS <sup>3</sup> | COMMENT/PRESENCE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|--------------------------------|---------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Diosma passerinoides</i>    | NEST (M), Vu        | Total population size estimated to be <5 000 mature individuals, based on records of 18 out of 25 subpopulations where species is indicated to be rare, uncommon, or only a few plants present, and with survey data of seven subpopulations indicating that the largest subpopulation consists of no more than 500 mature individuals. These populations are declining due to a number of different threats such as invasive alien plants, habitat degradation in the form grazing and habitat loss due to protea cultivation. Not recorded on site and no known localities in close proximity that suggest high likelihood of a local occurrence.                                                  |
| <i>Lampranthus pauciflorus</i> | NEST (M), En        | EOO 1270 km <sup>2</sup> , four known locations remain after most of this species' habitat has been transformed for coastal development. Habitat loss continues, especially around Plettenberg Bay, Mossel Bay and Knysna. Not recorded on site and no known localities in close proximity that suggest high likelihood of a local occurrence.                                                                                                                                                                                                                                                                                                                                                       |
| <i>Leucospermum glabrum</i>    | NEST (M), En        | Somewhat widespread distribution including a population in the northern areas of George. A restricted endemic with an extent of occurrence (EOO) ranging between 1620 and 1642 km <sup>2</sup> , and an area of occupancy (AOO) of between 152 and 156 km <sup>2</sup> . This species occurs as scattered small subpopulations with the total population not exceeding 2500 mature individuals, and each subpopulation having fewer than 250 plants. The mountains where this species occurs have been extensively surveyed. Road verges and significantly disturbed watercourses do not provide suitable habitat for this species. Not recorded on site, which is not typical of preferred habitat. |
| Sensitive species 1024         | NEST (M), En        | A range-restricted and very rare species known from four small, severely fragmented subpopulations. It has an extent of occurrence (EOO) of 971 km <sup>2</sup> . The population consists of 2 500 mature individuals, and the largest subpopulation has less than 200 plants. Not recorded on site and no known localities in close proximity that suggest high likelihood of a local occurrence.                                                                                                                                                                                                                                                                                                   |
| Sensitive species 1032         | NEST (M), Vu        | Somewhat widespread distribution including a population in the northern areas of George. Not recorded on site but found in surrounding area. Road verges and significantly disturbed watercourses do not provide suitable habitat for this species.                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Sensitive species 500          | NEST (M), En        | Somewhat widespread distribution. Not recorded on site and no known localities in close proximity that suggest high likelihood of a local occurrence.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Sensitive species 800          | NEST (M), Vu        | Formerly a very common species, now remaining mostly as small, isolated subpopulations on fragments of natural vegetation within its lowland distribution range. Not recorded on site and no known localities in close proximity that suggest high likelihood of a local occurrence.                                                                                                                                                                                                                                                                                                                                                                                                                 |

As per Table 4, no Endangered or Critically Endangered flora species were confirmed to be present nor are known to be present in the affected area. Most likely species that do occur in the broader surrounding area include *Leucospermum glabrum* & Sensitive species 1032, however none were observed on the site. The species *Diosma passerinoides*, *Lampranthus pauciflorus*, *Sensitive species 1024*, *Sensitive species 500* & *Sensitive species 800* have records in a much broader area and no records indicate a local presence.

Site observations also confirmed none being present, also confirmed to not be the typical habitat for several of the species, hence the footprint does not provide suitable habitat for these species.

<sup>3</sup> PNCO - Provincial Nature Conservation Ordinance (1974); NFA - National Forests Act of (1998); ToPS – Threatened or Protected Species; IUCN: CR - Critically Endangered, En - Endangered, Vu - Vulnerable; LC - Least Concern.

### Red Listed and Protected Fauna

As per Table 5, no Endangered or Critically fauna species were found to be present nor are known to be present in close proximity to the affected area or are likely to be directly affected by the proposed activity. The site falls within the general distribution range of a single faunal SCC as indicated in Table 5 below, however none are confirmed to be present. Since the project footprint is relatively small, is situated directly adjacent to urban and disturbed areas and also surrounded by extensive outlying areas of natural habitat, any disturbance or displacement associated with increased activity or habitat destruction as a direct result of the activity is unlikely to pose a significant negative impact faunal species and in particular the species of special concern.

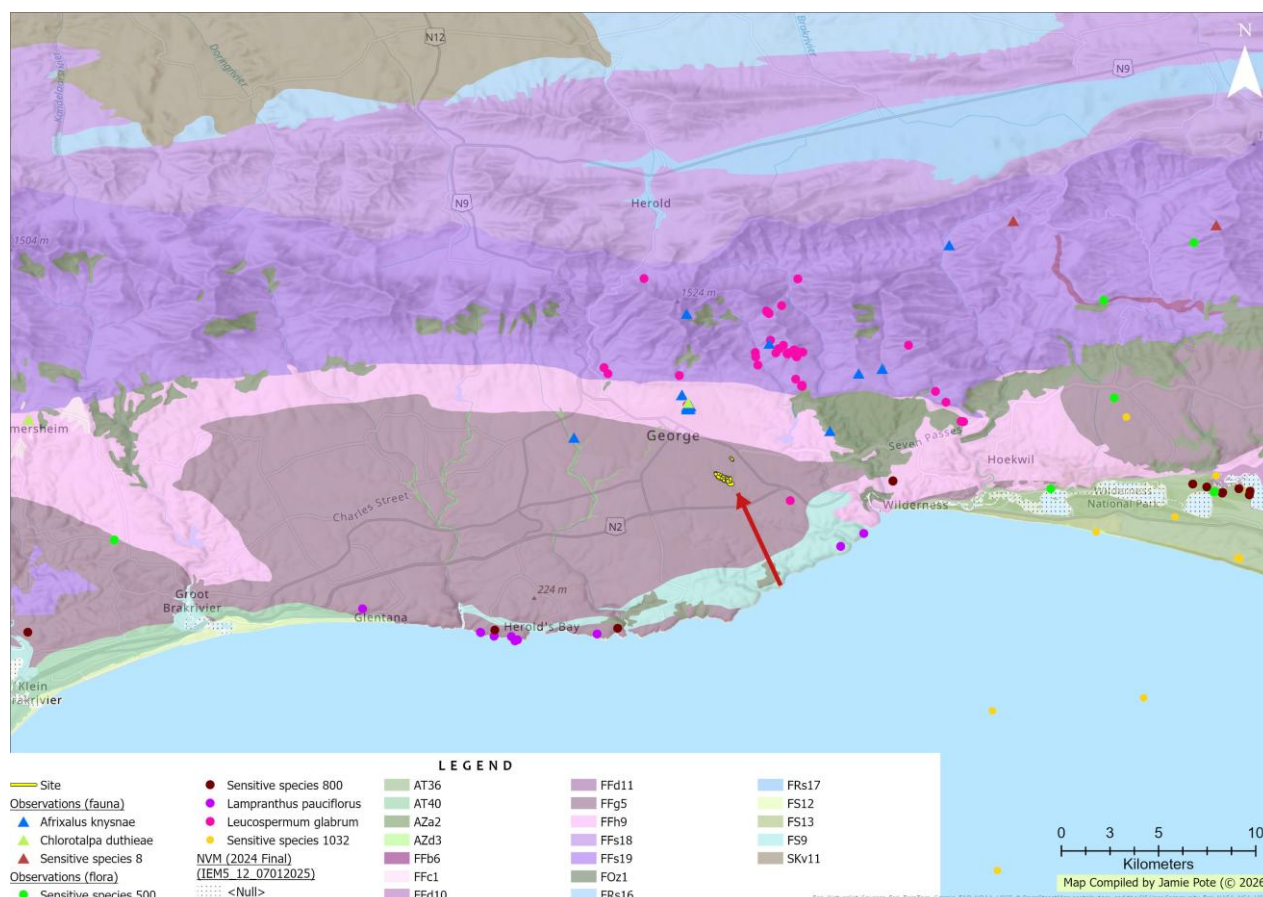


Figure 36: Distribution records of flora and fauna Species of Conservation Concern (GBIF, 26 July 2024) with known records from the broader area. NOTE some distribution records may have an offset for biosecurity purposes but will non the less give an indication of general locality (i.e. locality records in the sea).

Table 5: Fauna Species of Special Concern (SCC)

| SCIENTIFIC NAME             | COMMON NAME         | STATUS <sup>4</sup> | COMMENT/PRESENCE                                                                                                                                                                     |
|-----------------------------|---------------------|---------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Mammals</b>              |                     |                     |                                                                                                                                                                                      |
| <i>Chlorotalpa duthieae</i> | Duthies Golden Mole | NEST (M), Vu        | Known form the broader area, no evidence of any Golden Moles on site, which is primarily a landscaped garden and largely surrounded by compacted material.                           |
| Sensitive species 8         |                     | NEST (M), Vu        | Not recorded on site but records indicate a presence in the surrounding area. May be a transient visitor in developed areas, but not likely to be affected above baseline levels due |

<sup>4</sup> PNCO - Provincial Nature Conservation Ordinance (1974); ToPS – Threatened or Protected Species, IUCN: Cr - Critically - Endangered, En - Endangered, Vu - Vulnerable; LC - Least Concern.

| SCIENTIFIC NAME               | COMMON NAME                     | STATUS <sup>4</sup> | COMMENT/PRESENCE                                                                                                                                                                                                                                                                                                                |
|-------------------------------|---------------------------------|---------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                               |                                 |                     | to the proposed activity within a densely populated part of an urban area.                                                                                                                                                                                                                                                      |
| <b>Birds</b>                  |                                 |                     |                                                                                                                                                                                                                                                                                                                                 |
| <i>Bradypterus sylvaticus</i> | Knysna warbler                  | NEST (H)            | Unlikely to be affected above baseline levels by the proposed activity in an already transformed footprint.                                                                                                                                                                                                                     |
| <i>Circus ranivorus</i>       | African Marsh Harrier           | NEST (H)            |                                                                                                                                                                                                                                                                                                                                 |
| <b>Reptiles</b>               |                                 |                     |                                                                                                                                                                                                                                                                                                                                 |
| None                          |                                 |                     |                                                                                                                                                                                                                                                                                                                                 |
| <b>Amphibians</b>             |                                 |                     |                                                                                                                                                                                                                                                                                                                                 |
| <i>Afrixalus knysnae</i>      | <i>Knysna Spiny Reed Frog</i>   | NEST (M), En        | Unlikely to be present nor affected by the proposed temporary activity in a transformed footprint. While aquatic and other suitable habitat is in principle present, it is not deemed suitable due to the high levels of pollution in the watercourse and also the disturbed nature of the surrounding vegetation Not recorded. |
| <b>Invertebrates</b>          |                                 |                     |                                                                                                                                                                                                                                                                                                                                 |
| <i>Aneuryphymus montanus</i>  | Yellow-winged Agile Grasshopper | NEST (M), Vu        | No records from vicinity and not recorded on site. Unlikely to be present nor affected by the proposed temporary activity in a transformed landscape. Not recorded.                                                                                                                                                             |

Records indicate that the species *Chlorotalpa duthieae*, Sensitive species & *Afrixalus knysnae* have been recorded in the wider area, however none are likely to occur on the site. There is no evidence of any Golden Moles being present and while aquatic habitat is present, it is not deemed suitable due to the high levels of pollution in the watercourse and also the disturbed nature of the vegetation.

The birds *Bradypterus sylvaticus* & *Circus ranivorus*, as well as the insect *Aneuryphymus montanus*, while likely occurring in the surrounding area where natural vegetation is intact and more extensive, are unlikely to be affected by the proposed activity which will have a small and highly localised footprint. Improved sewer management is also likely to improve overall aquatic health after construction.

Site observations also confirmed none being present, also confirmed to not be the typical habitat for several of the species, hence the footprint does not provide suitable habitat for these species.

No fauna PNCO permits are anticipated to be required but are recommended as a precaution as small species such as lizards, geckos and snakes may be present in the rocky landscaped areas.

### Alien Invasive Species

On 18 September 2020, the Minister of Environmental Affairs published the Alien and Invasive Species Regulations (“the Regulations”) which came into effect on the 18 October 2020 in a bid to curb the negative effects of IAPs. The Regulations call on landowners and sellers of land alike to assist the Department of Environmental Affairs to conserve our indigenous fauna and flora and to foster sustainable use of our land. Non-adherence to the Regulations by a landowner or a seller of land can result in a criminal offence punishable by a fine of up to R 5 million (R 10 million in case of a second offence) and/or a period of imprisonment of up to 10 years.

- Category 1a and 1b listed invasive species must be controlled and eradicated.
- Category 2 plants may only be grown if a permit is obtained, and the property owner ensures that the invasive species do not spread beyond his or her property.
- The growing of Category 3 species is subject to various exemptions and prohibitions.

Some invasive plants are categorised differently in different provinces. *For example:* the Spanish Broom plant is categorised as a category 1b (harmful) invasive plant in Eastern Cape and Western Cape, but it is a category 3 (less harmful) invasive plant in the other seven provinces.

Invasive alien plants have a significant negative impact on the environment by causing direct habitat destruction, increasing the risk and intensity of wildfires, and reducing surface and sub-surface water. Landowners are under legal obligation to control alien plants occurring on their properties. Alien Invasive Plants require removal according to the Conservation of Agricultural Resources Act 43 of 1983 (CARA) and the National Environmental Management: Biodiversity Act (10 of 2004; NEMBA): Alien and Invasive Species Lists (GN R598 and GN R599 of 2014). Alien control programs are long-term management projects and a clearing plan, which includes follow up actions for rehabilitation of the cleared area, is essential. This will save time, money, and significant effort. Collective management and planning with neighbours allow for more cost-effective clearing and maintenance considering aliens seeds as easily dispersed across boundaries by wind or water courses. All clearing actions should be monitored and documented to keep track of which areas are due for follow-up clearing. A general rule of thumb is to first target lightly infested areas before tackling densely invaded areas and prioritize sensitive areas such as riverbanks and wetlands. Alien grasses are among the worst invaders in lowland ecosystems adjacent to farms but are often the most difficult to detect and control.

Many exotic invasive and other weed species were noted within the site and surrounding area. Proliferation of weedy and exotic species often indicate disturbance especially during or after construction. A list of species is included in Table 6. During construction it is highly likely that species currently not on site could be introduced through the construction process. A weed management programme is recommended after construction to counter the weed proliferation that would be expected after construction.

Table 6: Alien (exotic) invasive and other weed species and status.

| SCIENTIFIC NAME                        | COMMON NAME                  | FAMILY         | STATUS <sup>5</sup>  | PRESENCE            |
|----------------------------------------|------------------------------|----------------|----------------------|---------------------|
| <i>Acacia mearnsii</i>                 | Black Wattle                 | Fabaceae       | CARA 1b              | Present, common     |
| <i>Acacia melanoxylon</i>              | Blackwood                    | Fabaceae       | CARA 2               | Present, common     |
| <i>Canna indica</i>                    | Indian shot                  | Cannaceae      | CARA 1b <sup>6</sup> | Present, common     |
| <i>Cenchrus clandestinus</i>           | Kikuyu grass                 | Poaceae        | CARA 1b              | Present, common     |
| <i>Cestrum (Pennisetum) laevigatum</i> | Inkberry                     | Solanaceae     | CARA 1b              | Present, dominant.  |
| <i>Cirsium vulgare</i>                 | Scotch thistle               | Asteraceae     | CARA 1b              | Present, common     |
| <i>Cortaderia selloana</i>             | Pampas grass                 | Poaceae        | CARA 1b              | Present, common     |
| <i>Iris pseudacorus</i>                | Yellow flag                  | Iridaceae      | CARA 1a              | Present, occasional |
| <i>Lantana camara</i>                  | Lantana                      | Verbenaceae    | CARA 1b              | Present, occasional |
| <i>Leptospermum scoparium</i>          | Australian myrtle (Tea tree) | Asteraceae     | CARA 1b              | Present, common     |
| <i>Melia azedarach</i>                 | Syringa                      | Meliaceae      | CARA 1b              | Present, common     |
| <i>Phragmites australis</i>            | Spanish Reed                 | Poaceae        | CARA 1b              | Present, common.    |
| <i>Phytolacca americana</i>            | Pokeweed                     | Phytolaccaceae | CARA 2               | Present, occasional |
| <i>Ricinus communis</i>                | Castor Oil Plant             | Euphorbiaceae  | CARA 2               | Present, common     |
| <i>Rubus cuneifolius</i>               | Bramble                      | Rosaceae       | CARA 1b              | Present, common     |
| <i>Sambucus nigra</i>                  | European elder               | Adoxaceae      | CARA 1b              | Present, common     |
| <i>Senna didymobotrya</i>              | Peanut butter Cassia         | Fabaceae       | CARA 1b              | Present, occasional |
| <i>Sesbania punicea</i>                | Sesbania                     | Fabaceae       | CARA 1b              | Present, occasional |
| <i>Solanum mauritianum</i>             | Bugweed                      | Solanaceae     | CARA 1b              | Present, common     |
| <i>Solanum sisymbriifolium</i>         | Wild tomato                  | Solanaceae     | CARA 1b              | Present, occasional |
| <i>Urtica urens</i>                    | Nettle                       | Urticaceae     | Weed                 | Present, occasional |
| <i>Verbena bonariensis</i>             | Wild verbena                 | Verbenaceae    | CARA 1b              | Present, occasional |
| <i>Vinca major</i>                     | Greater periwinkle           | Apocynaceae    | CARA 1b              | Present, occasional |

<sup>5</sup> CARA - Conservation of Agricultural Resources Act (1993); National List of Invasive Species in Terms Sections 70(1), 71(3) and 71A (2016); Weed – an exotic ruderal weed species, not indigenous but not a declared invasive species.

<sup>6</sup> 1b in protected areas and wetlands, not listed elsewhere.



### Eradication protocol

The act required the removal of these species, being the responsibility of the landowner/contractor. Several other common weed species are also present which should also be managed as part of post construction management,

Specific eradication and management procedures must be stipulated in the EMP as to the methods to be implemented to remove and control the various alien invasive species as they tend to require species specific techniques. A management plan should be incorporated into the EMP, and a detailed action plan compiled and implemented by the ECO.

### 3.1.4 Aquatic Habitat

Aquatic systems do not function in isolation and in terms of ecological processes, the aquatic systems are intricately linked to the terrestrial system. In this case the riverine and riparian community that drains the surrounding urban landscape forms an integral link between upstream and downstream communities and as a corridor for various faunal especially avifaunal species. Based on the flora species composition, this is largely an artificial ecological landscape, and while it may support an associated faunal assemblage, the proposed activity is unlikely to significantly alter the associated composition and processes above current baseline levels.

### 3.1.5 Terrestrial Vegetation Sensitivity Assessment

An overall vulnerability assessment of proposed activity, incorporating key vegetation and ecological indicators was undertaken and includes the following key criteria:

- relative levels of *intactness* in terms of overall loss of indigenous vegetation cover.
- presence, diversity, and abundance of *species of special concern* (weighted in favour of local endemic species).
- extent of *invasion* (severity and overall ecological impact), as well as the degree to which successful rehabilitation could take place.
- overall degradation incorporating above factors.
- relative importance of the vegetation communities relative to regional conservation status - indicated as vulnerability of the area because of loss.

#### Intactness

Three basic classes are differentiated as follows:

- **Low:** > 75 % of original vegetation has been removed or lost; and/or no species of special concern present that are critically endangered, endangered, or endemic with highly localised distribution.
- **Moderate:** 25 - 75 % of original vegetation has been removed/lost; and or presence of species of special concern but not having high conservation status or high levels of endemism or highly localised distributions.
- **High:** < 25 % of original vegetation has been removed or lost; and or presence of species with a highly endemism and or high conservation status (endangered or critically endangered).

Intactness for the site is **Very Low**.

#### Alien Invasion

Three classes are differentiated as follows:

- **Low:** no or few scattered individuals.

- **Moderate:** individual clumps of invasives present but cover less than 50% or original area.
- **High:** dense, impenetrable stands of invasives present, or cover > 50 % of area with substantial loss functioning. Rehabilitation will most likely require specialised techniques over an extended period (> 5 years).

Alien invasion for the site is **Very High**.

### Degradation

Overall Degradation is determined from the above alien invasion and intactness scores, according to the following matrix:

| INTACTNESS | INVASION            |                     |                          |
|------------|---------------------|---------------------|--------------------------|
|            | LOW                 | MODERATE            | HIGH                     |
| High       | Pristine            | Near Pristine       | Moderately Degraded      |
| Moderate   | Near Pristine       | Moderately Degraded | <b>Severely Degraded</b> |
| <b>Low</b> | Moderately Degraded | Severely Degraded   | <b>Transformed</b>       |

Degradation for the site is **Very High** (Transformed and/or Severely Degraded)

### Overall Sensitivity score

Overall vulnerability (or Sensitivity) of the vegetation within the site is calculated according to the following matrix which combines degradation and overall conservation status of the vegetation units of the site.

| DEGRADATION                                                       | CONSERVATION STATUS |                 |            |                        |
|-------------------------------------------------------------------|---------------------|-----------------|------------|------------------------|
|                                                                   | LEAST CONCERN       | VULNERABLE      | ENDANGERED | CRITICALLY ENDANGERED  |
| Severely degraded/ Transformed                                    | Very Low/Low        | Low             | Moderate   | Moderate - High        |
| Moderately degraded                                               | Low                 | Moderate        | High       | High                   |
| Ecologically Pristine or near Pristine (no such areas identified) | Moderate            | Moderate - High | High       | Very High (No-Go area) |

### Habitat Sensitivity

- All of the portions of sewer within the residential area (roads and road verges) and are designated a **VERY LOW SENSITIVITY**.
- **LOW SENSITIVITY** areas are vegetated but generally kikuyu grass and limited to a few sections where the sewer enters the vegetated area.
- Almost the entire vegetated area (i.e. the areas of the route that are adjacent to the watercourse but on the upper banks where little to no natural riverine vegetation persists are designated a **MODERATE sensitivity**, where exotic and invasive species comprise most of the vegetation cover, but with some indigenous elements.
- **VERY HIGH sensitivity** portions are designated where Watercourses and riparian vegetation, although primarily exotic species) is present. This is limited to a single area where a 'watercourse' crossing is present. The high sensitivity is given more for the sake of highlighting that additional precautions will be required during construction, being a watercourse, rather than elevated ecological sensitivity as the area is also highly modified. Since the primary objective is to improve sewerage management and improve capacity, the overall impact of the sewer pipelines is not significantly negative within the broader context of the site and surrounds.
- No **VERY HIGH sensitivity** areas are identified but limited to the terrestrial environment and excludes aquatic processes, which is outside of the scope of this terrestrial assessment.

The nominal and temporary short-term impact will be far outweighed by the long benefits of improving sewer capacity and potentially reducing the risk of sewerage leaks in the future.

### 3.1.6 No-Go Areas

No-go areas are not identified within the site. Caution to be exercised in proximity to planted Cycads.

### 3.1.7 Potential Development Footprints

The remainder of the site outside of the identified no-go areas above is considered to be developable.



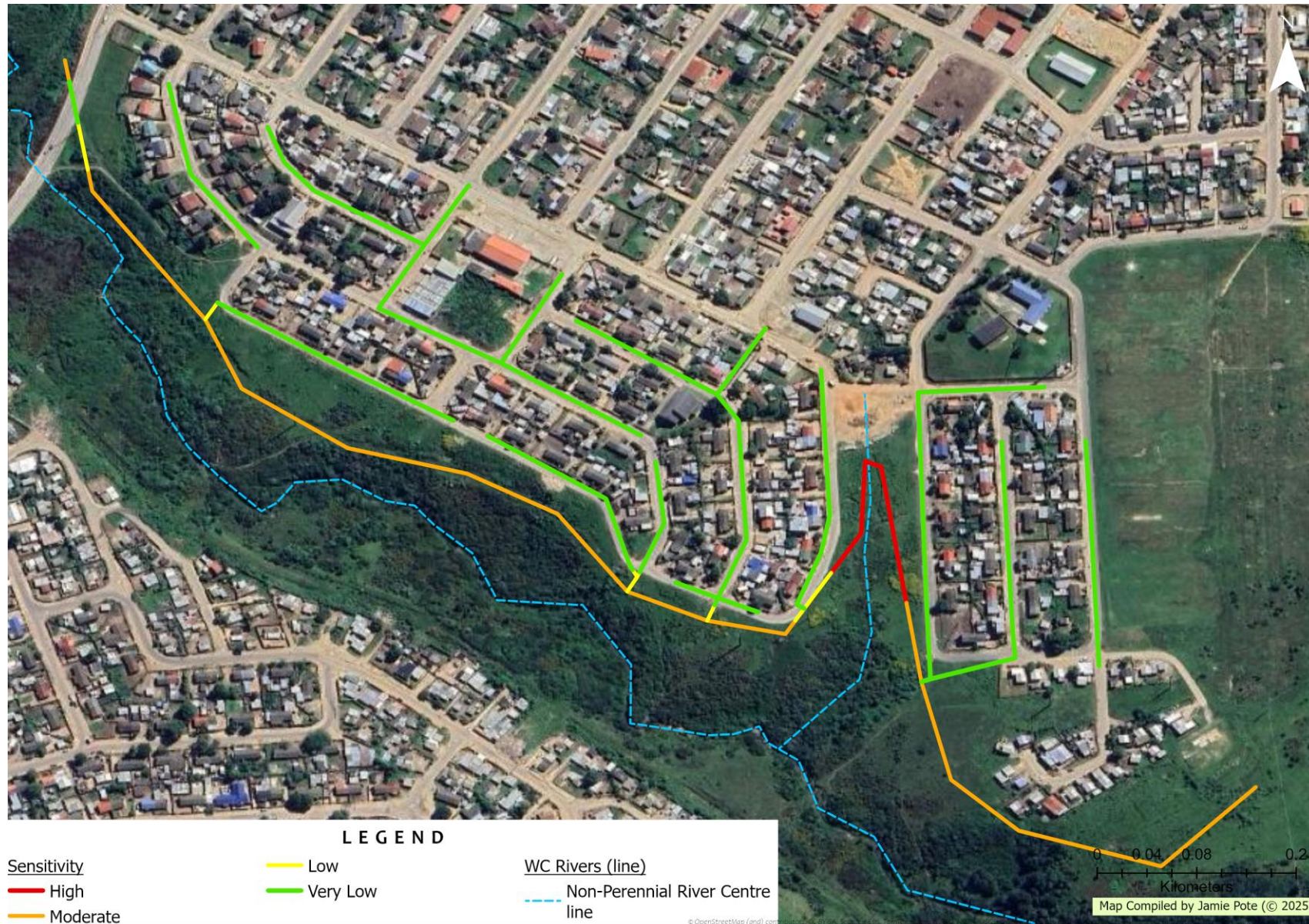


Figure 37: Vegetation Sensitivity of proposed site (Overview).



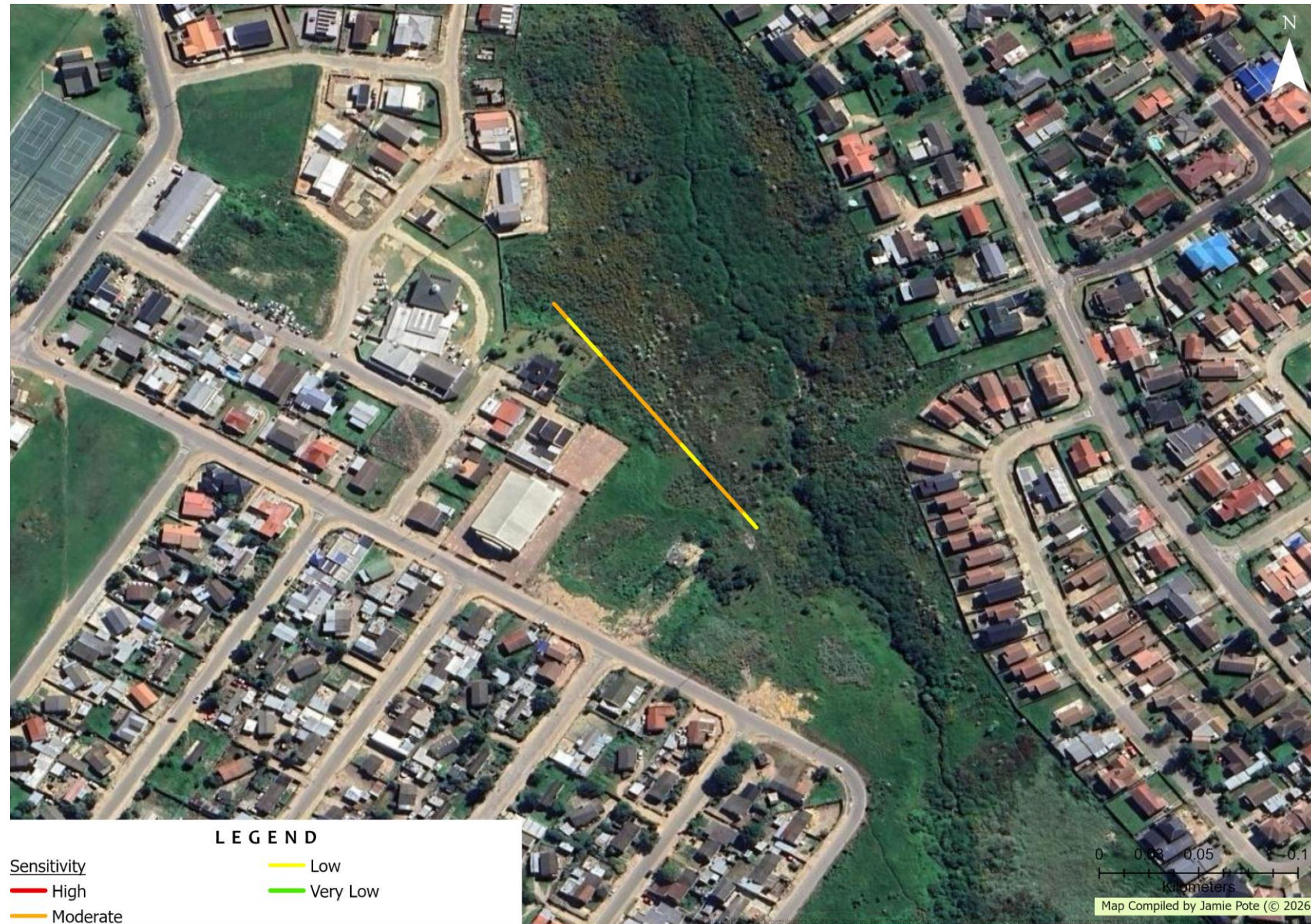


Figure 38: Vegetation Sensitivity of proposed site (Overview) – Additional northern section.



## 3.2 Risks and Potential Impacts to Biodiversity

### 3.2.1 Summary of actions, activities, or processes that require mitigation.

The main impacts associated with the unauthorised activity include the following and are described in Table 7:

1. Permanent or temporary loss of indigenous vegetation cover.
2. Loss of flora Species of Conservation Concern.
3. Susceptibility of post construction disturbed areas to invasion by exotic and alien invasive species.
4. Susceptibility of some areas to erosion associated with slopes and proximity to watercourses.
5. Disturbances to ecological processes.
6. Aquatic and Riparian processes.
7. Loss of faunal Species of Conservation Concern.
8. Loss of Faunal Habitat and processes.

### 3.2.2 Potential Terrestrial Biodiversity Impacts (Indirect)

No significant indirect impacts are anticipated.

### 3.2.3 Potential Terrestrial Biodiversity Impacts (Direct)

Overall impacts to terrestrial biodiversity are likely to be nominal, with loss resulting from removal of small footprints within the vegetated areas. As indicated in Figure 37, the proposed activity will require clearing of some vegetation along the watercourses in order to excavate temporary trenches install the sewer pipelines. The proposed activity, having a negligible footprint within significantly modified habitat, is thus unlikely to significantly impact terrestrial biodiversity above current baseline levels, as it will be a temporary activity and will likely return to a pre-construction state within two years.

Table 7: Potential Impacts to Terrestrial Biodiversity.

| IMPACT                     | Nature of Impact                                                                                                                                                                                                                                                                                                                                                                                          |
|----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Vegetation                 | <u>Permanent or temporary loss of indigenous vegetation</u> cover because of site clearing. Site clearing before construction will result in the blanket clearing of vegetation within the affected footprint.                                                                                                                                                                                            |
| Flora Species <sup>7</sup> | <u>Loss of flora Species of Conservation Concern</u> during pre-construction site clearing activities. Several Species of Conservation Concern are known from surrounding areas, which could be destroyed during site preparation, none of which were confirmed to be present.                                                                                                                            |
| Alien Invasive Species     | <u>Susceptibility of post construction disturbed areas to invasion</u> by exotic and alien invasive species and removal of exotic and alien invasive species during construction. Post construction disturbed areas having no vegetation cover are often susceptible to invasion by weedy and alien species, which can not only become invasive but also prevent natural flora from becoming established. |
| Erosion                    | <u>Susceptibility of some areas to erosion</u> because of construction related disturbances on slopes or in proximity to watercourses. Removal of vegetation cover and soil disturbance may result in some areas being susceptible to soil erosion after completion of the activity.                                                                                                                      |
| Ecological Processes       | <u>Disturbances to ecological processes</u> : Activity may result in disturbances to ecological processes.                                                                                                                                                                                                                                                                                                |

<sup>7</sup> Subject to findings of follow-up species survey.

| IMPACT                         | Nature of Impact                                                                                                                                                                                  |
|--------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Aquatic and Riparian processes | <u>Aquatic and Riparian processes</u> : None present/affected                                                                                                                                     |
| Faunal Species                 | <u>Loss of faunal SCC</u> due to construction activities: Activities associated with bush clearing, killing of perceived dangerous fauna, may lead to increased mortalities among faunal species. |
| Faunal Habitat                 | <u>Loss of Faunal Habitat</u> : Activity may result in the loss of habitat for faunal species, which could result in disturbance and displacement of faunal species.                              |
| Faunal Processes               | Impacts to <u>faunal processes</u> because of the activity                                                                                                                                        |

### 3.3 Assessment of Risks and Impacts to Biodiversity

#### 3.3.1 Methodology to determine the significance ratings.

The assessment criteria utilised in the Basic Assessment Report are based on, and adapted from, the Guideline on Impact Significance, Integrated Environmental Management Information Series 5 (Department of Environmental Affairs and Tourism (DEAT), 2002) and the Guideline 5: Assessment of Alternatives and Impacts in Support of the Environmental Impact Assessment Regulations (DEAT, 2006).

##### Determination of Extent (Scale):

|                      |                                                                                                                                                                                                               |
|----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Site specific</b> | On site or within 100 m of the site boundary, but not beyond the property boundaries.                                                                                                                         |
| <b>Local</b>         | The impacted area includes the whole or a measurable portion of the site and property, but could affect the area surrounding the development, including the neighbouring properties and wider municipal area. |
| <b>Regional</b>      | The impact would affect the broader region (e.g., neighbouring towns) beyond the boundaries of the adjacent properties.                                                                                       |
| <b>National</b>      | The impact would affect the whole country (if applicable).                                                                                                                                                    |

##### Determination of Duration:

|                    |                                                                                                                                                                                         |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Temporary</b>   | The impact will be limited to the construction phase.                                                                                                                                   |
| <b>Short term</b>  | The impact will either disappear with mitigation or will be mitigated through a natural process in a period shorter than 8 months after the completion of the construction phase.       |
| <b>Medium term</b> | The impact will last up to the end of the construction phase, where after it will be entirely negated in a period shorter than 3 years after the completion of construction activities. |
| <b>Long term</b>   | The impact will continue for the entire operational lifetime of the development but will be mitigated by direct human action or by natural processes thereafter.                        |
| <b>Permanent</b>   | This is the only class of impact that will be non-transitory. Such impacts are regarded to be irreversible, irrespective of what mitigation is applied.                                 |

##### Determination of Probability:

|                        |                                                                                                                                                                |
|------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Improbable</b>      | The possibility of the impact occurring is very low, due either to the circumstances, design or experience.                                                    |
| <b>Probable</b>        | There is a possibility that the impact will occur to the extent that provisions must therefore be made.                                                        |
| <b>Highly probable</b> | It is most likely that the impacts will occur at some stage of the development. Plans must be drawn up to mitigate the activity before the activity commences. |
| <b>Definite</b>        | The impact will take place regardless of any prevention plans.                                                                                                 |

*Determination of Significance (without mitigation):*

|                        |                                                                                                                                                                                                                                                |
|------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>No significance</b> | The impact is not substantial and does not require any mitigation action.                                                                                                                                                                      |
| <b>Low</b>             | The impact is of little importance but may require limited mitigation.                                                                                                                                                                         |
| <b>Medium</b>          | The impact is of sufficient importance and is therefore considered to have a negative impact. Mitigation is required to reduce the negative impacts to acceptable levels.                                                                      |
| <b>Medium-High</b>     | The impact is of high importance and is therefore considered to have a negative impact. Mitigation is required to manage the negative impacts to acceptable levels.                                                                            |
| <b>High</b>            | The impact is of great importance. Failure to mitigate, with the objective of reducing the impact to acceptable levels, could render the entire development option or entire project proposal unacceptable. Mitigation is therefore essential. |
| <b>Very High</b>       | The impact is critical. Mitigation measures cannot reduce the impact to acceptable levels. As such the impact renders the proposal unacceptable.                                                                                               |

*Determination of Significance (with mitigation):*

|                        |                                                                                                                                                                                                                                        |
|------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>No significance</b> | The impact will be mitigated to the point where it is regarded to be insubstantial.                                                                                                                                                    |
| <b>Low</b>             | The impact will be mitigated to the point where it is of limited importance.                                                                                                                                                           |
| <b>Medium</b>          | Notwithstanding the successful implementation of the mitigation measures, the impact will remain of significance. However, taken within the overall context of the project, such a persistent impact does not constitute a fatal flaw. |
| <b>High</b>            | Mitigation of the impact is not possible on a cost-effective basis. The impact continues to be of great importance, and taken within the overall context of the project, is considered to be a fatal flaw in the project proposal.     |

*Determination of Reversibility:*

|                              |                                                                             |
|------------------------------|-----------------------------------------------------------------------------|
| <b>Completely Reversible</b> | The impact is reversible with implementation of minor mitigation measures   |
| <b>Partly Reversible</b>     | The impact is partly reversible but more intense mitigation measures        |
| <b>Barely Reversible</b>     | The impact is unlikely to be reversed even with intense mitigation measures |
| <b>Irreversible</b>          | The impact is irreversible, and no mitigation measures exist                |

*Determination of Degree to which an Impact can be Mitigated:*

|                                |                                                                             |
|--------------------------------|-----------------------------------------------------------------------------|
| <b>Can be mitigated</b>        | The impact is reversible with implementation of minor mitigation measures   |
| <b>Can be partly mitigated</b> | The impact is partly reversible but more intense mitigation measures        |
| <b>Can be barely mitigated</b> | The impact is unlikely to be reversed even with intense mitigation measures |
| <b>Not able to mitigate</b>    | The impact is irreversible, and no mitigation measures exist                |

*Determination of Loss of Resources:*

|                                      |                                                            |
|--------------------------------------|------------------------------------------------------------|
| <b>No loss of resource</b>           | The impact will not result in the loss of any resources    |
| <b>Marginal loss of resource</b>     | The impact will result in marginal loss of resources       |
| <b>Significant loss of resources</b> | The impact will result in significant loss of resources    |
| <b>Complete loss of resources</b>    | The impact will result in a complete loss of all resources |

*Determination of Cumulative Impact:*

|                   |                                                                |
|-------------------|----------------------------------------------------------------|
| <b>Negligible</b> | The impact would result in negligible to no cumulative effects |
| <b>Low</b>        | The impact would result in insignificant cumulative effects    |
| <b>Medium</b>     | The impact would result in minor cumulative effects            |
| <b>High</b>       | The impact would result in significant cumulative effects      |



Determination of Consequence significance:

|                   |                                                          |
|-------------------|----------------------------------------------------------|
| <b>Negligible</b> | The impact would result in negligible to no consequences |
| <b>Low</b>        | The impact would result in insignificant consequences    |
| <b>Medium</b>     | The impact would result in minor consequences            |
| <b>High</b>       | The impact would result in significant consequences      |

### 3.3.2 Assessment of Terrestrial Biodiversity Impacts

The proposed operations can result in a range of negative impacts on terrestrial ecosystems if not effectively managed. Table 7 describes impacts that may potentially occur in the site (as per DEDEAT guidelines) as well indicating the relevant EMP section. The predicted significance of these during the construction phase are summarised below.

Construction Phase

| Alternative:                                                                                                                                                                                                                             | Preferred Alternative                                                                                                                                                                                                                                                         | No-Go Alternative |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| <b>Construction Phase</b>                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                               |                   |
| <b>Terrestrial Assessment Impact 1</b>                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                               |                   |
| <b>Potential impact and risk:</b>                                                                                                                                                                                                        | <b>Permanent or temporary loss of indigenous vegetation cover:</b><br>Permanent or temporary loss of indigenous vegetation cover because of site clearing. Site clearing before construction will result in the blanket clearing of vegetation within the affected footprint. |                   |
| Nature of impact:                                                                                                                                                                                                                        | <b>Negative</b>                                                                                                                                                                                                                                                               | <b>NO IMPACT</b>  |
| Extent and duration of impact:                                                                                                                                                                                                           | <b>Local and Short Term</b>                                                                                                                                                                                                                                                   |                   |
| Consequence of impact or risk:                                                                                                                                                                                                           | <b>Low</b>                                                                                                                                                                                                                                                                    |                   |
| Probability of occurrence:                                                                                                                                                                                                               | <b>Definite</b>                                                                                                                                                                                                                                                               |                   |
| Degree to which the impact may cause irreplaceable loss of resources:                                                                                                                                                                    | <b>Marginal loss of resource</b>                                                                                                                                                                                                                                              |                   |
| Degree to which the impact can be reversed:                                                                                                                                                                                              | <b>High</b>                                                                                                                                                                                                                                                                   |                   |
| Indirect impacts:                                                                                                                                                                                                                        | <b>None</b>                                                                                                                                                                                                                                                                   |                   |
| Cumulative impact prior to mitigation:                                                                                                                                                                                                   | <b>None</b>                                                                                                                                                                                                                                                                   |                   |
| Significance rating of impact prior to mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)                                                                                                                                    | <b>Low (-)</b>                                                                                                                                                                                                                                                                |                   |
| Degree to which the impact can be avoided:                                                                                                                                                                                               | <b>Moderate</b>                                                                                                                                                                                                                                                               |                   |
| Degree to which the impact can be managed:                                                                                                                                                                                               | <b>High</b>                                                                                                                                                                                                                                                                   |                   |
| Degree to which the impact can be mitigated:                                                                                                                                                                                             | <b>Can be mitigated</b>                                                                                                                                                                                                                                                       |                   |
| Proposed mitigation:                                                                                                                                                                                                                     | <b>See below.</b>                                                                                                                                                                                                                                                             |                   |
| Residual impacts:                                                                                                                                                                                                                        | <b>None</b>                                                                                                                                                                                                                                                                   |                   |
| Cumulative impact post mitigation:                                                                                                                                                                                                       | <b>None</b>                                                                                                                                                                                                                                                                   |                   |
| Significance rating of impact after mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)                                                                                                                                       | <b>Very Low (-)</b>                                                                                                                                                                                                                                                           | <b>NO IMPACT</b>  |
| <b>Mitigation Measures:</b> <ul style="list-style-type: none"> <li>No clearing outside of development footprint to take place.</li> <li>Areas surrounding the footprints should be revegetated on completion of construction.</li> </ul> |                                                                                                                                                                                                                                                                               |                   |

| Alternative: | Preferred Alternative | No-Go Alternative |
|--------------|-----------------------|-------------------|
|--------------|-----------------------|-------------------|

| Construction Phase                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                  |           |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| Terrestrial Assessment Impact 2                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                  |           |
| <b>Potential impact and risk:</b>                                                                                                                                                                            | <b>Loss of flora Species of Conservation Concern:</b><br>Loss of flora Species of Conservation Concern during pre-construction site clearing activities. Several Species of Conservation Concern are known from surrounding areas, which could be destroyed during site preparation, none of which were confirmed to be present. |           |
| Nature of impact:                                                                                                                                                                                            | Negative                                                                                                                                                                                                                                                                                                                         | NO IMPACT |
| Extent and duration of impact:                                                                                                                                                                               | Local and Short Term                                                                                                                                                                                                                                                                                                             |           |
| Consequence of impact or risk:                                                                                                                                                                               | Low                                                                                                                                                                                                                                                                                                                              |           |
| Probability of occurrence:                                                                                                                                                                                   | Probable                                                                                                                                                                                                                                                                                                                         |           |
| Degree to which the impact may cause irreplaceable loss of resources:                                                                                                                                        | Marginal loss of resource                                                                                                                                                                                                                                                                                                        |           |
| Degree to which the impact can be reversed:                                                                                                                                                                  | High                                                                                                                                                                                                                                                                                                                             |           |
| Indirect impacts:                                                                                                                                                                                            | None                                                                                                                                                                                                                                                                                                                             |           |
| Cumulative impact prior to mitigation:                                                                                                                                                                       | None                                                                                                                                                                                                                                                                                                                             |           |
| Significance rating of impact prior to mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)                                                                                                        | Low (-)                                                                                                                                                                                                                                                                                                                          |           |
| Degree to which the impact can be avoided:                                                                                                                                                                   | Moderate                                                                                                                                                                                                                                                                                                                         |           |
| Degree to which the impact can be managed:                                                                                                                                                                   | High                                                                                                                                                                                                                                                                                                                             |           |
| Degree to which the impact can be mitigated:                                                                                                                                                                 | Can be mitigated                                                                                                                                                                                                                                                                                                                 |           |
| Proposed mitigation:                                                                                                                                                                                         | See below.                                                                                                                                                                                                                                                                                                                       |           |
| Residual impacts:                                                                                                                                                                                            | None                                                                                                                                                                                                                                                                                                                             |           |
| Cumulative impact post mitigation:                                                                                                                                                                           | None                                                                                                                                                                                                                                                                                                                             |           |
| Significance rating of impact after mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)                                                                                                           | Very Low (-)                                                                                                                                                                                                                                                                                                                     | NO IMPACT |
| <b>Mitigation Measures:</b> <ul style="list-style-type: none"> <li>A flora search and rescue is unlikely to be required and no protected flora were found to be present within a natural context.</li> </ul> |                                                                                                                                                                                                                                                                                                                                  |           |

| Alternative:                      | Preferred Alternative                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | No-Go Alternative |
|-----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| Construction Phase                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                   |
| Terrestrial Assessment Impact 3   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                   |
| <b>Potential impact and risk:</b> | <b>Susceptibility of post construction disturbed areas to invasion by exotic and alien invasive species:</b><br>Susceptibility of post construction disturbed areas to invasion by exotic and alien invasive species and removal of exotic and alien invasive species during construction. Post construction disturbed areas having no vegetation cover are often susceptible to invasion by weedy and alien species, which can not only become invasive but also prevent natural flora from becoming established. |                   |
| Nature of impact:                 | Negative                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | NO IMPACT         |
| Extent and duration of impact:    | Local and Medium                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                   |
| Consequence of impact or risk:    | Low                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                   |
| Probability of occurrence:        | Highly Probable                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                   |

|                                                                                                                                                                                                                                                                     |                                  |                  |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|------------------|
| Degree to which the impact may cause irreplaceable loss of resources:                                                                                                                                                                                               | <b>Marginal loss of resource</b> |                  |
| Degree to which the impact can be reversed:                                                                                                                                                                                                                         | <b>High</b>                      |                  |
| Indirect impacts:                                                                                                                                                                                                                                                   | <b>None</b>                      |                  |
| Cumulative impact prior to mitigation:                                                                                                                                                                                                                              | <b>None</b>                      |                  |
| Significance rating of impact prior to mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)                                                                                                                                                               | <b>Low (-)</b>                   |                  |
| Degree to which the impact can be avoided:                                                                                                                                                                                                                          | <b>Moderate</b>                  |                  |
| Degree to which the impact can be managed:                                                                                                                                                                                                                          | <b>High</b>                      |                  |
| Degree to which the impact can be mitigated:                                                                                                                                                                                                                        | <b>Can be mitigated</b>          |                  |
| Proposed mitigation:                                                                                                                                                                                                                                                | <b>See below.</b>                |                  |
| Residual impacts:                                                                                                                                                                                                                                                   | <b>None</b>                      |                  |
| Cumulative impact post mitigation:                                                                                                                                                                                                                                  | <b>None</b>                      |                  |
| Significance rating of impact after mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)                                                                                                                                                                  | <b>Very Low (-)</b>              | <b>NO IMPACT</b> |
| <b>Mitigation Measures:</b> <ul style="list-style-type: none"> <li>A suitable weed management strategy to be implemented in and around the site post construction, which is likely to result in proliferation of weeds in disturbed areas on completion.</li> </ul> |                                  |                  |

| <b>Alternative:</b>                                                                                   | <b>Preferred Alternative</b>                                                                                                                                                                                                                                                                                                                                                          | <b>No-Go Alternative</b> |
|-------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
| <b>Construction Phase</b>                                                                             |                                                                                                                                                                                                                                                                                                                                                                                       |                          |
| <b>Terrestrial Assessment Impact 4</b>                                                                |                                                                                                                                                                                                                                                                                                                                                                                       |                          |
| <b>Potential impact and risk:</b>                                                                     | <b>Susceptibility of some areas to erosion associated with slopes and proximity to watercourses:</b><br>Susceptibility of some areas to erosion because of construction related disturbances on slopes or in proximity to watercourses. Removal of vegetation cover and soil disturbance may result in some areas being susceptible to soil erosion after completion of the activity. |                          |
| Nature of impact:                                                                                     | <b>Negative</b>                                                                                                                                                                                                                                                                                                                                                                       | <b>NO IMPACT</b>         |
| Extent and duration of impact:                                                                        | <b>Local and Medium</b>                                                                                                                                                                                                                                                                                                                                                               |                          |
| Consequence of impact or risk:                                                                        | <b>Low</b>                                                                                                                                                                                                                                                                                                                                                                            |                          |
| Probability of occurrence:                                                                            | <b>Probable</b>                                                                                                                                                                                                                                                                                                                                                                       |                          |
| Degree to which the impact may cause irreplaceable loss of resources:                                 | <b>Marginal loss of resource</b>                                                                                                                                                                                                                                                                                                                                                      |                          |
| Degree to which the impact can be reversed:                                                           | <b>High</b>                                                                                                                                                                                                                                                                                                                                                                           |                          |
| Indirect impacts:                                                                                     | <b>None</b>                                                                                                                                                                                                                                                                                                                                                                           |                          |
| Cumulative impact prior to mitigation:                                                                | <b>None</b>                                                                                                                                                                                                                                                                                                                                                                           |                          |
| Significance rating of impact prior to mitigation (e.g. Low, Medium, Medium-High, High, or Very-High) | <b>Low (-)</b>                                                                                                                                                                                                                                                                                                                                                                        |                          |
| Degree to which the impact can be avoided:                                                            | <b>Moderate</b>                                                                                                                                                                                                                                                                                                                                                                       |                          |
| Degree to which the impact can be managed:                                                            | <b>High</b>                                                                                                                                                                                                                                                                                                                                                                           |                          |
| Degree to which the impact can be mitigated:                                                          | <b>Can be mitigated</b>                                                                                                                                                                                                                                                                                                                                                               |                          |
| Proposed mitigation:                                                                                  | <b>See below.</b>                                                                                                                                                                                                                                                                                                                                                                     |                          |
| Residual impacts:                                                                                     | <b>None</b>                                                                                                                                                                                                                                                                                                                                                                           |                          |



|                                                                                                                                                                                                                                                                                                                                |                     |                  |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|------------------|
| Cumulative impact post mitigation:                                                                                                                                                                                                                                                                                             | <b>None</b>         |                  |
| Significance rating of impact after mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)                                                                                                                                                                                                                             | <b>Very Low (-)</b> | <b>NO IMPACT</b> |
| <b>Mitigation Measures:</b> <ul style="list-style-type: none"> <li>Suitable measures must be implemented where constructed on slopes to protected against erosion.</li> <li>Areas must be rehabilitated, and a suitable indigenous grass seed mix planted where natural vegetation re-establishment does not occur.</li> </ul> |                     |                  |

| <b>Alternative:</b>                                                                                                                                                                                                                                                 | <b>Preferred Alternative</b>                                                                                                                       | <b>No-Go Alternative</b> |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
| <b>Construction Phase</b>                                                                                                                                                                                                                                           |                                                                                                                                                    |                          |
| <b>Terrestrial Assessment Impact 5</b>                                                                                                                                                                                                                              |                                                                                                                                                    |                          |
| <b>Potential impact and risk:</b>                                                                                                                                                                                                                                   | <b>Disturbances to ecological processes:</b><br>Disturbances to ecological processes: Activity may result in disturbances to ecological processes. |                          |
| Nature of impact:                                                                                                                                                                                                                                                   | <b>Negative</b>                                                                                                                                    | <b>NO IMPACT</b>         |
| Extent and duration of impact:                                                                                                                                                                                                                                      | <b>Local and Short term</b>                                                                                                                        |                          |
| Consequence of impact or risk:                                                                                                                                                                                                                                      | <b>Low</b>                                                                                                                                         |                          |
| Probability of occurrence:                                                                                                                                                                                                                                          | <b>Probable</b>                                                                                                                                    |                          |
| Degree to which the impact may cause irreplaceable loss of resources:                                                                                                                                                                                               | <b>Marginal loss of resource</b>                                                                                                                   |                          |
| Degree to which the impact can be reversed:                                                                                                                                                                                                                         | <b>High</b>                                                                                                                                        |                          |
| Indirect impacts:                                                                                                                                                                                                                                                   | <b>None</b>                                                                                                                                        |                          |
| Cumulative impact prior to mitigation:                                                                                                                                                                                                                              | <b>None</b>                                                                                                                                        |                          |
| Significance rating of impact prior to mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)                                                                                                                                                               | <b>Low (-)</b>                                                                                                                                     |                          |
| Degree to which the impact can be avoided:                                                                                                                                                                                                                          | <b>High</b>                                                                                                                                        |                          |
| Degree to which the impact can be managed:                                                                                                                                                                                                                          | <b>High</b>                                                                                                                                        |                          |
| Degree to which the impact can be mitigated:                                                                                                                                                                                                                        | <b>Can be mitigated</b>                                                                                                                            |                          |
| Proposed mitigation:                                                                                                                                                                                                                                                | <b>See below.</b>                                                                                                                                  |                          |
| Residual impacts:                                                                                                                                                                                                                                                   | <b>None</b>                                                                                                                                        |                          |
| Cumulative impact post mitigation:                                                                                                                                                                                                                                  | <b>None</b>                                                                                                                                        |                          |
| Significance rating of impact after mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)                                                                                                                                                                  | <b>Very Low (-)</b>                                                                                                                                | <b>NO IMPACT</b>         |
| <b>Mitigation Measures:</b> <ul style="list-style-type: none"> <li>A suitable weed management strategy to be implemented in and around the site post construction, which is likely to result in proliferation of weeds in disturbed areas on completion.</li> </ul> |                                                                                                                                                    |                          |

| <b>Alternative:</b>                    | <b>Preferred Alternative</b>                                                                    | <b>No-Go Alternative</b> |
|----------------------------------------|-------------------------------------------------------------------------------------------------|--------------------------|
| <b>Construction Phase</b>              |                                                                                                 |                          |
| <b>Terrestrial Assessment Impact 6</b> |                                                                                                 |                          |
| <b>Potential impact and risk:</b>      | <b>Aquatic and Riparian processes:</b><br>Aquatic and Riparian processes: None present/affected |                          |
| Nature of impact:                      | <b>Negative</b>                                                                                 | <b>NO IMPACT</b>         |
| Extent and duration of impact:         | <b>Local and very short term</b>                                                                |                          |
| Consequence of impact or risk:         | <b>Low</b>                                                                                      |                          |
| Probability of occurrence:             | <b>Probable</b>                                                                                 |                          |

|                                                                                                                                                                                                                                                                                                                                                 |                                  |                  |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|------------------|
| Degree to which the impact may cause irreplaceable loss of resources:                                                                                                                                                                                                                                                                           | <b>Marginal loss of resource</b> |                  |
| Degree to which the impact can be reversed:                                                                                                                                                                                                                                                                                                     | <b>High</b>                      |                  |
| Indirect impacts:                                                                                                                                                                                                                                                                                                                               | <b>None</b>                      |                  |
| Cumulative impact prior to mitigation:                                                                                                                                                                                                                                                                                                          | <b>None</b>                      |                  |
| Significance rating of impact prior to mitigation<br>(e.g. Low, Medium, Medium-High, High, or Very-High)                                                                                                                                                                                                                                        | <b>Medium (-)</b>                |                  |
| Degree to which the impact can be avoided:                                                                                                                                                                                                                                                                                                      | <b>Moderate</b>                  |                  |
| Degree to which the impact can be managed:                                                                                                                                                                                                                                                                                                      | <b>High</b>                      |                  |
| Degree to which the impact can be mitigated:                                                                                                                                                                                                                                                                                                    | <b>Can be mitigated</b>          |                  |
| Proposed mitigation:                                                                                                                                                                                                                                                                                                                            | <b>See below.</b>                |                  |
| Residual impacts:                                                                                                                                                                                                                                                                                                                               | <b>None</b>                      |                  |
| Cumulative impact post mitigation:                                                                                                                                                                                                                                                                                                              | <b>None</b>                      |                  |
| Significance rating of impact after mitigation<br>(e.g. Low, Medium, Medium-High, High, or Very-High)                                                                                                                                                                                                                                           | <b>Low (-)</b>                   | <b>NO IMPACT</b> |
| <b>Mitigation Measures:</b> <ul style="list-style-type: none"> <li>Adequate measures to be implemented for erosion control in excavations during and after construction.</li> <li>It is imperative that trenches near the watercourses (and the site as a whole) are not left open for extended periods of time during construction.</li> </ul> |                                  |                  |

| <b>Alternative:</b>                                                                                      | <b>Preferred Alternative</b>                                                                                                                                                                                                                         | <b>No-Go Alternative</b> |
|----------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
| <b>Construction Phase</b>                                                                                |                                                                                                                                                                                                                                                      |                          |
| <b>Terrestrial Assessment Impact 7</b>                                                                   |                                                                                                                                                                                                                                                      |                          |
| <b>Potential impact and risk:</b>                                                                        | <b>Loss of faunal Species of Conservation Concern:</b><br>Loss of faunal SCC due to construction activities: Activities associated with bush clearing, killing of perceived dangerous fauna, may lead to increased mortalities among faunal species. |                          |
| Nature of impact:                                                                                        | <b>Negative</b>                                                                                                                                                                                                                                      | <b>NO IMPACT</b>         |
| Extent and duration of impact:                                                                           | <b>Local and very short term</b>                                                                                                                                                                                                                     |                          |
| Consequence of impact or risk:                                                                           | <b>Low</b>                                                                                                                                                                                                                                           |                          |
| Probability of occurrence:                                                                               | <b>Probable</b>                                                                                                                                                                                                                                      |                          |
| Degree to which the impact may cause irreplaceable loss of resources:                                    | <b>Marginal loss of resource</b>                                                                                                                                                                                                                     |                          |
| Degree to which the impact can be reversed:                                                              | <b>High</b>                                                                                                                                                                                                                                          |                          |
| Indirect impacts:                                                                                        | <b>None</b>                                                                                                                                                                                                                                          |                          |
| Cumulative impact prior to mitigation:                                                                   | <b>None</b>                                                                                                                                                                                                                                          |                          |
| Significance rating of impact prior to mitigation<br>(e.g. Low, Medium, Medium-High, High, or Very-High) | <b>Low (-)</b>                                                                                                                                                                                                                                       |                          |
| Degree to which the impact can be avoided:                                                               | <b>High</b>                                                                                                                                                                                                                                          |                          |
| Degree to which the impact can be managed:                                                               | <b>High</b>                                                                                                                                                                                                                                          |                          |
| Degree to which the impact can be mitigated:                                                             | <b>Can be mitigated</b>                                                                                                                                                                                                                              |                          |
| Proposed mitigation:                                                                                     | <b>See below.</b>                                                                                                                                                                                                                                    |                          |
| Residual impacts:                                                                                        | <b>None</b>                                                                                                                                                                                                                                          |                          |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                     |                  |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|------------------|
| Cumulative impact post mitigation:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | <b>None</b>         |                  |
| Significance rating of impact after mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | <b>Very Low (-)</b> | <b>NO IMPACT</b> |
| <b>Mitigation Measures:</b> <ul style="list-style-type: none"> <li>Small mammals within the habitat on and around the affected area are generally mobile and likely to be transient to the area. Specific measures are made to reduce this risk. The risk of species of special concern is low, and it is unlikely that there will be any impact to populations of such species because of the activity.</li> <li>A faunal search and rescue is unlikely to be required and no protected species are likely to be affected but is recommended as a precautionary measure.</li> <li>No animals are to be harmed, trapped or killed during the course of operations other than where rescue is required and only undertaken by an expert.</li> </ul> |                     |                  |

| <b>Alternative:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | <b>Preferred Alternative</b>                                                            | <b>No-Go Alternative</b> |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|--------------------------|
| <b>Construction Phase</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                         |                          |
| <b>Terrestrial Assessment Impact 8</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                         |                          |
| <b>Potential impact and risk:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <b>Loss of Faunal Processes:</b><br>Impacts to faunal processes because of the activity |                          |
| Nature of impact:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <b>Negative</b>                                                                         | <b>NO IMPACT</b>         |
| Extent and duration of impact:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | <b>Local and very short term</b>                                                        |                          |
| Consequence of impact or risk:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | <b>Low</b>                                                                              |                          |
| Probability of occurrence:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <b>Probable</b>                                                                         |                          |
| Degree to which the impact may cause irreplaceable loss of resources:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | <b>Marginal loss of resource</b>                                                        |                          |
| Degree to which the impact can be reversed:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | <b>High</b>                                                                             |                          |
| Indirect impacts:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <b>None</b>                                                                             |                          |
| Cumulative impact prior to mitigation:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | <b>None</b>                                                                             |                          |
| Significance rating of impact prior to mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | <b>Low (-)</b>                                                                          |                          |
| Degree to which the impact can be avoided:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <b>High</b>                                                                             |                          |
| Degree to which the impact can be managed:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <b>High</b>                                                                             |                          |
| Degree to which the impact can be mitigated:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | <b>Can be mitigated</b>                                                                 |                          |
| Proposed mitigation:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | <b>See below.</b>                                                                       |                          |
| Residual impacts:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <b>None</b>                                                                             |                          |
| Cumulative impact post mitigation:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | <b>None</b>                                                                             |                          |
| Significance rating of impact after mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | <b>Very Low (-)</b>                                                                     | <b>NO IMPACT</b>         |
| <b>Mitigation Measures:</b> <ul style="list-style-type: none"> <li>Small mammals within the habitat on and around the affected area are generally mobile and likely to be transient to the area. Specific measures are made to reduce this risk. The risk of species of special concern is low, and it is unlikely that there will be any impact to populations of such species because of the activity.</li> <li>A faunal search and rescue is unlikely to be required and no protected species are likely to be affected but is recommended as a precautionary measure.</li> <li>No animals are to be harmed, trapped or killed during the course of operations other than where rescue is required and only undertaken by an expert. .</li> </ul> |                                                                                         |                          |

| Alternative:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Preferred Alternative                                                                                                                                                                          | No-Go Alternative |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| <b>Construction Phase</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                |                   |
| <b>Terrestrial Assessment Impact 9</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                |                   |
| <b>Potential impact and risk:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | <b>Loss of Faunal Habitat:</b><br>Loss of Faunal Habitat: Activity may result in the loss of habitat for faunal species, which could result in disturbance and displacement of faunal species. |                   |
| Nature of impact:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | <b>Negative</b>                                                                                                                                                                                | <b>NO IMPACT</b>  |
| Extent and duration of impact:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | <b>Local and very short term</b>                                                                                                                                                               |                   |
| Consequence of impact or risk:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | <b>Low</b>                                                                                                                                                                                     |                   |
| Probability of occurrence:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | <b>Probable</b>                                                                                                                                                                                |                   |
| Degree to which the impact may cause irreplaceable loss of resources:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | <b>Marginal loss of resource</b>                                                                                                                                                               |                   |
| Degree to which the impact can be reversed:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | <b>High</b>                                                                                                                                                                                    |                   |
| Indirect impacts:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | <b>None</b>                                                                                                                                                                                    |                   |
| Cumulative impact prior to mitigation:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | <b>None</b>                                                                                                                                                                                    |                   |
| Significance rating of impact prior to mitigation<br>(e.g. Low, Medium, Medium-High, High, or Very-High)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <b>Low (-)</b>                                                                                                                                                                                 |                   |
| Degree to which the impact can be avoided:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | <b>High</b>                                                                                                                                                                                    |                   |
| Degree to which the impact can be managed:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | <b>High</b>                                                                                                                                                                                    |                   |
| Degree to which the impact can be mitigated:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | <b>Can be mitigated</b>                                                                                                                                                                        |                   |
| Proposed mitigation:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | <b>See below.</b>                                                                                                                                                                              |                   |
| Residual impacts:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | <b>None</b>                                                                                                                                                                                    |                   |
| Cumulative impact post mitigation:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | <b>None</b>                                                                                                                                                                                    |                   |
| Significance rating of impact after mitigation<br>(e.g. Low, Medium, Medium-High, High, or Very-High)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | <b>Very Low (-)</b>                                                                                                                                                                            | <b>NO IMPACT</b>  |
| <b>Mitigation Measures:</b> <ul style="list-style-type: none"> <li>The habitats and microhabitats present on the project site are not unique and are widespread in the general area, hence the local impact associated with the footprint above current baseline levels would be of low significance if mitigation measures are adhered to. Faunal Species</li> <li>Small mammals within the habitat on and around the affected area are generally mobile and likely to be transient to the area. Specific measures are made to reduce this risk. The risk of species of special concern is low, and it is unlikely that there will be any impact to populations of such species because of the activity.</li> <li>A faunal search and rescue is unlikely to be required and no protected species are likely to be affected but is recommended as a precautionary measure.</li> <li>No animals are to be harmed, trapped or killed during the course of operations other than where rescue is required and only undertaken by an expert.</li> </ul> |                                                                                                                                                                                                |                   |



*Site Closure & Rehabilitation Phase*

| Alternative:                                                                                                                                                                                                                             | Preferred Alternative                                                                                                                                                                                                                                                         | No-Go Alternative |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| <b>Operational Phase</b>                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                               |                   |
| <b>Terrestrial Assessment Impact 1</b>                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                               |                   |
| <b>Potential impact and risk:</b>                                                                                                                                                                                                        | <b>Permanent or temporary loss of indigenous vegetation cover:</b><br>Permanent or temporary loss of indigenous vegetation cover because of site clearing. Site clearing before construction will result in the blanket clearing of vegetation within the affected footprint. |                   |
| Nature of impact:                                                                                                                                                                                                                        | <b>Negative</b>                                                                                                                                                                                                                                                               | <b>NO IMPACT</b>  |
| Extent and duration of impact:                                                                                                                                                                                                           | <b>Local and Short Term</b>                                                                                                                                                                                                                                                   |                   |
| Consequence of impact or risk:                                                                                                                                                                                                           | <b>Low</b>                                                                                                                                                                                                                                                                    |                   |
| Probability of occurrence:                                                                                                                                                                                                               | <b>Definite</b>                                                                                                                                                                                                                                                               |                   |
| Degree to which the impact may cause irreplaceable loss of resources:                                                                                                                                                                    | <b>Marginal loss of resource</b>                                                                                                                                                                                                                                              |                   |
| Degree to which the impact can be reversed:                                                                                                                                                                                              | <b>High</b>                                                                                                                                                                                                                                                                   |                   |
| Indirect impacts:                                                                                                                                                                                                                        | <b>None</b>                                                                                                                                                                                                                                                                   |                   |
| Cumulative impact prior to mitigation:                                                                                                                                                                                                   | <b>None</b>                                                                                                                                                                                                                                                                   |                   |
| Significance rating of impact prior to mitigation<br>(e.g. Low, Medium, Medium-High, High, or Very-High)                                                                                                                                 | <b>Low (-)</b>                                                                                                                                                                                                                                                                |                   |
| Degree to which the impact can be avoided:                                                                                                                                                                                               | <b>High</b>                                                                                                                                                                                                                                                                   |                   |
| Degree to which the impact can be managed:                                                                                                                                                                                               | <b>High</b>                                                                                                                                                                                                                                                                   |                   |
| Degree to which the impact can be mitigated:                                                                                                                                                                                             | <b>Can be mitigated</b>                                                                                                                                                                                                                                                       |                   |
| Proposed mitigation:                                                                                                                                                                                                                     | <b>See below.</b>                                                                                                                                                                                                                                                             |                   |
| Residual impacts:                                                                                                                                                                                                                        | <b>None</b>                                                                                                                                                                                                                                                                   |                   |
| Cumulative impact post mitigation:                                                                                                                                                                                                       | <b>None</b>                                                                                                                                                                                                                                                                   |                   |
| Significance rating of impact after mitigation<br>(e.g. Low, Medium, Medium-High, High, or Very-High)                                                                                                                                    | <b>Very Low (-)</b>                                                                                                                                                                                                                                                           | <b>NO IMPACT</b>  |
| <b>Mitigation Measures:</b> <ul style="list-style-type: none"> <li>No clearing outside of development footprint to take place.</li> <li>Areas surrounding the footprints should be revegetated on completion of construction.</li> </ul> |                                                                                                                                                                                                                                                                               |                   |

| Alternative:                                                          | Preferred Alternative                                                                                                                                                                                                                                                                                                            | No-Go Alternative |
|-----------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| <b>Operational Phase</b>                                              |                                                                                                                                                                                                                                                                                                                                  |                   |
| <b>Terrestrial Assessment Impact 2</b>                                |                                                                                                                                                                                                                                                                                                                                  |                   |
| <b>Potential impact and risk:</b>                                     | <b>Loss of flora Species of Conservation Concern:</b><br>Loss of flora Species of Conservation Concern during pre-construction site clearing activities. Several Species of Conservation Concern are known from surrounding areas, which could be destroyed during site preparation, none of which were confirmed to be present. |                   |
| Nature of impact:                                                     | <b>Negative</b>                                                                                                                                                                                                                                                                                                                  | <b>NO IMPACT</b>  |
| Extent and duration of impact:                                        | <b>Local and Short Term</b>                                                                                                                                                                                                                                                                                                      |                   |
| Consequence of impact or risk:                                        | <b>Low</b>                                                                                                                                                                                                                                                                                                                       |                   |
| Probability of occurrence:                                            | <b>Probable</b>                                                                                                                                                                                                                                                                                                                  |                   |
| Degree to which the impact may cause irreplaceable loss of resources: | <b>Marginal loss of resource</b>                                                                                                                                                                                                                                                                                                 |                   |

|                                                                                                                                                                                                              |                         |                  |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|------------------|
| Degree to which the impact can be reversed:                                                                                                                                                                  | <b>High</b>             |                  |
| Indirect impacts:                                                                                                                                                                                            | <b>None</b>             |                  |
| Cumulative impact prior to mitigation:                                                                                                                                                                       | <b>None</b>             |                  |
| Significance rating of impact prior to mitigation<br>(e.g. Low, Medium, Medium-High, High, or Very-High)                                                                                                     | <b>Low (-)</b>          |                  |
| Degree to which the impact can be avoided:                                                                                                                                                                   | <b>High</b>             |                  |
| Degree to which the impact can be managed:                                                                                                                                                                   | <b>High</b>             |                  |
| Degree to which the impact can be mitigated:                                                                                                                                                                 | <b>Can be mitigated</b> |                  |
| Proposed mitigation:                                                                                                                                                                                         | <b>See below.</b>       |                  |
| Residual impacts:                                                                                                                                                                                            | <b>None</b>             |                  |
| Cumulative impact post mitigation:                                                                                                                                                                           | <b>None</b>             |                  |
| Significance rating of impact after mitigation<br>(e.g. Low, Medium, Medium-High, High, or Very-High)                                                                                                        | <b>Very Low (-)</b>     | <b>NO IMPACT</b> |
| <b>Mitigation Measures:</b> <ul style="list-style-type: none"> <li>A flora search and rescue is unlikely to be required and no protected flora were found to be present within a natural context.</li> </ul> |                         |                  |

| <b>Alternative:</b>                                                                                      | <b>Preferred Alternative</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | <b>No-Go Alternative</b> |
|----------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
| <b>Operational Phase</b>                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                          |
| <b>Terrestrial Assessment Impact 3</b>                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                          |
| <b>Potential impact and risk:</b>                                                                        | <b>Susceptibility of post construction disturbed areas to invasion by exotic and alien invasive species:</b><br>Susceptibility of post construction disturbed areas to invasion by exotic and alien invasive species and removal of exotic and alien invasive species during construction. Post construction disturbed areas having no vegetation cover are often susceptible to invasion by weedy and alien species, which can not only become invasive but also prevent natural flora from becoming established. |                          |
| Nature of impact:                                                                                        | <b>Negative</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <b>NO IMPACT</b>         |
| Extent and duration of impact:                                                                           | <b>Local and Medium</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                          |
| Consequence of impact or risk:                                                                           | <b>Low</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                          |
| Probability of occurrence:                                                                               | <b>Highly Probable</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                          |
| Degree to which the impact may cause irreplaceable loss of resources:                                    | <b>Marginal loss of resource</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                          |
| Degree to which the impact can be reversed:                                                              | <b>High</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                          |
| Indirect impacts:                                                                                        | <b>None</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                          |
| Cumulative impact prior to mitigation:                                                                   | <b>None</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                          |
| Significance rating of impact prior to mitigation<br>(e.g. Low, Medium, Medium-High, High, or Very-High) | <b>Low (-)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                          |
| Degree to which the impact can be avoided:                                                               | <b>Moderate</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                          |
| Degree to which the impact can be managed:                                                               | <b>High</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                          |
| Degree to which the impact can be mitigated:                                                             | <b>Can be mitigated</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                          |
| Proposed mitigation:                                                                                     | <b>See below.</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                          |
| Residual impacts:                                                                                        | <b>None</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                          |

|                                                                                                                                                                                                                                                                     |                     |                  |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|------------------|
| Cumulative impact post mitigation:                                                                                                                                                                                                                                  | <b>None</b>         |                  |
| Significance rating of impact after mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)                                                                                                                                                                  | <b>Very Low (-)</b> | <b>NO IMPACT</b> |
| <b>Mitigation Measures:</b> <ul style="list-style-type: none"> <li>A suitable weed management strategy to be implemented in and around the site post construction, which is likely to result in proliferation of weeds in disturbed areas on completion.</li> </ul> |                     |                  |

| <b>Alternative:</b>                                                                                                                                                                                                                                                                                                            | <b>Preferred Alternative</b>                                                                                                                                                                                                                                                                                                                                                          | <b>No-Go Alternative</b> |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
| <b>Operational Phase</b>                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                       |                          |
| <b>Terrestrial Assessment Impact 4</b>                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                       |                          |
| <b>Potential impact and risk:</b>                                                                                                                                                                                                                                                                                              | <b>Susceptibility of some areas to erosion associated with slopes and proximity to watercourses:</b><br>Susceptibility of some areas to erosion because of construction related disturbances on slopes or in proximity to watercourses. Removal of vegetation cover and soil disturbance may result in some areas being susceptible to soil erosion after completion of the activity. |                          |
| Nature of impact:                                                                                                                                                                                                                                                                                                              | <b>Negative</b>                                                                                                                                                                                                                                                                                                                                                                       | <b>NO IMPACT</b>         |
| Extent and duration of impact:                                                                                                                                                                                                                                                                                                 | <b>Local and Medium</b>                                                                                                                                                                                                                                                                                                                                                               |                          |
| Consequence of impact or risk:                                                                                                                                                                                                                                                                                                 | <b>Low</b>                                                                                                                                                                                                                                                                                                                                                                            |                          |
| Probability of occurrence:                                                                                                                                                                                                                                                                                                     | <b>Probable</b>                                                                                                                                                                                                                                                                                                                                                                       |                          |
| Degree to which the impact may cause irreplaceable loss of resources:                                                                                                                                                                                                                                                          | <b>Marginal loss of resource</b>                                                                                                                                                                                                                                                                                                                                                      |                          |
| Degree to which the impact can be reversed:                                                                                                                                                                                                                                                                                    | <b>High</b>                                                                                                                                                                                                                                                                                                                                                                           |                          |
| Indirect impacts:                                                                                                                                                                                                                                                                                                              | <b>None</b>                                                                                                                                                                                                                                                                                                                                                                           |                          |
| Cumulative impact prior to mitigation:                                                                                                                                                                                                                                                                                         | <b>None</b>                                                                                                                                                                                                                                                                                                                                                                           |                          |
| Significance rating of impact prior to mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)                                                                                                                                                                                                                          | <b>Low (-)</b>                                                                                                                                                                                                                                                                                                                                                                        |                          |
| Degree to which the impact can be avoided:                                                                                                                                                                                                                                                                                     | <b>Moderate</b>                                                                                                                                                                                                                                                                                                                                                                       |                          |
| Degree to which the impact can be managed:                                                                                                                                                                                                                                                                                     | <b>High</b>                                                                                                                                                                                                                                                                                                                                                                           |                          |
| Degree to which the impact can be mitigated:                                                                                                                                                                                                                                                                                   | <b>Can be mitigated</b>                                                                                                                                                                                                                                                                                                                                                               |                          |
| Proposed mitigation:                                                                                                                                                                                                                                                                                                           | <b>See below.</b>                                                                                                                                                                                                                                                                                                                                                                     |                          |
| Residual impacts:                                                                                                                                                                                                                                                                                                              | <b>None</b>                                                                                                                                                                                                                                                                                                                                                                           |                          |
| Cumulative impact post mitigation:                                                                                                                                                                                                                                                                                             | <b>None</b>                                                                                                                                                                                                                                                                                                                                                                           |                          |
| Significance rating of impact after mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)                                                                                                                                                                                                                             | <b>Very Low (-)</b>                                                                                                                                                                                                                                                                                                                                                                   | <b>NO IMPACT</b>         |
| <b>Mitigation Measures:</b> <ul style="list-style-type: none"> <li>Suitable measures must be implemented where constructed on slopes to protected against erosion.</li> <li>Areas must be rehabilitated, and a suitable indigenous grass seed mix planted where natural vegetation re-establishment does not occur.</li> </ul> |                                                                                                                                                                                                                                                                                                                                                                                       |                          |

| Alternative:                                                                                                                                                                                                                            | Preferred Alternative                                                                                                                              | No-Go Alternative |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| <b>Operational Phase</b>                                                                                                                                                                                                                |                                                                                                                                                    |                   |
| <b>Terrestrial Assessment Impact 5</b>                                                                                                                                                                                                  |                                                                                                                                                    |                   |
| <b>Potential impact and risk:</b>                                                                                                                                                                                                       | <b>Disturbances to ecological processes:</b><br>Disturbances to ecological processes: Activity may result in disturbances to ecological processes. |                   |
| Nature of impact:                                                                                                                                                                                                                       | <b>Negative</b>                                                                                                                                    | <b>NO IMPACT</b>  |
| Extent and duration of impact:                                                                                                                                                                                                          | <b>Local and Short term</b>                                                                                                                        |                   |
| Consequence of impact or risk:                                                                                                                                                                                                          | <b>Low</b>                                                                                                                                         |                   |
| Probability of occurrence:                                                                                                                                                                                                              | <b>Probable</b>                                                                                                                                    |                   |
| Degree to which the impact may cause irreplaceable loss of resources:                                                                                                                                                                   | <b>Marginal loss of resource</b>                                                                                                                   |                   |
| Degree to which the impact can be reversed:                                                                                                                                                                                             | <b>High</b>                                                                                                                                        |                   |
| Indirect impacts:                                                                                                                                                                                                                       | <b>None</b>                                                                                                                                        |                   |
| Cumulative impact prior to mitigation:                                                                                                                                                                                                  | <b>None</b>                                                                                                                                        |                   |
| Significance rating of impact prior to mitigation<br>(e.g. Low, Medium, Medium-High, High, or Very-High)                                                                                                                                | <b>Low (-)</b>                                                                                                                                     |                   |
| Degree to which the impact can be avoided:                                                                                                                                                                                              | <b>High</b>                                                                                                                                        |                   |
| Degree to which the impact can be managed:                                                                                                                                                                                              | <b>High</b>                                                                                                                                        |                   |
| Degree to which the impact can be mitigated:                                                                                                                                                                                            | <b>Can be mitigated</b>                                                                                                                            |                   |
| Proposed mitigation:                                                                                                                                                                                                                    | <b>See below.</b>                                                                                                                                  |                   |
| Residual impacts:                                                                                                                                                                                                                       | <b>None</b>                                                                                                                                        |                   |
| Cumulative impact post mitigation:                                                                                                                                                                                                      | <b>None</b>                                                                                                                                        |                   |
| Significance rating of impact after mitigation<br>(e.g. Low, Medium, Medium-High, High, or Very-High)                                                                                                                                   | <b>Very Low (-)</b>                                                                                                                                | <b>NO IMPACT</b>  |
| <b>Mitigation Measures:</b>                                                                                                                                                                                                             |                                                                                                                                                    |                   |
| <ul style="list-style-type: none"> <li>A suitable weed management strategy to be implemented in and around the site post construction, which is likely to result in proliferation of weeds in disturbed areas on completion.</li> </ul> |                                                                                                                                                    |                   |

| Alternative:                                                                                             | Preferred Alternative                                                                           | No-Go Alternative |
|----------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|-------------------|
| <b>Operational Phase</b>                                                                                 |                                                                                                 |                   |
| <b>Terrestrial Assessment Impact 6</b>                                                                   |                                                                                                 |                   |
| <b>Potential impact and risk:</b>                                                                        | <b>Aquatic and Riparian processes:</b><br>Aquatic and Riparian processes: None present/affected |                   |
| Nature of impact:                                                                                        | <b>Negative</b>                                                                                 | <b>NO IMPACT</b>  |
| Extent and duration of impact:                                                                           | <b>Local and very short term</b>                                                                |                   |
| Consequence of impact or risk:                                                                           | <b>Low</b>                                                                                      |                   |
| Probability of occurrence:                                                                               | <b>Probable</b>                                                                                 |                   |
| Degree to which the impact may cause irreplaceable loss of resources:                                    | <b>Marginal loss of resource</b>                                                                |                   |
| Degree to which the impact can be reversed:                                                              | <b>High</b>                                                                                     |                   |
| Indirect impacts:                                                                                        | <b>None</b>                                                                                     |                   |
| Cumulative impact prior to mitigation:                                                                   | <b>None</b>                                                                                     |                   |
| Significance rating of impact prior to mitigation<br>(e.g. Low, Medium, Medium-High, High, or Very-High) | <b>Medium (-)</b>                                                                               |                   |
| Degree to which the impact can be avoided:                                                               | <b>Moderate</b>                                                                                 |                   |



|                                                                                                                                                                                                                                                                                                                                                 |                         |                  |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|------------------|
| Degree to which the impact can be managed:                                                                                                                                                                                                                                                                                                      | <b>High</b>             |                  |
| Degree to which the impact can be mitigated:                                                                                                                                                                                                                                                                                                    | <b>Can be mitigated</b> |                  |
| Proposed mitigation:                                                                                                                                                                                                                                                                                                                            | <b>See below.</b>       |                  |
| Residual impacts:                                                                                                                                                                                                                                                                                                                               | <b>None</b>             |                  |
| Cumulative impact post mitigation:                                                                                                                                                                                                                                                                                                              | <b>None</b>             |                  |
| Significance rating of impact after mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)                                                                                                                                                                                                                                              | <b>Low (-)</b>          | <b>NO IMPACT</b> |
| <b>Mitigation Measures:</b> <ul style="list-style-type: none"> <li>Adequate measures to be implemented for erosion control in excavations during and after construction.</li> <li>It is imperative that trenches near the watercourses (and the site as a whole) are not left open for extended periods of time during construction.</li> </ul> |                         |                  |

| <b>Alternative:</b>                                                                                                                                                                                                                                                                                                                                                                                                 | <b>Preferred Alternative</b>                                                                                                                                                                                                                         | <b>No-Go Alternative</b> |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
| <b>Operational Phase</b>                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                      |                          |
| <b>Terrestrial Assessment Impact 7</b>                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                      |                          |
| <b>Potential impact and risk:</b>                                                                                                                                                                                                                                                                                                                                                                                   | <b>Loss of faunal Species of Conservation Concern:</b><br>Loss of faunal SCC due to construction activities: Activities associated with bush clearing, killing of perceived dangerous fauna, may lead to increased mortalities among faunal species. |                          |
| Nature of impact:                                                                                                                                                                                                                                                                                                                                                                                                   | <b>Negative</b>                                                                                                                                                                                                                                      | <b>NO IMPACT</b>         |
| Extent and duration of impact:                                                                                                                                                                                                                                                                                                                                                                                      | <b>Local and very short term</b>                                                                                                                                                                                                                     |                          |
| Consequence of impact or risk:                                                                                                                                                                                                                                                                                                                                                                                      | <b>Low</b>                                                                                                                                                                                                                                           |                          |
| Probability of occurrence:                                                                                                                                                                                                                                                                                                                                                                                          | <b>Probable</b>                                                                                                                                                                                                                                      |                          |
| Degree to which the impact may cause irreplaceable loss of resources:                                                                                                                                                                                                                                                                                                                                               | <b>Marginal loss of resource</b>                                                                                                                                                                                                                     |                          |
| Degree to which the impact can be reversed:                                                                                                                                                                                                                                                                                                                                                                         | <b>High</b>                                                                                                                                                                                                                                          |                          |
| Indirect impacts:                                                                                                                                                                                                                                                                                                                                                                                                   | <b>None</b>                                                                                                                                                                                                                                          |                          |
| Cumulative impact prior to mitigation:                                                                                                                                                                                                                                                                                                                                                                              | <b>None</b>                                                                                                                                                                                                                                          |                          |
| Significance rating of impact prior to mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)                                                                                                                                                                                                                                                                                                               | <b>Low (-)</b>                                                                                                                                                                                                                                       |                          |
| Degree to which the impact can be avoided:                                                                                                                                                                                                                                                                                                                                                                          | <b>High</b>                                                                                                                                                                                                                                          |                          |
| Degree to which the impact can be managed:                                                                                                                                                                                                                                                                                                                                                                          | <b>High</b>                                                                                                                                                                                                                                          |                          |
| Degree to which the impact can be mitigated:                                                                                                                                                                                                                                                                                                                                                                        | <b>Can be mitigated</b>                                                                                                                                                                                                                              |                          |
| Proposed mitigation:                                                                                                                                                                                                                                                                                                                                                                                                | <b>See below.</b>                                                                                                                                                                                                                                    |                          |
| Residual impacts:                                                                                                                                                                                                                                                                                                                                                                                                   | <b>None</b>                                                                                                                                                                                                                                          |                          |
| Cumulative impact post mitigation:                                                                                                                                                                                                                                                                                                                                                                                  | <b>None</b>                                                                                                                                                                                                                                          |                          |
| Significance rating of impact after mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)                                                                                                                                                                                                                                                                                                                  | <b>Very Low (-)</b>                                                                                                                                                                                                                                  | <b>NO IMPACT</b>         |
| <b>Mitigation Measures:</b> <ul style="list-style-type: none"> <li>Small mammals within the habitat on and around the affected area are generally mobile and likely to be transient to the area. Specific measures are made to reduce this risk. The risk of species of special concern is low, and it is unlikely that there will be any impact to populations of such species because of the activity.</li> </ul> |                                                                                                                                                                                                                                                      |                          |

- A faunal search and rescue is unlikely to be required and no protected species are likely to be affected but is recommended as a precautionary measure.
- No animals are to be harmed, trapped or killed during the course of operations other than where rescue is required and only undertaken by an expert.

| Alternative:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Preferred Alternative                                                                   | No-Go Alternative |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|-------------------|
| <b>Operational Phase</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                         |                   |
| <b>Terrestrial Assessment Impact 8</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                         |                   |
| <b>Potential impact and risk:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <b>Loss of Faunal Processes:</b><br>Impacts to faunal processes because of the activity |                   |
| Nature of impact:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Negative                                                                                | NO IMPACT         |
| Extent and duration of impact:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Local and very short term                                                               |                   |
| Consequence of impact or risk:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Low                                                                                     |                   |
| Probability of occurrence:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Probable                                                                                |                   |
| Degree to which the impact may cause irreplaceable loss of resources:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Marginal loss of resource                                                               |                   |
| Degree to which the impact can be reversed:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | High                                                                                    |                   |
| Indirect impacts:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | None                                                                                    |                   |
| Cumulative impact prior to mitigation:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | None                                                                                    |                   |
| Significance rating of impact prior to mitigation<br>(e.g. Low, Medium, Medium-High, High, or Very-High)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Low (-)                                                                                 |                   |
| Degree to which the impact can be avoided:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | High                                                                                    |                   |
| Degree to which the impact can be managed:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | High                                                                                    |                   |
| Degree to which the impact can be mitigated:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Can be mitigated                                                                        |                   |
| Proposed mitigation:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | See below.                                                                              |                   |
| Residual impacts:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | None                                                                                    |                   |
| Cumulative impact post mitigation:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | None                                                                                    |                   |
| Significance rating of impact after mitigation<br>(e.g. Low, Medium, Medium-High, High, or Very-High)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Very Low (-)                                                                            | NO IMPACT         |
| <b>Mitigation Measures:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                         |                   |
| <ul style="list-style-type: none"> <li>• Small mammals within the habitat on and around the affected area are generally mobile and likely to be transient to the area. Specific measures are made to reduce this risk. The risk of species of special concern is low, and it is unlikely that there will be any impact to populations of such species because of the activity.</li> <li>• A faunal search and rescue is unlikely to be required and no protected species are likely to be affected but is recommended as a precautionary measure.</li> <li>• No animals are to be harmed, trapped or killed during the course of operations other than where rescue is required and only undertaken by an expert.</li> </ul> |                                                                                         |                   |

| Alternative:                           | Preferred Alternative                                                                                                                                                                          | No-Go Alternative |
|----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| <b>Operational Phase</b>               |                                                                                                                                                                                                |                   |
| <b>Terrestrial Assessment Impact 9</b> |                                                                                                                                                                                                |                   |
| <b>Potential impact and risk:</b>      | <b>Loss of Faunal Habitat:</b><br>Loss of Faunal Habitat: Activity may result in the loss of habitat for faunal species, which could result in disturbance and displacement of faunal species. |                   |
| Nature of impact:                      | Negative                                                                                                                                                                                       | NO IMPACT         |
| Extent and duration of impact:         | Local and very short term                                                                                                                                                                      |                   |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                  |                  |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|------------------|
| Consequence of impact or risk:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | <b>Low</b>                       |                  |
| Probability of occurrence:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | <b>Probable</b>                  |                  |
| Degree to which the impact may cause irreplaceable loss of resources:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | <b>Marginal loss of resource</b> |                  |
| Degree to which the impact can be reversed:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | <b>High</b>                      |                  |
| Indirect impacts:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | <b>None</b>                      |                  |
| Cumulative impact prior to mitigation:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | <b>None</b>                      |                  |
| Significance rating of impact prior to mitigation<br>(e.g. Low, Medium, Medium-High, High, or Very-High)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <b>Low (-)</b>                   |                  |
| Degree to which the impact can be avoided:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | <b>High</b>                      |                  |
| Degree to which the impact can be managed:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | <b>High</b>                      |                  |
| Degree to which the impact can be mitigated:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | <b>Can be mitigated</b>          |                  |
| Proposed mitigation:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | <b>See below.</b>                |                  |
| Residual impacts:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | <b>None</b>                      |                  |
| Cumulative impact post mitigation:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | <b>None</b>                      |                  |
| Significance rating of impact after mitigation<br>(e.g. Low, Medium, Medium-High, High, or Very-High)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | <b>Very Low (-)</b>              | <b>NO IMPACT</b> |
| <b>Mitigation Measures:</b> <ul style="list-style-type: none"> <li>The habitats and microhabitats present on the project site are not unique and are widespread in the general area, hence the local impact associated with the footprint above current baseline levels would be of low significance if mitigation measures are adhered to. Faunal Species</li> <li>Small mammals within the habitat on and around the affected area are generally mobile and likely to be transient to the area. Specific measures are made to reduce this risk. The risk of species of special concern is low, and it is unlikely that there will be any impact to populations of such species because of the activity.</li> <li>A faunal search and rescue is unlikely to be required and no protected species are likely to be affected but is recommended as a precautionary measure.</li> <li>No animals are to be harmed, trapped or killed during the course of operations other than where rescue is required and only undertaken by an expert.</li> </ul> |                                  |                  |

*Impacts to Aquatic & Riparian Processes are expected to be medium before mitigation and Low after mitigation. All other impacts are assessed to be of low significance before mitigation and can be reduced to very low (or insignificant) with the implementation of the mitigation measures.*

**Note: Since the installation of the pipeline is a temporary activity the 'operational phase is deemed to also be equivalent to the Site Closure and Rehabilitation Phase.**

### 3.3.3 Potential Terrestrial Biodiversity Impacts (Cumulative)

No cumulative impacts are expected because of the development of the site providing recommendation and mitigation measures are adhered to, due to the limited disturbance area.

### 3.3.4 Terrestrial Biodiversity Impact Reversibility

In general, most impacts will have a high reversibility in the affected habitat as installation of sewer will be a temporary activity and will likely return to a pre-construction state within two years.

### 3.3.5 Impacts and Risks to Irreplaceable Biodiversity Resources

Risks to Irreplaceable Biodiversity Resources is low to very low.

### 3.3.6 Residual Risks and Uncertainties

No residual risks or uncertainties are anticipated.

## 3.4 Findings, Outcomes and Recommendations

### 3.4.1 Summary of Findings

- The vegetation on site is generally highly modified, degraded, transformed and/or comprising vegetation cover with little evidence of remnant natural vegetation (Garden Route Granite Fynbos).
- No Sensitive plant or Animal species identified as per the National Environmental Screening Tool were found to be present or likely to be present. The general vegetation cover along the remnant watercourses is primarily comprised of kikuyu grass (non-indigenous) and a wide range of invasive and weed herbaceous, shrub and tree species.
- Although areas are designated CBA 1 and CBA 2, these designations do not have remnant Garden Route Granite Fynbos vegetation. In terms of species composition. While the vegetated areas may provide habitat for faunal species, these are mostly species that are adapted to an urbanised environment.
- All of the portions of sewer within the residential area (roads and road verges) and are designated a VERY LOW SENSITIVITY.
- LOW SENSITIVITY areas are vegetated but generally kikuyu grass and limited to a few sections where the sewer enters the vegetated area.
- Almost the entire vegetated area (i.e. the areas of the route that are adjacent to the watercourse but on the upper banks where little to no natural riverine vegetation persists are designated a MODERATE sensitivity, where exotic and invasive species comprise most of the vegetation cover, but with some indigenous elements.
- VERY HIGH sensitivity portions are designated where Watercourses and riparian vegetation, although primarily exotic species) is present. This is limited to a single area where a 'watercourse' crossing is present. The high sensitivity is given more for the sake of highlighting that additional precautions will be required during construction, being a watercourse, rather than elevated ecological sensitivity as the area is also highly modified. Since the primary objective is to improve sewerage management and improve capacity, the overall impact of the sewer pipelines is not significantly negative within the broader context of the site and surrounds.
- No VERY HIGH sensitivity areas are identified but limited to the terrestrial environment and excludes aquatic processes, which is outside of the scope of this terrestrial assessment.
- No No-go areas are identified within the site footprint.
- No significant direct, indirect or cumulative impacts are anticipated.

### 3.4.2 Recommendations & Mitigation Measures

- The proposed activity is unlikely to pose any significant risk to natural ecological processes; vegetarian or plant and animal species of conservation concern due to the limited footprint and significantly degraded and/or transformed nature of the site(s).
- No PNCO protected species were recorded within any of the proposed sewer pipeline footprints. PNCO (Provincial Nature Conservation Ordinance) permits are not likely to be required for any naturally occurring indigenous species.



- The proposed activity, having a negligible footprint within significantly modified habitat, is thus unlikely to significantly impact any ecological process, intact vegetation with an elevated conservation status or species above current baseline levels, as it will be a temporary activity and will likely return to a pre-construction state within two years.

Table 8 lists specific mitigation measures that must be implemented and adhered to. These must be considered to be conditions of authorisation.

Table 8: Specific Mitigation Measures and Recommendations

| IMPACT                         | MITIGATION MEASURES                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|--------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Vegetation                     | <ul style="list-style-type: none"> <li>• No clearing outside of development footprint to take place.</li> <li>• Areas surrounding the footprints should be revegetated on completion of construction.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Flora Species                  | <ul style="list-style-type: none"> <li>• A flora search and rescue is <u>unlikely</u> to be required and no protected flora were found to be present within a natural context.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Alien Invasive Species         | <ul style="list-style-type: none"> <li>• A suitable weed management strategy to be implemented in and around the site post construction, which is likely to result in proliferation of weeds in disturbed areas on completion.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Erosion                        | <ul style="list-style-type: none"> <li>• Suitable measures must be implemented where constructed on slopes to protected against erosion.</li> <li>• Areas must be rehabilitated, and a suitable indigenous grass seed mix planted where natural vegetation re-establishment does not occur.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Aquatic and Riparian processes | <ul style="list-style-type: none"> <li>• Adequate measures to be implemented for erosion control in excavations during and after construction.</li> <li>• It is imperative that trenches near the watercourses (and the site as a while) are not left open for extended periods of time during construction.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                               |
| Faunal Processes               | <ul style="list-style-type: none"> <li>• The habitats and microhabitats present on the project site are not unique and are widespread in the general area, hence the local impact associated with the footprint above current baseline levels would be of low significance if mitigation measures are adhered to.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                          |
| Faunal Species                 | <ul style="list-style-type: none"> <li>• Small mammals within the habitat on and around the affected area are generally mobile and likely to be transient to the area. Specific measures are made to reduce this risk. The risk of species of special concern is low, and it is unlikely that there will be any impact to populations of such species because of the activity.</li> <li>• A faunal search and rescue is <u>unlikely</u> to be required and no protected species are likely to be affected but is recommended as a precautionary measure.</li> <li>• No animals are to be harmed, trapped or killed during the course of operations other than where rescue is required and only undertaken by an expert. .</li> </ul> |

### 3.5 Site Preparation and Vegetation Clearing Plan

No flora relocation is likely to be required before commencement, and flora permits are unlikely to be required.

No fauna relocation is likely to be required before commencement, and permits were unlikely to be required for any species of conservation concern but recommended as a precautionary measure for any small rodents and reptiles may occur, and since fauna are mobile, they may be transient to the area.

### 3.6 Open Space Management/Conservation Plan

None are applicable for this project.

### 3.7 Maintenance Management Plan

Ongoing maintenance is likely to be required in the long-term, which could include ongoing repairs to sewer pipelines. All measures of this report, including the EMPr should be adhered for any maintenance requirements during the operation phase. Any excavated areas must be stabilised and rehabilitated as per the measures indicated in this report.

## 4 Organizational Capacity and Competency

Successful Implementation will be in part be dependent on the organisational capacity and competency of the applicant and any implementing agents. The following aspects are likely to pose risk to the successful mitigation of the project:

- Budget constraints – budget allocated for environmental management tends to be inadequate for construction projects.
- Organisational Structure – implementing agents may or may not have adequate capacity and competency to ensure appropriate and adequate environmental management.

## 5 Emergency Preparedness and Response

Emergency Preparedness Plan must be included in the EMPr and should address specific measures relating to the following emergency risks:

- Fire management and response.
- Spill management and incident response.
- Waste management and incident response.
- Response to emergency site shutdown, including labour and protest actions.

## 6 Stakeholder Engagement

Possible Stakeholders relating to Biodiversity could include the following key groups:

- Neighbouring Property Owners
- Local Regional and National Conservation Authorities

No Stakeholder Engagement was conducted specifically by the Specialist. Stakeholder Engagement will be undertaken by the EAP as part of the environment application public participatory process. Any comments raised relating to Biodiversity will be addressed by the specialist in the final report.

## 7 Monitoring and Review

Key monitoring activities should include the following:

1. Pre-construction
  - a) Ensure flora permits are in place timeously (PNCO only) – allow at least 1 or 2 months before commencement.
  - b) Environmental Awareness and training (EAT) – Ensure all labour are informed and plant operators are aware of risks, issues, do's and don'ts and no-go areas.
2. Bush clearing
  - a) Ensure working plant has no oil or hydraulic leaks
  - b) Check delineated footprints area not exceeded.

3. Construction
  - a) Regular checks on trenches for trapped animals and possible drowning risks
  - b) Regular checks of fences for snares
4. Rehabilitation
  - a) Check quality of topsoil and weed free.
  - b) Check for weed regrowth and manage timeously (before seed is set)
5. Operation monitoring
  - a) Weed management on ongoing basis.
  - b) Erosion to be addressed on ongoing basis

## 8 Appendices

### 8.1 Appendix A: References

#### General Reference Sources

- Acocks, J. P. H. 1988. *Veld Types of South Africa*. Memoirs of the Botanical Survey of South Africa, No 57. Botanical Research Institute, Department of Agriculture and Water Supply, South Africa.
- Atlas and Red List of the Reptiles of South Africa, Lesotho and Swaziland. 2014. Edited by Michael F. Bates, William R. Branch, Aaron M. Bauer, Marius Burger, Johan Marais, Graham J. Alexander & Marienne S. de Villiers. SANBI, Pretoria.
- Bates, M.F., Branch, W.R., Bauer, A.M., Burger, M., Marais, J., Alexander, G.J. & Marienne S. de Villiers. (Eds). 2014. *Atlas and Red List of the Reptiles of South Africa, Lesotho and Swaziland*. SANBI, Pretoria.
- Bromilow, C. 2001. *Problem Plants of South Africa*. A Guide to the Identification and Control of More than 300 Invasive Plants and Other Weeds. Briza Publications. Pp 258
- Child M.F., Roxburgh L., Do Linh San E., Raimondo D., Davies-Mostert H.T. 2016. *The Red List of Mammals of South Africa, Swaziland and Lesotho*. South African National Biodiversity Institute and Endangered Wildlife Trust, South Africa.
- Council for Scientific and Industrial Research. NFEPA river FEPAs 2011 [vector geospatial dataset] 2011. Available from the Biodiversity GIS website, downloaded on 20 July 2020.
- Council for Scientific and Industrial Research. NFEPA rivers 2011 [vector geospatial dataset] 2011. Available from the Biodiversity GIS website, downloaded on 20 July 2020.
- Council for Scientific and Industrial Research. NFEPA wetland clusters 2011 [vector geospatial dataset] 2011. Available from the Biodiversity GIS website, downloaded on 20 July 2020.
- Council for Scientific and Industrial Research. NFEPA wetlands vegetation 2011 [vector geospatial dataset] 2011. Available from the Biodiversity GIS website, downloaded on 20 July 2020.
- Cowling, R.M., Richardson, D.M. & Pierce, S.M. 1997. *Vegetation of Southern Africa*. Cambridge University Press.
- Esler, K.J., Milton, S.J. & Dean, W.R.J. 2006. *Karoo Veld: Ecology and Management*. Briza Publications.
- Fitzpatrick Institute of African Ornithology (2024). MammalMAP Virtual Museum. Accessed at <http://vmus.adu.org.za/?vm=MammalMAP> on 2024-01-27.
- Fitzpatrick Institute of African Ornithology (2024). OrchidMAP Virtual Museum. Accessed at <http://vmus.adu.org.za/?vm=OrchidMAP> on 2024-01-27.
- Fitzpatrick Institute of African Ornithology (2024). PHOWN Virtual Museum. Accessed at <http://vmus.adu.org.za/?vm=PHOWN> on 2024-01-27.
- FitzPatrick Institute of African Ornithology (2024). ScorpionMAP Virtual Museum. Accessed at <http://vmus.adu.org.za/?vm=ScorpionMAP> on 2024-01-27.
- Fitzpatrick Institute of African Ornithology (2024). SpiderMAP Virtual Museum. Accessed at <http://vmus.adu.org.za/?vm=SpiderMAP> on 2024-01-27.

- Fuggle, R. F. & Rabie, M. A. 2003. *Environmental Management in South Africa*. Juta & Co, Johannesburg.
- Germishuizen, G. & Meyer, N.L. (eds). 2003. *Plants of southern Africa: An annotated checklist*. Strelitzia, 14. Pretoria: National Botanical Institute.
- Golding, J. (Ed.) 2002. *Southern African Plant Red Data Lists*. Southern African Botanical Diversity Network Report No 14.
- Henderson, L. 2001. *Alien Weeds and Invasive Plants*. Plant Protection Research Institute Handbook No 12. Agricultural Research Council. Pp 300.
- Hilton-Taylor, C. 1996. *Red Data List of Southern African Plants*. National Botanical Institute.
- Hockey PAR, Dean WRJ and Ryan PG 2005. *Roberts - Birds of southern Africa*, VIIth ed. The Trustees of the John Voelcker Bird Book Fund, Cape Town.
- International Finance Corporation. 2012. *Performance Standards on Environmental and Social Sustainability*.
- Low, A.B. & Rebelo, A.G. 1998. *Vegetation of South Africa, Lesotho and Swaziland*. Pretoria: Department of Environmental Affairs and Tourism.
- Marnewick MD, Retief EF, Theron NT, Wright DR, Anderson TA. 2015. *Important Bird and Biodiversity Areas of South Africa*. Johannesburg: BirdLife South Africa.
- Mecenero, S., Ball, J.B., Edge, D.A., Hamer, M.L., Hening, G.A., Krüger, M., Pringle, R.L., Terblanche, R.F. & Williams, M.C. (Eds). 2013. *Conservation assessment of butterflies of South Africa, Lesotho and Swaziland: Red List and atlas*. Safronics (Pty) Ltd., Johannesburg and Animal Demography Unit, Cape Town.
- Minter LR, Burger M, Harrison JA, Braack HH, Bishop PJ & Kloepfer D (Eds). 2004. *Atlas and Red Data book of the frogs of South Africa, Lesotho and Swaziland*. SI/MAB Series no. 9. Smithsonian Institution, Washington, D.C.
- Minter LR, Burger M, Harrison JA, Braack HH, Bishop PJ & Kloepfer D (eds). 2004. *Atlas and Red Data book of the frogs of South Africa, Lesotho and Swaziland*. SI/MAB Series no. 9. Smithsonian Institution, Washington, D.C.
- Mucina, L. & Rutherford, M.C. (Eds). 2006. *The vegetation of South Africa, Lesotho and Swaziland*, in Strelitzia 19. South African National Biodiversity Institute, Pretoria.
- Myers, N., Mittermeir, R.A., Mittermeir, C.G., De Fonseca, G.A.B. & Kent, J. 2000. *Biodiversity hotspots for conservation priorities*. Nature, 403: 853–858.
- Nel, J., Colvin, C., Le Maitre, D., Smith, J., Haines, I. 2013. *Defining South Africa's Water Source Areas*. WWF South Africa & Council for Scientific & Industrial Research (CSIR).
- Nel, J.L., Murray, K.M., Maherry, A.M., Petersen, C.P., Roux, D.J., Driver, A., Hill, L., van Deventer, H., Funke, N., Swart, E.R., Smith-Ado, L.B., Mbona, N., Downsborough, L. & Nienaber, S. 2011. *Technical Report for the National Freshwater Ecosystem Priority Areas project*. Report to the Water Research Commission, WRC Report No. 1801/2/11. ISBN 978-1-4312-0149-5.
- Pienaar, K. 2000. *The South African What Flower is That?* Struik Publishers (Pty) Ltd. Cape Town.
- Powrie, L.W. 2013. A database of biodiversity taxon names in South Africa for copy-and-paste into reports or documents. South African National Biodiversity Institute, Cape Town. Obtained from SANBI on 20 July 2020.
- Powrie, L.W. 2013. A list of South African biodiversity terms and common names for spell checking. South African National Biodiversity Institute, Cape Town. Downloaded from [www.sanbi.org](http://www.sanbi.org) on 20 July 2020.
- Powrie, L.W. 2013. A list of South African botanical names for spell checking. South African National Biodiversity Institute, Cape Town. Downloaded from [www.sanbi.org](http://www.sanbi.org) 18 July 2020.
- Powrie, L.W. 2013. A list of South African physical feature names for spell checking. South African National Biodiversity Institute, Cape Town. Downloaded from [www.sanbi.org](http://www.sanbi.org) on 20 July 2020.
- Powrie, L.W. 2013. A list of South African zoological and other (including fungi and lichen) names for spell checking. South African National Biodiversity Institute, Cape Town. Downloaded from [www.sanbi.org](http://www.sanbi.org) on 20 July 2020.



- Rouget, M., Reyers, B., Jonas, Z., Desmet, P., Driver, A., Maze, K., Egoh, B. & Cowling, R.M. 2004. *South African National Spatial Biodiversity Assessment 2004: Technical Report. Volume 1: Terrestrial Component*. Pretoria: South African National Biodiversity Institute.
- Skowno, A.L., Raimondo, D.C., Poole, C.J., Fizzotti, B. & Slingsby, J.A. (Eds.). 2019. *South African National Biodiversity Assessment 2018 Technical Report Volume 1: Terrestrial Realm*. South African National Biodiversity Institute, Pretoria. <http://hdl.handle.net/20.>
- South African National Biodiversity Institute (SANBI). 2019. *National Biodiversity Assessment 2018: The status of South Africa's ecosystems and biodiversity. Synthesis Report*. South African National Biodiversity Institute, an entity of the Department of Environment, Forestry and Fisheries, Pretoria. pp. 1–214.
- Stirton, C. H. 1987. *Plant Invaders: Beautiful, but Dangerous*. The Department of Nature and Environmental Conservation of the Cape Province Administration. Galvin and Sales, Cape Town.
- Taylor, M.R., Peacock, F., and Wanless, R.M. 2015. *Eskom Red Data Book of Birds of South Africa, Lesotho and Swaziland*.
- Taylor, P.B., Navarro, R.A., Wren-Sargent, M., Harrison, J.A. & Kieswetter, S.L. 1999. *Coordinated waterbird Counts in South Africa, 1992-1997*. Avian Demography Unit, Cape Town.
- UN Natural Value Initiative. 2009. *The Ecosystem Services Benchmark, 2009*.
- Van Wyk, A.E. & Smith, G.F. 2001. *Regions of Floristic Endemism: A Review with Emphasis on Succulents*, Umdaus Press.
- Weather Bureau. 1988. *Climate of South Africa – Climate statistics up to 1984 (WB40)*. Government Printer, Pretoria.
- Young, D.J., Harrison, J.A, Navarro, R.A., Anderson, M.A., & Colahan, B.D. (Eds.). 2003. *Big birds on farms: Mazda CAR Report 1993-2001*. Avian Demography Unit: Cape Town.

#### Web Databases

- Animal Demographic Unit: <http://vmus.adu.org.za>
- Conservation International: <http://www.biodiversityhotspots.org>
- Global Biodiversity Information Facility (GBIF): <http://gbif.org>
- International Union for Conservation of Nature (IUCN) Redlist: <http://iucnredlist.org>
- Millennium Ecosystem Assessment (MEA). 2005: <https://www.millenniumassessment.org>
- Plants of Southern Africa: <http://newposa.sanbi.org>
- South African National Biodiversity Institute (SANBI) Redlist: <http://redlist.sanbi.org>
- South African Bird Atlas Project: <http://sabap2.birdmap.africa>
- United Nations Environment Programme (UNEP), *A to Z Areas of Biodiversity Importance*: <http://www.biodiversitya-z.org>
- United Nations Environment Programme (UNEP), *World Database on Protected Areas, Protected Planet*: <http://www.protectedplanet.net>
- World Resources Institute (WRI): <https://www.wri.org>

## 8.2 Appendix B: Abbreviations & Glossary

### 8.2.1 Abbreviations

|        |                                                                                                                                                                                                                                                                                                                                               |
|--------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CARA   | Conservation of Agricultural Resources Act, Act 43 of 1983                                                                                                                                                                                                                                                                                    |
| CBA    | Critical Biodiversity Area                                                                                                                                                                                                                                                                                                                    |
| DEA    | Department of Environmental Affairs (now DFFE, see below)                                                                                                                                                                                                                                                                                     |
| DEDEAT | Department of Economic Development, Environmental Affairs and Tourism<br>The Department of Environmental Affairs was renamed the <u>Department of Forestry, Fisheries &amp; the Environment</u> (DFFE) in April 2021, incorporating the forestry and fisheries functions from the previous Department of Agriculture, Forestry and Fisheries. |
| DFFE   |                                                                                                                                                                                                                                                                                                                                               |
| DEMC   | Desired Ecological Management Class                                                                                                                                                                                                                                                                                                           |
| DWS    | Department of Water Affairs and Sanitation                                                                                                                                                                                                                                                                                                    |
| DWAF   | Department of Water Affairs and Forestry (former department name)                                                                                                                                                                                                                                                                             |
| EA     | Environmental Authorisation                                                                                                                                                                                                                                                                                                                   |
| ECO    | Environmental Control Officer                                                                                                                                                                                                                                                                                                                 |
| EIA    | Environmental Impact Assessment                                                                                                                                                                                                                                                                                                               |
| EIR    | Environmental Impact Report                                                                                                                                                                                                                                                                                                                   |
| EMC    | Ecological Management Class                                                                                                                                                                                                                                                                                                                   |
| EMP    | Environmental Management Plan                                                                                                                                                                                                                                                                                                                 |
| EMPr   | Environmental Management Programme report                                                                                                                                                                                                                                                                                                     |
| ER     | Environmental Representative                                                                                                                                                                                                                                                                                                                  |
| ESS    | Ecosystem Services                                                                                                                                                                                                                                                                                                                            |
| IAP's  | Interested and Affected Parties                                                                                                                                                                                                                                                                                                               |
| IEM    | Integrated Environmental Management                                                                                                                                                                                                                                                                                                           |
| LM     | Local Municipality                                                                                                                                                                                                                                                                                                                            |
| masl   | meters above sea level                                                                                                                                                                                                                                                                                                                        |
| NBA    | National Biodiversity Assessment                                                                                                                                                                                                                                                                                                              |
| NEMA   | National Environmental Management Act, Act 107 of 1998                                                                                                                                                                                                                                                                                        |
| NFA    | National Forests Act                                                                                                                                                                                                                                                                                                                          |
| NEM:BA | National Environmental Management: Biodiversity Act 10 of 2004                                                                                                                                                                                                                                                                                |
| NFA    | National Forest Act, Act 84 of 1998                                                                                                                                                                                                                                                                                                           |
| PEMC   | Present Ecological Management Class                                                                                                                                                                                                                                                                                                           |
| PES    | Present Ecological State                                                                                                                                                                                                                                                                                                                      |
| PNCO   | Provincial Nature and Environment Conservation Ordinance (No. 19 of 1974).                                                                                                                                                                                                                                                                    |
| RDL    | Red Data List                                                                                                                                                                                                                                                                                                                                 |
| RHS    | Right Hand Side                                                                                                                                                                                                                                                                                                                               |
| RoD    | Record of Decision                                                                                                                                                                                                                                                                                                                            |
| SANBI  | South African National Biodiversity Institute                                                                                                                                                                                                                                                                                                 |
| SDF    | Spatial Development Framework                                                                                                                                                                                                                                                                                                                 |
| SoER   | State of the Environment Report                                                                                                                                                                                                                                                                                                               |
| SSC    | Species of Special Concern                                                                                                                                                                                                                                                                                                                    |
| ToPS   | Threatened or Protected Species                                                                                                                                                                                                                                                                                                               |
| ToR    | Terms of Reference                                                                                                                                                                                                                                                                                                                            |
| +ve    | Positive                                                                                                                                                                                                                                                                                                                                      |
| -ve    | Negative                                                                                                                                                                                                                                                                                                                                      |

## 8.2.2 Glossary

|                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Alien Invasive Species (AIS) | An alien species whose introduction and/or spread threaten biological diversity ( <a href="#">Convention on Biological Diversity</a> ). Note: “Alien invasive species” is considered to be equivalent to “invasive alien species”. An alien species which becomes established in natural or semi-natural ecosystems or habitat, is an agent of change, and threatens native biological diversity ( <a href="#">IUCN</a> ).                                                                                                               |
| Best Environmental Practice  | The application of the most appropriate combination of environmental control measures and strategies ( <a href="#">Stockholm Convention</a> ).                                                                                                                                                                                                                                                                                                                                                                                           |
| Best Management Practice     | Established techniques or methodologies that, through experience and research, have proven to lead to a desired result ( <a href="#">BBOP</a> ).                                                                                                                                                                                                                                                                                                                                                                                         |
| Biodiversity                 | Biological diversity means the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are a part; this includes diversity within species, between species and of ecosystems.                                                                                                                                                                                                                                             |
| Biodiversity Offset          | Measurable conservation outcomes resulting from actions designed to compensate for significant residual adverse biodiversity impacts arising from project development after appropriate prevention and mitigation measures have been taken. The goal of biodiversity offsets is to achieve no net loss and preferably a net gain of biodiversity on the ground with respect to species composition, habitat structure and ecosystem function and people’s use and cultural values associated with biodiversity ( <a href="#">BBOP</a> ). |
| Bioremediation               | The use of organisms such as plants or microorganisms to aid in removing hazardous substances from an area. Any process that uses microorganisms, fungi, green plants, or their enzymes to return the natural environment altered by contaminants to its original condition.                                                                                                                                                                                                                                                             |
| Boundary                     | Landscape patches have a boundary between them which can be defined or fuzzy ( <a href="#">Sanderson and Harris, 2000</a> ). The zone composed of the edges of adjacent ecosystems is the boundary.                                                                                                                                                                                                                                                                                                                                      |
| Catchment                    | In relation to a watercourse or watercourses or part of a watercourse, means the area from which any rainfall will drain into the watercourse or watercourses or part of a watercourse, through surface flow to a common point or common points.                                                                                                                                                                                                                                                                                         |
| Connectivity                 | The measure of how connected or spatially continuous a corridor, network, or matrix is. For example, a forested landscape (the matrix) with fewer gaps in forest cover (open patches) will have higher connectivity.                                                                                                                                                                                                                                                                                                                     |
| Corridors                    | Have important functions as strips of a landscape differing from adjacent land on both sides. Habitat, ecosystems or undeveloped areas that physically connect habitat patches. Smaller, intervening patches of surviving habitat can also serve as “steppingstones” that link fragmented ecosystems by ensuring that certain ecological processes are maintained within and between groups of habitat fragments.                                                                                                                        |
| Critically Endangered (CR)   | A category on the IUCN Red List of Threatened Species which indicates a taxon is considered to be facing an <b>extremely high risk of extinction in the wild</b> ( <a href="#">IUCN</a> ).                                                                                                                                                                                                                                                                                                                                               |
| Cultural Ecosystem Services  | The non-material benefits people obtain from ecosystems through spiritual enrichment, cognitive development, reflection, recreation, and aesthetic experience, including, e.g. knowledge systems, social relations, and aesthetic values ( <a href="#">Millennium Ecosystem Assessment</a> ).                                                                                                                                                                                                                                            |
| Cumulative Impacts           | The total impact arising from the project (under the control of the developer), other activities (that may be under the control of others, including other developers, local communities, government) and other background pressures                                                                                                                                                                                                                                                                                                     |

|                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                       | and trends which may be unregulated. The project's impact is therefore one part of the total cumulative impact on the environment. The analysis of a project's incremental impacts combined with the effects of other projects can often give a more accurate understanding of the likely results of the project's presence than just considering its impacts in isolation ( <a href="#">BBOP</a> ).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Data Deficient (DD)   | A taxon is Data Deficient when there is inadequate information to make a direct, or indirect, assessment of its risk of extinction based on its distribution and/or population status. A taxon in this category may be well studied, and its biology well known, but appropriate data on abundance and/or distribution are lacking. Data Deficient is therefore not a category of threat( <a href="#">IUCN</a> ).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Degraded Habitat/Land | Land that has been impacted upon by human activities (including introduction of invasive alien plants, light to moderate overgrazing, accelerated soil erosion, dumping of waste), but still retains a degree of its original structure and species composition (although some species loss would have occurred) and where ecological processes still occur (albeit in an altered way). Degraded land is capable of being restored to a near-natural state with appropriate ecological management.                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Disturbance           | An event that significantly alters the pattern of variation in the structure or function of a system, while fragmentation is the breaking up of a habitat, ecosystem, or land-use type into smaller parcels. Disturbance is generally considered a natural process.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Ecological Function   | How each of the elements in the landscape interacts based on its life cycle events [Producers, Consumers, Decomposers Transformers]. Includes the capacity of natural processes and components to provide goods and services that satisfy human needs, either directly or indirectly.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Ecological Pattern    | The contents and internal order of the landscape, or its spatial (and temporal) components. May be homogenous or heterogenous. Result from the ecological processes that produce them.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Ecological Process    | Includes <i>Physical processes</i> [Climate (precipitation, insolation), hydrology, geomorphology]; <i>Biological processes</i> [Photosynthesis, respiration, reproduction]; <i>Ecological processes</i> [Competition, predator-prey interactions, environmental gradients, life histories]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Ecological Processes  | Ecological processes typically only function well where natural vegetation remains, and where the remaining vegetation is well-connected with other nearby patches of natural vegetation. Loss and fragmentation of natural habitat severely threaten the integrity of ecological processes. Where basic processes are intact, ecosystems are likely to recover more easily from disturbances or inappropriate actions if the actions themselves are not permanent. Conversely, the more interference there has been with basic processes, the greater the severity (and longevity) of effects. Natural processes are complex and interdependent, and it is not possible to predict all the consequences of loss of biodiversity or ecosystem integrity. When a region's natural or historic level of diversity and integrity is maintained, higher levels of system productivity are supported in the long run, and the overall effects of disturbances may be dampened. |
| Ecological Structure  | The composition, or configuration, and the proportion of different patches across the landscape. Relates to species diversity, the greater the diversity, the more complex the structure. A description of the organisms and physical features of environment including nutrients and climatic conditions.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Ecosystem             | All the organisms of a habitat, such as a lake or forest, together with the physical environment in which they live. A dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |



|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Ecosystem Services | A dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit. Supporting Ecosystem services are those that are necessary for the maintenance of all other ecosystem services. Some examples include biomass production, production of atmospheric oxygen, soil formation and retention, nutrient cycling, water cycling, and provisioning of habitat.                                                                                                                                                                                                                                                                                                                                                |
| Ecosystem Status   | Ecosystem status of terrestrial ecosystems is based on the degree of habitat loss that has occurred in each ecosystem, relative to two thresholds: one for maintaining healthy ecosystem functioning, and one for conserving the majority of species associated with the ecosystem. As natural habitat is lost in an ecosystem, its functioning is increasingly compromised, leading eventually to the collapse of the ecosystem and to loss of species associated with that ecosystem ( <a href="#">Millennium Ecosystem Assessment</a> ).                                                                                                                                                                                                                                 |
| Ecotone            | The transitional zone between two communities. Ecotones can arise naturally, such as a lakeshore, or can be human created, such as a cleared agricultural field from a forest. The ecotonal community retains characteristics of each bordering community and often contains species not found in the adjacent communities. Classic examples of ecotones include fencerows; forest to marshlands transitions; forest to grassland transitions; or land-water interfaces such as riparian zones in forests. Characteristics of ecotones include vegetational sharpness, physiognomic change, and occurrence of a spatial community mosaic, many exotic species, ecotonal species, spatial mass effect, and species richness higher or lower than either side of the ecotone. |
| Edge               | The portion of an ecosystem near its perimeter, where influences of the adjacent patches can cause an environmental difference between the interior of the patch and its edge. This edge effect includes a distinctive species composition or abundance in the outer part of the landscape patch. For example, when a landscape is a mosaic of perceptibly different types, such as a forest adjacent to a grassland, the edge is the location where the two types adjoin. In a continuous landscape, such as a forest giving way to open woodland, the exact edge location is fuzzy and is sometimes determined by a local gradient exceeding a threshold, as an example, the point where the tree cover falls below thirty-five percent.                                  |
| Emergent Tree      | Trees that grow above the top of the canopy                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Endangered (En)    | <u>Endangered terrestrial ecosystems</u> have lost significant amounts (more than 60 % lost) of their original natural habitat, so their functioning is compromised. A taxon (species) is Endangered when the best available evidence indicates that it meets any of the criteria for Endangered, and it is therefore considered to be facing a very high risk of extinction in the wild ( <a href="#">IUCN</a> ).                                                                                                                                                                                                                                                                                                                                                          |
| Endemic            | A plant or animal species, or a vegetation type, which is naturally restricted to a defined region or limited geographical area. Many endemic species have widespread distributions and are common and thus are not considered to be under any threat. They are however noted to be unique to a region, which can include South Africa, a specific province or a bioregion, vegetation type, or a localised area. In cases where it is highly localised or known only from a few or a few localities, and is under threat, it may be red listed either in terms of the South Africa Threatened Species Programme, NEMBA Threatened or Protected Species (ToPS) or the IUCN Red List of Threatened Species.                                                                  |
| Environment        | The external circumstances, conditions and objects that affect the existence and development of an individual, organism or group. These circumstances include biophysical, social, economic, historical and cultural aspects.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Estuary            | a partially or fully enclosed body of water -<br>(a) which is open to the sea permanently or periodically; and                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

|                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|---------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                       | (b) within which the sea water can be diluted, to an extent that is measurable, with fresh water drained from land.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Evolutionary Processes                | <p>The process by which genetic changes have taken place and continue to take place in populations of plants and animals over successive generations in response to environmental changes. Evolutionary Processes includes the mechanisms that produce the biodiversity of life and include Mutation and Migration (Gene Flow), Genetic Drift, Natural Selection, Common Descent, Speciation, Sexual Selection, and Biogeography. Disruptions to evolutionary processes can prevent ecosystems and species from adapting to environmental change over time. Significant fragmentation is considered to be an important disrupter of evolutionary processes.</p> <p>Series of actions which enable new species to evolve in response to changing Biodiversity is maintained by ecological processes at the micro-scale (such as in pollination and nutrient cycling via microbial action) through to the mega-scale (natural events e.g. fire, flood; migration of species along river valleys or coastal areas, quality and quantity of water feeding rivers and estuaries; marine sand movement and the seasonal mountain-to-coast migration of birds that pollinate plants).</p> |
| Exotic                                | Non-indigenous; introduced from elsewhere, may also be a weed or alien invasive species. Exotic species may be invasive or non-invasive.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Fragmentation (Habitat Fragmentation) | The 'breaking apart' of continuous habitat into distinct pieces. Causes land transformation, an important current process in landscapes as more and more development occurs.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Habitat                               | The home of a plant or animal species. Generally, those features of an area inhabited by animal or plant which are essential to its survival.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Habitat Banking                       | A market where credits from actions with beneficial biodiversity outcomes can be purchased to offset the debit from environmental damage. Credits can be produced in advance of, and without ex-ante links to, the debits they compensate for, and stored over time ( <a href="#">IEEP</a> ).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| IFC PS6                               | <a href="#">International Finance Corporation Performance Standard 6</a> – A standard guiding biodiversity conservation and sustainable management of living natural resources for projects financed by the International Finance Corporation (IFC)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Indicator                             | Information based on measured data used to represent an attribute, characteristic, or property of a system.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Indicator species                     | A species whose status provides information on the overall condition of the ecosystem and of other species in that ecosystem. They reflect the quality and changes in environmental conditions as well as aspects of community composition.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Indigenous                            | Native; occurring naturally in a defined area.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Indigenous Species (Native species)   | <p>A species that has been observed in the form of a naturally occurring and self-sustaining population in historical times (<i>Bern Convention 1979</i>).</p> <p>A species or lower taxon living within its natural range (past or present) including the area which it can reach and occupy <u>using its natural dispersal systems</u> (<i>modified after the Convention on Biological Diversity</i>)</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Indirect Impact                       | Impacts triggered in response to the presence of a project, rather than being directly caused by the project's own operations ( <a href="#">BBOP</a> )                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Instream habitat                      | Includes the physical structure of a watercourse and the associated vegetation in relation to the bed of the watercourse;                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Intact Habitat / Vegetation           | Land that has not been significantly impacted upon by man's activities. These are ecosystems that are in a near-pristine condition in terms of structure, species composition and functioning of ecological processes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Intrinsic Value                       | The inherent worth of something, independent of its value to anyone or anything else.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

|                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|---------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Keystone Species                      | Species whose influence on ecosystem function and diversity are disproportionate to their numerical abundance. Although all species interact, the interactions of some species are more profound and far-reaching than others, such that their elimination from an ecosystem often triggers cascades of direct and indirect changes on more than a single trophic level, leading eventually to losses of habitats and extirpation of other species in the food web.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Landscape                             | An area of land that contains a mosaic of ecosystems, including human-dominated ecosystems ( <a href="#">Millennium Ecosystem Assessment</a> ).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Landscape Approach                    | Dealing with large-scale processes in an integrated and multidisciplinary manner, combining natural resources management with environmental and livelihood considerations ( <a href="#">FAO</a> ).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Landscape connectivity                | The degree to which the landscape facilitates or impedes movement among resource patches.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Least threatened / Least Concern (LC) | <p>These <u>ecosystems</u> have lost only a small proportion (more than 80 % remains) of their original natural habitat and are largely intact (although they may be degraded to varying degrees, for example by invasive alien species, overgrazing, or overharvesting from the wild).</p> <p>A <u>taxon (species)</u> is Least Concern when it has been evaluated against the criteria and does not qualify for Critically Endangered, Endangered, Vulnerable or Near Threatened. Widespread and abundant taxa are included in this category (<a href="#">IUCN</a>).</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Matrix                                | The “background ecological system” of a landscape with a high degree of connectivity.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Natural Forest (Indigenous Forest)    | <p>The definition of “natural forest” in the National Forests Act of 1998 (NFA) Section 2(1)(xx) is as follows: ‘A natural forest means a group of indigenous trees.</p> <ul style="list-style-type: none"> <li>• whose crowns are largely contiguous.</li> <li>• or which have been declared by the Minister to be a natural forest under section 7(2)?</li> </ul> <p>This definition should be read in conjunction with Section 2(1)(x) which states that ‘Forest’ includes:</p> <ul style="list-style-type: none"> <li>• A natural forest, a woodland, and a plantation</li> <li>• The forest-produce in it; and</li> <li>• The ecosystems which it makes up.</li> </ul> <p>The legal definition must be supported by a technical definition, as demonstrated by a court case in the Umzimkulu magisterial district, relating to the illegal felling of Yellowwood (<i>Podocarpus latifolius</i>) and other species in the Gonqogonqo forest. From scientific definitions (also see Appendix B) we can define natural forest as:</p> <ul style="list-style-type: none"> <li>• A generally multi-layered vegetation unit</li> <li>• Dominated by trees that are largely evergreen or semi-deciduous.</li> <li>• The combined tree strata have overlapping crowns, and crown cover is &gt;75%</li> <li>• Grasses in the herbaceous stratum (if present) are generally rare.</li> <li>• Fire does not normally play a major role in forest function and dynamics except at the fringes.</li> <li>• The species of all plant growth forms must be typical of natural forest (check for indicator species)</li> <li>• The forest must be one of the national forest types</li> </ul> |
| Near Threatened (NT)                  | A <u>taxon (species)</u> is Near Threatened when it has been evaluated against the criteria but does not qualify for Critically Endangered, Endangered or Vulnerable                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

|                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|--------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                          | now, but is close to qualifying for or is likely to qualify for a threatened category in the near future ( <a href="#">IUCN</a> ).                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Patch                    | A term fundamental to landscape ecology, is defined as a relatively homogeneous area that differs from its surroundings. Patches are the basic unit of the landscape that change and fluctuate, a process called patch dynamics. Patches have a definite shape and spatial configuration and can be described compositionally by internal variables such as number of trees, number of tree species, height of trees, or other similar measurements.                                                                                                  |
| Protected Area           | A clearly defined geographical space, recognised, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values.                                                                                                                                                                                                                                                                                                                              |
| Range restricted species | Species with a geographically restricted area of distribution. Note: Within the IFC PS6, restricted range refers to a limited <u>extent of occurrence</u> (EOO): <ul style="list-style-type: none"> <li>For terrestrial vertebrates and plants, restricted-range species are defined as those species that have an EOO less than 50,000 square kilometres (km<sup>2</sup>).</li> </ul>                                                                                                                                                                |
| Refugia                  | A location which supports an isolated or relict population of a once more widespread species. This isolation can be due to climatic changes, geography, or human activities such as deforestation and overhunting.                                                                                                                                                                                                                                                                                                                                    |
| Rehabilitation           | Measures taken to rehabilitate degraded ecosystems or restore cleared ecosystems following exposure to impacts that cannot be completely avoided and/or minimised. Rehabilitation emphasizes the reparation of ecosystem processes, productivity and services, whereas the goals of restoration also include the re-establishment of the pre-existing biotic integrity in terms of species composition and community structure ( <a href="#">BBOP</a> ).                                                                                              |
| Resilience               | The capacity of a natural system to recover from disturbance ( <a href="#">OECD</a> ).                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Restoration              | The process of assisting the recovery of an ecosystem that has been degraded, damaged, or destroyed. An ecosystem has recovered when it contains sufficient biotic and abiotic resources to continue its development without further assistance or subsidy. It would sustain itself structurally and functionally, demonstrate resilience to normal ranges of environmental stress and disturbance, and interact with contiguous ecosystems in terms of biotic and abiotic flows and cultural interactions ( <a href="#">IFC</a> ).                   |
| Riparian                 | Pertaining to, situated on or associated with the banks of a watercourse, usually a river or stream.                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Riparian Habitat         | Includes the physical structure and associated vegetation of the areas associated with a watercourse which are commonly characterised by alluvial soils, and which are inundated or flooded to an extent and with a frequency sufficient to support vegetation of species with a composition and physical structure distinct from those of adjacent land areas.                                                                                                                                                                                       |
| River Corridors          | River corridors perform several ecological functions such as modulating stream flow, storing water, removing harmful materials from water, and providing habitat for aquatic and terrestrial plants and animals. These corridors also have vegetation and soil characteristics distinctly different from surrounding uplands and support higher levels of species diversity, species densities, and rates of biological productivity than most other landscape elements. Rivers provide for migration and exchange between inland and coastal biotas. |
| Sustainable Development  | Development that meets the needs of the present without compromising the ability of future generations to meet their own needs ( <a href="#">WCED</a> ).                                                                                                                                                                                                                                                                                                                                                                                              |
| Terrestrial              | Occurring on, or inhabiting, land.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Threatened Species       | Umbrella term for any species categorised as Critically Endangered, Endangered or Vulnerable by the IUCN Red List of Threatened Species ( <a href="#">IUCN</a> ). Any species that                                                                                                                                                                                                                                                                                                                                                                    |



|                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                  | is likely to become extinct within the foreseeable future throughout all or part of its range and whose survival is unlikely if the factors causing numerical decline or habitat degradation continue to operate (EU).                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Traditional Ecological Knowledge | Knowledge, innovations and practices of indigenous and local communities around the world. Developed from experience gained over the centuries and adapted to the local culture and environment, traditional knowledge is transmitted orally from generation to generation. It tends to be collectively owned and takes the form of stories, songs, folklore, proverbs, cultural values, beliefs, rituals, community laws, local language, and agricultural practices, including the development of plant species and animal breeds. Traditional knowledge is mainly of a practical nature, particularly in such fields as agriculture, fisheries, health, horticulture, and forestry (CBD). |
| Transformation                   | In ecology, transformation refers to adverse changes to biodiversity, typically habitats or ecosystems, through processes such as cultivation, forestry, drainage of wetlands, urban development or invasion by alien plants or animals. Transformation results in habitat fragmentation – the breaking up of a continuous habitat, ecosystem, or land-use type into smaller fragments.                                                                                                                                                                                                                                                                                                      |
| Transformed Habitat/Land         | Land that has been significantly impacted upon as a result of human interferences/disturbances (such as cultivation, urban development, mining, landscaping, severe overgrazing), and where the original structure, species composition and functioning of ecological processes have been irreversibly altered. Transformed habitats are not capable of being restored to their original states.                                                                                                                                                                                                                                                                                             |
| Tributary                        | A small stream or river flowing into a larger one.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Untransformed Habitat/Land       | Land that has not been significantly impacted upon by man's activities. These are ecosystems that are in a near-pristine condition in terms of structure, species composition and functioning of ecological processes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Vulnerable (Vu)                  | <u>Vulnerable terrestrial ecosystems</u> have lost some (more than 60 % remains) of their original natural habitat and their functioning will be compromised if they continue to lose natural habitat.<br>A <u>taxon (species)</u> is Vulnerable when the best available evidence indicates that it meets any of the criteria for Vulnerable, and it is therefore considered to be facing a high risk of extinction in the wild (IUCN).                                                                                                                                                                                                                                                      |
| Watercourse                      | Natural or man-made channel through or along which water may flow.<br>A river or spring; a natural channel in which water flows regularly or intermittently; a wetland, lake or dam into which, or from which, water flows.<br>and a reference to a watercourse includes, where relevant, its bed and banks;                                                                                                                                                                                                                                                                                                                                                                                 |
| Weed                             | An indigenous or non-indigenous plant that grows and reproduces aggressively, usually a ruderal pioneer of disturbed areas. Weeds may be unwanted because they are unsightly, or they limit the growth of other plants by blocking light or using up nutrients from the soil. They can also harbour and spread plant pathogens. Weeds are generally known to proliferate through the production of large quantities of seed.                                                                                                                                                                                                                                                                 |
| Wetlands                         | A collective term used to describe lands that are sometimes or always covered by shallow water or have saturated soils, and where plants adapted for life in wet conditions usually grow.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

## 8.3 Appendix C: Biodiversity Environmental Management Plan

Specific measures relating to management of Biodiversity Impacts that must be included in the project Environmental Management Programme (EMPr). This Environmental Management Plan (EMP) contains guidelines, operating procedures and rehabilitation control requirements, which will be binding on the holder of the environmental authorisation after approval of the EMP. The impacts identified and listed in Section 3.3 will be managed / controlled as set out under mitigating measures and as detailed in this section, which provides general management guidelines, which may or may not be appropriate, depending on the specific circumstances.

### 8.3.1 Protection of Flora and Fauna

The following actions must be implemented at construction phase, where deemed necessary.

- Search and rescue operations for Species of Conservation Concern must be undertaken before the commencement of site clearing activities.
- Indigenous vegetation encountered on the sites that are to be conserved and left intact.
- It is important that clearing activities are kept to the minimum and take place in a phased manner. This allows animal species to move into safe areas and prevents wind and water erosion of the cleared areas.
- Stripped vegetation should be temporarily stored during operations and to be used later to stabilise slopes. This excludes exotic invasive species.
- No animals are to be harmed or killed during the course of operations.
- Workers are NOT allowed to collect any flora or snare any faunal species. All flora and fauna remain the property of the landowner and must not be disturbed, upset or used without their expressed consent.
- It is the responsibility of the Contractor to provide sufficient fuel for cooking and heated as needed by the staff.
- No domestic animals are permitted on the sites.
- Trees and shrubs that are directly affected by the operations may be felled or cleared but only by the expressed written permission of the ECO.
- Rehabilitation of vegetation of the site must be done as described in the Rehabilitation Plans.

#### Flora Search and Rescue

The following flora relocation plan is recommended, where deemed necessary:

- Once the final layout has been determined the botanist will be consulted in order to finalise the plant relocation and vegetation clearing plan.
- Respective permits to be obtained.
- Flora search and rescue is to be conducted before vegetation clearing takes place.
- Areas should only be stripped of vegetation as and when required and once species of special concern have been relocated for that area.
- Once site clearing is to commence, the area to be cleared of vegetation will be surveyed by the vegetation and plant search and rescue team clearing under the supervision of the botanist to identify and remove species suitable for rescue and commence removal of plants.
- These species are to be replanted immediately in a suitable area of similar vegetation, where future development is unlikely to occur, or within a nearby protected area.

#### Fauna Search and Rescue

The following fauna relocation plan is recommended for inclusion in the EMP and Fauna removal permit applications, where deemed necessary:

- An on-foot search, conducted by a professional reptile handler/team, is to be carried out to search for reptiles within every possible habitat.

- Once caught, each reptile will be placed into transport containers suited for that individual reptile.
- The transport containers must be kept cool to decrease stress for the reptiles.
- The reptiles will be relocated as soon as possible after they have been caught.
- Professional equipment will be used to ensure limited harm to the reptiles and to prevent the team members from being bitten by venomous snakes.
- Nooses should not be used as they cause injury to lizards.
- Safety procedures will be in place for the release of the reptiles.
- Amphibians should be caught by hand and net.
- Amphibians must be placed into transport containers with damp substrates to avoid dehydration.
- Tadpoles may be collected, placed into water containers and released as soon as possible, where required.
- During release, the tadpoles will be allowed to acclimatize to the new water in terms of temperature, pH etc.
- Small mammals will be caught with nets and by hand. They will then be transported in carry cages and released as soon as possible.
- No immobilizers or tranquilizers will be used on the mammals.

### 8.3.2 Alien and Invasive Plan Management Plan

The following mitigation measures have been identified in order to ensure that the introduction and spread of alien invasive vegetation is minimised, where deemed necessary:

- Alien species must be removed from the site as per the National Environmental Management: Biodiversity Act (No. 10 of 2004) requirements.
- A suitable weed management strategy must be implemented in the construction phase and carried through the operational (Site Closure and Rehabilitation) phase.
- Weeds and alien species must be cleared by hand before the rehabilitation phase of the areas. Removal of alien plants are to be done according to the Working for Water Guidelines.
- The Contractor is responsible for the removal of alien species within all areas disturbed during construction activities. Disturbed areas include (but are not limited to) access roads, construction camps, site areas and temporary storage areas.
- In consultation with relevant authorities, the Engineer may order the removal of alien plants (when necessary). Areas within the confines of the site are to be included.
- All alien plant material (including brushwood and seeds) should be removed from site and disposed of at a registered waste disposal site. Should brushwood be utilised for soil stabilization or mulching, it must be seed free.
- After clearing is completed, an appropriate cover crop may be required, should natural re-establishment of grasses not take place in a timely manner.

### 8.3.3 Fires

The following mitigation measures have been identified in order to minimise fire risks, where deemed necessary:

- The Contractor must ensure that an emergency preparedness plan is in place in order to fight accidental fires or veld fires, should they occur. The adjacent landowners/users/managers should also be informed or otherwise involved.
- Enclosed areas for food preparation should be provided and the Contractor must strictly prohibit the use of open fires for cooking and heating purposes.
- The use of branches of trees and shrubs for fire-making must be strictly prohibited.
- The Contractor should take all reasonable and active steps to avoid increasing the risk of fire through their activities on-site. No fires may be lit except at places approved by the ECO.

- The Contractor must ensure that the basic fire-fighting equipment is to the satisfaction of the Local Emergency Services.
- The Contractor must supply all living quarters, site offices, kitchen areas, workshop areas, materials, stores and any other relevant areas with tested and approved fire-fighting equipment.
- Fires and “hot work” must be restricted to demarcated areas.
- A braai facility may be considered at the discretion of the Contractor and in consultation with the ECO. The area must be away from flammable stores. All events must be under management’s supervision and a fire extinguisher will be immediately available. “Low-smoke” fuels must be used (e.g. charcoal) and smoke control regulations, if applicable, must be considered.
- The Contractor must take precautions when working with welding or grinding equipment near potential sources of combustion. Such precautions include having a suitable, tested and approved fire extinguisher immediately at hand and the use of welding curtains.

### 8.3.4 Soil Aspects

The following mitigation measures have been identified in order to minimise soil loss, where deemed necessary:

- Sufficient topsoil must be stored for later use during decommissioning, particularly from outcrop areas.
- Topsoil shall be removed from all areas where physical disturbance of the surface will occur.
- All available topsoil shall be removed after consultation with the botanist and horticulturalist prior to commencement of any operations.
- The removed topsoil shall be stored on high ground within the site footprint outside the 1:50 flood level within demarcated areas.
- Topsoil shall be kept separate from overburden and shall not be used for building or maintenance of roads.
- The stockpiled topsoil shall be protected from being blown away or being eroded. The application of a suitable grass seed/runner mix will facilitate this and reduce the minimise weeds.

### 8.3.5 Dust

The following mitigation measures have been identified in order to minimise dust, where deemed necessary:

- To manage complaints relation to impacts on the nearby communities, a dust register will be developed.
- If required, water spray vehicles will be used to control wind cause by strong winds during activities on the works.
- No over-watering of the site or road surfaces.
- Wind screens should be used to reduce wind and dust in open areas.

### 8.3.6 Infrastructural Requirements

The following mitigation measures have been identified in order to minimise impacts of infrastructure requirements, where deemed necessary:

#### Topsoil

- Topsoil shall be removed from all areas where physical disturbance of the surface will occur.
- All available topsoil shall be removed after consultation with the Regional Manager prior to commencement of any operations.



- The removed topsoil shall be stored on high ground within the footprint outside the 1:50 flood level within demarcated areas (Appendix 1)
- Topsoil shall be kept separate from overburden and shall not be used for building or maintenance of roads.
- The stockpiled topsoil shall be protected from being blown away or being eroded. The use of a suitable grass seed/runner mix will facilitate soil protection and minimise weeds/weed growth.

### Stormwater and Erosion Control

- Stormwater Management Plans must be developed for the site and should include the following:
  - The management of stormwater during construction.
  - The installation of stormwater and erosion control infrastructure.
  - The management of infrastructure after completion of construction.
- Temporary drainage works may be required to prevent stormwater to prevent silt laden surface water from draining into river systems in proximity to the site. Stormwater must be prevented from entering or running off site.
- To ensure that site is not subjected to excessive erosion and capable of drainage runoff with minimum risk of scour, their slopes should be profiled at a maximum 1:3 gradient.
- Diversion channels should be constructed ahead of the open cuts, and above emplacement areas and stockpiles to intercept clean runoff and divert it around disturbed areas into the natural drainage system downstream of the site.
- Rehabilitation is necessary to control erosion and sedimentation of all eroded areas (where works will take place).
- Existing vegetation must be retained as far as possible to minimise erosion problems.
- It is importation that the rehabilitation of site is planned and completed in such a way that the runoff water will not cause erosion.
- Visual inspections will be done on a regular basis with regard to the stability of water control structure, erosion and siltation.
- Sediment-laden runoff from cleared areas must be prevented from entering rivers and streams.
- No river or surface water may be affected by silt emanating from the site.

### Site Office / Camp Sites

- No site offices or camp sites will be constructed on the site under current operating conditions, existing structures will be used.

### Operating Procedures in the Site

- Construction shall only take place within the approved demarcated site.
- Construction may be limited to the areas indicated by the Regional Manager on assessment of the application.
- The holder of the environmental authorisation shall ensure that operations take place only in the demarcated areas as described in this report.
- Watering to minimise the effect of dust generation should be carried out as frequently as necessary. Noise should also be kept within reason.
- No workers will be allowed to damage or collect any indigenous plant or snare any animal.
- Grass and vegetation of the immediate environment or adapted grass / vegetation will be re-established on completion of construction activities, where applicable.
- No firewood to be collected on site and the lighting of fires must be prohibited.
- Cognisance is to be taken of the potential for endangered species occurring in the area. It is considered unlikely, however, that these species will be affected by the proposed activity, or the access road.

### Excavations

Whenever any excavation is undertaken, the following procedures shall be adhered to:

- Topsoil shall be handled as described in this EMP.
- Excavations shall take place only within the approved demarcated site.
- Excavations must follow the contour lines where possible.
- The construction site will not be left in any way to deteriorate into an unacceptable state.
- The excavated area must serve as a final depositing area for waste rock and overburden during the rehabilitation process.
- Once excavations have been filled with overburden, rocks and coarse natural materials and profiled with acceptable contours (including erosion control measures), the previously stored topsoil shall be returned to its original depth over the area.
- The area shall be fertilised, if necessary, to allow vegetation to establish rapidly. The site shall be seeded with a local or adapted indigenous seed mix in order to propagate the locally occurring flora.

### Rehabilitation of Processing and Excavation Areas

- On completion of construction, the surface of the processing areas especially if compacted due to hauling and dumping operations shall be scarified to a depth of at least 200 mm and graded to an even surface condition and the previously stored topsoil will be returned to its original depth over the area.
- The area shall be fertilised, if necessary, to allow vegetation to establish rapidly. The site shall be seeded with suitable grasses and local indigenous seed mix.
- Excavations may be used for the dumping of construction wastes. This shall be done in such a way as to aid rehabilitation.
- Waste (non-biodegradable refuse) will not be permitted to be deposited in the excavations.
- If a reasonable assessment indicates that the re-establishment of vegetation is unacceptably slow, the Regional Manager may require that the soil be analysed and any deleterious effects on the soil arising from the activity, be corrected and the area be seeded with a vegetation seed mix to his or her satisfaction. This must be done in conjunction with the ECO.
- Final rehabilitation must comply with the requirements mention in the Rehabilitation Plan.

## 8.3.7 Rehabilitation Plan

The following mitigation measures have been identified in order to maximise rehabilitation success, where deemed necessary.

### Rehabilitation Objective

The overall objective of the rehabilitation plan is to minimize adverse environmental impacts associated with the activity whilst maximizing the future utilization of the property. Significant aspects to be borne in mind in this regard is, revegetation of undeveloped footprint and stability and environmental risk. The depression and immediate area of the working must also be free of alien vegetation. Additional broad rehabilitation strategies / objectives include the following:

- Rehabilitating the worked-out areas to take place concurrently within prescribed framework established in the EMP.
- All infrastructure, equipment, plant and other items used during the construction period will be removed from the site.
- Waste material of any description, including scrap, rubble and tyres, will be removed entirely from the site and disposed of at a recognised landfill facility. It will not be permitted to be buried or burned on site.
- Final rehabilitation shall be completed within a period specified by the Regional Manager.

### Topsoil and Subsoil Replacement

Topsoil and subsoil will be stripped and stockpiled separately and only used in rehabilitation work towards the end of the operation. This is in contrast to the gravel activity where rehabilitation and topsoil replacement was earmarked at the completion of each phase.

Stripped overburden will be backfilled into the worked-out areas where needed. Stripped topsoil will be spread over the re-profiled areas to an adequate depth to encourage plant regrowth. The vegetative cover will be stripped with the thin topsoil layer to provide organic matter to the relayed material and to ensure that the seed store contained in the topsoil is not diminished. Reseeding may be required should the stockpiles stand for too long and be considered barren from a seed bank point of view. Stockpiles should ideally be stored for no longer than a year.

The topsoil and overburden will be keyed into the reprofiled surfaces to ensure that they are not eroded or washed away. The topsoiled surface will be left fairly rough to enhance seedling establishment, reduce water runoff and increase infiltration.

### Revegetation

All prepared surfaces will be seeded with suitable grass species to provide an initial ground cover and stabilize the soil surface. The following grass seed that is commonly available and suitable.

| Botanical name                                             | Common name        | Approx seed mixture /Ha |
|------------------------------------------------------------|--------------------|-------------------------|
| <i>Cynodon dactylon</i>                                    | Kweek              | 12 kg/ Ha               |
| <i>Eragrostis curvula</i>                                  | Weeping Love Grass | 6 kg/ Ha                |
| <i>Eragrostis tef</i>                                      | Teff               | 2 kg/ Ha                |
| <i>Digitaria eriantha</i>                                  | Smuts Grass        | 4 kg/ Ha                |
| Other indigenous veld grasses can be added to the seed mix |                    | ± 4 kg/Ha               |

The overall revegetation plan will, therefore, be as follows:

- Ameliorate the aesthetic impact of the site.
- Stabilise disturbed soil and rock faces.
- Minimize surface erosion and consequent siltation of natural water course located on site.
- Control wind-blown dust problems.
- Enhance the physical properties of the soil.
- Re-establish nutrient cycling.
- Re-establish a stable ecological system.

Every effort must be made to avoid unnecessary disturbance of the natural vegetation during operations.

### Drainage and Erosion Control

To control the drainage and erosion at site the following procedures will be adopted:

- Areas where construction is completed should be rehabilitated immediately.
- Areas to be disturbed in future activities will be kept as small as possible (i.e. conducting the operations in phases), thereby limiting the scale of erosion.
- Slopes will be profiled to ensure that they are not subjected to excessive erosion but capable of drainage runoff with minimum risk of scour (maximum 1:3 gradient).
- All existing disturbed areas will be re-vegetated to control erosion and sedimentation.
- Existing vegetation will be retained as far as possible to minimize erosion problems.

### Visual Impacts Amelioration

The overall visual impact of the proposed activities will be minimised by the following mitigating measures:

- Confining the footprint to an area as small as possible
- Re-topsoiling and vegetating all disturbed areas.

### 8.3.8 Monitoring and Reporting

Adequate management, maintenance and monitoring will be carried out annually by the applicant to ensure successful rehabilitation of the property until a closure certificate is obtained.

To minimise adverse environmental impacts associated with operations it is intended to adopt a progressive rehabilitation programme, which will entail carrying out the proposed rehabilitation procedures concurrently with activity.

### 8.3.9 Closure objectives and extent of alignment to pre-construction environment

#### Closure Objectives

The closure of the site will involve removal of all debris and rehabilitation of areas disturbed during the construction phase of the project. This will comprise the scarification of compacted areas, reshaping of areas, topsoiling and rehabilitating all prepared surfaces.



## 8.4 Appendix D: General Impact Rating Scale

To ensure a direct comparison between various specialist studies, six standard rating scales are defined and used to assess and quantify the identified impacts. This is necessary since impacts have several parameters that need to be assessed.

These scales are:

1. The Severity/ Benefit Scale, which assesses the importance of the impact from a purely technical perspective.
2. The Spatial Impact Scale, which assesses the extent or magnitude of the impact (the area that will be affected by the impact).
3. The Temporal Impact Scale, which assesses how long the impact will be felt. Some impacts are of a short duration, whereas others are permanent.
4. The Degree of Certainty Scale, which provides a measure of how confident the author feels about their prediction.
5. The Likelihood Scale, which provides an indication of the risk or chance of an impact taking place.
6. The Environmental Significance Scale, which assesses the importance of the impact in the overall context of the affected system or party.

To ensure integration of social and ecological impacts, to facilitate specialist assessment of impact significance, and to reduce reliance on value judgments, the severity of the impact within the scientific field in which it takes place (e.g. vegetation, fauna etc.) was assessed first. Thereafter, each impact was assessed within the context of time and space, and the probability of the impact occurring was quantified using the degree of certainty scale.

The impact was then assessed in the context of the whole environment to establish the “environmental significance” of the impact to the flora and vegetation.

The scales are described in detail below.

### 8.4.1 The Severity/ Beneficial Scale

The *severity scale* was used to scientifically evaluate how severe negative impacts would be, or how beneficial positive impacts would be on an affected system (for ecological impacts) or an affected party. This methodology attempts to remove any value judgments from the assessment, although it relies on the professional judgment of the specialist.

| NEGATIVE IMPACT                                                                                                                                                                              | POSITIVE IMPACT                                                                                                                                                                                                      |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <u>Very severe</u><br>An irreversible and permanent change to the affected system(s) which cannot be mitigated. For example, change in topography resulting from a quarry.                   | <u>Very Beneficiary</u><br>A permanent and very substantial benefit to the affected system(s) with no alternative to achieve this benefit.                                                                           |
| <u>Severe</u><br>Long-term impacts on the affected system(s) that could be mitigated. However, this mitigation would be difficult, expensive or time consuming or some combination of these. | <u>Beneficial</u><br>A long-term impact and substantial benefit to the affected system(s). Alternative ways of achieving this benefit would be difficult, expensive or time consuming, or some combination of these. |
| <u>Moderately severe</u><br>Medium- to long-term impact on the affected system(s) that could be mitigated.                                                                                   | <u>Moderately beneficial</u><br>A medium- to long-term impact of real benefit to the affected system(s) Other ways of optimising are equally difficult, expensive and time                                           |

| NEGATIVE IMPACT                                                                                                                                | POSITIVE IMPACT                                                                                                                                                                                                              |
|------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                                                | consuming (or a combination of these), as achieving them in this way.                                                                                                                                                        |
| <u>Slight</u><br>Medium- to short term impacts on the affected system(s) Mitigation is very easy, cheap, less time consuming or not necessary. | <u>Slightly beneficial</u><br>A short- to medium-term impact and negligible benefit to the affected system(s) Other ways of optimising the beneficial effects are easier, cheaper and quicker, or some combination of these. |
| <u>No effect</u><br>The system(s) is not affected by the proposed development.                                                                 | <u>Do not know/Cannot know</u><br>In certain cases, it may not be possible to determine the severity of the impact.                                                                                                          |

The severity of impacts can be evaluated with and without mitigation order to demonstrate how serious the impact is when nothing is done about it. For beneficial impacts, optimisation means anything that can enhance the benefits. However, mitigation or optimisation must be practical, technically feasible and economically viable.

### 8.4.2 Spatial and Temporal Scales

Two additional factors were considered when assessing the impacts, namely the relationship of the impact to Spatial and Temporal Scales.

The *spatial scale* (shown in italics) defines the impact at the following scales.

| SPATIAL SCALE | EXPLANATION                                                                                                                                    |
|---------------|------------------------------------------------------------------------------------------------------------------------------------------------|
| Localised     | at a localised scale (i.e. few hectares in extent). The specific area to which this scale refers is defined for the impact to which it refers. |
| Study Area    | the site, some effects to surrounding area (~10 km)                                                                                            |
| District      | the site, some effects to wider surrounding area (~100 km)                                                                                     |
| Regional      | the site, some effects to surrounding area (+250 km)                                                                                           |
| National      | Impacts will affect at a country level                                                                                                         |
| International | Impacts extend beyond country boundary                                                                                                         |

The *temporal scale* (shown in italics) defines the impact at the following scales.

| TEMPORAL SCALE | EXPLANATION                                                                    |
|----------------|--------------------------------------------------------------------------------|
| Short Term     | Less than 5 years. Many construction phase impacts will be of a short duration |
| Medium Term    | Between 5 and 20 years                                                         |
| Long Term      | Between 20 and 40 years, and from a human perspective essentially permanent.   |
| Permanent      | Over 40 years and resulting in a permanent and lasting change.                 |

### 8.4.3 The Degree of Certainty and the Likelihood Scale

It is also for each specialist to state the degree of certainty, or the confidence attached to their prediction of significance. For this reason, a 'degree of certainty' scale (shown in bold) must be used.

| DEGREE    | DESCRIPTION                                                                           |
|-----------|---------------------------------------------------------------------------------------|
| Definite: | More than 90% sure of fact. To use this one will need to substantial supportive data. |
| Probable: | Between 70% and 90% sure of fact.                                                     |
| Possible: | Between 40% and 70% sure of fact.                                                     |
| Unsure:   | Less than 40% sure of fact.                                                           |

The risk or likelihood (shown in normal font) of impacts being manifested differs. There is no doubt that some impacts would occur, but certain other (usually secondary data) impacts are not as likely and may or may not result. Although these impacts maybe severe, the likelihood of them occurring may affect their overall significance and must therefore be considered. It is therefore necessary for the author to state his estimate of the likelihood of an impact occurring, using the following likelihood scale:

| DEGREE        | DESCRIPTION                                                                                         |
|---------------|-----------------------------------------------------------------------------------------------------|
| Very unlikely | The chance of these impacts occurring is extremely slim, e.g. natural forces destroying a dam wall. |
| Unlikely      | The risk of these impacts occurring is slight.                                                      |
| May occur     | The risk of these impacts is more likely, although it is not definite.                              |
| Very Likely   | Slight chance that this impact will not occur.                                                      |
| Definite      | There is no chance that this impact will not occur.                                                 |

#### 8.4.4 The Environmental Significance Scale

The environmental significance scale is an attempt to evaluate the significance of an impact, the severity or benefit of which has already been assessed. This evaluation needs to be assessed in the relevant context, as an impact can either be ecological or social, or both. Since the severity of impacts with and without mitigation will already have been assessed, significance was only evaluated after mitigation. In many cases, this mitigation will take place, as it has been incorporated into project design. A six-point significance scale is applied as follows:

| SIGNIFICANCE        | DESCRIPTION                                                                                                                                                                                    |
|---------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Very High (6)       | Impacts considered to have a major and permanent change to natural environment and are rate as VERY HIGH, usually resulting to severe or very severe/ beneficial to highly beneficial effects. |
| High (5)            | Long term change and are rated as HIGH resulting to severe or moderately severe effects/ beneficial to moderately beneficial.                                                                  |
| Moderate (4)        | Medium to long-term effects. Impacts are rated as MODERATE with moderately severe or moderately beneficial effects.                                                                            |
| Low (3)             | Medium to short term effects. Impacts are rated as MODERATE resulting in moderately severe or moderately beneficial effects.                                                                   |
| Insignificant (2)   | Short term effects are present. Impacts are rated as SLIGHT resulting in SLIGHTLY BENEFICIAL effects. Residual effects are present but are of no consequence.                                  |
| No Significance (1) | No primary or secondary effects, resulting in NO SIGNIFICANT impact.                                                                                                                           |
| Do not Know (0)     | Not possible to determine the significance of impacts                                                                                                                                          |

### 8.4.5 Absence of Data

In certain instances, an assessment must be produced in the absence of all the relevant and necessary data, due to paucity or lack of scientific information on the study area. It is more important to identify all the likely environmental impacts than to precisely evaluate the more obvious impacts. It is important to be on the conservative side in reporting likely environmental impacts. Because assessing impacts with a lack of data is more dependent on scientific judgment, the rating on the certainty scale cannot be too high. It is for these reasons that a degree of certainty scale has been provided, as well as the categories DON'T KNOW or CAN'T KNOW.



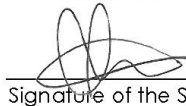
## 8.5 Appendix E: Declaration, Specialist Profile and Registration

### DECLARATION OF THE SPECIALIST

**Note:** Duplicate this section where there is more than one specialist.

**Jamie Pote**  
I ..... as the appointed Specialist hereby declare/affirm the correctness of the information provided or to be provided as part of the application, and that:

- In terms of the general requirement to be independent:
  - other than fair remuneration for work performed in terms of this application, have no business, financial, personal or other interest in the development proposal or application and that there are no circumstances that may compromise my objectivity; or
  - am not independent, but another specialist (the "Review Specialist") that meets the general requirements set out in Regulation 13 of the NEMA EIA Regulations has been appointed to review my work (Note: a declaration by the review specialist must be submitted);
- In terms of the remainder of the general requirements for a specialist, have throughout this EIA process met all of the requirements;
- I have disclosed to the applicant, the EAP, the Review EAP (if applicable), the Department and I&APs all material information that has or may have the potential to influence the decision of the Department or the objectivity of any Report, plan or document prepared or to be prepared as part of the application; and
- I am aware that a false declaration is an offence in terms of Regulation 48 of the EIA Regulations.



Signature of the Specialist:

04 December 2025

Date:

N/A

Name of company (if applicable):



## Jamie Pote

SENIOR ECOLOGIST AND ENVIRONMENTAL  
SCIENTIST

### CONTACT

-  (+27) 76 888 9890
-  [jamiepote@live.co.za](mailto:jamiepote@live.co.za)
-  Port Elizabeth, South Africa
-  [Linkedin.com](https://www.linkedin.com)
-  Jamiepote
-  [Bluesky-SA](https://bsky.app)

### EDUCATION

- Bachelor of Science  
*Rhodes University*  
2001 (Botany & Environmental Science)
- Bachelor of Science (Honours)  
*Rhodes University*  
2002 (Botany)
- Professional Natural Scientist  
*SACNASP*  
2016

### SERVICES

- Terrestrial Biodiversity/Ecological Assessments*
- Environmental & Ecological Risk-Assessments*
- Bioremediation, Restoration & Rehabilitation Plans*
- Environmental Management Plans & Programmes*
- GIS Mapping & Analysis & Web maps*
- Alien Invasive Management (Terrestrial)*
- Environmental Auditing & Monitoring (ECO)*
- Flora Search & Rescue & Relocation*
- Independent Environmental & Ecological review*
- Permit and License applications*
- Environmental & Mining Applications*

### ABOUT ME

*16 years broad professional experience in Biodiversity, Ecological and Vegetation Assessments on over 220 projects in southern, western and central Africa. Senior Environmental Consultant and EAP on over 50 projects in the mining, infrastructure, housing and agricultural sectors. Environmental monitoring and auditing on over 50 civil infrastructure and construction projects. Have managed all aspects of projects from inception through to implementation. GIS mapping and analytics.*

### EXPERIENCE AND CLIENTS

#### Key Sectors

- *Wind, Solar Energy Facilities*
- *Infrastructure and Housing*
- *Agriculture and Forestry*
- *Mining and Industrial*

#### Key Projects

- *Over 220 independent Biodiversity/Ecological Assessments throughout southern, western and central Africa.*
- *Mining applications and construction auditing on over 40 projects and more than 300 gravel borrow pits for the Eastern Cape Department of Roads and Public Works, Department of Transport and the South African National Roads Agency (SANRAL) throughout the Eastern Cape.*
- *South-End Precinct Mixed Use Development for Mandela Bay Development Agency - Environmental application, Ecological assessments and Construction monitoring.*
- *Coega Development Corporation IDZ projects – Ecological assessments, Flora search & rescue and Construction monitoring.*
- *Environmental applications, construction monitoring and auditing for a wide range of projects, including infrastructure and housing for various clients including the Department of Transport and SANRAL.*
- *Various agricultural expansion and infrastructure projects.*
- *Various wind and solar energy and associated infrastructure projects.*
- *Numerous infrastructure projects including electrical, water and roads.*
- *Various Environmental Management and Rehabilitation Plans.*



**herewith certifies that**  
**Jamie Robert Claude Pote**  
Registration Number: 115233  
**is a registered scientist**

in terms of section 20(3) of the Natural Scientific Professions Act, 2003  
(Act 27 of 2003)  
in the following field(s) of practice (Schedule 1 of the Act)  
Ecological Science (Professional Natural Scientist)

Effective **20 July 2016**

Expires **31 March 2026**



A handwritten signature in black ink, appearing to read 'A. Keph'.

Chairperson

A handwritten signature in black ink, appearing to read 'N. Maseko'.

Chief Executive Officer



To verify this certificate scan this code

Mr Jamie Pote (BSc (Hons) PR. Sci. Nat.)

**PROJECT EXPERIENCE****PERFORMANCE STANDARD BIODIVERSITY AND CRITICAL HABITAT ASSESSMENTS (IFC PS6)**

- DBSA Environmental & Social Safeguards Standards 9: Biodiversity Conservation and Sustainable Management Assessment: The Ilitha Fibre Project, Ethekeini 2021
- Critical Habitat & Biodiversity Assessment - Roggeveld Wind Energy Project 2020
- Biodiversity Assessment for Kalukundi Copper/Cobalt Mine, Democratic Republic of Congo 2008

**TERRESTRIAL BIODIVERSITY ASSESSMENTS AND COMPLIANCE STATEMENTS**

- Terrestrial Biodiversity Assessment (Addo BSD Offices) 2021
- Terrestrial Biodiversity Assessment (Blaauwater Farms) 2021
- Terrestrial Biodiversity Assessment (Buffelshoek Farm, Loerie) 2021
- Terrestrial Biodiversity & Aquatic Assessment & Review (Falcon Ridge Dam) 2021
- Terrestrial Biodiversity Assessment (Gubenxa Valley Deciduous Fruit) 2021
- Terrestrial Biodiversity Assessment (Little Chelsea Mixed-use) 2021
- Terrestrial Biodiversity Compliance Statement (Maidenhead Farm) 2021
- Terrestrial Biodiversity Review, Mulilo Total Hydra Storage Project Grid Interconnection 2021
- Terrestrial Biodiversity Compliance Statement (Lahlangubo River Bridge) 2021
- Terrestrial Biodiversity Assessment (Mbashe access roads - 3 sites) 2021
- Terrestrial Biodiversity Assessment (Burlington Farm Citrus Development, Cookhouse) 2020
- Terrestrial Biodiversity Compliance Statement: CHDM Cluster 9 Phase 3D Pipeline 2020
- Terrestrial Biodiversity Review, Mulilo Total Hydra Storage Project BESS 2020
- Terrestrial Biodiversity Assessment (Mbashe housing projects, Dutywa & Willowvale) 2020
- Terrestrial Biodiversity Assessment (Helpmekaar Dam, Tarkastad) 2020
- Terrestrial Biodiversity Assessment (Herbertsdale pipeline, Mossel Bay) 2020
- Terrestrial Biodiversity Assessment (Keurbooms Erf 155, Keurboomstrand) 2020
- Terrestrial Biodiversity Assessment (Lowmar Hydroelectric Project, Cradock) 2020
- Terrestrial Biodiversity Assessment (Mossel Bay Gas Power Plant) 2020
- Terrestrial Biodiversity Assessment (Erf 1820, Mthatha) 2020
- Terrestrial Biodiversity Assessment (Newlyn Manganese Terminal, Coega SEZ) 2020
- Terrestrial Biodiversity Assessment Thornhill Phase 2 Sanitation Link 2020

**ENERGY PROJECTS (WIND FARM AND PHOTOVOLTAIC INFRASTRUCTURE)**

- Preliminary Biodiversity Screening for Chrisdelina Ranch Agricultural Project, Kizenga District 2020
- Preliminary Biodiversity Screening and GIS mapping for Balekani Photovoltaic Solar Project 2020
- Preliminary Biodiversity Screening and GIS mapping for Sihhoye Photovoltaic Solar Project 2020
- Preliminary Biodiversity Screening and GIS mapping Mpaka Photovoltaic Solar Project 2020
- Preliminary Biodiversity Screening and GIS mapping for Chiwelwa Hydroelectric project 2020
- Ecological Assessment for Vermaak Boerdery Hydro Turbine (Cookhouse), Eastern Cape 2020
- Ecological Assessment for Windcurrent Wind Farm, Eastern Cape 2012
- Ecological Assessment for Universal Windfarm, NMB 2011
- Ecological Assessment for Inca Energy Windfarm, Northern Cape 2011
- Ecological Assessment for Broadlands Photovoltaic Farm, Eastern Cape 2011
- Botanical Assessment for Electrawinds Windfarm Coega, NMB 2010
- Botanical Assessment and Open Space Management Plan for Mainstream WEF Phase 2, Eastern Cape 2010

**SPECIALISED ECOLOGICAL REPORTS AND REVIEWS**

- Rebels Vlei Riparian delineation 2021



Mr Jamie Pote (BSc (Hons) PR. Sci. Nat.)

|                                                                                                                    |      |
|--------------------------------------------------------------------------------------------------------------------|------|
| • Buck Kraal Dam Rehabilitation Plan Review                                                                        | 2020 |
| • Rehabilitation Plan for Hitgeheim Farm (Farm 960), Sunland, Eastern Cape                                         | 2017 |
| • Green Star Rating Ecological Assessment for SANRAL office, Bay West City, NMBM                                   | 2015 |
| • Section 24G Assessment and Rehabilitation Plan for Bingo Farm, Eastern Cape                                      | 2014 |
| • Mapping and Ecological services for Congo Agriculture, Republic of Congo                                         | 2013 |
| • Rehabilitation Plan for Nieu Bethesda, Eastern Cape                                                              | 2011 |
| • Mapping of pipeline for Kenton Water Board, Eastern Cape                                                         | 2010 |
| • Rehabilitation Plan for N2 Upgrade - Coega to Colchester, NMB                                                    | 2010 |
| • Representative for landowner group for Seaview burial Park, NMB                                                  | 2010 |
| • Botanical Sensitivity Analysis for LSDF, Greenbushes-Hunters Retreat, NMB                                        | 2008 |
| • Forestry Rehabilitation Assessment Report for Amahlathi Forest Rehabilitation, Eastern Cape                      | 2007 |
| • Botanical & Riparian Assessment for Orange River Weirs-Boegoeberg, Douglas Dam and Sendelingsdrif, Northern Cape | 2006 |
| • Botanical Assessment for State of the Environment Report for Chris Hani District Municipality SoER, Eastern Cape | 2003 |

ROAD AND RAILWAY INFRASTRUCTURE PROJECTS

|                                                                                  |      |
|----------------------------------------------------------------------------------|------|
| • Ecological Assessment for CDC IDZ Mn Terminal, conveyor and railway line, NMB  | 2013 |
| • Ecological Assessment Review for Penhoek Road widening, Eastern Cape           | 2012 |
| • Ecological Assessment for R61 road widening, Eastern Cape                      | 2012 |
| • Botanical Assessment for Chelsea RD - Walker Drive Ext., NMB                   | 2010 |
| • Botanical Assessment for Motherwell - Blue Water Bay Road, NMB                 | 2010 |
| • Ecological Assessment for Port St John Road, Eastern Cape                      | 2010 |
| • Botanical Basic Assessment for Bholani Village Rd, Port St Johns, Eastern Cape | 2009 |
| • Botanical Report, EMP and Rehab Plan for Coega-Colchester N2 Upgrade, NMB      | 2009 |
| • Botanical Assessment for Manganese Conveyor Screening Report, NMB              | 2008 |
| • Ecological Assessment for Road Layout for Whiskey Creek- Kenton, Eastern Cape  | 2006 |

MINING PROJECTS

|                                                                                                                                |      |
|--------------------------------------------------------------------------------------------------------------------------------|------|
| • Ecological Assessment for Bochum Borrow Pits, Limpopo                                                                        | 2013 |
| • Ecological Assessment and Mining and Rehabilitation Plan for Greater Soutpansberg Mining Project, Limpopo (3 proposed Mines) | 2013 |
| • Ecological Assessment for Thulwe Road Borrow Pits, Limpopo                                                                   | 2013 |
| • Ecological Assessment and Mining and Rehabilitation Plan for Baghana Mining, Ghana                                           | 2010 |
| • Botanical Assessment for Zwartbosch Quarry, Eastern Cape                                                                     | 2008 |
| • Botanical description & map production for Quarry - Rudman Quarry, Eastern Cape                                              | 2008 |
| • Botanical Basic Assessment, Rehab Plan & Maps for Borrow Pit - Rocklands/Patensie, Eastern Cape                              | 2008 |
| • Botanical Assessment & Maps for Sandman Sand Gravel Mine, Eastern Cape                                                       | 2008 |
| • Botanical Assessment & GIS maps for Shamwari Borrow Pit, Eastern Cape                                                        | 2008 |
| • Detailed Botanical Assessment, EMP and Rehab Plan for Kalukundi Copper/Cobalt Mine, Democratic Republic of Congo             | 2008 |
| • Botanical Assessment, Rehab Plan & Maps for Borrow Pit Humansdorp/Oyster Bay, Eastern Cape                                   | 2008 |
| • Botanical Assessment, Rehab Plan & Maps for AWRM - Cala, Eastern Cape                                                        | 2008 |
| • Botanical Assessment, Rehab Plan & Maps for AWRM - Camdeboo, Eastern Cape                                                    | 2008 |
| • Botanical Assessment, Rehab Plan & Maps for AWRM - Somerset East, Eastern Cape                                               | 2008 |
| • Botanical Assessment, Rehab Plan & Maps for AWRM - Nkonkobe, Eastern Cape                                                    | 2008 |
| • Botanical Assessment, Rehab Plan & Maps for AWRM - Ndlambe, Eastern Cape                                                     | 2008 |
| • Botanical Assessment, Rehab Plan & Maps for AWRM - Blue Crane Route, Eastern Cape                                            | 2008 |

Mr Jamie Pote (BSc (Hons) PR. Sci. Nat.)

|                                                                                                                                 |      |
|---------------------------------------------------------------------------------------------------------------------------------|------|
| • Botanical Assessment, EMP and Rehabilitation Plan for AWRM - Cathcart, Eastern Cape                                           | 2008 |
| • Botanical Assessment, GIS maps and Rehab Plan for Mthatha Prospecting, Eastern Cape                                           | 2008 |
| • Regional Botanical Map for mining prospecting permit, Welkom                                                                  | 2008 |
| • Botanical Assessment for Scoping Report and Detailed Botanical Assessment and Rehab Plan for Elitheni Coal Mine, Eastern Cape | 2007 |
| • Botanical Assessment, Rehab Plan & Maps for Borrow Pit - Oyster Bay, Eastern Cape                                             | 2007 |
| • Botanical Assessment, Rehab Plan & Maps for Borrow Pit - Bathurst/GHT, Eastern Cape                                           | 2007 |
| • Botanical Assessment, Rehab Plan & Maps for Borrow Pit - Jeffreys Bay, Eastern Cape                                           | 2007 |
| • Botanical Assessment, Rehab Plan & Maps for Borrow Pit - Storms River/Kareedouw, Eastern Cape                                 | 2007 |
| • Biophysical Assessment for Humansdorp Quarry, Eastern Cape                                                                    | 2006 |
| • Botanical Assessment, Rehab Plan & Maps for Quarry-Cathcart & Somerset East, Eastern Cape                                     | 2006 |
| • Botanical Assessment, Rehab Plan & Maps for Quarry - Despatch Quarry, NMB                                                     | 2006 |
| • GIS Mapping & Botanical Assessment and Rehab Plan for Quarry - JBay Crushers, Eastern Cape                                    | 2006 |
| • Botanical Assessment, EMP and Rehabilitation Plan for Polokwane Silicon Smelter, Limpopo                                      | 2006 |
| • Application for Mining Permit for Bruce Howarth Quarry, Eastern Cape                                                          | 2006 |

POWERLINE INFRASTRUCTURE PROJECTS

|                                                                                                           |      |
|-----------------------------------------------------------------------------------------------------------|------|
| • Ecological Assessment: Dieprivier-Karreedouw 132kV Powerline realignment, Kouga LM                      | 2016 |
| • Eskom Ecological Walkdown: Dieprivier-Karreedouw 132 kV Powerline, Kouga LM                             | 2016 |
| • Eskom Solar one Ecological Walkdown: Nieuwehoop 400 kV powerline                                        | 2015 |
| • Rehabilitation Plan and Auditing for Grassridge-Poseidon Powerline Rehab, Eastern Cape                  | 2013 |
| • Ecological Assessment for Dieprivier Karreedouw 132kV Powerline, Eastern Cape                           | 2012 |
| • Flora and Fauna search and Rescue plan for Van Stadens Windfarm Powerline, NMB                          | 2012 |
| • Botanical Assessment for Dedisa-Grassridge Powerline, Eastern Cape                                      | 2010 |
| • Ecological Assessment for Grahamstown-Kowie Powerline, Eastern Cape                                     | 2010 |
| • Species of Special Concern Mapping Transmission Line for San Souci to Nivens Drift 132kV powerline, NMB | 2009 |
| • Botanical Assessment for Eskom Powerline - Albany-Kowie, Eastern Cape                                   | 2009 |
| • Botanical Assessment for Eskom 132 kV Dedisa Grassridge Power line-Coega, NMB                           | 2006 |
| • Botanical Assessment for Eskom Power line – Tyalara-Wilo, Eastern Cape                                  | 2006 |
| • Botanical Assessment for Steynsburg - Teebus 132 kV powerline, Eastern Cape                             | 2004 |

PIPELINE INFRASTRUCTURE PROJECTS

|                                                                                                    |      |
|----------------------------------------------------------------------------------------------------|------|
| • Terrestrial Biodiversity Assessment for Thornhill Phase 2 Sanitation Link, Ndlambe, Eastern Cape | 2020 |
| • Botanical Assessment for Ngqamakhwe Regional Water Supply Scheme (Phase 3)                       | 2018 |
| • Ecological Assessment for Butterworth Emergency Bulk Water Supply Scheme                         | 2017 |
| • Ecological Assessment for Karringmelkspruit Emergency Bulk Water Supply (Lady Grey)              | 2017 |
| • Ecological Assessment for Wanhoop-Willowmore Bulk Water Supply, Eastern Cape                     | 2016 |
| • Ecological Assessment for Steytlerville Bulk Water Supply, Eastern Cape (Phase 4)                | 2013 |
| • Ecological Assessment for Steytlerville Bulk Water Supply, Eastern Cape (Phase 5)                | 2013 |
| • Detailed Ecological Assessment for Suikerbos Pipeline, Gauteng                                   | 2012 |
| • Basic Botanical Assessment for Wanhoop farm pipeline, Eastern Cape                               | 2010 |
| • Basic Botanical Assessment for Chatty Sewer, NMB                                                 | 2010 |
| • Species of Special Concern Mapping for Seaview Pipeline, NMB                                     | 2009 |
| • Species of Special Concern Mapping for Chelsea Bulk Water Pipeline, NMB                          | 2009 |
| • Map Production for Russell Rd Stormwater, NMB                                                    | 2008 |
| • Basic Botanical Assessment for Albany Pipeline, Eastern Cape                                     | 2008 |
| • Environmental Risk Assessment for Elands River pipeline, Eastern Cape                            | 2007 |

Mr Jamie Pote (BSc (Hons) PR. Sci. Nat.)

|                                                                                   |      |
|-----------------------------------------------------------------------------------|------|
| • Detailed Botanical Assessment for Motherwell Pipeline, NMB                      | 2007 |
| • Detailed Botanical Assessment, GIS maps for Erasmuskloof Pipeline, Eastern Cape | 2007 |
| • Botanical & Floristic Report for Hankey pipeline, Eastern Cape                  | 2006 |
| • Detailed Botanical Assessment for Port Alfred water pipeline, Eastern Cape      | 2004 |

GENERAL INFRASTRUCTURE DEVELOPMENT PROJECTS

|                                                                                                                   |      |
|-------------------------------------------------------------------------------------------------------------------|------|
| • Ecological Assessment for Amalinda crossing, BCM, Eastern Cape                                                  | 2019 |
| • Ecological Assessment for Cookhouse Bridge rehabilitation and temporary deviation, Eastern Cape                 | 2019 |
| • Ecological Assessment for Nelson Mandela University Access Road, NMB                                            | 2019 |
| • Botanical Assessment for Zachtevelei Dam (Lady Grey), Eastern Cape                                              | 2017 |
| • Botanical Assessment for Gcebula River bridge (Peddie), Eastern Cape                                            | 2017 |
| • Botanical Assessment for Kouga Dam wall upgrade, Eastern Cape                                                   | 2012 |
| • Botanical Assessment for Jansenville Cemetery, Eastern Cape                                                     | 2009 |
| • Botanical Assessment for Radar Mast construction for South African Weather Service – BCM & NMB                  | 2008 |
| • Botanical Assessment and GIS mapping for golf course realignment for East London Golf Course, BCM, Eastern Cape | 2007 |
| • Botanical Assessment for PE Airport Extension, NMB                                                              | 2006 |
| • Botanical Assessment for Kidd's Beach Desalination Plant, BCM, Eastern Cape                                     | 2006 |

HOUSING DEVELOPMENT PROJECTS

|                                                                                                          |      |
|----------------------------------------------------------------------------------------------------------|------|
| • Terrestrial Biodiversity Assessment for Erf 1820 Mthatha, KSDM, Eastern Cape                           | 2020 |
| • Ecological Assessment for Erf 599 Walmer Mixed Use Development, Nelson Mandela Bay                     | 2019 |
| • Ecological Assessment Portion 21-23 and 41 of Farm 807, Gonubie, Buffalo City                          | 2019 |
| • Ecological Assessment for Emerald Sky Housing Project, BCMM                                            | 2019 |
| • Ecological Assessment for Erf 14, Kabega, Port Elizabeth                                               | 2017 |
| • Ecological Assessment for Fairwest Rental Housing, Port Elizabeth                                      | 2017 |
| • Ecological Assessment for Hankey Housing, Kouga District Municipality                                  | 2015 |
| • Ecological Assessment for Lebowakgoma Housing, Limpopo                                                 | 2013 |
| • Ecological Assessment for Giyani Development, Limpopo                                                  | 2013 |
| • Ecological Assessment for Palmietfontein Development, Limpopo                                          | 2013 |
| • Ecological Assessment for Seshego Development, Limpopo                                                 | 2013 |
| • Botanical Assessment for Sheerness Road, BCM, Eastern Cape                                             | 2013 |
| • Ecological Assessment for Ethembeni Housing, NMB                                                       | 2012 |
| • Ecological Assessment for Pelana Housing, Limpopo                                                      | 2012 |
| • Flora Search and Rescue Plan for Kwanobuhle Housing, Western Cape                                      | 2011 |
| • Botanical Assessment for The Craggs 288/03, Western Cape                                               | 2010 |
| • Ecological Assessment Revision Report for Fairview Housing, NMB                                        | 2010 |
| • Botanical Assessment, EMP and Open Space Management Plan for Hornlee Housing Development, Western Cape | 2010 |
| • Botanical Assessment for Little Ladywood, Western Cape                                                 | 2010 |
| • Botanical Assessment and Open Space Management Plan for Motherwell NU31, NMB                           | 2010 |
| • Botanical Assessment and Open Space Management Plan for Plett 443/07, Western Cape                     | 2010 |
| • Botanical Assessment for Willow Tree Farm, NMB                                                         | 2010 |
| • Botanical Assessment for Kouga RDP Housing, Eastern Cape                                               | 2009 |
| • Botanical Assessment for Fairview Erf 1226 (Wonderwonings), NMB                                        | 2009 |
| • Species List Compilation for Zeekoerivier Humansdorp, Eastern Cape                                     | 2009 |
| • Botanical Assessment for Woodlands Golf Estate (Farm 858), BCM, Eastern Cape                           | 2009 |



Mr Jamie Pote (BSc (Hons) PR. Sci. Nat.)

|                                                                                             |      |
|---------------------------------------------------------------------------------------------|------|
| • Botanical Assessment for Plettenberg Bay - 438/4, Western Cape                            | 2009 |
| • Vegetation Assessment for Kwanokuthula RDP housing project, Western Cape                  | 2008 |
| • Site screening assessment for Greenbushes Site screening, NMB                             | 2008 |
| • Botanical Assessment for Fairfax development, Eastern Cape                                | 2008 |
| • Botanical Assessment for Plettenberg Bay Brakkloof 50&51, Western Cape                    | 2008 |
| • Botanical Assessment, GIS mapping for Theescombe Erf 325, NMB                             | 2008 |
| • Site Screening for Mount Road, NMB                                                        | 2008 |
| • Botanical Assessment for Greenbushes Farm 40 Swinburne 404, NMB                           | 2008 |
| • Botanical Assessment for Greenbushes 130, NMB                                             | 2008 |
| • Botanical Assessment for Greenbushes Kuyga no. 10, NMB                                    | 2008 |
| • Botanical Assessment for Plettenberg Bay - 438/24, Western Cape                           | 2007 |
| • Botanical Assessment for Plettenberg Bay - Olive Hills 438/7, Western Cape                | 2007 |
| • Botanical Assessment for Gonubie Portion 809/9, BCM, Eastern Cape                         | 2006 |
| • Botanical Assessment for Glengariff Farm 723, BCM, Eastern Cape                           | 2006 |
| • Botanical Assessment for Gonubie Portion 809/10, BCM, Eastern Cape                        | 2006 |
| • Botanical Assessment for Gonubie Portion 809/4 & 5, BCM, Eastern Cape                     | 2006 |
| • Botanical Assessment for Plettenberg bay - Ladywood 438/1&3, Western Cape                 | 2006 |
| • Botanical Assessment and Rehab Plan for Winterstrand Desalination Plant, BCM              | 2006 |
| • Botanical Assessment for Bosch Hoogte, NMB                                                | 2006 |
| • Botanical Assessment for Plettenberg bay Farm 444/38, Western Cape                        | 2006 |
| • Botanical Assessment for Plettenberg Bay - 444/27, Western Cape                           | 2006 |
| • Botanical Assessment for Leisure Homes, BCM, Eastern Cape                                 | 2006 |
| • Botanical Basic Assessment for Trailees Wetland Assessment, Eastern Cape                  | 2005 |
| • Botanical Assessment and Rehab Plan for Arlington Racecourse - PE, NMB                    | 2005 |
| • Botanical Assessment for Smart Stone, NMB                                                 | 2005 |
| • Botanical Assessment for Peninsular Farm (Port Alfred), Eastern Cape                      | 2005 |
| • Botanical Assessment for Mount Pleasant - Bathurst, Eastern Cape                          | 2005 |
| • Botanical Assessment and RoD amendments for Colchester Erven 1617 & 1618 (Riverside), NMB | 2005 |
| • Basic Botanical Assessment for Parsonsvelei 3/4, Eastern Cape                             | 2005 |
| • Botanical Assessment for Bridgemead – Malabar PE, NMB                                     | 2004 |

AGRICULTURAL PROJECTS

|                                                                                            |      |
|--------------------------------------------------------------------------------------------|------|
| • Ecological Assessment for Vermaak Boerdery Hydro Turbine (Cookhouse)2020                 | 2020 |
| • Thornhill Eggland Specialist Ecological Assessment                                       | 2020 |
| • Ecological Assessment for Citrus expansion on Hitgeheim Farm, Sunland, Eastern Cape      | 2015 |
| • Ecological Assessment for Citrus expansion on farm 960, Patensie (AIN du Preez Boerdery) | 2014 |
| • Ecological Assessment for Doornkraal Pivot (Hankey), Eastern Cape                        | 2014 |
| • Ecological Assessment for Tzaneen Chicken Farm, Limpopo                                  | 2013 |
| • Botanical Assessment and Open Space Management Plan for Kudukloof, NMB                   | 2010 |
| • Botanical Assessment and Open Space Management Plan for Landros Veeplaats, NMB           | 2010 |
| • Botanical Assessment and Flora Relocation Plan for Wildemans Plaas, NMB                  | 2006 |

GOLF ESTATE AND RESORT DEVELOPMENT PROJECTS

|                                                                                            |      |
|--------------------------------------------------------------------------------------------|------|
| • Species List& Comments Report for Kidds Beach Golf Course, BCM, Eastern Cape             | 2009 |
| • Botanical Assessment for Plettenberg Bay -Farm 288/03, Western Cape                      | 2009 |
| • Botanical Assessment for Rockcliff Golf Course, BCM, Eastern Cape                        | 2008 |
| • Botanical Assessment for Rockcliff Resort Development, BCM, Eastern Cape                 | 2007 |
| • Botanical Assessment, EMP and Rehabilitation Plan for Tiffendel Ski Resort, Eastern Cape | 2006 |



Mr Jamie Pote (BSc (Hons) PR. Sci. Nat.)

MIXED USE DEVELOPMENT PROJECTS

- Ecological Assessment for South-End Precinct Mixed Use Development, Nelson Mandela Bay 2018
- Botanical Assessment, EMP and Open Space Management Plan for Bay West City, NMB 2010
- Botanical Assessment, GIS maps, Open Space and Rehab Plans for Fairview Erf 1082, NMB 2009
- Botanical Assessment and GIS maps for Utopia Estate PE, NMB 2008
- Botanical Assessment and GIS mapping for Madiba Bay Leisure Park, NMB 2007
- Botanical Assessment and GIS mapping for Madiba Bay Leisure Park, NMB 2007
- Botanical Basic Assessment for Cuyler Manor (Farm 320), Uitenhage, NMB 2007

BUSINESS AND INDUSTRIAL DEVELOPMENT PROJECTS

- Ecological Assessment for Parsonsvei Erf 984 & 1134 Parsonsvei, NMB 2020
- Mthatha Retails and Service Center 2020
- Ecological Assessment for Walmer Erf 11667 - Bidfood Warehousing Development, NMB 2020
- Ecological Assessment for Portion 87 of the Farm Little Chelsea No 10, NMB 2020
- Ecological Assessment for Bay West City ENGEN Service Station, NMB 2015
- Ecological Assessment for Green Star grading for SANRAL, NMB 2014
- Ecological Assessment for OTGC Tank Farm, NMB 2012
- Botanical Assessment and Open Space Management Plan for Petro SA Refinery, Coega IDZ, NMB 2010
- Botanical Assessment for Bluewater Bay Erf 805, NMB 2009
- Ecological Assessment for Bay West City, NMB 2007
- Botanical Assessment for Kenton Petrol Station, Eastern Cape 2005
- Botanical Assessment and RoD amendments for Colchester Petrol Station, NMB 2005

ECO-ESTATE DEVELOPMENT PROJECTS

- Botanical Re-Assessment of Swanlake Eco Estate, Aston Bay, Eastern Cape 2018
- Detailed Botanical Assessment and Open Space Management Plan for Olive Hills, Western Cape 2010
- Botanical Assessment and EMP for Zwartbosch Road, Eastern Cape 2010
- Botanical Assessment - Poultry Farm for Coega Kammaskloof Farm 191, NMB 2008
- Botanical Assessment - Housing development for Coega Ridge, NMB 2008
- Botanical Assessment, Rehabilitation Plan, EMP and GIS maps for Amanzi Estate, NMB, 2008
- Botanical Assessment for Roydon Game farm, Queenstown, Eastern Cape 2007
- Botanical Assessment for Winterstrand Estate (Farm 1008), BCM, Eastern Cape 2007
- Botanical Assessment for Homeleigh Farm 820, BCM, Eastern Cape 2007
- Botanical Basic Assessment, Rehab Plan & Maps for Candlewood, Tsitsikamma, Western Cape 2007
- Botanical Assessment, EMP and Rehab Plan for Carpe Diem Eco development, Eastern Cape 2007
- Botanical Assessment, EMP and Rehabilitation Plan for Seaview Eco-estate, NMB 2006
- Botanical Assessment for Kidd's Beach portion 1076, BCM, Eastern Cape 2006
- Botanical Assessment for Palm Springs, Kidds Beach East London, BCM, Eastern Cape 2006
- Botanical Assessment for Nahoon Farm 29082, BCM, Eastern Cape 2006
- Botanical Assessment for Rosehill Farm, Eastern Cape 2005
- Botanical Assessment for Resolution Game Farm, Eastern Cape 2005
- Botanical Assessment for Gonubie Portion 809/11, BCM, Eastern Cape 2005
- Botanical Assessment for Kidd's Beach portion 1075, BCM, Eastern Cape 2005

FLORA AND FAUNA RELOCATION PLANS, PERMITS AND IMPLEMENTATION

- Flora Search and Rescue for Nelson Mandela University Phase 2 & 3 Residences, Eastern Cape 2020

Mr Jamie Pote (BSc (Hons) PR. Sci. Nat.)

|                                                                                                    |      |
|----------------------------------------------------------------------------------------------------|------|
| • Flora Search and Rescue for Fairwest Housing Estate, Nelson Mandela Bay, Eastern Cape            | 2019 |
| • Flora Search and Rescue for Utopia Estate, Nelson Mandela Bay, Eastern Cape                      | 2019 |
| • Flora Search and Rescue for Citrus expansion on Boschkraal Citrus Farm, Sunland, Eastern Cape    | 2018 |
| • Flora Search and Rescue for Wanhoop pipeline, Willowmore, Eastern Cape                           | 2018 |
| • Flora Search and Rescue for Wilgekloof pipeline, Willowmore, Eastern Cape                        | 2018 |
| • Flora Search and Rescue for Citrus expansion on Hitgeheim Farm (Farm 960), Sunland, Eastern Cape | 2017 |
| • Flora Search and Rescue for Steytlerville Bulk Water Supply, Eastern Cape (Phase 5)              | 2016 |
| • Flora Search and Rescue for Citrus expansion on Farm 960, Patensie (AIN du Preez Boerdery)       | 2016 |
| • Flora Search and Rescue for Steytlerville Bulk Water Supply & WTW, Eastern Cape (Phase 4)        | 2015 |
| • Flora and Fauna Search and Rescue for Riversbend Citrus Farm, NMB                                | 2014 |
| • Flora and Fauna Search and Rescue for Mainstream Windfarm, Eastern Cape                          | 2013 |
| • Flora Search and Rescue for Steytlerville Bulk Water Supply, Eastern Cape (Phase 1, 2 & 3)       | 2013 |
| • Flora and Fauna Search and Rescue for OTGC Tank Farm, Coega IDZ, NMB                             | 2013 |
| • Flora and Fauna Search and Rescue for Jeffreys Bay School, Eastern Cape                          | 2013 |
| • Flora Search and Rescue Plan for Red Cap Wind Farm, Eastern Cape                                 | 2012 |
| • Flora Relocation for Disco Poultry Farm, NMB                                                     | 2010 |
| • Flora Relocation for Mainstream Windfarm, Eastern Cape                                           | 2010 |

ENVIRONMENTAL MANAGEMENT PLANS

|                                                                                                                                                                                     |      |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| • Final Environmental Management Programme (EMPr) and Maintenance Management Plan for South End Precinct Mixed Use Zone, Nelson Mandela Bay Municipality                            | 2020 |
| • Final Environmental Management Programme (EMPr) for Coega Land-Based Aquaculture Development Zone (ADZ), Coega Industrial Development Zone (IDZ), Nelson Mandela Bay Municipality | 2019 |
| • Basic Botanical Assessment for Kromensee EMP (Jeffries Bay), Eastern Cape                                                                                                         | 2010 |
| • Wetland Management Plan for NMB Portnet, NMB                                                                                                                                      | 2010 |
| • Baseline Botanical Study, Vegetation mapping and EMP for Local Nature Reserve for Plettenberg Bay Lookout LNA, Western Cape                                                       | 2009 |
| • Biodiversity & Ecological Processes for Bathurst-Commonage, Eastern Cape                                                                                                          | 2006 |
| • EMP for Kromensee EMP (Jeffries Bay), Eastern Cape                                                                                                                                | 2006 |
| • Floral Survey for Mbotyi Conservation Assessment, Eastern Cape                                                                                                                    | 2005 |
| • Identifying and Assessment on Aquatic Weeds for Pumba Private Game Reserve, Eastern Cape                                                                                          | 2005 |

BASIC ASSESSMENT APPLICATION PROJECTS (DEDEAT)

|                                                                                              |      |
|----------------------------------------------------------------------------------------------|------|
| • Basic Assessment Application for Parsonsvei Erf 984 & 1134 Parsonsvei                      | 2020 |
| • Construction of Deviation and Rehabilitation of Bridge along DR02481 road                  | 2020 |
| • Basic Assessment Application for Vermaak Boerdery Hydro Turbine (Cookhouse)                | 2020 |
| • Basic Assessment Application for Walmer Erf 11667 Bidfood Warehousing Development          | 2020 |
| • Basic Assessment Application for Portion 87 of the Farm Little Chelsea No 10               | 2020 |
| • Basic Assessment Application for Nelson Mandela University Access Road, NMB                | 2019 |
| • Basic Assessment, WULA and Borrow Pit/Quarry Mining Application, Clarkebury Rd, Idutywa    | 2019 |
| • Basic Assessment Application for Erf 599 Walmer Mixed Use Development, Nelson Mandela Bay  | 2019 |
| • Basic Assessment Application for Cookhouse Bridge rehabilitation and temporary deviation   | 2019 |
| • Basic Assessment Application for Erf 14 Kabega, NMBM                                       | 2017 |
| • Basic Assessment Application for Hankey Housing, Kouga District Municipality               | 2017 |
| • Basic Assessment Application for Fairwest Rental Housing, Nelson Mandela Bay               | 2017 |
| • Basic Assessment Application for Citrus expansion on Hitgeheim Farm, Sunland, Eastern Cape | 2015 |

Mr Jamie Pote (BSc (Hons) PR. Sci. Nat.)

- Basic Assessment Application for Hankey Housing, Kouga District Municipality 2015
- Basic Assessment Application for Citrus expansion on farm 960, Patensie (AIN du Preez Boerdery) 2014
- Basic Assessment Application for South-End Precinct Mixed Use Development, Nelson Mandela Bay 2018

MINING PERMIT/ENVIRONMENTAL MANAGEMENT PROGRAMME APPLICATIONS (DMR)

- Mining BAR/EMP's for Blue Crane Route & Camdeboo LM 12 Borrow Pits – (DoT) 2019
- Mining BAR/EMP's for Elundini LM 6 Borrow Pits (DoT)
- Mining BAR/EMP's for Baviaans LM 6 Borrow Pits (DoT)
- Mining BAR/EMP's for Kouga & Koukamma LM 12 Borrow Pits (DoT)
- Mining BAR/EMP's for Sakhisizwe & Engcobo LM 12 Borrow Pits (DoT)
- Mining BAR/EMP's for Senqu LM 12 Borrow Pits (DoT)
- Mining BAR/EMP's for 24 Borrow Pits in 6 districts within the Eastern Cape – (SANRAL) 2018
- Mining BAR/EMP's for Ingquza Hill LM Borrow Pits – (SANRAL) 2017
- Mining BAR/EMP's for Baviaans LM Borrow Pits – (DRPW) 2017
- Mining BAR/EMP's for Senqu LM Borrow Pits – (DRPW) 2017
- Mining BAR/EMP's for Kouga/Koukamma LM Borrow Pits – (DRPW) 2017
- Mining BAR/EMP's for Inkwanca (Enoch Mgijima) LM Borrow Pits – (DRPW) 2017
- Mining BAR/EMP's for Kouga/Koukamma LM Borrow Pits – (DRPW) 2017
- Mining BAR/EMP's for Sakhisizwe/Engcobo LM Borrow Pits – (DRPW) 2017
- Mining BAR/EMP's for Raymond Mahlaba LM Borrow Pits – (DRPW) 2017
- Mining BAR/EMP's for Camdeboo LM Borrow Pits – (DRPW) 2017
- Mining BAR/EMP's for Elundini LM Borrow Pits – (DRPW) 2017
- Mining BAR/EMP's for Emalahleni/Intsika Yethu LM Borrow Pits – (DRPW) 2017
- Mining BAR/EMP's for Nkonkobe LM Borrow Pits – (SANRAL) 2016
- Mining BAR/EMP's for Mbhashe LM Borrow Pits – (SANRAL) 2016
- Mining BAR/EMP's for Mbizana LM Borrow Pits – (SANRAL) 2016
- Mining BAR/EMP's for Senqu LM Borrow Pits – (SANRAL) 2016
- Mining BAR/EMP's for Elundini LM Borrow Pits – (SANRAL) 2016
- Mining BAR/EMP's for Emalahleni LM Borrow Pits – (SANRAL) 2016
- Mining BAR/EMP's for Emalahleni LM Borrow Pits – (DRPW) 2016
- Mining BAR/EMP's for Ikwezi/Baviaans LM Borrow Pits – (DRPW) 2016
- Mining BAR/EMP's for Chris Hani DM Borrow Pits - MR00716 (Tarkastad) (DRPW) 2015
- Mining BAR/EMP's for Chris Hani DM Borrow Pits - Intsika Yethu and Emalahleni (DRPW) 2015
- Mining BAR/EMP's for Joe Gqabi DM Borrow Pits - Senqu (DRPW) 2015
- Mining BAR/EMP's for Makana/Ndlambe LM Borrow Pits - Sarah Baartman (DRPW) 2015
- Mining BAR/EMP's for Amahlathi LM Borrow Pits - Amatole (DRPW) 2015
- Mining BAR/EMP's for Mbashe/Mqume LM Borrow Pits - Amatole (DRPW) 2015
- Mining BAR/EMP's for Sundays River Valley LM Borrow Pits - Sarah Baartman (DRPW) 2015
- Mining BAR/EMP's for Kouga LM Borrow Pits - Sarah Baartman (DRPW) 2015
- Mining BAR/EMP's for Chris Hani DM Borrow Pits - MR00716 (DRPW) 2014
- Mining BAR/EMP's for Chris Hani DM Borrow Pits - DR02581 (DRPW) 2014
- Mining BAR/EMP's for Chris Hani DM Borrow Pits - DR08041, DR08247, DR08248 & DR08504 (DRPW) 2014
- Mining BAR/EMP's for Chris Hani DM Borrow Pits - DR08599, DR08601 & DR08570 (DRPW) 2014
- Mining BAR/EMP's for Chris Hani DM Borrow Pits - DR08235, DR08551 & DR08038 (DRPW) 2014
- Mining BAR/EMP's for Alfred Nzo DM Borrow Pits - DR08092, DR08093 & DR08649 (DRPW) 2014
- Mining BAR/EMP's for Alfred Nzo DM Borrow Pits - DR08090, DR08412, DR08425, DR08129, DR08109, DR08106, DR08104 & DR08099 - Matatiele (DRPW) 2014



Mr Jamie Pote (BSc (Hons) PR. Sci. Nat.)

ENVIRONMENTAL COMPLIANCE AUDITING

- Environmental Compliance Audit (Habata Boerdery) 2021
- Environmental Compliance Audit (Sontule Farm) 2021

ENVIRONMENTAL MANAGEMENT, AUDITING, COMPLIANCE AND MONITORING PROJECTS

- Environmental Auditing Services Pre-construction and Construction (Rocky Coast Farm) 2021
- Environmental Auditing Services (Middledrift Breeder Facility) 2021
- Coega Aquaculture Development Zone Environmental Compliance and Monitoring for Construction (24 Months) 2020
- Construction of NMU West End Student Residences Phases 1 & 3 Environmental Control Office (30 Months) 2020
- Environmental Auditing and construction monitoring for construction of Phase 1 River Park (South End Precinct) 2020
- Waste Management License audit for Bedford Recycling project 2020
- Auditing for Construction of Fairwest Village Housing Project 2019
- Auditing for Construction of Utopia Estate monthly auditing 2019
- ECO for DRPW IRM Road Maintenance projects, Baviaans LM 2019
- ECO for DRPW IRM Road Maintenance projects, Senqu LM 2019
- ECO for DRPW IRM Road Maintenance projects, Kouga/Koukamma LM 2019
- ECO for DRPW IRM Road Maintenance projects, Sakhisizwe/Engcobo LM 2019
- ECO for DRPW IRM Road Maintenance projects, Elundini LM 2019
- ECO for DRPW IRM Road Maintenance projects, Emalahleni/Intsika Yethu LM 2019
- ECO for Construction of Fairwest Village Housing Project 2019
- ECO for Construction of Utopia Estate Mixed Use Project 2019
- ECO for Construction of NMU West End Student Residences Phases 1 & 3 2019
- ECO for Construction of Eco-Pullets pullet rearing facility, Paterson 2018
- ECO for DRPW IRM Road Maintenance projects, Raymond Mahlaba LM 2018
- ECO for DRPW IRM Road Maintenance projects, Inkwanca (Enoch Mgiijima) LM 2018
- ECO for Citrus expansion on Farm 960, Patensie (AIN du Preez Boerdery) 2017
- ECO for Citrus expansion on Hitgeheim Farm (Farm 960), Sunland, Eastern Cape 2017
- DEO for improvement of national route R67 section 5 from Whittlesea (km 0.00) to Swart Kei river (km 15.40) – Murray & Roberts 2017
- ECO for SANRAL RRP Road Maintenance projects, Mbizana LM 2017
- ECO and Botanical Specialist for the special maintenance of national route R61 Section 2 from Elinus Farm (km 42.2) to N10 (km 85.0) (SANRAL) 2016
- Environmental Control Officer (ECO): Construction of NSRI Slipway - Port Elizabeth Harbour 2016
- ECO for SANRAL RRP Road Maintenance projects, Mbashe LM 2016
- ECO for SANRAL RRP Road Maintenance projects, Nkonkobe LM 2016
- ECO for SANRAL RRP Road Maintenance projects, Mbizana LM 2016
- ECO for SANRAL RRP Road Maintenance projects, Senqu LM 2016
- ECO for SANRAL RRP Road Maintenance projects, Elundini LM 2016
- ECO and Environmental Management for closure of Bushmans River Landfill site 2016
- ECO for DRPW IRM Road Maintenance projects, Amahlathi Municipality 2015
- ECO for DRPW IRM Road Maintenance projects, Makana/Ndlambe Municipality 2015
- ECO for DRPW IRM Road Maintenance projects, Mbashe/Mqume Municipality 2015
- ECO for DRPW IRM Road Maintenance projects, Port St Johns, Mbizana, Ingquza Hill LM's 2015
- ECO for Riversbend Citrus Farm, NMB 2014
- ECO for Alfred Nzo DM Road resurfacing - DR08071, DR08649, DR08092, DR08418, DR08452, DR08015, DR08085, DR08639 & DR08073, Eastern Cape - MSBA 2014



Mr Jamie Pote (BSc (Hons) PR. Sci. Nat.)

|                                                                               |      |
|-------------------------------------------------------------------------------|------|
| • ECO Audits for Koukamma Flood Damage Road Repairs – Hatch Goba              | 2014 |
| • EMP and ECO for Utopia Estate, NMB                                          | 2013 |
| • Final EMP submission for Seaview Garden Estate, NMB                         | 2012 |
| • ECO audits for NMB Road surfacing, NMB (multiple contacts)                  | 2011 |
| • EMP submission and ECO for Seaview Garden Estate, NMB                       | 2010 |
| • ECO for Mainstream Windfarm wind monitoring mast installation, Eastern Cape | 2010 |
| • EMP and ECO for Sinati Golf Estate EMP, BCM, Eastern Cape                   | 2009 |
| • Flora Relocation Plan and Permit application for Wildemans Plaas, NMB       | 2006 |

ENVIRONMENTAL SCREENING PROJECTS

|                                                                                                    |      |
|----------------------------------------------------------------------------------------------------|------|
| • Somerset East Stormwater Environmental Screening Report                                          | 2021 |
| • Woodlands Diary Road Upgrade Environmental Screening Report, Kouga LM                            | 2021 |
| • Risk Assessment and Screening for proposed Heatherbank access road, NMB                          | 2020 |
| • Environmental Screening Report for Proposed Life Hospital parking expansion, NMB                 | 2019 |
| • Environmental Screening Report for Erf 984 & 1134 development, Parsonslei, NMB                   | 2019 |
| • Environmental Screening Report for proposed Khayaletu School, Buffalo City                       | 2018 |
| • Environmental Screening Report for Proposed Housing Development of Erf 8700, Kabega Park, NMB    | 2017 |
| • Environmental Screening Report for Proposed Housing Development of Erf 14, Kabega Park, NMB      | 2017 |
| • Environmental Screening Report for Proposed Fairvest Social Housing project, Fairview, NMB       | 2016 |
| • Environmental Screening Report for Development of Little Chelsea No 25, NMB                      | 2016 |
| • Terrestrial Vegetation Risk Assessment for proposed Skietnek Citrus Farm development (Kirkwood)  | 2015 |
| • Preliminary Environmental Risk Assessment: NSRI Slipway Port Elizabeth                           | 2015 |
| • Environmental Screening Report for Proposed Development of a Dwelling on Erf 899, Theescombe     | 2015 |
| • Environmental Screening Report for Proposed Development on Erf 559, Walmer, Port Elizabeth       | 2015 |
| • Environmental Screening Report for Proposed Housing Scheme Development of Erf 8709, Wells Estate | 2015 |
| • Environmental Screening Report for Development of Portion 10 of Little Chelsea No 87, NMB        | 2015 |

SECTION 24G APPLICATIONS

|                                                                               |      |
|-------------------------------------------------------------------------------|------|
| • 12 000 ML Dam constructed on farm 960, Patensie (MGM Trust)                 | 2015 |
| • Illegal clearing of 20 Ha of lands on Hitgeheim Farm, Sunland, Eastern Cape | 2015 |

CONFERENCES AND PUBLICATIONS

- Pote, J., Shackleton, C.M., Cocks, M. & Lubke, R. 2006. *Fuelwood harvesting and selection in Valley Thicket, South Africa*. *Journal of Arid Environments*, 67: 270-287.
- Pote, J., Cocks, M., Dold, T., Lubke, R.A. and Shackleton, C. 2004. *The homegarden cultivation of indigenous medicinal plants in the Eastern Cape*. *Indigenous Plant Use Forum*, 5 - 8 July 2004, Augsburg Agricultural School, Clanwilliam, Western Cape.
- Pote, J. & Lubke, R.A. 2003. *The selection of indigenous species suitable for use as fuelwood and building materials as a replacement of invasive species that are currently used by the under-privileged in the Grahamstown commonage*. *Working for Water Inaugural Research Symposium* 19 - 21 August 2003, Kirstenbosch. Poster presentation.
- Pote, J. & Lubke, R.A. 2003. *The screening of indigenous pioneer species for use as a substitute cover crop for rehabilitation after removal of woody alien species by WfW in the grassy fynbos biome in the Eastern Cape*. *Working for Water Inaugural Research Symposium* 19 - 21 August 2003, Kirstenbosch, South Africa.

Mr Jamie Pote (BSc (Hons) PR. Sci. Nat.)

#### OTHER RESEARCH EXPERIENCE

- Resource assessment of bark stripped trees in indigenous forests in Weza/Kokstad area (June 2000; Dr C. Geldenhuys & Mr. M. Kaplin).
- Working for Water research project for indigenous trees for woodlots (December 2000/January 2001; Prof R.A. Lubke, Rhodes University).
- Project coordinator and leader of the REFYN project – A BP conservation gold award: Conservation and Restoration of Grassy-Fynbos. A multidisciplinary project focusing on management, restoration and public awareness/education (2001 – 2002).
- Conservation Project Management Training Workshops: Royal Geographical Society, London 2001 – Fieldwork Techniques, Habitat Assessment, Biological Surveys, Project Planning, Public Relations and Communications, Risk Assessment, Conservation Education
- Selection and availability of wood in Crossroads village, Eastern Cape, South Africa. Honours Research Project 2002. Supervisors: Prof. R.A. Lubke & Prof. C. Shackleton.
- Floral Morphology, Pollination and Reproduction in Cyphia (LOBELIACEAE). Honours Research Project 2002. Supervisor: Mr. P. Phillipson.
- Forestry resource assessment of bark-stripped species in Amatola District (December 2002; Prof R.A. Lubke).
- Homegarden Cultivation of Medicinal Plants in the Amathole area. Postgraduate Research Project (2003-2005; Prof R.A. Lubke, Prof C.M. Shackleton and Ms C.M., Cocks).

## 8.6 Appendix F: Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Biodiversity

### **SCOPE**

The protocol (*Procedures for the assessment and minimum criteria for reporting on identified environmental themes in terms of sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, when applying for environmental authorisation (GN 320, 20 March 2020)*) provides the criteria for the assessment and reporting of impacts on terrestrial biodiversity for activities requiring environmental authorisation.

The protocol (*Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of sections 24(5)(a) and (h) and 44 of NEMA, gazetted on 30 October 2020*), provides the criteria for the assessment and reporting of impacts on plant and animal species for activities requiring environmental authorisation.

These protocols replace the requirements of Appendix 6 of the Environmental Impact Assessment Regulation<sup>8</sup>.

The assessment and minimum reporting requirements of this protocol are associated with a level of environmental sensitivity identified by the national web based environmental screening tool (<https://screening.environment.gov.za/screeningtool>). The requirements for terrestrial biodiversity are for landscapes or sites which support various levels of biodiversity. The relevant terrestrial biodiversity data in the screening tool has been provided by the South African National Biodiversity Institute<sup>9</sup>.

### **SITE SENSITIVITY VERIFICATION AND MINIMUM REPORT CONTENT REQUIREMENTS**

Prior to commencing with a specialist assessment, the current use of the land and the potential environmental sensitivity of the site under consideration as identified by the screening tool must be confirmed by undertaking a site sensitivity verification.

2.1. The site sensitivity verification must be undertaken by an environmental assessment practitioner or a specialist.

2.2. The site sensitivity verification must be undertaken through the use of:

- (a) a desk top analysis, using satellite imagery,
- (b) a preliminary on-site inspection; and
- (c) any other available and relevant information.

2.3. The outcome of the site sensitivity verification must be recorded in the form of a report that:

- (a) confirms or disputes the current use of the land and environmental sensitivity as identified by the screening tool, such as new developments or infrastructure, the change in vegetation cover or status etc.;
- (b) contains a motivation and evidence (e.g., photographs) of either the verified or different use of the land and environmental sensitivity; and
- (c) is submitted together with the relevant assessment report prepared in accordance with the requirements of the Environmental Impact Assessment Regulations.

<sup>8</sup> The Environmental Impact Assessment Regulations, as promulgated in terms of Section 24 (5) of the National Environmental Management Act, 1998 (Act 107 of 1998).

<sup>9</sup> The biodiversity dataset has been provided by the South African National Biodiversity Institute (for details of the dataset, click on the options button to the right of the various biodiversity layers on the screening tool).

## TERRESTRIAL BIODIVERSITY SPECIALIST ASSESSMENT AND MINIMUM REPORT CONTENT REQUIREMENTS

| ASSESSMENT AND REPORTING OF IMPACTS ON TERRESTRIAL BIODIVERSITY    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |   |
|--------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|
| 1                                                                  | General Information                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |   |
| 1.1                                                                | An applicant intending to undertake an activity identified in the scope of this protocol, on a site identified on the screening tool as being "very high sensitivity" for terrestrial biodiversity, must submit a Terrestrial Biodiversity Specialist Assessment.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | ✓ |
| 1.2                                                                | An applicant intending to undertake an activity identified in the scope of this protocol on a site identified by the screening tool as being 'low sensitivity' for terrestrial biodiversity, must submit a Terrestrial Biodiversity Compliance Statement.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | ✓ |
| 1.3                                                                | However, where the information gathered from the site sensitivity verification differs from the designation of 'very high' terrestrial biodiversity sensitivity on the screening tool and it is found to be of a 'low' sensitivity, then a Terrestrial Biodiversity Compliance Statement must be submitted.                                                                                                                                                                                                                                                                                                                                                                                                                                                 | ✓ |
| 1.4                                                                | Similarly, where the information gathered from the site sensitivity verification differs from that identified as having a 'low' terrestrial biodiversity sensitivity on the screening tool, a Terrestrial Biodiversity Specialist Assessment must be conducted.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | ✓ |
| 1.5                                                                | If any part of the proposed development footprint falls within an area of 'very high' sensitivity, the assessment and reporting requirements prescribed for the 'very high' sensitivity apply to the entire footprint, excluding linear activities for which impacts on terrestrial biodiversity are temporary and the land in the opinion of the terrestrial biodiversity specialist, based on the mitigation and remedial measures, can be returned to the current state within two years of the completion of the construction phase, in which case a compliance statement applies. Development footprint in the context of this protocol means the area on which the proposed development will take place and includes any area that will be disturbed. | ✓ |
| VERY HIGH SENSITIVITY RATING for terrestrial biodiversity features |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |   |
| 2                                                                  | Terrestrial Biodiversity Specialist Assessment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |   |
| 2.1                                                                | The assessment must be prepared by a specialist registered with the South African Council for Natural Scientific Professionals (SACNASP) with expertise in the field of terrestrial biodiversity.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |   |
| 2.2                                                                | The assessment must be undertaken on the preferred site and within the proposed development footprint.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |   |
| 2.3                                                                | The assessment must provide a baseline description of the site which includes, as a minimum, the following aspects:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |   |
| 2.3.1                                                              | a description of the ecological drivers or processes of the system and how the proposed development will impact these;                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |   |
| 2.3.2                                                              | ecological functioning and ecological processes (e.g. fire, migration, pollination, etc.) that operate within the preferred site;                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |   |
| 2.3.3                                                              | the ecological corridors that the proposed development would impede including migration and movement of flora and fauna;                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |   |
| 2.3.4                                                              | the description of any significant terrestrial landscape features (including rare or important flora-faunal associations, presence of strategic water source areas (SWSAs) or freshwater ecosystem priority area (FEPA) sub catchments);                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |   |
| 2.3.5                                                              | a description of terrestrial biodiversity and ecosystems on the preferred site, including:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |   |
| (a)                                                                | main vegetation types;                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |   |
| (b)                                                                | threatened ecosystems, including listed ecosystems as well as locally important habitat types identified;                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |   |



|         | ASSESSMENT AND REPORTING OF IMPACTS ON TERRESTRIAL BIODIVERSITY                                                                                                                                                                   |  |
|---------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| (c)     | ecological connectivity, habitat fragmentation, ecological processes and fine- scale habitats; and                                                                                                                                |  |
| (d)     | species, distribution, important habitats (e.g. feeding grounds, nesting sites, etc.) and movement patterns identified;                                                                                                           |  |
| 2.3.6   | the assessment must identify any alternative development footprints within the preferred site which would be of 'low' sensitivity as identified by the screening tool and verified through the site sensitivity verification; and |  |
| 2.3.7   | the assessment must be based on the results of a site inspection undertaken on the preferred site and must identify:                                                                                                              |  |
| 2.3.7.1 | terrestrial critical biodiversity areas (CBAs), including:                                                                                                                                                                        |  |
| (a)     | the reasons why an area has been identified as a CBA;                                                                                                                                                                             |  |
| (b)     | an indication of whether or not the proposed development is consistent with maintaining the CBA in a natural or near natural state or in achieving the goal of rehabilitation;                                                    |  |
| (c)     | the impact on species composition and structure of vegetation with an indication of the extent of clearing activities in proportion to remaining extent of the ecosystem type(s);                                                 |  |
| (d)     | the impact on ecosystem threat status;                                                                                                                                                                                            |  |
| (e)     | the impact on explicit subtypes in the vegetation;                                                                                                                                                                                |  |
| (f)     | the impact on overall species and ecosystem diversity of the site; and                                                                                                                                                            |  |
| (g)     | the impact on any changes to threat status of populations of species of conservation concern in the CBA;                                                                                                                          |  |
| 2.3.7.2 | terrestrial ecological support areas (ESAs), including:                                                                                                                                                                           |  |
| (a)     | the impact on the ecological processes that operate within or across the site;                                                                                                                                                    |  |
| (b)     | the extent the proposed development will impact on the functionality of the ESA; and                                                                                                                                              |  |
| (c)     | loss of ecological connectivity (on site, and in relation to the broader landscape) due to the degradation and severing of ecological corridors or introducing barriers that impede migration   and movement of flora and fauna;  |  |
| 2.3.7.3 | protected areas as defined by the National Environmental Management: Protected Areas Act, 2004 including                                                                                                                          |  |
| (a)     | an opinion on whether the proposed development aligns with the objectives or purpose of the protected area and the zoning as per the protected area management plan;                                                              |  |
| 2.3.7.4 | priority areas for protected area expansion, including-                                                                                                                                                                           |  |
| (a)     | the way in which in which the proposed development will compromise or contribute to the expansion of the protected area I network;                                                                                                |  |
| 2.3.7.5 | SWSAs (strategic water source areas) including:                                                                                                                                                                                   |  |
| (a)     | the impact(s) on the terrestrial habitat of SWSA; and                                                                                                                                                                             |  |
| (b)     | the impacts of the proposed development on the SWSA water quality and quantity (e.g. describing potential increased runoff leading to increased sediment load in water courses),                                                  |  |
| 2.3.7.6 | FEPA sub catchments, including-                                                                                                                                                                                                   |  |
| (a)     | the impacts of the proposed development on habitat condition and species in the FEPA sub catchment;                                                                                                                               |  |
| 2.3.7.7 | indigenous forests, including:                                                                                                                                                                                                    |  |
| (a)     | impact on the ecological integrity of the forest and                                                                                                                                                                              |  |

|        | ASSESSMENT AND REPORTING OF IMPACTS ON TERRESTRIAL BIODIVERSITY                                                                                                                                                                                                                                  |   |
|--------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|
| (b)    | percentage of natural or near natural indigenous forest area lost and a statement on the implications in relation to the remaining areas.                                                                                                                                                        |   |
| 2.4    | The findings of the assessment must be written up in a Terrestrial Biodiversity Specialist Assessment Report                                                                                                                                                                                     |   |
| 3.     | Terrestrial Biodiversity Specialist Assessment Report                                                                                                                                                                                                                                            |   |
| 3.1    | The Terrestrial Biodiversity Specialist Assessment Report must contain, as a minimum, the following information:                                                                                                                                                                                 |   |
| 3.1.1  | contact details of the specialist, their SACNASP registration number, their field of expertise and a curriculum vitae;                                                                                                                                                                           |   |
| 3.1.2  | a signed statement of independence by the specialist;                                                                                                                                                                                                                                            |   |
| 3.1.3  | a statement on the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment,                                                                                                                                                            |   |
| 3.1.4  | description of the methodology used to undertake the site verification and impact assessment and site inspection, including equipment and modeling used, where relevant;                                                                                                                         |   |
| 3.1.5  | a description of the assumptions made and any uncertainties or gaps in knowledge or data as well as a statement of the timing and intensity of site inspection observations;                                                                                                                     |   |
| 3.1.6  | a location of the areas not suitable for development, which are to be avoided during construction and operation (where relevant);                                                                                                                                                                |   |
| 3.1.7  | additional environmental impacts expected from the proposed development;                                                                                                                                                                                                                         |   |
| 3.1.8  | any direct, indirect and cumulative impacts of the proposed development;                                                                                                                                                                                                                         |   |
| 3.1.9  | the degree to which impacts and risks can be mitigated;                                                                                                                                                                                                                                          |   |
| 3.1.10 | the degree to which the impacts and risks can be reversed;                                                                                                                                                                                                                                       |   |
| 3.1.11 | the degree to which the impacts and risks can cause loss of irreplaceable resources;                                                                                                                                                                                                             |   |
| 3.1.12 | proposed impact management actions and impact management outcomes proposed by the specialist for inclusion in the Environmental Management Programme (EMPr),                                                                                                                                     |   |
| 3.1.13 | A motivation must be provided if there were development footprints identified as per paragraph 2.3.6 above that were identified as having a 'low' terrestrial biodiversity sensitivity and that were not considered appropriate,                                                                 |   |
| 3.1.14 | a substantiated statement based on the findings of the specialist assessment, regarding the acceptability, or not, of the proposed development, if it should receive approval or not; and                                                                                                        |   |
| 1.1.15 | any conditions to which this statement is subjected.                                                                                                                                                                                                                                             |   |
| 3.2    | The findings of the Terrestrial Biodiversity Specialist Assessment must be incorporated into the Basic Assessment Report or the Environmental Impact Assessment Report, including the mitigation and monitoring measures as identified, which must be incorporated into the EMPr where relevant. |   |
| 3.3    | A signed copy of the assessment must be appended to the Basic Assessment Report or Environmental Impact Assessment Report.                                                                                                                                                                       |   |
|        | <b>LOW SENSITIVITY RATING – for terrestrial biodiversity features</b>                                                                                                                                                                                                                            |   |
| 4      | Terrestrial Biodiversity Compliance Statement                                                                                                                                                                                                                                                    | ✓ |
| 4.1    | The compliance statement must be prepared by a specialist registered with the SACNASP and having expertise in the field of ecological sciences.                                                                                                                                                  | ✓ |
| 4.2    | The compliance statement must:                                                                                                                                                                                                                                                                   | ✓ |
| 4.2.1  | be applicable to the preferred site and proposed development footprint;                                                                                                                                                                                                                          | ✓ |
| 4.2.2  | confirm that the site is of 'low' sensitivity for terrestrial biodiversity; and                                                                                                                                                                                                                  | ✓ |

|       | ASSESSMENT AND REPORTING OF IMPACTS ON TERRESTRIAL BIODIVERSITY                                                                                                                                                                                                                     |     |
|-------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| 4.2.3 | indicate whether or not the proposed development will have any impact on the biodiversity feature.                                                                                                                                                                                  | ✓   |
| 4.3   | The compliance statement must contain, as a minimum, the following information:                                                                                                                                                                                                     | ✓   |
| 4.3.1 | the contact details of the specialist, their SACNASP registration number, their field of expertise and a curriculum vitae;                                                                                                                                                          | ✓   |
| 4.3.2 | a signed statement of independence by the specialist;                                                                                                                                                                                                                               | ✓   |
| 4.3.3 | a statement on the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment;                                                                                                                                               | ✓   |
| 4.3.4 | a baseline profile description of biodiversity and ecosystems of the site;                                                                                                                                                                                                          | ✓   |
| 4.3.5 | the methodology used to verify the sensitivities of the terrestrial biodiversity features on the site, including equipment and modeling used, where relevant;                                                                                                                       | ✓   |
| 4.3.6 | in the case of a linear activity, confirmation from the terrestrial biodiversity specialist that, in their opinion, based on the mitigation and remedial measures proposed, the land can be returned to the current state within two years of completion of the construction phase; | ✓   |
| 4.3.7 | where required, proposed impact management outcomes or any monitoring requirements for inclusion in the EMPr;                                                                                                                                                                       | ✓   |
| 4.3.8 | a description of the assumptions made and any uncertainties or gaps in knowledge or data; and                                                                                                                                                                                       | ✓   |
| 4.3.9 | any conditions to which this statement is subjected.                                                                                                                                                                                                                                | EAP |
| 4.4   | A signed copy of the compliance statement must be appended to the Basic Assessment Report or Environmental Impact Assessment Report.                                                                                                                                                | EAP |

#### **ANIMAL SPECIES SPECIALIST ASSESSMENT AND MINIMUM REPORT CONTENT REQUIREMENTS**

|     | ASSESSMENT AND REPORTING OF IMPACTS ON TERRESTRIAL BIODIVERSITY                                                                                                                                                                                                                                                                                                                                                                 |   |
|-----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|
| 1   | General Information                                                                                                                                                                                                                                                                                                                                                                                                             |   |
| 1.1 | An applicant intending to undertake an activity identified in the scope of this protocol, on a site identified by the screening tool as being of “very high” or “high” sensitivity for terrestrial animal species must submit a Terrestrial Animal Species Specialist Assessment Report.                                                                                                                                        | ✓ |
| 1.2 | An applicant intending to undertake an activity identified in the scope of this protocol on a site identified by the screening tool as being of “medium sensitivity” for terrestrial animal species must submit either a Terrestrial Animal Species Specialist Assessment Report or a Terrestrial Animal Species Compliance Statement, depending on the outcome of a site inspection undertaken in accordance with paragraph 4. | ✓ |
| 1.3 | An applicant intending to undertake an activity identified in the scope of this protocol on a site identified by the screening tool as being of “low” sensitivity for terrestrial animal species must submit a Terrestrial Animal Species Compliance Statement.                                                                                                                                                                 | ✓ |
| 1.4 | Where the information gathered from the site sensitivity verification differs from the screening tool designation of “very high” or “high”, for terrestrial animal species sensitivity and it is found to be of a “low” sensitivity, then a Terrestrial Animal Species Compliance Statement must be submitted.                                                                                                                  | ✓ |
| 1.5 | Where the information gathered from the site sensitivity verification differs from the screening tool designation of “low” terrestrial animal species sensitivity and it is found to be of a “very high” or “high” terrestrial animal species sensitivity, a Terrestrial Animal Species Specialist Assessment must be conducted.                                                                                                | ✓ |
| 1.6 | If any part of the development falls within an area of confirmed “very high” or “high” sensitivity, the assessment and reporting requirements prescribed for the “very high”                                                                                                                                                                                                                                                    | ✓ |

| ASSESSMENT AND REPORTING OF IMPACTS ON TERRESTRIAL BIODIVERSITY             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |   |
|-----------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|
|                                                                             | or “high” sensitivity, apply to the entire development footprint. Development footprint in the context of this protocol means, the area on which the proposed development will take place and includes the area that will be disturbed or impacted.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |   |
| 1.7                                                                         | The Terrestrial Animal Species Specialist Assessment and the Terrestrial Animal Species Compliance Statement must be undertaken within the study area.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | ✓ |
| 1.8                                                                         | Where the nature of the activity is not expected to have an impact on species of conservation concern (SCC) beyond the boundary of the preferred site, the study area means the proposed development footprint within the preferred site.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | ✓ |
| 1.9                                                                         | Where the nature of the activity is expected to have an impact on SCC beyond the boundary of the preferred site, the project areas of influence (PAOI) must be determined by the specialist in accordance with Species Environmental Assessment Guideline <sup>10</sup> , and the study area must include the PAOI, as determined.                                                                                                                                                                                                                                                                                                                                                                                                                                                            | ✓ |
| <b>VERY HIGH AND HIGH SENSITIVITY RATING for terrestrial animal species</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |   |
| 2                                                                           | Terrestrial Animal Species Specialist Assessment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |   |
|                                                                             | <b>VERY HIGH SENSITIVITY RATING</b><br>Critical habitat for range-restricted species <sup>11</sup> of conservation concern, that have a global range of less than 10 km <sup>2</sup> .<br>SCC listed on the IUCN Red List of Threatened Species <sup>12</sup> or on South Africa’s National Red List website <sup>13</sup> as Critically Endangered, Endangered or Vulnerable according to the IUCN Red List 3.1. Categories and Criteria or listed as Nationally Rare.<br>Species aggregations that represent ≥1% of the global population size of a species, over a season, and during one or more key stages of its life cycle.<br>The number of mature individuals that ranks the site among the largest 10 aggregations known for the species.<br>These areas are irreplaceable for SCC. | ✓ |
| 4.6                                                                         | Where SCC are found on site or have been confirmed to be likely present, a Terrestrial Animal Species Specialist Assessment must be submitted in accordance with the requirements specified for “very high” and “high” sensitivity in this protocol.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | ✓ |
| 4.7                                                                         | Similarly, where no SCC are found on site during the site inspection or the presence is confirmed to be unlikely, a Terrestrial Animal Species Compliance Statement must be submitted.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | ✓ |
| <b>5 LOW SENSITIVITY RATING – for terrestrial animal species</b>            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |   |
|                                                                             | Terrestrial Animal Species Compliance Statement<br>Areas where no natural habitat remains.<br>Natural areas where there is no suspected occurrence of SCC.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |   |
| 5.1                                                                         | The compliance statement must be prepared by a SACNASP registered specialist under one of the two fields of practice (Zoological Science or Ecological Science).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | ✓ |
| 5.2                                                                         | The compliance statement must:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | ✓ |
| 5.2.1                                                                       | be applicable to the study area;                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | ✓ |
| 5.2.2                                                                       | confirm that the study area, is of “low” sensitivity for terrestrial animal species; and                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | ✓ |

<sup>10</sup> Available at <https://bgis.sanbi.org/>

<sup>11</sup> Species with a geographically restricted area of distribution.

<sup>12</sup> <https://www.iucnredlist.org/>

<sup>13</sup> This category includes the categories Extremely Rare, Critically Rare and Rare



|       | ASSESSMENT AND REPORTING OF IMPACTS ON TERRESTRIAL BIODIVERSITY                                                                                                       |   |
|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|
| 5.2.3 | indicate whether or not the proposed development will have any impact on SCC.                                                                                         | ✓ |
| 5.3   | The compliance statement <sup>14</sup> must contain, as a minimum, the following information:                                                                         | ✓ |
| 5.3.1 | contact details and relevant experience as well as the SACNASP registration number of the specialist preparing the compliance statement including a curriculum vitae; | ✓ |
| 5.3.2 | a signed statement of independence by the specialist;                                                                                                                 | ✓ |
| 5.3.3 | a statement on the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment;                                 | ✓ |
| 5.3.4 | a description of the methodology used to undertake the site survey and prepare the compliance statement, including equipment and modelling used where relevant;       | ✓ |
| 5.3.5 | the mean density of observations/ number of samples sites per unit area <sup>15</sup> .                                                                               | ✓ |
| 5.3.6 | where required, proposed impact management actions and outcomes or any monitoring requirements for inclusion in the EMPr;                                             | ✓ |
| 5.3.7 | a description of the assumptions made and any uncertainties or gaps in knowledge or data; and                                                                         | ✓ |
| 5.3.8 | any conditions to which the compliance statement is subjected.                                                                                                        | ✓ |
| 6.    | A signed copy of the Terrestrial Animal Species Compliance Statement must be appended to the Basic Assessment Report or the Environmental Impact Assessment Report.   | ✓ |

#### PLANT SPECIES SPECIALIST ASSESSMENT AND MINIMUM REPORT CONTENT REQUIREMENTS

|          | ASSESSMENT AND REPORTING OF IMPACTS ON TERRESTRIAL BIODIVERSITY                                                                                                                                                                                                                                                                                                                                                                             |   |
|----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|
| <b>1</b> | <b>General Information</b>                                                                                                                                                                                                                                                                                                                                                                                                                  |   |
| 1.1      | An applicant intending to undertake an activity identified in the scope of this protocol, on a site identified by the screening tool as being of “very high” or “high” sensitivity for <u>terrestrial plant species</u> must submit a <b>Terrestrial Plant Species Specialist Assessment Report</b> .                                                                                                                                       | ✓ |
| 1.2      | An applicant intending to undertake an activity identified in the scope of this protocol on a site identified by the screening tool as being of “medium sensitivity” for <u>terrestrial plant species</u> must submit <b>either a Terrestrial Plant Species Specialist Assessment Report or a Terrestrial Plant Species Compliance Statement</b> , depending on the outcome of a site inspection undertaken in accordance with paragraph 4. | ✓ |
| 1.3      | An applicant intending to undertake an activity identified in the scope of this protocol on a site identified by the screening tool as being of “low” sensitivity for <u>terrestrial plant species</u> must submit a <b>Terrestrial Plant Species Compliance Statement</b> .                                                                                                                                                                | ✓ |
| 1.4      | Where the information gathered from the site sensitivity verification differs from the screening tool designation of “very high” or “high”, for terrestrial plant species sensitivity and it is found to be of a “low” sensitivity, then a <b>Terrestrial Plant Species Compliance Statement</b> must be submitted.                                                                                                                         | ✓ |
| 1.5      | Where the information gathered from the site sensitivity verification differs from the screening tool designation of “low” terrestrial plant species sensitivity and it is found to be of a “very high” or “high” terrestrial plant species sensitivity, a <b>Terrestrial Plant Species Specialist Assessment</b> must be conducted.                                                                                                        | ✓ |
| 1.6      | If any part of the development falls within an area of confirmed “very high” or “high” sensitivity, the assessment and reporting requirements prescribed for the “very high” or “high” sensitivity, apply to the entire development footprint. Development footprint in the context of this protocol means, the area on which the proposed development will take place and includes the area that will be disturbed or impacted.            | ✓ |
| 1.7      | The <b>Terrestrial Plant Species Specialist Assessment</b> and the <b>Terrestrial Plant Species</b>                                                                                                                                                                                                                                                                                                                                         | ✓ |

<sup>14</sup> An example of a what is contained in a Compliance Statement for Animal Species Impact Assessment can be found in the Species Environmental Impact Assessment Guideline

| ASSESSMENT AND REPORTING OF IMPACTS ON TERRESTRIAL BIODIVERSITY            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |   |
|----------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|
|                                                                            | <b>Compliance Statement</b> must be undertaken within the study area.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |   |
| 1.8                                                                        | Where the nature of the activity <b>is not</b> expected to have an impact on species of conservation concern (SCC) beyond the boundary of the preferred site, the study area means the proposed development footprint within the preferred site.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | ✓ |
| 1.9                                                                        | Where the nature of the activity <b>is</b> expected to have an impact on SCC beyond the boundary of the preferred site, the project areas of influence (PAOI) must be determined by the specialist in accordance with <i>Species Environmental Assessment Guideline</i> <sup>15</sup> , and the study area must include the PAOI, as determined.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | ✓ |
| <b>VERY HIGH AND HIGH SENSITIVITY RATING for terrestrial plant species</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |   |
| 2                                                                          | <b>Terrestrial Plant Species Specialist Assessment</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |   |
|                                                                            | <p><u>VERY HIGH SENSITIVITY RATING</u></p> <ol style="list-style-type: none"> <li>1. Critical habitat for range-restricted species<sup>16</sup> of conservation concern, that have a global range of less than 10 km<sup>2</sup>.</li> <li>2. SCC listed on the IUCN Red List of Threatened Species<sup>17</sup> or on South Africa's National Red List website<sup>18</sup> as Critically Endangered, Endangered or Vulnerable according to the IUCN Red List 3.1. Categories and Criteria or listed as Nationally Rare.</li> <li>3. Species aggregations that represent ≥1% of the global population size of a species, over a season, and during one or more key stages of its life cycle.</li> <li>4. The number of mature individuals that ranks the site among the largest 10 aggregations known for the species.</li> </ol> <p>These areas are irreplaceable for SCC.</p> <p><u>HIGH SENSITIVITY RATING</u></p> <ol style="list-style-type: none"> <li>1. Confirmed habitat for SCC.</li> <li>2. SCC, listed on the IUCN Red List of Threatened Species or South Africa's National Red List website as Critically Endangered, Endangered or Vulnerable, according to the IUCN Red List 3.1. Categories and Criteria and under the national category of Rare.</li> </ol> <p>These areas are unsuitable for development due to a very likely impact on SCC.</p> | ✓ |
| 2.3.12                                                                     | identify any <u>alternative development footprints</u> within the preferred site which would be of "low" or "medium" sensitivity as identified by the screening tool and verified through the site sensitivity verification.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | ✓ |
| 2.4                                                                        | The findings of the assessment must be written up in a <b>Terrestrial Plant Species Specialist Assessment Report</b> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | ✓ |
| 3                                                                          | <b>Terrestrial Plant Species Specialist Assessment Report</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | ✓ |
| 3.1.13                                                                     | a <u>motivation must be provided</u> if there were any development footprints identified as per paragraph 2.3.12 above that were identified as having "low" or "medium" terrestrial plant species sensitivity and were not considered appropriate.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | ✓ |
| 4                                                                          | <b>MEDIUM SENSITIVITY SPECIES OF CONSERVATION CONCERN CONFIRMATION</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |   |
|                                                                            | <b>MEDIUM SENSITIVITY RATING – for terrestrial plant species:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |   |
|                                                                            | <ol style="list-style-type: none"> <li>1. <u>Suspected habitat for SCC</u> based either on there being records for this species collected in the past, prior to 2002, or <u>being a natural area included in a habitat suitability model</u><sup>19</sup>.</li> <li>2. SCC listed on the IUCN Red List of Threatened Species or South Africa's National Red List website as Critically Endangered, Endangered or Vulnerable according to the IUCN Red List 3.1. Categories and Criteria and under the national category of Rare.</li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | ✓ |

<sup>15</sup> Available at <https://bgis.sanbi.org/>

<sup>16</sup> Species with a geographically restricted area of distribution.

<sup>17</sup> <https://www.iucnredlist.org/>

<sup>18</sup> This category includes the categories Extremely Rare, Critically Rare and Rare

<sup>19</sup> The methodology by which habitat suitability models have been developed are explained within the Species Environmental Assessment Guideline.

|       | ASSESSMENT AND REPORTING OF IMPACTS ON TERRESTRIAL BIODIVERSITY                                                                                                                                                                                            |   |
|-------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|
| 4.6   | Where SCC are found on site or have been confirmed to be likely present, a <b>Terrestrial Plant Species Specialist Assessment</b> must be submitted in accordance with the requirements specified for “very high” and “high” sensitivity in this protocol. | ✓ |
| 4.7   | Similarly, where no SCC are found on site during the site inspection or the presence is confirmed to be unlikely, a <b>Terrestrial Plant Species Compliance Statement</b> must be submitted.                                                               | ✓ |
| 5     | <b>LOW SENSITIVITY RATING – for terrestrial plant species</b>                                                                                                                                                                                              |   |
|       | <b>Terrestrial Plant Species Compliance Statement</b>                                                                                                                                                                                                      | ✓ |
|       | 1. Areas where no natural habitat remains.                                                                                                                                                                                                                 |   |
|       | 2. Natural areas where there is no suspected occurrence of SCC.                                                                                                                                                                                            |   |
| 5.1   | The compliance statement must be prepared by a SACNASP registered specialist under one of the two fields of practice (Botanical Science or Ecological Science).                                                                                            | ✓ |
| 5.2   | The compliance statement must:                                                                                                                                                                                                                             | ✓ |
| 5.2.1 | be applicable to the study area;                                                                                                                                                                                                                           | ✓ |
| 5.2.2 | confirm that the study area, is of “low” sensitivity for terrestrial plant species; and                                                                                                                                                                    | ✓ |
| 5.2.3 | indicate whether or not the proposed development will have any impact on SCC.                                                                                                                                                                              | ✓ |
| 5.3   | The compliance statement <sup>20</sup> must contain, as a minimum, the following information:                                                                                                                                                              | ✓ |
| 5.3.1 | contact details and relevant experience as well as the SACNASP registration number of the specialist preparing the compliance statement including a curriculum vitae;                                                                                      | ✓ |
| 5.3.2 | a signed statement of independence by the specialist;                                                                                                                                                                                                      | ✓ |
| 5.3.3 | a statement on the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment;                                                                                                                      | ✓ |
| 5.3.4 | a description of the methodology used to undertake the site survey and prepare the compliance statement, including equipment and modelling used where relevant;                                                                                            | ✓ |
| 5.3.5 | where required, proposed impact management actions and outcomes or any monitoring requirements for inclusion in the EMP;                                                                                                                                   | ✓ |
| 5.3.6 | a description of the assumptions made and any uncertainties or gaps in knowledge or data;                                                                                                                                                                  | ✓ |
| 5.3.7 | the mean density of observations/ number of samples sites per unit area <sup>21</sup> ; and                                                                                                                                                                | ✓ |
| 5.3.8 | any conditions to which the compliance statement is subjected.                                                                                                                                                                                             | ✓ |
| 6     | A signed copy of the <b>Terrestrial Plant Species Compliance Statement</b> must be appended to the Basic Assessment Report or the Environmental Impact Assessment Report.                                                                                  | ✓ |

<sup>20</sup> An example of a what is contained in a Compliance Statement for Plant Species Impact Assessment can be found in the Species Environmental Impact Assessment Guideline

<sup>21</sup> Refer to the Species Environmental Assessment Guideline

## 8.7 Site Sensitivity Verification Report

### 8.7.1 Background

Sharples Environmental Services cc (SES) has been appointed by Lyners Engineers on behalf of the George Municipality (applicant), to conduct the Environmental Impact Assessment process for the proposed upgrading of sewer infrastructure in Rosemoor, George, Western Cape (Figure 39). As part of this application, a Terrestrial Biodiversity, Plant & Animal Specialist Assessment is required.



Figure 39: Site locality.

### 8.7.2 Purpose of Report

The “Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of sections 24 (5) (a) and (h) and 44 of the Act, when applying for Environmental Authorisation”, as published on 20 March, 2020 in National Gazette, No. 43110 in terms of NEMA (Act 107 of 1998) sections 24(5)(a), (h) and 44, lists protocols and minimum report requirements for environmental impacts on terrestrial biodiversity and provides the criteria for the assessment and reporting of impacts on terrestrial biodiversity for activities requiring environmental authorisation. The assessment and minimum reporting requirements of this protocol are associated with a level of environmental sensitivity identified by the National web based Environmental Screening Tool. Prior to commencing with a specialist assessment, the current use of the land and the environmental sensitivity of the site under consideration, identified by the screening tool, must be confirmed by undertaking a **site sensitivity verification**, which must include the following.

4. The site sensitivity verification must be undertaken by an environmental assessment practitioner or a specialist.
5. The site sensitivity verification must be undertaken through the use of:



- a. a desk top analysis, using satellite imagery.
  - b. a preliminary on-site inspection; and
  - c. any other available and relevant information.
6. The outcome of the site sensitivity verification must be recorded in the form of a report that:
  - a. confirms or disputes the current use of the land and environmental sensitivity as identified by the screening tool.
  - b. contains a motivation and evidence of either the verified or different use of the land and environmental sensitivity; and
  - c. is submitted together with the relevant assessment report prepared in accordance with the requirements of the Environmental Impact Assessment Regulations.

The National Web Based Screening Tool was used to generate the potential environmental sensitivity of the site which has then been compared to various online and other databases and information sources in order to verify and confirm the validity of the screening tool findings. This was further supported with on-site observations and analysis of most recent aerial photography.

This terrestrial biodiversity site verification has been undertaken as per the requirements of the Procedures for the assessment and minimum criteria for reporting on identified environmental themes in terms of sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, when applying for environmental authorisation (GN 320, 20 March 2020).

### 8.7.3 Data sources and references

Data sources that were utilised for this report include the following:

- National (DFFE) Web Based Screening Tool – to generate the sites potential environmental sensitivity.
- National Vegetation Map 2018 (NVM, 2018), Mucina & Rutherford (2006) and National Biodiversity Assessment or Red Listed Ecosystems (NBA/RLE, 2022) – description of vegetation types, species (including endemic) and most recent vegetation unit conservation status.
- National and Regional Legislation including Provincial Nature Conservation Ordinance (P.N.C.O). NEM:BA Threatened or Protected Species (ToPS).
- Botanical Database of Southern Africa (BODATSA) and New Plants of Southern Africa (POSA) – lists of plant species and potential species of concern found in the general area (SANBI.)
- International Union for Conservation of Nature (IUCN) - Red List of Threatened Species.
- Animal Demography Unit Virtual Museum (VM) – potential faunal species.
- Global Biodiversity Information Facility (GBIF) – potential flora & faunal species.
- National Red Books and Lists - mammals, reptiles, frogs, dragonflies & butterflies.
- National Freshwater Ecosystem Priority Areas assessment (NFEPA, 2011) - important catchments.
- National Protected Areas Expansion Strategy (NPAES, 2018) and South Africa Protected Area database (2020) – protected area information.
- SANBI BGIS – All other biodiversity GIS datasets.
- Western Cape Biodiversity Spatial Plan (2023).
- Aerial Imagery – Google Earth, ESRI, Chief Surveyor General (<http://csg.dla.gov.za>).
- Cadastral and other topographical country data - Chief Surveyor General (<http://csg.dla.gov.za>).
- Other sources may include peer-reviewed journals, regional and local assessments, and studies in the general location of the project and its area of influence, landscape prioritization schemes (Key Biodiversity Areas), systematic conservation planning assessments and plans (as above), and any pertinent masters and doctoral theses, among others.

This terrestrial biodiversity assessment has been undertaken as per the requirements of the Procedures for the assessment and minimum criteria for reporting on identified environmental themes in terms of sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, when applying for environmental authorisation (GN 320, 20 March 2020).

#### 8.7.4 Site visit

A site inspection was conducted on **04 December 2025**, during late spring/early summer and a follow up site visit (early autumn) for additional infrastructure. The site falls within a temperate climate with rainfall occurring throughout the year but is often higher in winter. For the purposes of this report, a single site visit is deemed to be adequate, specifically due to the disturbed nature of the site.

#### 8.7.5 Assumptions, Uncertainties and Gaps in Knowledge

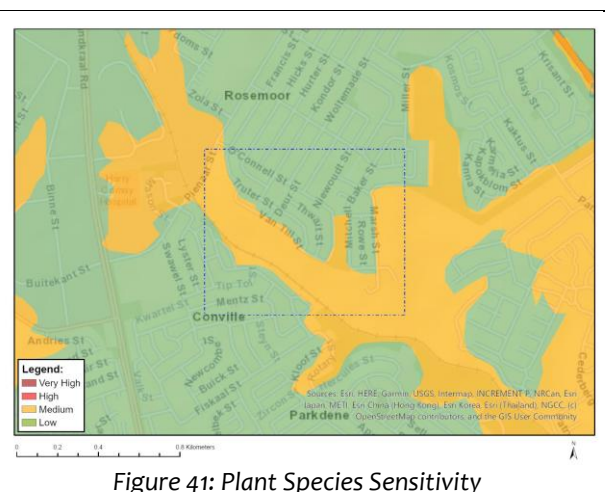
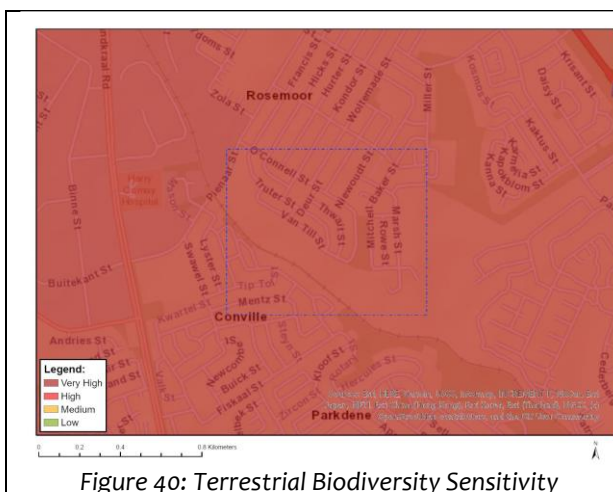
The findings and recommendations of this report may be susceptible to the following uncertainties and limitation:

- No assessment has been made of aquatic aspects relating to any wetlands, pans, and/or rivers/steep ecosystems outside of the scope of a terrestrial biodiversity report. Refer to separate reporting.
- Any botanical surveys based upon a limited sampling time-period, may not reflect the actual species composition of the site due to seasonal variations in flowering times. Additionally, the composition of fire adapted vegetation may vary depending on level of maturity or time since last burn. As far as possible, site collected data has been supplemented with desktop and database-centred distribution data.
- As far as possible, site collected data has been supplemented with desktop and database-centred distribution data as well as previous studies undertaken in the area.

#### 8.7.6 National Environmental Screening Tool

The DFFE Screening Tool indicates the following, summarised in Table 1:

- Terrestrial Biodiversity is Very High (Figure 4).
- Plant species sensitivity is Low & Moderate (Figure 5).
- Animal Species sensitivity is Moderate & High (Figure 6).
- Aquatic Sensitivity is Very High (Figure 7).



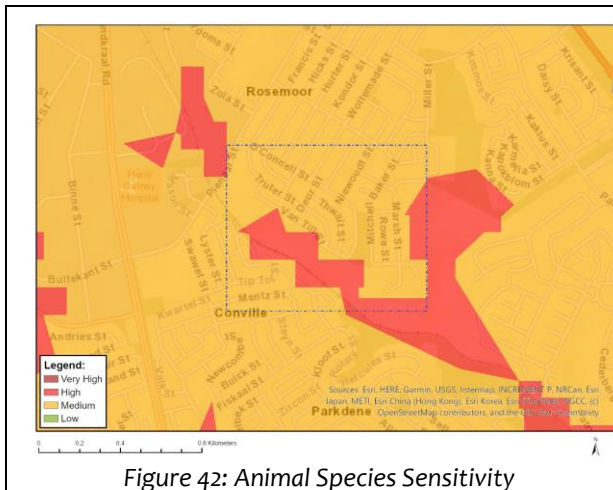


Figure 42: Animal Species Sensitivity



Figure 43: Aquatic Sensitivity

Table 9: Summary of Screening tool designations.

| Terrestrial Sensitivity    | Feature(s) in proximity                                                                                                                   |
|----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| Very High                  | CBA: Terrestrial, CBA2: Terrestrial, SWSA (Outeniqua) & Garden Route Granite Fynbos (Critically Endangered)                               |
| High                       | None                                                                                                                                      |
| Medium                     | None                                                                                                                                      |
| Low                        | Present                                                                                                                                   |
| <b>Plant Sensitivity</b>   |                                                                                                                                           |
| Very High                  | None                                                                                                                                      |
| High                       | None                                                                                                                                      |
| Medium                     | <i>Lampranthus pauciflorus</i> , <i>Leucospermum glabrum</i> , <i>Diosma passerinoides</i> , Sensitive species 1024, 1032, 800 & 500.     |
| Low                        | Present                                                                                                                                   |
| <b>Animal Sensitivity</b>  |                                                                                                                                           |
| Very High                  | None                                                                                                                                      |
| High                       | <i>Circus ranivorus</i> & <i>Bradypterus sylvaticus</i> (Birds)                                                                           |
| Medium                     | <i>Afrivalus knysnae</i> (Amphibian), <i>Chlorotalpa duthieae</i> , Sensitive species 8 (Mammal) & <i>Aneuryphymus montanus</i> (Insects) |
| Low                        | Present                                                                                                                                   |
| <b>Aquatic Sensitivity</b> |                                                                                                                                           |
| Very High                  | CBA: Wetland, SWSA (SW Outeniqua) & Wetlands (Unchanneled Valley-bottom)                                                                  |
| High                       | None                                                                                                                                      |
| Medium                     | None                                                                                                                                      |
| Low                        | None                                                                                                                                      |

The site assessment will also physically screen for the presence of the listed, and other possible species and/or sensitivities that are not identified in the screening tool in addition to those that are flagged. Not all features are directly affected, but being in proximity, the risks associated with the activity will be investigated further and addressed in the report.

The following is deduced from the DFFE National Environmental Screening Tool:

- The terrestrial biodiversity theme is Very-High due to the proposed sewer infrastructure points being within or on the edge of designated CBA 1 & 2 areas. The Very High sensitivity designation is disputed as the entire site is situated on the edge of an urban area with little to no natural vegetation remaining. Vegetation cover is largely comprised of exotic species, and while it will serve limited ecological function, the specific proposed activity, if implemented responsibly and following the recommended mitigation and management actions, can be considered low risk.

- Several flora (plant) species regarded as being of concern are flagged as potentially being present (Medium sensitivity) and are assessed further in the report, however none were found to be present during the site visit and are furthermore due to the transformed nature of the site, it is not deemed to be suitable habitat for any functional species population. The Medium sensitivity designation is thus disputed as the site, which is situated on the edge of an urban area, is within a developed landscape and has hardened surfaces (roads and sidewalks) and/or landscaped gardens with little to no remnant natural vegetation, that will have limited ecological function.
- Several fauna (animal) species regarded as being of concern are flagged as potentially being present (High sensitivity) and are assessed further in the report. Due to the limited size of the site and transformed nature of the surrounding landscape, the site would not be deemed to be viable for any species population. The Medium/High sensitivity designation is thus disputed as the site, which is situated on the edge of an urban area, is within a developed landscape and has hardened surfaces (roads and sidewalks) with little to no remnant natural vegetation that have limited ecological function nor provide suitable habitat other than for temporarily transient fauna species (i.e. such as perching in a tree). The watercourses and riparian vegetation are likely highly polluted and thus not suited to the amphibian species.
- The aquatic sensitivity is Very High due to falling within designated CBA 1: Aquatic, SWSA (SW Outeniqua) & Wetlands - Eastern Fynbos-Renosterveld Bioregion (Valley-bottom). While the site does have a network of watercourses, these are largely modified, being within an urban context, subject to unmanaged stormwater discharge and sewer leaks and also having significantly modified (or exotic) vegetation cover, with some remaining riparian elements. The proposed sewer infrastructure is thus likely to improve aquatic functioning in the long-term.
- The impacts are assessed further in the relevant report sections in the accompanying report.

## 8.7.7 Findings, Outcomes and Recommendations

### Terrestrial Biodiversity

Site verification of the Terrestrial Biodiversity sensitivities is summarised in Table 10 and depicted in Figure 44, where CBA is green and ESA is light blue/yellow. The CBA and ESA designation are primarily associated with feature adjacent to the site and/or outside of the proposed development/activity footprint.

Table 10: Terrestrial Biodiversity Features flagged in the National Environmental Screening Tool.

| Feature                      | COMMENT |                                                                                                                                                                                                                                                                                                                                                                                                                     |
|------------------------------|---------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Critical Biodiversity Area 1 | CBA 1   | <b>Dispute</b> – the site is within an urban area and is vegetation cover is significantly altered where little to no natural vegetation remains, and since any vegetation restoration implies that vegetation would be in a secondary context and thus would strictly speaking not be CBA 1 but CBA 2.                                                                                                             |
| Critical Biodiversity Area 2 | CBA 2   | <b>Partially Agree</b> – In principle it would be possible to restore indigenous vegetation, however the likelihood in the short term is not considered to be high, without significant cost. A part of this process would be to upgrade sewer infrastructure reduce unwanted sewerage discharge into the watercourses, so the proposed activity could indirectly improve overall localised ecological functioning. |



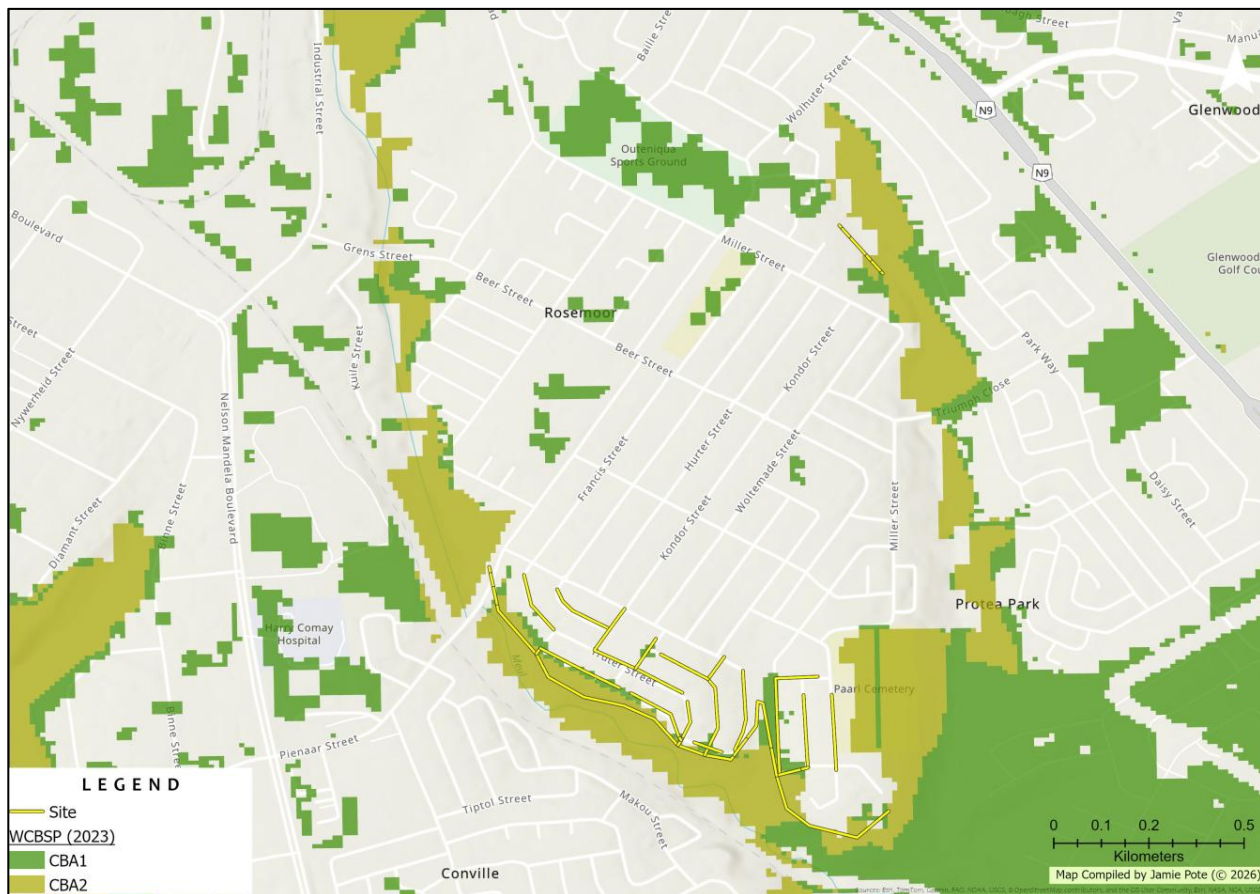


Figure 44: Western Cape Biodiversity Spatial Plan (2023). The site does overlap with some designated CBA 1, CBA 2 and ESA 2 areas.

A CBA 1 designation implies natural vegetation is present, whereas CBA 2 implies restoration is required. In light of the significant lack of indigenous species and high levels of disturbance and/or alien invasion, the correct CBA/ESA designations would need to be ESA 2 and/or CBA 2. It is questionable if the broader vegetated areas along the watercourses would ever achieve a state that would support conservation (i.e. CBA), without significant changes to municipal management and well as resident behaviour, well outside the scope of this assessment; however, they do serve a somewhat role in supporting local ecological processes and connectivity, and with some rehabilitation (which includes construction and improvement of sewer infrastructure), this is likely to improve.

**NOTE:** as per point 1.5 of the Terrestrial Biodiversity Specialist Assessment and Minimum Report Content Requirements:

*'If any part of the proposed development footprint falls within an area of 'very high' sensitivity, the assessment and reporting requirements prescribed for the 'very high' sensitivity apply to the entire footprint, excluding linear activities for which impacts on terrestrial biodiversity are temporary and the land in the opinion of the terrestrial biodiversity specialist, based on the mitigation and remedial measures, can be returned to the current state within two years of the completion of the construction phase, in which case a compliance statement applies. Development footprint in the context of this protocol means the area on which the proposed development will take place and includes any area that will be disturbed.'* The terrestrial biodiversity sensitivity for such features is thus deemed low.

Ecological processes should be considered within a landscape level and since the ecological areas are within a significantly modified and fragmented urban landscape, the minor impacts of the proposed sewer infrastructure will have a negligible impact.

The SSVR thus disputes the flagged flora high terrestrial biodiversity sensitivity designation.

### Plant Species (Flora)

National Environmental Screening Tool flagged several flora species. Almost the entire site is situated within a significantly altered and degraded landscape, where little natural vegetation remains. No significant pockets of natural vegetation were found that might provide suitable habitat for these species and it is confirmed that no species of conservation concern having an elevated status and/or limited distribution range as flagged in the screening tool are present.

The SSVR thus disputes the flagged flora ('plant') species of conservation concern and medium plant species designations. The specialist designated a low plant species sensitivity.

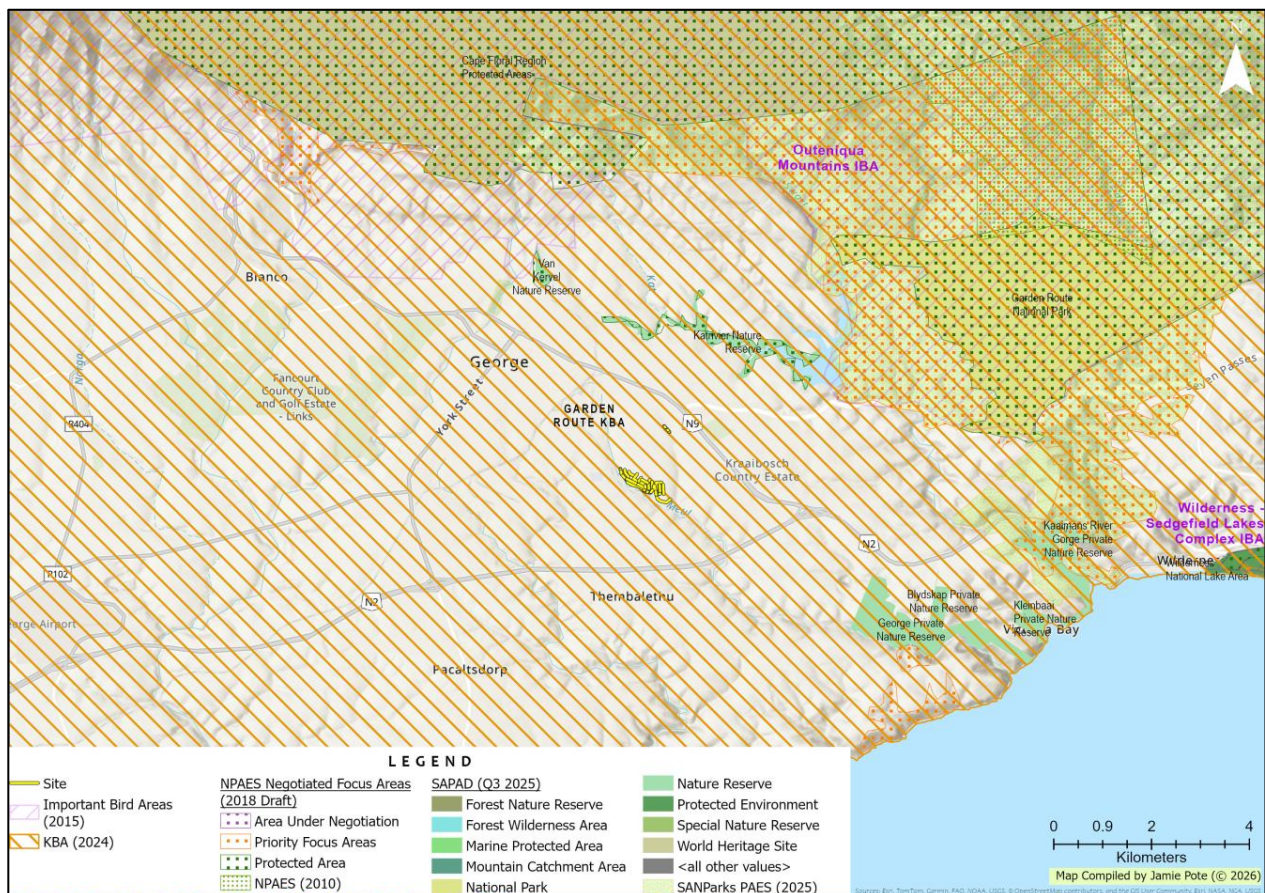


Figure 45: Protected Areas and NPAES in vicinity.

### Animal Species (Fauna)

National Environmental Screening Tool flagged several fauna species. Almost the entire site is situated within a significantly altered and degraded landscape, where little natural vegetation remains. No significant pockets of natural vegetation were found that might provide suitable habitat for these species and it is confirmed that no species of conservation concern having an elevated status and/or limited distribution range as flagged in the screening tool are present.



The SSVR thus disputes the flagged fauna ('animal') species of conservation concern designations and High animal species designations. The specialist designated a low animal species sensitivity.

### Aquatic

Wetland and River features are present in the broader area, including the watercourses within the urban area. Aquatic aspects are beyond the scope of this Terrestrial Biodiversity assessment but is given consideration in terms of terrestrial processes that may be influenced by the terrestrial vegetation. Based on the terrestrial vegetation composition, the watercourse would be deemed to be significantly modified, having little to no remnant natural vegetation and a high proliferation of weed and invasive alien species. The very high aquatic sensitivity it thus questionable, but outside the scope of this terrestrial assessment which does not include any water quality analysis.

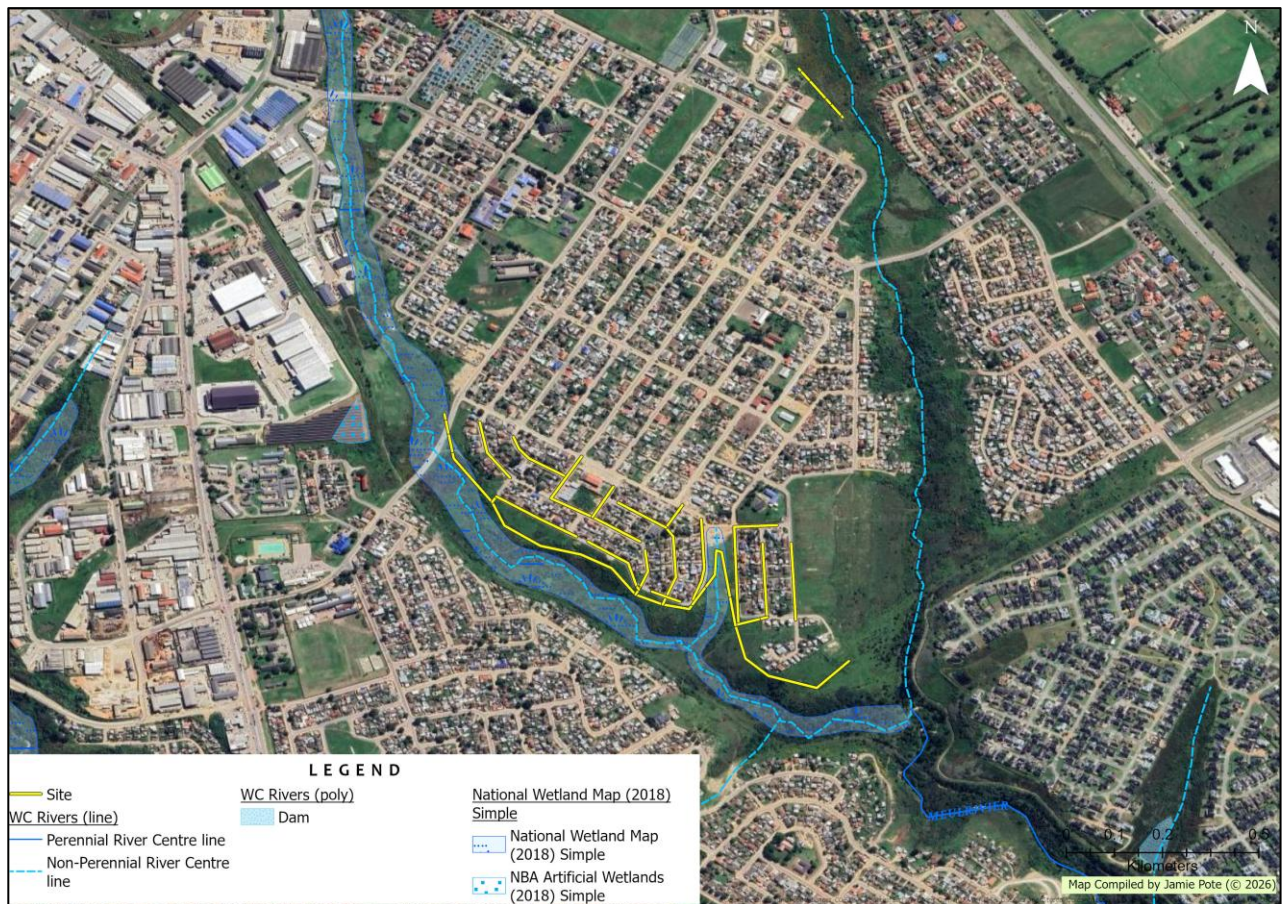


Figure 46: Rivers, FEPAs & SWSA's.

## 8.7.8 Conclusions

The site verification thus confirms that the site does not fall within a terrestrial biodiversity screening tool designated CBA area, as there is no evidence of any ecologically significant remaining natural vegetation as the site is almost entirely transformed as the footprint is within a degraded, transformed urban landscape, which will have limited and modified ecological function. In principle, the proposed improvement of sewer infrastructure could result in an overall improvement to the ecological function of the area.

It further disputes that any of the screening tool flagged flora or fauna species of conservation concern are likely to be affected by the proposed activity within a degraded, modified and transformed landscape.

The SSVR thus disputes the flagged flora ('plant') species of conservation concern and medium plant species designation. The specialist designated a low plant species sensitivity.

The SSVR thus disputes the flagged fauna ('plant') species of conservation concern and medium plant species designation. The specialist designated a low animal species sensitivity.

The SSVR thus disputes the flagged terrestrial biodiversity sensitivity designation. The specialist designated a low terrestrial biodiversity sensitivity.



*PAGE INTENTIONALLY LEFT BLANK*

END

## **Appendix B2: Terrestrial Biodiversity Compliance Statement and Assessment - Stormwater**



# Terrestrial Biodiversity Assessment

## Rosemoor Stormwater

Date: 23/03/2026  
Version: Draft  
Author: J. Pote

# Terrestrial Biodiversity Assessment

## Rosemoor Stormwater

Compiled by: **Jamie Pote** (Pr. Sci. Nat.)

Postnet Suite 57, Private Bag X13130, Humewood, Port Elizabeth, 6013, South Africa

[jamiepote@live.co.za](mailto:jamiepote@live.co.za) +27 (0)76 888 9890

Compiled for: **Sharples Environmental Services**

Date of report: **23/03/2026**

## Draft Report

This Report has been prepared with all reasonable skill, care and diligence within the scope of appointment by Mr Jamie Pote, with consideration to the resources devoted to it by agreement with the client, incorporating our Standard Terms and Conditions of Business.

This Report is prepared exclusively for use by the client, and the author disclaims any liability in respect of its use by any party other than the client and for the purpose for which it was written. The Report is subject to all the copyright and intellectual property laws and practices of South Africa and contains intellectual property and proprietary information that is protected by such copyright in favour of the author. No person, other than the client, may reproduce, distribute to any third party, or rely on the content of any portion of this report, without the prior written consent of the author.

The author accepts no responsibility of whatsoever nature to third parties to whom this Report, or any part thereof, is made known. Any such persons or parties rely on the report at their own risk.

## Revisions

| Report/Revision Version | Date:      | Approved by: |
|-------------------------|------------|--------------|
| First Draft             | 2026/03/23 | Jamie Pote   |
| Revisions/Comments      |            |              |
| Final Draft             |            |              |
| IAP comments            |            |              |
| Final Version           |            |              |



# Table of Contents

|                                                                                 |     |
|---------------------------------------------------------------------------------|-----|
| Revisions .....                                                                 | ii  |
| Table of Contents .....                                                         | i   |
| List of Figures .....                                                           | iii |
| List of Tables .....                                                            | iv  |
| 1 Introduction & Background .....                                               | 1   |
| 1.1 Background.....                                                             | 1   |
| 1.2 Purpose of Report .....                                                     | 1   |
| 1.3 Activity Description .....                                                  | 2   |
| 1.4 Methodology and Approach.....                                               | 4   |
| 1.5 Data sources and references .....                                           | 4   |
| 1.5.1 Site visit .....                                                          | 5   |
| 1.5.2 Assumptions, Uncertainties and Gaps in Knowledge.....                     | 5   |
| 2 Policy .....                                                                  | 6   |
| 2.1 Legislation Framework.....                                                  | 6   |
| 2.2 Systematic Planning Frameworks .....                                        | 8   |
| 2.2.1 National Environmental Screening Tool.....                                | 9   |
| 2.2.2 Vegetation of Southern Africa .....                                       | 10  |
| 2.2.3 Western Cape Biodiversity Spatial Plan (WCBSP, 2023) – Terrestrial .....  | 12  |
| 2.2.4 Protected areas .....                                                     | 13  |
| 2.2.5 Key Biodiversity Areas.....                                               | 14  |
| 2.2.6 Important Bird Areas.....                                                 | 15  |
| 2.2.7 Garden Route Biodiversity Sector Plan (2010).....                         | 15  |
| 2.2.8 Rivers, Watercourses and Wetlands.....                                    | 15  |
| 3 Biodiversity Risk Identification and Assessment .....                         | 16  |
| 3.1 Baseline Biodiversity Description .....                                     | 16  |
| 3.1.1 Present Ecological State .....                                            | 1   |
| 3.1.2 Vegetation and Ecological Processes and Corridors .....                   | 1   |
| 3.1.3 Flora & Fauna .....                                                       | 2   |
| 3.1.4 Aquatic Habitat.....                                                      | 7   |
| 3.1.5 Terrestrial Vegetation Sensitivity Assessment .....                       | 7   |
| 3.1.6 No-Go Areas .....                                                         | 9   |
| 3.1.7 Potential Development Footprints.....                                     | 9   |
| 3.2 Risks and Potential Impacts to Biodiversity .....                           | 1   |
| 3.2.1 Summary of actions, activities, or processes that require mitigation..... | 1   |
| 3.2.2 Potential Terrestrial Biodiversity Impacts (Indirect) .....               | 1   |
| 3.2.3 Potential Terrestrial Biodiversity Impacts (Direct) .....                 | 1   |
| 3.3 Assessment of Risks and Impacts to Biodiversity .....                       | 2   |
| 3.3.1 Criteria of assigning significance to potential impacts.....              | 2   |
| 3.3.2 Significance Rating .....                                                 | 3   |
| 3.3.3 Assessment of Terrestrial Biodiversity Impacts.....                       | 3   |
| 3.3.4 Potential Terrestrial Biodiversity Impacts (Cumulative) .....             | 4   |
| 3.3.5 Terrestrial Biodiversity Impact Reversibility .....                       | 4   |

|       |                                                                                                                                                       |    |
|-------|-------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| 3.3.6 | Impacts and Risks to Irreplaceable Biodiversity Resources.....                                                                                        | 4  |
| 3.3.7 | Residual Risks and Uncertainties.....                                                                                                                 | 4  |
| 3.4   | Findings, Outcomes and Recommendations .....                                                                                                          | 5  |
| 3.4.1 | Summary of Findings.....                                                                                                                              | 5  |
| 3.4.2 | Recommendations & Mitigation Measures .....                                                                                                           | 5  |
| 3.5   | Site Preparation and Vegetation Clearing Plan.....                                                                                                    | 6  |
| 3.6   | Open Space Management/Conservation Plan.....                                                                                                          | 6  |
| 3.7   | Maintenance Management Plan .....                                                                                                                     | 6  |
| 4     | Organizational Capacity and Competency .....                                                                                                          | 6  |
| 5     | Emergency Preparedness and Response.....                                                                                                              | 7  |
| 6     | Stakeholder Engagement .....                                                                                                                          | 7  |
| 7     | Monitoring and Review.....                                                                                                                            | 7  |
| 8     | Appendices .....                                                                                                                                      | 7  |
| 8.1   | Appendix A: References.....                                                                                                                           | 7  |
| 8.2   | Appendix B: Abbreviations & Glossary.....                                                                                                             | 11 |
| 8.2.1 | Abbreviations.....                                                                                                                                    | 11 |
| 8.2.2 | Glossary.....                                                                                                                                         | 12 |
| 8.3   | Appendix C: Biodiversity Environmental Management Plan .....                                                                                          | 19 |
| 8.3.1 | Protection of Flora and Fauna .....                                                                                                                   | 19 |
| 8.3.2 | Alien and Invasive Plan Management Plan .....                                                                                                         | 20 |
| 8.3.3 | Fires .....                                                                                                                                           | 20 |
| 8.3.4 | Soil Aspects.....                                                                                                                                     | 21 |
| 8.3.5 | Dust .....                                                                                                                                            | 21 |
| 8.3.6 | Infrastructural Requirements .....                                                                                                                    | 21 |
| 8.3.7 | Rehabilitation Plan .....                                                                                                                             | 23 |
| 8.3.8 | Monitoring and Reporting .....                                                                                                                        | 25 |
| 8.3.9 | Closure objectives and extent of alignment to pre-construction environment .....                                                                      | 25 |
| 8.4   | Appendix D: General Impact Rating Scale .....                                                                                                         | 26 |
| 8.4.1 | The Severity/ Beneficial Scale .....                                                                                                                  | 26 |
| 8.4.2 | Spatial and Temporal Scales .....                                                                                                                     | 27 |
| 8.4.3 | The Degree of Certainty and the Likelihood Scale .....                                                                                                | 27 |
| 8.4.4 | The Environmental Significance Scale.....                                                                                                             | 28 |
| 8.4.5 | Absence of Data .....                                                                                                                                 | 29 |
| 8.5   | Appendix E: Declaration, Specialist Profile and Registration .....                                                                                    | 30 |
| 8.6   | Appendix F: Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Biodiversity..... | 44 |
| 8.7   | Site Sensitivity Verification Report.....                                                                                                             | 53 |
| 8.7.1 | Background.....                                                                                                                                       | 53 |
| 8.7.2 | Activity Location and Description.....                                                                                                                | 53 |
| 8.7.3 | Purpose of Report .....                                                                                                                               | 53 |
| 8.7.4 | Data sources and references .....                                                                                                                     | 54 |
| 8.7.5 | Site visit .....                                                                                                                                      | 55 |
| 8.7.6 | Assumptions, Uncertainties and Gaps in Knowledge.....                                                                                                 | 55 |
| 8.7.7 | National Environmental Screening Tool.....                                                                                                            | 55 |
| 8.7.8 | Findings, Outcomes and Recommendations .....                                                                                                          | 57 |

|       |                   |    |
|-------|-------------------|----|
| 8.7.9 | Conclusions ..... | 60 |
|-------|-------------------|----|

## List of Figures

|                                                                                                                                                              |    |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| Figure 1: Site locality.....                                                                                                                                 | 1  |
| Figure 2: Rosemoor Stormwater Structure Sites.....                                                                                                           | 2  |
| Figure 3: Rosemoor Stormwater Structure Sites. ....                                                                                                          | 3  |
| Figure 3: Rosemoor Stormwater Structure Sites (additional). ....                                                                                             | 3  |
| Figure 4: Terrestrial Biodiversity Sensitivity.....                                                                                                          | 9  |
| Figure 5: Plant Species Sensitivity .....                                                                                                                    | 9  |
| Figure 6: Animal Species Sensitivity .....                                                                                                                   | 9  |
| Figure 7: Aquatic Sensitivity .....                                                                                                                          | 9  |
| Figure 8: National Biodiversity Assessment Vegetation Type and Conservation Status (NBA, 2018).<br>Darker shaded areas indicative of remnant vegetation..... | 11 |
| Figure 9: Western Cape Biodiversity Spatial Plan (WCBSP, 2023) –The site does overlap with some<br>designated CBA 1 and CBA 2 areas. ....                    | 12 |
| Figure 10: Protected Areas.....                                                                                                                              | 14 |
| Figure 11: Garden Route Biodiversity Sector Plan (2007) vegetation designation and CBA/ESA status. ....                                                      | 15 |
| Figure 12: Rivers, Wetlands and Estuaries associated with the site.....                                                                                      | 16 |
| Figure 13: Aerial photo of the site.....                                                                                                                     | 17 |
| Figure 14: Typical urban street.....                                                                                                                         | 18 |
| Figure 15: Typical urban street. ....                                                                                                                        | 18 |
| Figure 16: Typical urban street.....                                                                                                                         | 18 |
| Figure 17: Typical urban street. ....                                                                                                                        | 18 |
| Figure 18: Grassed open space area. ....                                                                                                                     | 18 |
| Figure 19: Grassed open space area. ....                                                                                                                     | 18 |
| Figure 20: Typical vegetated watercourse bank (Kikuyu).....                                                                                                  | 19 |
| Figure 21: Typical vegetated watercourse bank (Kikuyu).....                                                                                                  | 19 |
| Figure 22: Typical vegetated watercourse bank (Kikuyu). ....                                                                                                 | 19 |
| Figure 23: Typical vegetated watercourse bank (Kikuyu). ....                                                                                                 | 19 |
| Figure 24: Typical vegetated area (Kikuyu).....                                                                                                              | 19 |
| Figure 25: Typical vegetated area (Kikuyu). ....                                                                                                             | 19 |
| Figure 26: Typical vegetated area (Kikuyu).....                                                                                                              | 19 |
| Figure 27: Typical vegetated area (Cape Ivy). ....                                                                                                           | 19 |
| Figure 28: Typical vegetated area (Kikuyu).....                                                                                                              | 20 |
| Figure 29: Typical vegetated area (Kikuyu).....                                                                                                              | 20 |
| Figure 30: Watercourse bridge crossing. ....                                                                                                                 | 20 |
| Figure 31: Discharge point at watercourse crossing.....                                                                                                      | 20 |
| Figure 32: Typical Watercourse.....                                                                                                                          | 20 |
| Figure 33: Typical Watercourse.....                                                                                                                          | 20 |
| Figure 34: Typical Watercourse. ....                                                                                                                         | 21 |
| Figure 35: Typical Watercourse.....                                                                                                                          | 21 |
| Figure 36: Typical Watercourse. ....                                                                                                                         | 21 |
| Figure 37: Typical Watercourse.....                                                                                                                          | 21 |
| Figure 38: Typical discharge point. ....                                                                                                                     | 21 |
| Figure 39: Eroded and polluted watercourse. ....                                                                                                             | 21 |
| Figure 40: Eroded and polluted watercourse. ....                                                                                                             | 21 |
| Figure 41: Eroded and polluted watercourse.....                                                                                                              | 21 |

|                                                                                                                                                                                                                                                                                                                                    |    |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| Figure 42: Mapped vegetation of the site (Overview).....                                                                                                                                                                                                                                                                           | 1  |
| Figure 43: Mapped vegetation of the site (North portion).....                                                                                                                                                                                                                                                                      | 2  |
| Figure 44: Mapped vegetation of the site (South portion). ....                                                                                                                                                                                                                                                                     | 3  |
| Figure 45: Distribution records of flora and fauna Species of Conservation Concern (GBIF, 26 July 2024) with known records in the vicinity of the site. NOTE some distribution records may have an offset for biosecurity purposes and/or accuracy errors but will non the less give an indication of general locality. ....       | 2  |
| Figure 46: Distribution records of flora and fauna Species of Conservation Concern (GBIF, 26 July 2024) with known records from the broader area. NOTE some distribution records may have an offset for biosecurity purposes but will non the less give an indication of general locality (i.e. locality records in the sea). .... | 4  |
| Figure 47: Vegetation Sensitivity of proposed site (Overview). ....                                                                                                                                                                                                                                                                | 1  |
| Figure 48: Vegetation Sensitivity of proposed site (North portion). ....                                                                                                                                                                                                                                                           | 2  |
| Figure 49: Vegetation Sensitivity of proposed site (South portion). ....                                                                                                                                                                                                                                                           | 3  |
| Figure 50: Site locality. ....                                                                                                                                                                                                                                                                                                     | 53 |
| Figure 51: Terrestrial Biodiversity Sensitivity .....                                                                                                                                                                                                                                                                              | 56 |
| Figure 52: Plant Species Sensitivity.....                                                                                                                                                                                                                                                                                          | 56 |
| Figure 53: Animal Species Sensitivity.....                                                                                                                                                                                                                                                                                         | 56 |
| Figure 54: Aquatic Sensitivity.....                                                                                                                                                                                                                                                                                                | 56 |
| Figure 55: Western Cape Biodiversity Spatial Plan (2017). The site does overlap with some designated CBA 1, CBA 2 and ESA 2 areas. ....                                                                                                                                                                                            | 58 |
| Figure 56: Protected Areas and NPAES in vicinity. ....                                                                                                                                                                                                                                                                             | 59 |
| Figure 57: Rivers, FEPAs & SWSA's. ....                                                                                                                                                                                                                                                                                            | 60 |

## List of Tables

|                                                                                                       |    |
|-------------------------------------------------------------------------------------------------------|----|
| Table 1: Summary of Regional Planning Biodiversity features.....                                      | 8  |
| Table 2: Summary of Screening tool designations. ....                                                 | 10 |
| Table 3: Criteria defining Critical Biodiversity Areas (Source: WC BSP, 2023).....                    | 12 |
| Table 4: Approximate footprint coverage areas of habitat in hectares.....                             | 21 |
| Table 5: Flora Species of Special Concern .....                                                       | 3  |
| Table 6: Fauna Species of Special Concern (SCC).....                                                  | 4  |
| Table 7: Alien (exotic) invasive and other weed species and status. ....                              | 6  |
| Table 8: Summary of discharge point habitat.....                                                      | 8  |
| Table 9: Potential Impacts to Terrestrial Biodiversity. ....                                          | 1  |
| Table 10 : Construction Phase Assessment (Refer to Sections 3.3.1 & 3.3.2 for methodology).....       | 3  |
| Table 11: Operational Phase Assessment (Refer to Sections 3.3.1 & 3.3.2 for methodology). ....        | 4  |
| Table 12: Specific Mitigation Measures and Recommendations.....                                       | 5  |
| Table 13: Summary of Screening tool designations.....                                                 | 55 |
| Table 14: Terrestrial Biodiversity Features flagged in the National Environmental Screening Tool..... | 57 |



# 1 Introduction & Background

## 1.1 Background

Sharples Environmental Services cc (SES) has been appointed by Lyners Engineers on behalf of the George Municipality (applicant), to conduct the Environmental Impact Assessment process for the proposed upgrading of stormwater infrastructure of Rosemoor, George, Western Cape (Figure 1). As part of this application, a Terrestrial Biodiversity, Plant & Animal Specialist Assessment is required. This report has been updated to include additional infrastructure added to the layout in 2026.



Figure 1: Site locality.

## 1.2 Purpose of Report

The “Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of sections 24 (5) (a) and (h) and 44 of the Act, when applying for Environmental Authorisation”, as published on 20 March, 2020 in National Gazette, No. 43110 in terms of NEMA (Act 107 of 1998) sections 24(5)(a), (h) and 44, lists protocols and minimum report requirements for environmental impacts on terrestrial biodiversity and provides the criteria for the assessment and reporting of impacts on terrestrial biodiversity for activities requiring environmental authorisation. The assessment and minimum reporting requirements of this protocol are associated with a level of environmental sensitivity identified by the National web based Environmental Screening Tool. Prior to commencing with a specialist assessment, the current use of the land and the environmental sensitivity of the site under consideration, identified by the screening tool, must be confirmed by undertaking a **site sensitivity verification**, which must include the following.

1. The site sensitivity verification must be undertaken by an environmental assessment practitioner or a specialist.

2. The site sensitivity verification must be undertaken through the use of:
  - a. a desk top analysis, using satellite imagery.
  - b. a preliminary on-site inspection; and
  - c. any other available and relevant information.
3. The outcome of the site sensitivity verification must be recorded in the form of a report that:
  - a. confirms or disputes the current use of the land and environmental sensitivity as identified by the screening tool.
  - b. contains a motivation and evidence of either the verified or different use of the land and environmental sensitivity; and
  - c. is submitted together with the relevant assessment report prepared in accordance with the requirements of the Environmental Impact Assessment Regulations.

The National Web Based Screening Tool was used to generate the potential environmental sensitivity of the site which has then been compared to various online and other databases and information sources in order to verify and confirm the validity of the screening tool findings. This was further supported with on-site observations and analysis of most recent aerial photography.

This terrestrial biodiversity site verification has been undertaken as per the requirements of the Procedures for the assessment and minimum criteria for reporting on identified environmental themes in terms of sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, when applying for environmental authorisation (GN 320, 20 March 2020).

### 1.3 Activity Description

The red polygons above (highlighted by red circles) show the areas where stormwater infrastructure outlets will be upgraded outside of the road reserve and in close proximity to watercourses (Figure 2). An additional pipeline was added to the layout in 2026 (Figure 4), and the report has been updated to reflect the additional section.

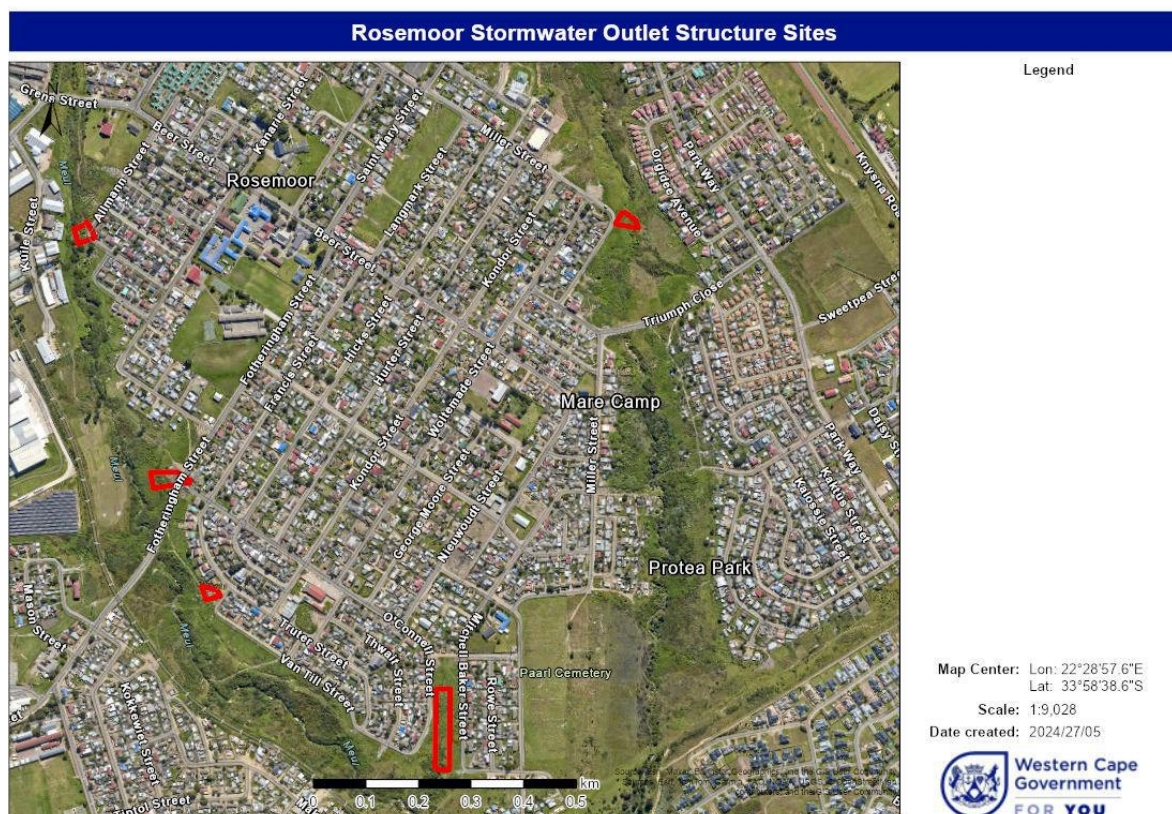
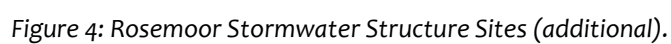


Figure 2: Rosemoor Stormwater Structure Sites.







## 1.4 Methodology and Approach

The proposed methodology and approach followed in this assessment are outlined below:

- Conduct a comprehensive desktop study and identify potential risks relating to vegetation and flora of the site and surrounding area, for a Terrestrial Biodiversity Assessment Report. This will include the relevant Regional Planning and legislated frameworks, which will also be represented in a series of associated maps.
- Conduct a detailed site visit to assess the following:
  - Detailed field survey of vegetation, flora and habitats present.
  - Comprehensive species list, highlighting species that are of special concern, threatened, Red Data species and species requiring permits for destruction/relocation in terms of NEMBA and the Provincial Nature Conservation Ordinance No. 19 of 1974.
  - Detailed mapping of the various habitat units and assessment of habitat integrity, ecological sensitivity, levels of degradation and transformation, alien invasion and Species of Conservation Concern, the outcome being a detailed sensitivity map ranked into high, medium or low classes.
- Reporting will be comprised of a preliminary summary, with identification of anticipated impacts and risks for any scoping phase report (where applicable), a draft detailed Assessment Report (for public review and comment) and a Final Assessment Report for submission. The draft and final detailed reports will include the following:
  - Indicate any assumptions made and gaps in available information. Assessment of all the vegetation types and habitat units within the relevant Regional Planning Frameworks.
  - A detailed species list highlighting the various Species of Conservation Concern categories (endemic, threatened, Red Data species and other protected species requiring permits for destruction/relocation and invasive/exotic weeds).
  - Description and assessment of the habitat units and site sensitivities ranked into high, medium or low classes based on sensitivity and conservation importance. A standard methodology has been developed based on other projects in the specific area.
  - Assessment of Impacts and Mitigation Measure, as well as specific measure that may be required for alternative development plans.
  - A comprehensive EMPr for inclusion in the reports and EMP with specific management actions for construction and Operation.
  - A habitat sensitivity map will be compiled, indicating the sensitivities as described above.
  - A map indicating buffers (if required) to accommodate Regional Planning and any other requirements.

This terrestrial biodiversity compliance statement has been undertaken as per the requirements of the Procedures for the assessment and minimum criteria for reporting on identified environmental themes in terms of sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, when applying for environmental authorisation (GN 320, 20 March 2020).

## 1.5 Data sources and references

Data sources that were utilised for this report include the following:

- National (DFFE) Web Based Screening Tool – to generate the sites potential environmental sensitivity.
- National Vegetation Map 2018 (NVM, 2018), Mucina & Rutherford (2006) and National Biodiversity Assessment or Red Listed Ecosystems (NBA/RLE, 2022) – description of vegetation types, species (including endemic) and most recent vegetation unit conservation status.
- National and Regional Legislation including Provincial Nature Conservation Ordinance (P.N.C.O). NEM:BA Threatened or Protected Species (ToPS).



- Botanical Database of Southern Africa (BODATSA) and New Plants of Southern Africa (POSA) – lists of plant species and potential species of concern found in the general area (SANBI.)
- International Union for Conservation of Nature (IUCN) - Red List of Threatened Species.
- Animal Demography Unit Virtual Museum (VM) – potential faunal species.
- Global Biodiversity Information Facility (GBIF) – potential flora & faunal species distributions.
- National Red Books and Lists - mammals, reptiles, frogs, dragonflies & butterflies.
- National Freshwater Ecosystem Priority Areas assessment (NFEPA, 2011) - important catchments.
- National Protected Areas Expansion Strategy (NPAES, 2018) and South Africa Protected Area database (2020) – protected area information.
- SANBI BGIS – All other biodiversity GIS datasets.
- Western Cape Biodiversity Spatial Plan (2017).
- Aerial Imagery – Google Earth, ESRI, Chief Surveyor General (<http://csg.dla.gov.za>).
- Cadastral and other topographical country data - Chief Surveyor General (<http://csg.dla.gov.za>).
- Other sources may include peer-reviewed journals, regional and local assessments, and studies in the general location of the project and its area of influence, landscape prioritization schemes (Key Biodiversity Areas), systematic conservation planning assessments and plans (as above), and any pertinent masters and doctoral theses, among others.

This terrestrial biodiversity assessment has been undertaken as per the requirements of the Procedures for the assessment and minimum criteria for reporting on identified environmental themes in terms of sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, when applying for environmental authorisation (GN 320, 20 March 2020).

### 1.5.1 Site visit

A site inspection was conducted on **24 July 2024**, during mid-winter and a follow up site visit (early autumn) for additional infrastructure. The site falls within a temperate climate with rainfall occurring throughout the year but is often higher in winter, hence for the purposes of this report, a single site visit is deemed to be adequate, specifically due to the disturbed nature of the site.

### 1.5.2 Assumptions, Uncertainties and Gaps in Knowledge

The findings and recommendations of this report may be susceptible to the following uncertainties and limitation:

- No assessment has been made of aquatic aspects relating to any wetlands, pans, and rivers/seeps and/or estuaries or marine ecosystems outside of the scope of a terrestrial biodiversity report. Refer to separate reporting.
- Any botanical surveys based upon a limited sampling time-period, may not reflect the actual species composition of the site due to seasonal variations in flowering times. Additionally, the composition of fire adapted vegetation may vary depending on level of maturity or time since last burn. As far as possible, site collected data has been supplemented with desktop and database-centred distribution data.
- As far as possible, site collected data has been supplemented with desktop and database-centred distribution data as well as previous studies undertaken in the area.

## 2 Policy

### 2.1 Legislation Framework

In terms of NEMA EIA Regulations (07 April 2014, as amended), the following is applicable<sup>1</sup>:

- In terms of section 52 of NEMBA (Activity (a)(i)), the vegetation unit Garden Route Granite Fynbos, has a **Critically Endangered** status as per National Biodiversity Assessment (2022).
- In terms of the Western Cape Biodiversity Spatial Plan (WCBSP, 2017), designated Critical Biodiversity Area 1 & 2 and Ecological Support Area 2 overlaps partially with the site.

#### **Listing Notice 1:**

Activity 12: The development of—

(xii) infrastructure or structures with a physical footprint of 100 square metres or more.

where such development occurs—

(c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse: —

excluding—

(dd) where such development occurs within an urban area; or

(ee) where such development occurs within existing roads or road reserves.

The proposed activity is located within an urban area; hence the activity is not applicable.

Activity 19: The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse.

but excluding where such infilling, depositing, dredging, excavation, removal or moving—

~~i. will occur behind a development setback.~~

The proposed activity will exceed the excavation of more than 10 cubic meters from within 32m of a watercourse, hence will be triggered.

Activity 27: The clearance of an area of 1 hectare or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for—

(i) the undertaking of a linear activity; or

~~(ii) maintenance purposes undertaken in accordance with a maintenance management plan.~~

The proposed activity will potentially exceed clearing of more than 1 Ha of indigenous vegetation resulting from construction of the discharge points.

#### **Listing Notice 2:**

None are applicable.

#### **Listing Notice 3:**

Activity 12: The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan.

(a) In Eastern Cape, Free State, Gauteng, Limpopo, North-West and Western Cape provinces:

i. Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or ~~prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004.~~

ii. Within critical biodiversity areas identified in bioregional plans.

<sup>1</sup> The listed activities itemized are only those with Biodiversity relevance to this report and is not a complete list.

The proposed activity will potentially exceed clearing of more than 300m<sup>2</sup> of indigenous vegetation from within designated Critical Biodiversity Areas as well as designated Critically Endangered vegetation, resulting from construction of the discharge points.

**Activity 14:** The development of—

(ii) infrastructure or structures with a physical footprint of 10 m<sup>2</sup> or more, where such development occurs—

(c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse

(f) In Western Cape:

i. Outside urban areas, in:

(ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans.

The proposed activity will include structures of more than 10m<sup>2</sup> within 32m of a watercourse within designated Critical Biodiversity Area and Ecological Support Areas, however, is situated within an urban area.

In terms of the EIA Listing Notices, listing notice 1 & 3, the activity is triggered as indicated above, thus requiring a Basic Assessment process. This Terrestrial Biodiversity Assessment will primarily deal with the activities triggering listed activities 12 (LN 1) and 14 (LN 3), depending on requirements for clearing of indigenous vegetation.

Other potentially relevant legislation, which will be evaluated as required, includes the following:

- Liability for any environmental damage, pollution, or ecological degradation: Arising from all -related activities occurring inside or outside the area to which the permission/right/permit relates is the responsibility of the rights holder. The National Water Act and NEMA both oblige any person to take all reasonable measures to prevent pollution or degradation from occurring, continuing, or reoccurring (polluter pays principle). Where a person/company fails to take such measures, a relevant authority may direct specific measures to be taken and, failing that, may carry out such measures and recover costs from the person responsible.
- Public participation: Public consultation and participation processes prior to granting licences or authorisations can be an effective way of ensuring that the range of ways in which the activities impact on the environment, social and economic conditions are addressed, and considered when the administrative discretion to grant or refuse the licence is made.
- Constitution of Republic of South Africa (1996): Section 24(a) of the Constitution states that everyone has the right ‘to an environment that is not harmful to their health or well-being’. Construction activities must comply with South African constitutional law by conducting their activities with due diligence and care for the rights of others.
- Western Cape Nature and Environmental Conservation Ordinance 19 of 1974: Lists Protected species, requiring permits for removal (Department of Economic Development, Environmental Affairs and Tourism).
- Water Use Authorisations: The National Water Act (No. 36 of 1998): Requires that provision is made both in terms of water quantity and quality for ‘the reserve’, namely, to meet the ecological requirements of freshwater systems and basic human needs of downstream communities. It is essential in preparing an EMP that any impacts on water resources be they surface water or groundwater resources, and/ or impacts on water quality or flow, are carefully assessed, and evaluated against both the reserve requirement and information on biodiversity priorities. This information will be required in applications for water use licenses or permits and/or in relation to waste disposal authorisations.
- Conservation of Agricultural Resources Act 43 of 1993: Lists Alien invasive species requiring removal.

## 2.2 Systematic Planning Frameworks

A screening of Systematic Planning Framework for the region has been undertaken (summarised in Table 1), that included the following features:

- National Environmental Screening Tool
- Critically Endangered, Endangered and Vulnerable Ecosystems
- Critical Biodiversity and Ecological Support Areas
- River and Wetland Freshwater Ecosystem Priority Areas (FEPAs) and buffers
- Protected Areas (and buffers) and National Protected Area Expansion Strategy areas (NPAES).
- Critical Habitat for listed endemic or protected species.

Table 1: Summary of Regional Planning Biodiversity features.

| FEATURE <sup>2</sup>                                             | DESCRIPTION                                                                                                                        | IMPLICATIONS/COMMENT                                                                                                                                                 |
|------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| National Environmental Screening Tool (Terrestrial Biodiversity) | Very High Terrestrial Biodiversity<br><br>Low, Medium & High Plant & Animal Species sensitivities<br>Very High Aquatic sensitivity | CBA 1 & 2, ESA 2, Critically Endangered ecosystem, SWSA & SANParks Buffer<br>Several Plant & Animal Species flagged by the screening tool.<br>CBA 1, SWSA & Wetlands |
| National Vegetation Map (NVM, 2018)                              | Garden Route Granite Fynbos                                                                                                        | Critically Endangered                                                                                                                                                |
| Critically Endangered and Endangered Ecosystems (NBA 2018)       | Garden Route Granite Fynbos                                                                                                        | Assessment to determine risks.                                                                                                                                       |
| Vulnerable Ecosystems (NBA)                                      | None                                                                                                                               | N/A                                                                                                                                                                  |
| Western Cape Biodiversity Spatial Plan (2017)                    | Critical Biodiversity Area 1 & 2, Ecological Support Area 1                                                                        | Assessment to determine risks.                                                                                                                                       |
| Protected Areas (SAPAD)                                          | None                                                                                                                               | N/A                                                                                                                                                                  |
| Protected Areas (WC BSP)                                         | None                                                                                                                               | N/A                                                                                                                                                                  |
| NPAES (Draft 2018)                                               | None                                                                                                                               | N/A                                                                                                                                                                  |
| NPAES (2010)                                                     | None                                                                                                                               | N/A                                                                                                                                                                  |
| Strategic Water Source Areas (SWSA)                              | Outeniqua SWSA                                                                                                                     | Impacts to site may have risks to downstream water sources.                                                                                                          |
| Freshwater Ecosystem Priority Areas (FEPA's)                     | None                                                                                                                               | N/A                                                                                                                                                                  |
| Regional Hotspots & Regions of Endemism                          | Cape Floristic Region Hotspot                                                                                                      | Specific activity and site unlikely to pose any risk to broader biodiversity hotspot.                                                                                |
| Important Bird Areas (IBA's)                                     | None                                                                                                                               | N/A                                                                                                                                                                  |
| Key Biodiversity Areas (KBA's)                                   | None                                                                                                                               | N/A                                                                                                                                                                  |
| Marine/Coastal areas                                             | None                                                                                                                               | N/A                                                                                                                                                                  |
| RAMSAR sites                                                     | None                                                                                                                               | N/A                                                                                                                                                                  |
| Within 32 m of Watercourse                                       | Stormwater discharge points will be within 32m of watercourses                                                                     | May have impacts to watercourses and/or associated flora and fauna.                                                                                                  |
| Within 100 m of River                                            | None.                                                                                                                              | N/A                                                                                                                                                                  |
| Estuary                                                          | None                                                                                                                               | N/A                                                                                                                                                                  |

<sup>2</sup> Refer to Figure 9 to Figure 13.



| FEATURE <sup>2</sup>                                   | DESCRIPTION                                                                                                                                                                                                                                                                                                                                               | IMPLICATIONS/COMMENT                                                                           |
|--------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|
| Within 500 m of Wetland                                | Valley Bottom Wetlands are associated with the watercourses in the area.                                                                                                                                                                                                                                                                                  | May have impacts to watercourse and/or associated flora and fauna.                             |
| Forest                                                 | None                                                                                                                                                                                                                                                                                                                                                      | N/A                                                                                            |
| Surrounding Land Uses                                  | Surrounding land primarily used for urban dwellings.                                                                                                                                                                                                                                                                                                      | Site and surrounding area are transformed and/or with scattered secondary vegetation elements. |
| Critical Habitat for listed endemic/ protected species | No specific populations of threatened species were identified within the footprint and the affected footprint is largely disturbed or comprised of secondary vegetation. There are several red listed species in the surrounding area and vegetation units that are known to have limited distributions, however none were recorded within the footprint. |                                                                                                |

### 2.2.1 National Environmental Screening Tool

The DEA Screening Tool indicates the following, summarised in Table 1:

- Terrestrial Biodiversity is Very High (Figure 5).
- Plant species sensitivity is Low & Moderate (Figure 6).
- Animal Species sensitivity is High (Figure 7).
- Aquatic Sensitivity is Very High (Figure 8).

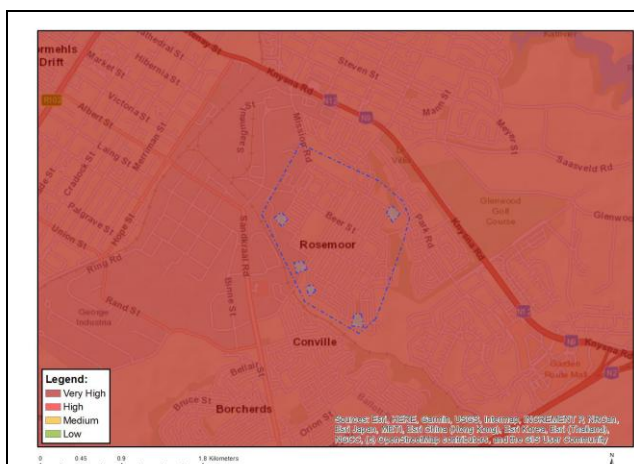


Figure 5: Terrestrial Biodiversity Sensitivity

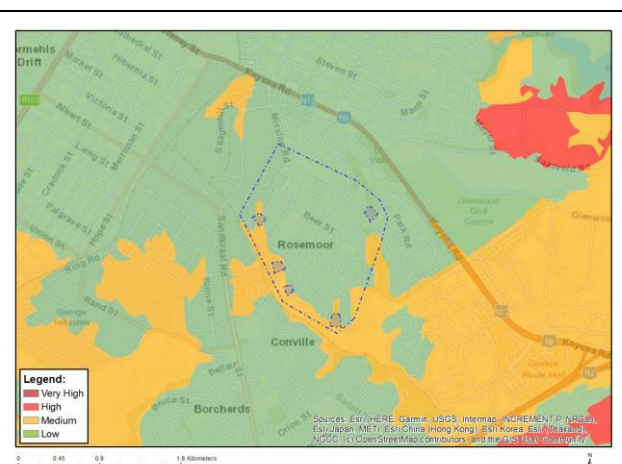


Figure 6: Plant Species Sensitivity

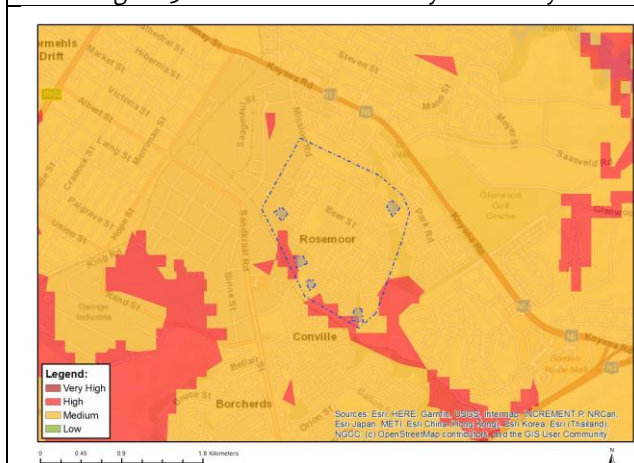


Figure 7: Animal Species Sensitivity

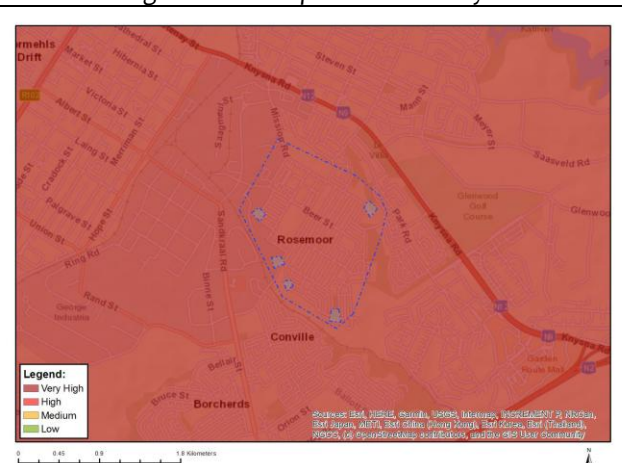


Figure 8: Aquatic Sensitivity

Table 2: Summary of Screening tool designations.

| Terrestrial Sensitivity | Feature(s) in proximity                                                                                                                   |
|-------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| Very High               | CBA 1: Terrestrial, CBA 2: Terrestrial, SWSA (SW Outeniqua) & Garden Route Granite Fynbos (Critically Endangered)                         |
| High                    | None                                                                                                                                      |
| Medium                  | None                                                                                                                                      |
| Low                     | Present                                                                                                                                   |
| Plant Sensitivity       |                                                                                                                                           |
| Very High               | None                                                                                                                                      |
| High                    | None                                                                                                                                      |
| Medium                  | <i>Lampranthus pauciflorus</i> , <i>Leucospermum glabrum</i> , <i>Diosma passerinoides</i> , Sensitive species 1024, 1032, 800 & 500.     |
| Low                     | Present                                                                                                                                   |
| Animal Sensitivity      |                                                                                                                                           |
| Very High               | None                                                                                                                                      |
| High                    | <i>Circus ranivorus</i> & <i>Bradypterus sylvaticus</i> (Birds)                                                                           |
| Medium                  | <i>Afrixalus knysnae</i> (Amphibian), <i>Chlorotalpa duthieae</i> , Sensitive species 8 (Mammal) & <i>Aneuryphymus montanus</i> (Insects) |
| Low                     | Present                                                                                                                                   |
| Aquatic Sensitivity     |                                                                                                                                           |
| Very High               | CBA 1: Aquatic, SWSA (SW Outeniqua) & Wetlands - Eastern Fynbos-Renosterveld Bioregion (Valley-bottom wetlands)                           |
| High                    | None                                                                                                                                      |
| Medium                  | None                                                                                                                                      |
| Low                     | None                                                                                                                                      |

## 2.2.2 Vegetation of Southern Africa

The National Vegetation Type (NBA, 2018, Figure 9) indicated for the site and surrounding area are Garden Route Granite Fynbos, having a *Critically Endangered* status, as per National Biodiversity Red Listed Ecosystems Assessment (NBA/RLE, 2022).

### Garden Route Granite Fynbos (FFg 5)

VT 46 Coastal Renosterbosveld (70%) (Acoccks 1953). South Coast Renosterveld (22%) (Moll & Bossi 1983). LR 2 Afromontane Forest (67%) (Low & Rebelo 1996). BHU 100 Knysna Afromontane Forest (64%), BHU 28 Blanco Fynbos/Renosterveld Mosaic (36%) (Cowling et al. 1999b, Cowling & Heijnis 2001).

**Distribution:** Western Cape Province: Garden Route. Three main blocks south of the Outeniqua Mountains on the coastal plain from Botterberg west of Brandwaghoogte (south of Robinson Pass) to Groot Brak River; the largest block from Groot Brak River to Woodfield near the Wilderness (with a few strips along the coast from Bothastrand to the Wilderness); lastly, north of the lakes from Woodville to Hoogekraal Pass, west of Karatara.

**Altitude:** 0–300 m.

**Vegetation & Landscape Features:** Moderately undulating plains and undulating hills on the coastal forelands. Dense proteoid and ericoid shrubby grassland. Proteoid and graminoid fynbos are dominant with ericaceous fynbos in seeps. In the west, most remnants of this type are dominated by proteas. Eastwards graminoid and ericaceous fynbos are dominant on the flat plateaus, with proteas confined to the steep slopes.

**Geology & Soils:** George Batholith of the Cape Granite Suite. Deep, prismacutanic- and pedocutanic-dominated soils typical of Db land types (mainly).



**Climate:** MAP 350–880 mm (mean: 600 mm), with a slight low in early winter. Mean daily maximum and minimum temperatures 27.8°C and 6.8°C for January–February and July, respectively. Frost incidence 2 or 3 days per year.

**Important Taxa:** Tall Shrubs: *Passerina corymbosa* (d), *Cliffortia serpyllifolia*, *Protea coronata*, *P. lanceolata*, *P. neriifolia*. Low Shrubs: *Erica discolor* variant ‘*speciosa*’ (d), *E. peltata* (d), *Phylica confusa* (d), *Syncarpha paniculata* (d), *Agathosma ovata*, *Anthospermum prostratum*, *Aspalathus asparagoides*, *Cliffortia falcata*, *Cullumia bisulca*, *Erica canaliculata*, *E. diaphana*, *E. formosa*, *Eriocephalus africanus*, *Hermannia angularis*, *Leucadendron salignum*, *Lobelia tomentosa*, *Metalasia pungens*, *Mimetes cucullatus*, *Pelargonium fruticosum*, *Relhania calycina*. Succulent Shrub: *Lampranthus sociorum*. Semiparasitic Shrubs: *Osyris compressa*, *Thesium virgatum*. Semiparasitic Epiphytic Shrub: *Viscum capense*. Geophytic Herb: *Schizaea pectinata*. Graminoids: *Tetraria cuspidata* (d), *Brachiaria serrata*, *Eragrostis capensis*, *Ficinia nigrescens*, *Heteropogon contortus*, *Pentstemon eriostoma*, *Restio triticeus*, *Themeda triandra*.

**Conservation:** Critically Endangered (2022). Target 23%. Only about 1% conserved in the proposed Garden Route National Park. About 70% has been transformed for, cultivation (56%), pine plantations (7%) and by urban development (6%). Remnants are largely confined to isolated pockets on steeper slopes.

**Erosion:** Moderate and High. Very few patches of this type remain in a pristine condition as most of it has been converted to pasture by liming, bush-cutting and frequent burning, and augmented with pasture grasses. Western remnants suggest that proteoid fynbos might have been dominant historically. It is easily converted to graminoid fynbos by regular fires and augmentation with pasture grasses.

**References:** Drews (1980b), Hoare et al. (2000).

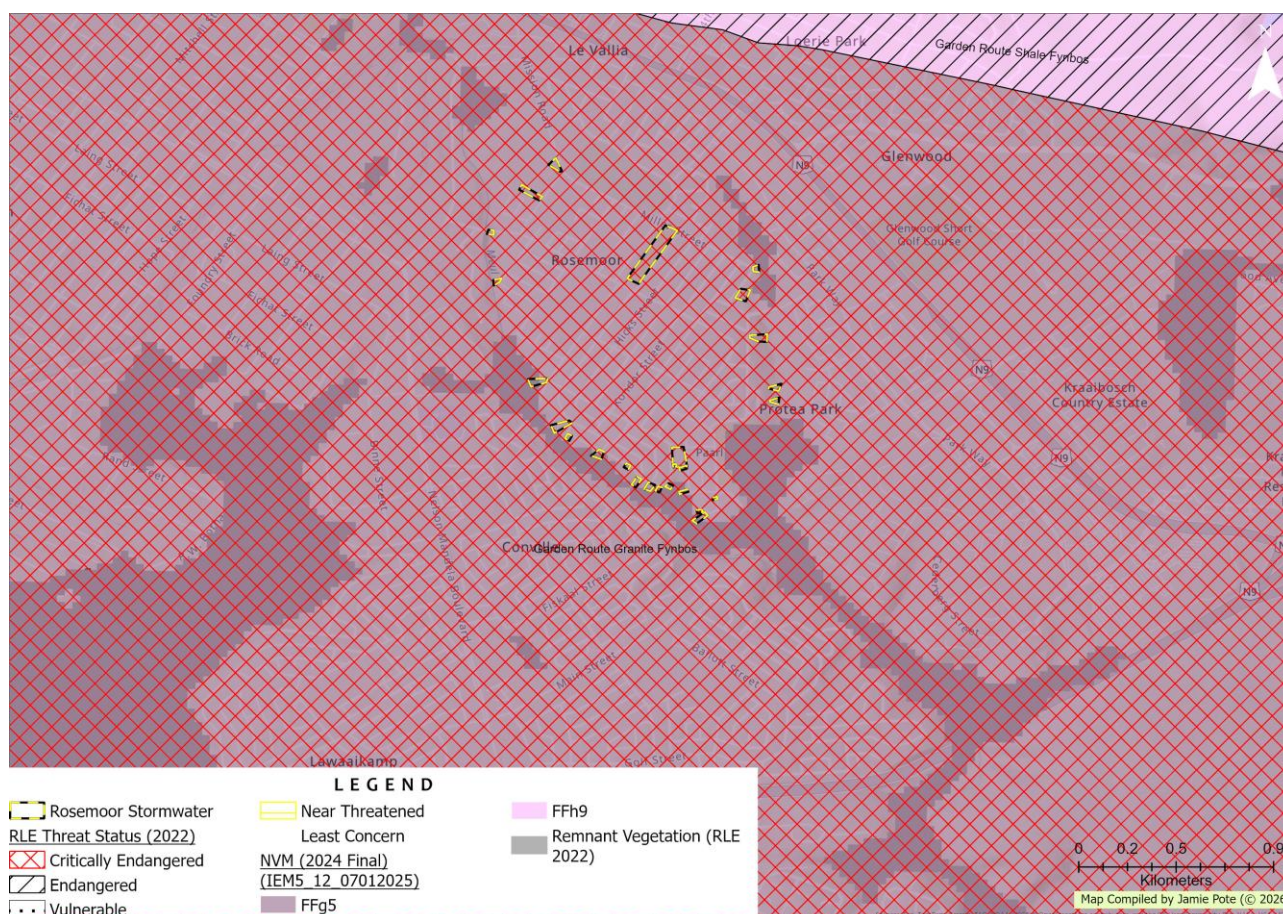


Figure 9: National Biodiversity Assessment Vegetation Type and Conservation Status (NBA, 2018). Darker shaded areas indicative of remnant vegetation.



### 2.2.3 Western Cape Biodiversity Spatial Plan (WCBSP, 2023) – Terrestrial

The Western Cape Biodiversity Spatial Plan (2017, Figure 10) indicates that most of the proposed stormwater structure footprints fall within transformed roads and road reserves, with predominantly the discharge points falling within areas designated CBA 1 & 2 and ESA 2, which are associated with the watercourses and surrounding vegetation that are undeveloped within the urban area.

The Biodiversity Spatial Plan indicates areas of land as well as aquatic features which must to be safeguarded in their natural state if biodiversity is to persist and ecosystems are to continue functioning. Land in this category is referred to as a Critical Biodiversity Area. CBAs incorporate:

- I. areas that need to be safeguarded in order to meet national biodiversity thresholds.
- II. areas required to ensure the continued existence and functioning of species and ecosystems, including the delivery of ecosystem services; and/or
- III. important locations for biodiversity features or rare species.

Ecological Support Areas (ESAs) are supporting zones required to prevent the degradation of Critical Biodiversity Areas and Protected Areas. An ESA may be an ecological process area that connects and therefore sustains Critical Biodiversity Areas or a terrestrial feature. None are present within the site or immediate vicinity. Defining criteria and recommended activities are summarised in Table 3 below.

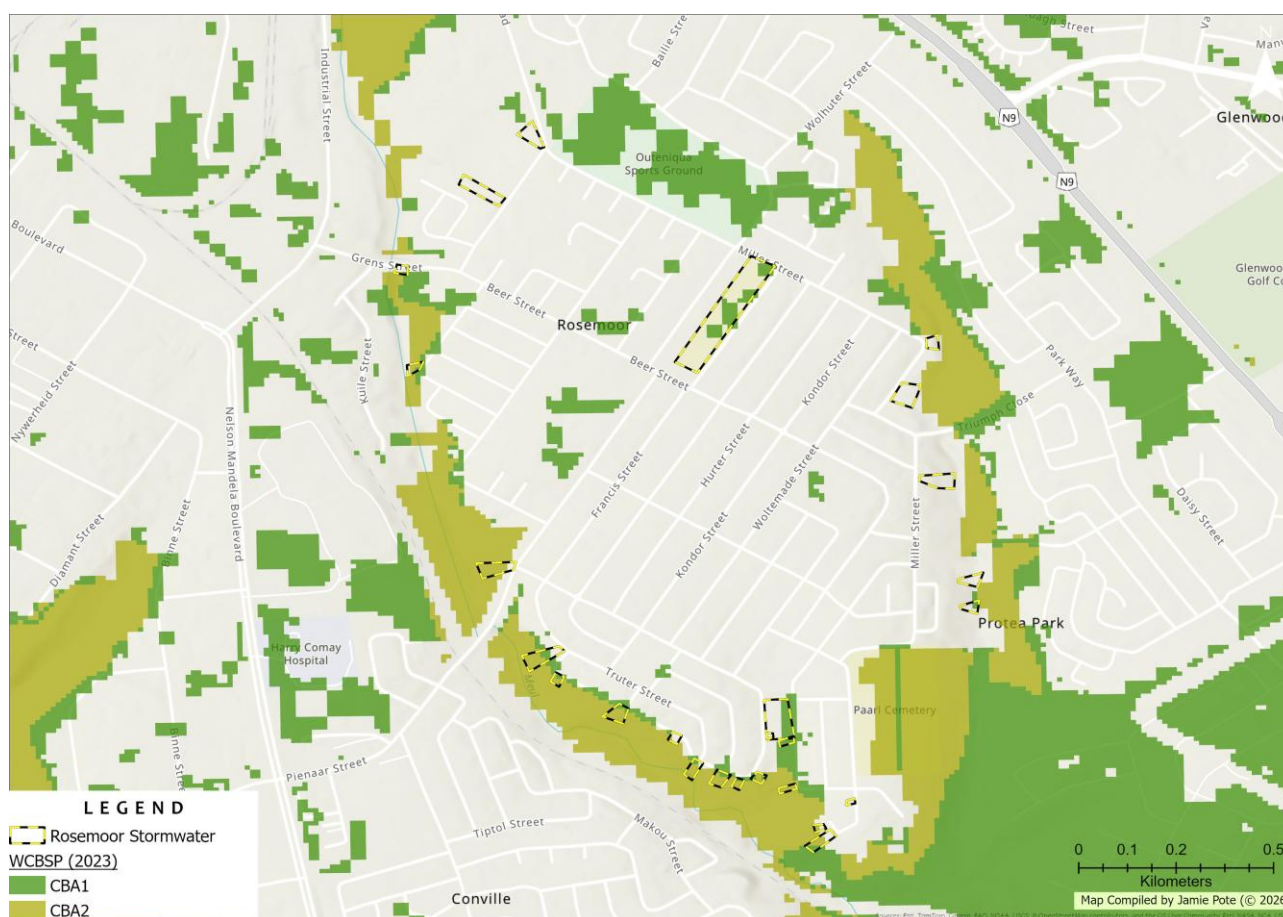


Figure 10: Western Cape Biodiversity Spatial Plan (WCBSP, 2023) – The site does overlap with some designated CBA 1 and CBA 2 areas.

Table 3: Criteria defining Critical Biodiversity Areas (Source: WC BSP, 2023)

| CBA MAP CATEGORY:                | DEFINING CRITERIA                                                                      |
|----------------------------------|----------------------------------------------------------------------------------------|
| Protected Areas<br>(Not Present) | Areas that are proclaimed as protected areas under national or provincial legislation. |



| CBA MAP CATEGORY:                                   | DEFINING CRITERIA                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|-----------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                     | Must be kept in a natural state, with a management plan focused on maintaining or improving the state of biodiversity. A benchmark for biodiversity.                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Critical Biodiversity Areas 1 (CBA)<br>(Present)    | Areas in a natural condition that are required to meet biodiversity targets, for species, ecosystems or ecological processes and infrastructure.<br>Maintain in a natural or near natural state, with no further loss of habitat. Degraded areas should be rehabilitated. Only low-impact, biodiversity-sensitive land uses are appropriate.                                                                                                                                                                                                                                  |
| Critical Biodiversity Areas 1 (CBA 2)<br>(Present)  | Areas in a degraded or secondary condition that are required to meet biodiversity targets, for species, ecosystems or ecological processes and infrastructure.<br>Maintain in a functional, natural, or near-natural state, with no further loss of natural habitat. These areas should be rehabilitated.                                                                                                                                                                                                                                                                     |
| Ecological Support Areas 1 (ESA 1)<br>(Not Present) | Areas that are not essential for meeting biodiversity targets, but that play an important role in supporting the functioning of PA's or CBA's and are often vital for delivering ecosystem services.<br>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 Areas 2 (ESA 2)<br>(Not Present) | Areas that are not essential for meeting biodiversity targets, but that play an important role in supporting the functioning of PA's or CBA's and are often vital for delivering ecosystem services.<br>Restore and/or manage to minimise impact on ecological infrastructure functioning; especially soil and water-related services.                                                                                                                                                                                                                                        |
| Other Natural Areas (ONA)<br>(Present)              | Areas that have not been identified as a priority in the current systematic biodiversity plan but retain most of their natural character and perform a range of biodiversity and ecological infrastructure functions. Although they have not been prioritised for biodiversity, they are still an important part of the natural ecosystem.<br>Minimise 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. |
| No Natural Area Remaining (NNAR)<br>(Present)       | Areas that have been modified by human activity to the extent that they are no longer natural, and do not contribute to biodiversity targets. These areas may still provide limited biodiversity and ecological infrastructure functions, even if they are never prioritised for conservation action.<br>Manage in a biodiversity-sensitive manner, aiming to maximise ecological functionality. Offers the most flexibility regarding potential land uses, but some authorisation may still be required for high impact land uses.                                           |

## 2.2.4 Protected areas

The South Africa Protected Areas Database (SAPAD) database, a comprehensive database of various protected area categories, is updated on a quarterly basis, and provides a comprehensive source of all national and private nature reserves, world heritage sites and other formal legally protected conservation areas situated within South Africa (Figure 11).

When projects are located in legally protected and internationally recognized areas, clients should ensure that project activities are consistent with any national land use, resource use, and management criteria (including Protected Area Management Plans, National Biodiversity Strategy and Action Plans (NBSAP's), or similar documents).

The proposed site does not overlap with any SAPAD designated Protected Areas and is unlikely to have any impacts of significance to any species or processes associated with any nearby Protected Areas. Nearest Protected Areas within 10 km of the site include Blydskap Private Nature Reserve (4.6 km SE), Cape Floral Kingdom Protected Areas (4.6 km NW), Garden Route National Park (4.2 km NE), George Private Nature Reserve (3.8 km SE), Katrivier Nature Reserve (1.6 km N), Van Kervel Nature Reserve (2.6 km NW), Kwelanga Private Nature Reserve (6.4 km S), Kleinbaai Private Nature Reserve (6 km SE), Kaaimans River Gorge Private Nature Reserve (5.7 km NE). The watercourses associated with the proposed stormwater infrastructure are subsidiaries of the Meul River, which flows in a southerly direction and passes along the southern boundary of the George Private Nature Reserve.

The site is not within or in proximity to any designated NPAES areas, where any impacts may arise.

Activities that improve water quality discharge are likely to have a positive indirect impact in the downstream areas including protected areas.

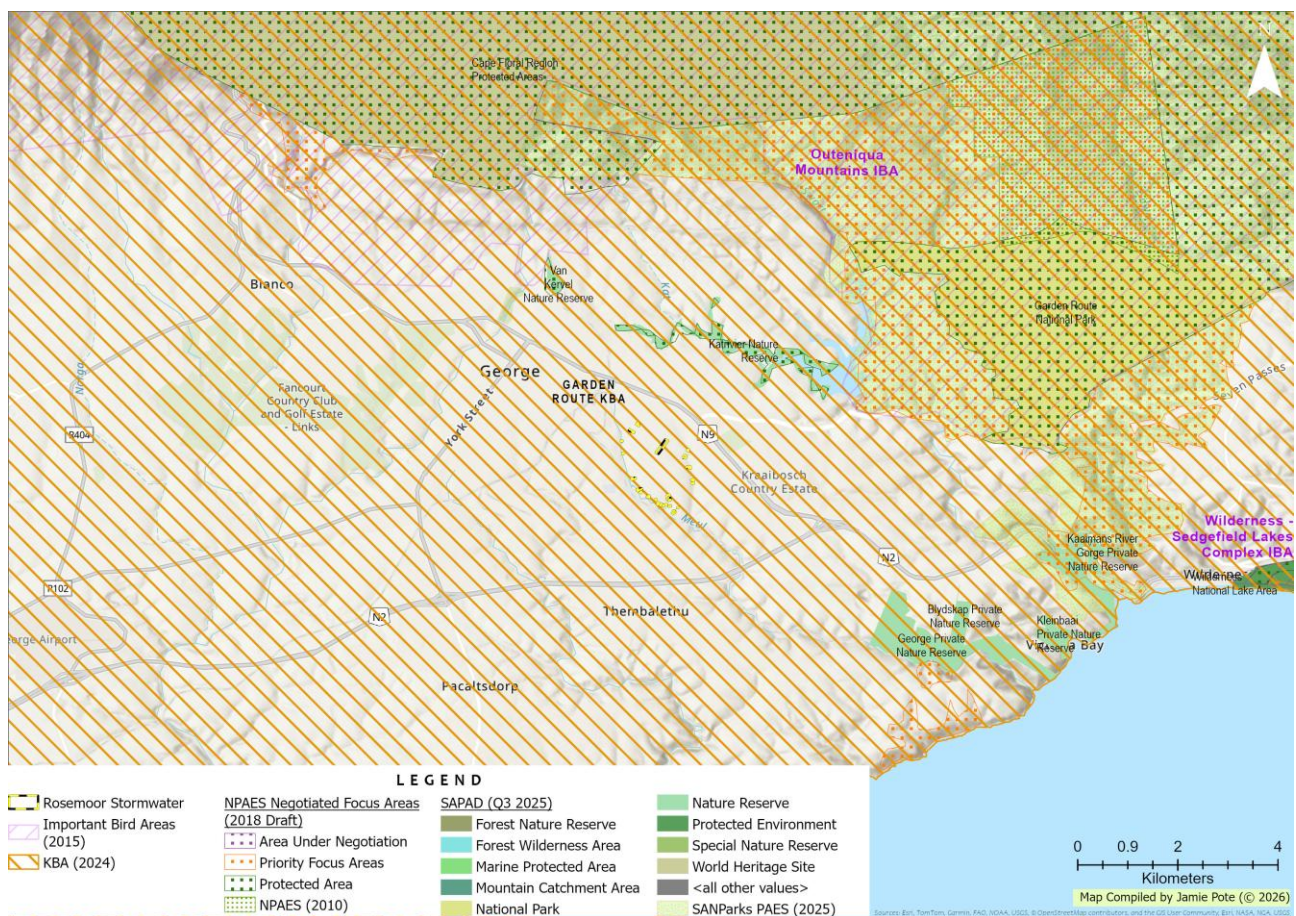


Figure 11: Protected Areas.

### 2.2.5 Key Biodiversity Areas

The site is situated within the Garden Route KBA, which covers an extensive area within the eastern and western Cape provinces. Subsequently, while 132 potential triggers (habitat and species) are flagged within the KBA, most are localised and thus only applicable to a small area within the boundary of the designated KBA area which includes terrestrial, marine, freshwater habitat and species. The specific triggers that are relevant to this site are addressed in the respective sections pertaining to the vegetation unit and species of conservation concern.



## 2.2.6 Important Bird Areas

The site is not situated within or near any designated Important Bird Area (Figure 11). The nearest IBA is the Outeniqua mountains IBA situated just over 3 km to the north and east. While the surrounding area may have transient bird species visitors that are associated with the IBA, it is unlikely that the specific activity, within an urban and significantly transformed and degraded area is likely to have any impact of significance to such occurrences.

## 2.2.7 Garden Route Biodiversity Sector Plan (2010)

The Garden Route BSP (GRBSP, 2007, Figure 12) identified the vegetation as being **Grassy Fynbos** (associated with the slopes) and **Rivers & Floodplain** (associated with the watercourses). The Garden Route BSP further indicates that portions of the site partially intersect with designated Critical Biodiversity Area along the watercourses and possibly representing historically intact or remnant vegetation. The Garden Route BSP is largely integrated with and/or superseded by the Western Cape BSP and National Vegetation Map, which is also updated to represent changing land use, but indicates that the later plans are broadly aligned with the earlier GRBSP.



Figure 12: Garden Route Biodiversity Sector Plan (2007) vegetation designation and CBA/ESA status.

## 2.2.8 Rivers, Watercourses and Wetlands

The site is situated within along roads within an urban area, on slopes that drain into the adjacent slightly incised watercourses. The slopes directly adjacent to the watercourses are generally undeveloped and have vegetation cover. The condition and status of the vegetation cover, including riparian vegetation, is included in the vegetation description section below. The non-perennial watercourses associated with

the Rosemoor area drain in a southerly direction into the Meul River, which flows southwards to the coast.

Wetlands potentially comprise Valley bottom wetlands that are associated with the local watercourses. Aquatic assessment is outside the scope of this assessment but will consider aspects that relate to terrestrial processes and species.

Formalisation of stormwater infrastructure implemented correctly is likely to reduce erosion along riverbanks and ease localised flooding. Within the urban context, any wetlands in the vicinity of the discharge points are likely already significantly modified and/or affected by stormwater flows and are thus unlikely to be affected above baseline levels.

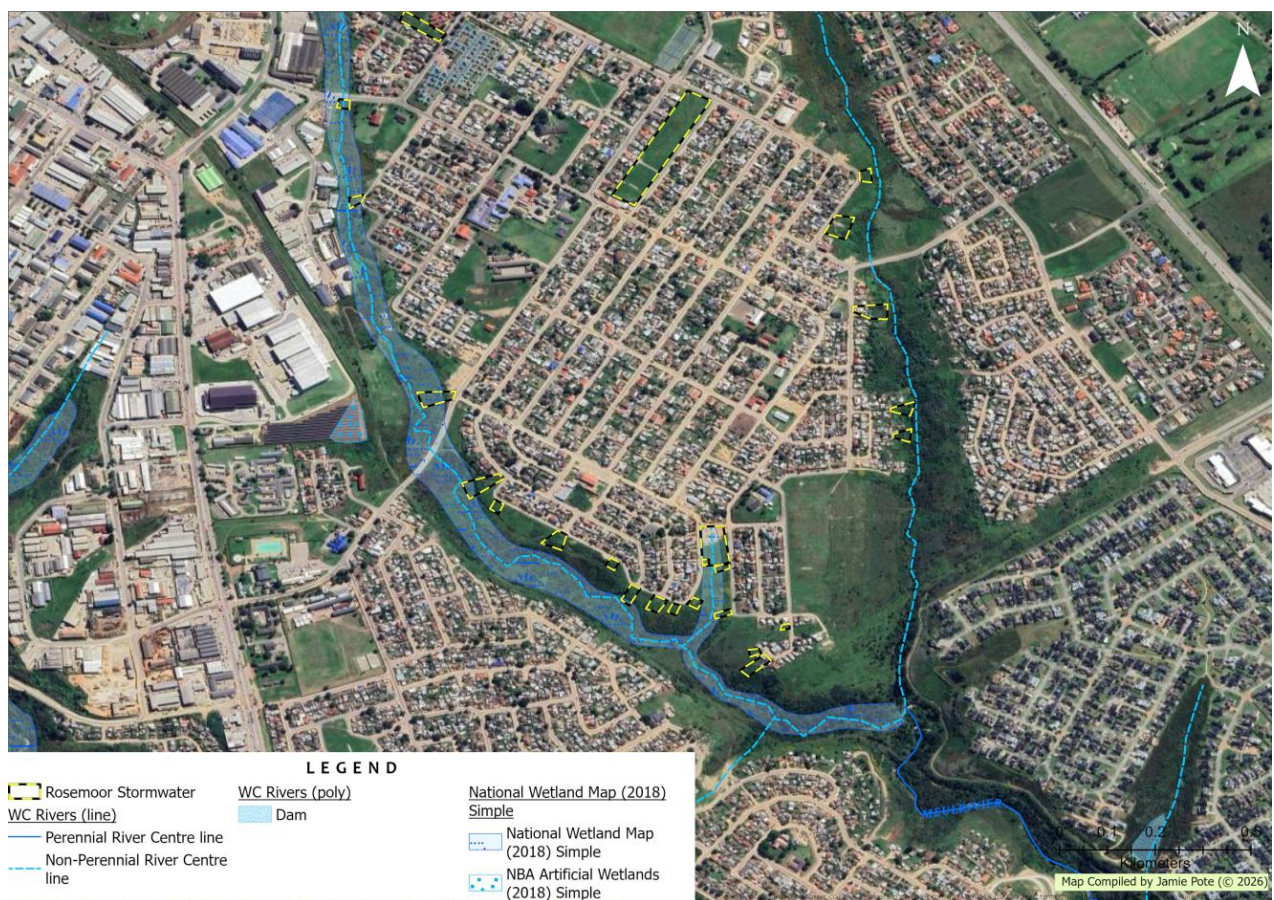


Figure 13: Rivers, Wetlands and Estuaries associated with the site.

### 3 Biodiversity Risk Identification and Assessment

#### 3.1 Baseline Biodiversity Description

The site is located within a transformed developed urban area on slopes adjacent to somewhat incised watercourses, draining in a southerly direction. The only remaining vegetation cover is comprised of a narrow band of vegetation along the banks of the watercourses, as well as some grassed and landscaped gardens within the suburbs (Figure 15 to Figure 42).

The site is comprised predominantly of transformed areas which include the dwellings, surfaced roads, sidewalks, landscaped gardens and a few grassed open space areas (Figure 43). The areas having 'natural'



vegetation cover are generally confined to the undeveloped areas surrounding the watercourses. The discharge points associated with the proposed stormwater infrastructure are generally located within these areas, typically discharging into the watercourses.

Three different main habitats can be differentiated within the vegetated area:

1. Transformed – Includes hardened surfaces such as paved roads, sidewalks, landscaped gardens and grassed areas including parks and road verges (Figure 15 to Figure 20).
2. Vegetated Areas– significantly degraded ‘natural’ vegetation composed predominantly of ruderal weeds, shrubs small trees and grasses (Figure 21 to Figure 30).
3. Watercourse – Watercourses are significantly degraded (Figure 31 to Figure 42).

Figure 15 to Figure 42 provide a general overview of the site.



Figure 14: Aerial photo of the site.

### Transformed

Transformed areas (Figure 15 to Figure 20) are comprised of hardened surfaces such as paved roads, sidewalks, landscaped gardens and grassed areas including grassy parks and road verges. No indigenous terrestrial vegetation is present in these areas, other than planted trees on sidewalks and road verges that include predominantly exotic species.





Figure 15: Typical urban street.



Figure 16: Typical urban street.



Figure 17: Typical urban street.



Figure 18: Typical urban street.



Figure 19: Grassed open space area.



Figure 20: Grassed open space area.

Open areas are generally subject to mowing and vegetated with grasses including exotic Kikuyu grass (*Cenchrus clandestinus*, previously *Pennisetum clandestinum*) and Kweek (*Cynodon dactylon*) as well as several creeping ruderal weeds including *Arctotheca prostrata* (Prostrate Cape Milkweed).

### Vegetated Areas

Vegetated areas (Figure 21 to Figure 30) along the slopes adjacent to watercourses are significantly disturbed and vegetation cover is comprised primarily of exotic Kikuyu grass (*Cenchrus clandestinus*, previously *Pennisetum clandestinum*) and *Senecio angulatus* (Cape Ivy) as groundcovers, with a range of ruderal and invasive weed species including herbs and shrubs *Ricinus communis* (Castor Oil plant), Bugweed (*Solanum mauritianum*), *Canna indica*, Inkberry (*Cestrum laevigatum*), *Lantana camara*, *Nidorella ivifolia*, *Amaranthus* spp. (Amaranth), *Verbena bonariensis*, *Iris pseudacorus*, *Cirsium vulgare* (Thistle), *Senna didymobotrya* (Peanut-Butter Cassia), *Phytolacca octandra* (Inkweed), *Urtica urens* (Nettle) and *Vinca major* (Periwinkle) and *Rubus* sp. (Bramble). Common trees include *Sambucus nigra* (European Black Elderberry) and *Acacia mearnsii* (Black Wattle), as well as *Leptospermum scoparium* (Broom tree), *Sesbania punicea* (Sesbania), *Acacia melanoxylon* (Blackwood), and *Melia azedarach* (Syringa). Clumps of *Cortaderia selloana* (Pampas Grass) is also common along the water courses. A wide range of garden escapees are also present, likely coming from dumped garden waste, mostly non-indigenous species.



Remnant elements include *Arctotheca prostrata* (Prostrate Cape Milkweed), *Carpobrotus deliciosus* (Sourfig), Wild Dagga (*Leonotis leonurus*), Arum lily (*Zantedeschia aethiopica*), *Senecio angulatus* and *Searsia rehmanniana*. While *Senecio angulatus* is an indigenous species, it can become invasive in disturbed areas and the creeping vine-like growth from allows it to effectively smother other vegetation.

The percentage of natural vegetation within this habitat is likely between 5 and 10 % comprising a few scattered elements. The vegetation present is not representative of the Critically Endangered



Figure 21: Typical vegetated watercourse bank (Kikuyu).



Figure 22: Typical vegetated watercourse bank (Kikuyu).



Figure 23: Typical vegetated watercourse bank (Kikuyu).



Figure 24: Typical vegetated watercourse bank (Kikuyu).



Figure 25: Typical vegetated area (Kikuyu).



Figure 26: Typical vegetated area (Kikuyu).



Figure 27: Typical vegetated area (Kikuyu).



Figure 28: Typical vegetated area (Cape Ivy).





Figure 29: Typical vegetated area (Kikuyu).



Figure 30: Typical vegetated area (Kikuyu).

## Watercourses

Watercourses (Figure 31 to Figure 42) are significantly disturbed and/or modified with vegetation also comprised predominantly of exotic and invasive species. Cover is primarily also exotic Kikuyu grass (*Cenchrus clandestinus*, previously *Pennisetum clandestinum*) and *Senecio angulatus* (Cape Ivy), as well as *Cortaderia selloana* (Pampas Grass) and *Sambucus nigra* (European Black Elderberry) trees and the reed *Arundo donax* (Giant Reed). Riparian vegetation is not easily distinguished from surrounding vegetation due to the proliferation of weeds that are common to both habitats.

Remnant indigenous elements are occasional and include Arum lily (*Zantedeschia aethiopica*), clumps of *Typha capensis* (Bulrushes), occasional indigenous reeds (*Phragmites australis*) and occasional tufts of remnant sedges, including *Juncus effusus*, *Cyperus polystachyos* and *Cyperus textilis*.



Figure 31: Watercourse bridge crossing.



Figure 32: Discharge point at watercourse crossing.



Figure 33: Typical Watercourse.



Figure 34: Typical Watercourse.





Figure 35: Typical Watercourse.



Figure 36: Typical Watercourse.



Figure 37: Typical Watercourse.



Figure 38: Typical Watercourse.



Figure 39: Typical discharge point.



Figure 40: Eroded and polluted watercourse.



Figure 41: Eroded and polluted watercourse.



Figure 42: Eroded and polluted watercourse.

The proposed development is unlikely to have any significant impact on any 'intact' or natural indigenous vegetation of any significant ecological value. The respective vegetation or habitats coverages are indicated in Table 4 below

Table 4: Approximate footprint coverage areas of habitat in hectares.

| HABITAT              | SENSITIVITY | AREA (HECTARES) |
|----------------------|-------------|-----------------|
| Watercourse          | Moderate    | ~ 0.7           |
| Vegetated Areas      | Low         | ~ 1.0           |
| Transformed/Hardened | Low         | ~ 1.8           |
| <b>TOTAL</b>         |             | <b>~ 3.5</b>    |





Figure 43: Mapped vegetation of the site (Overview).



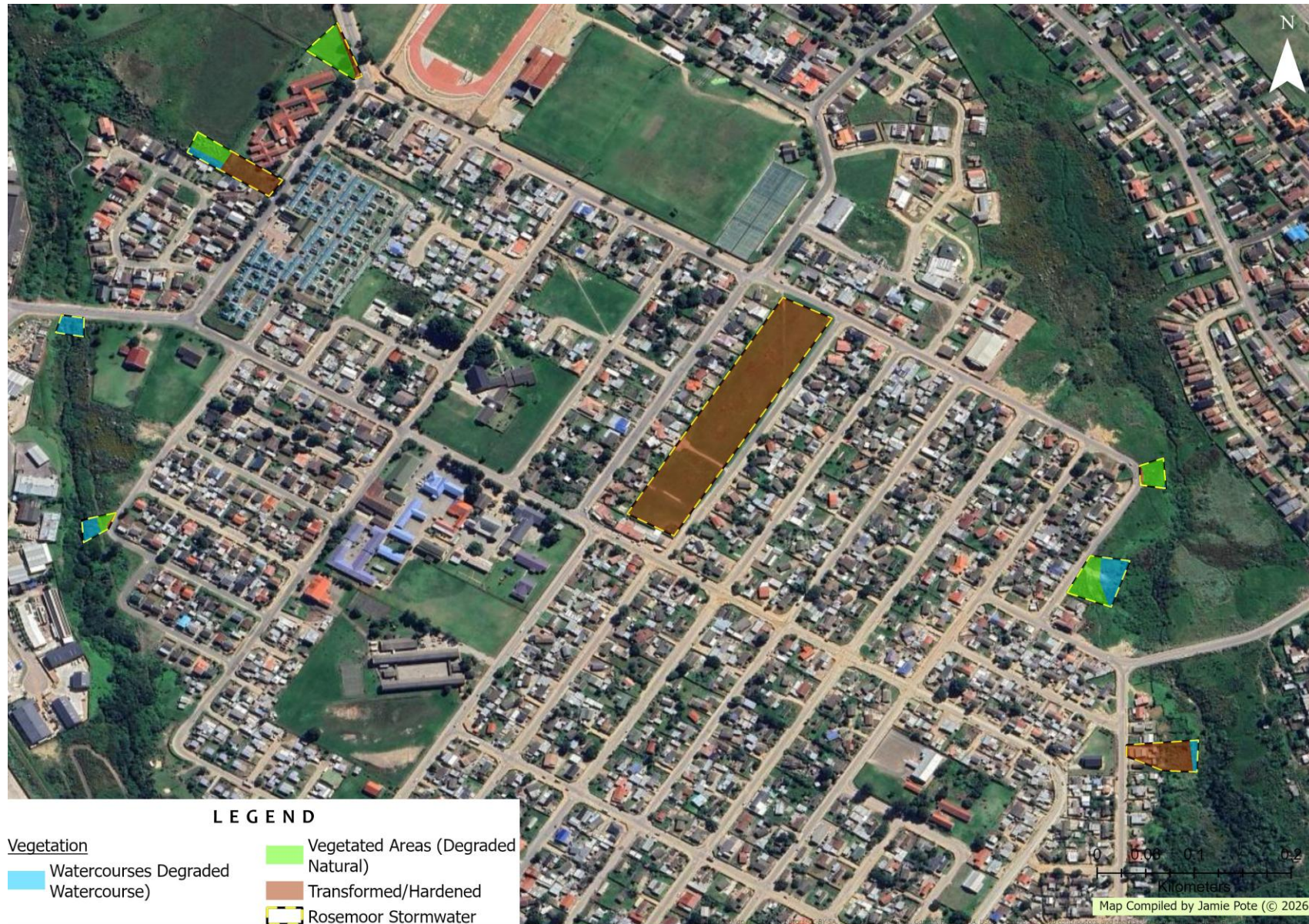


Figure 44: Mapped vegetation of the site (North portion).





Figure 45: Mapped vegetation of the site (South portion).



### 3.1.1 Present Ecological State

In summary, the following general observations can be noted regarding the site:

- The area in and around the site is completely transformed and or degraded as a result of urban development and associated processes including dumping of refuse and garden waste and other pollution sources, with the occasional remnant scattered indigenous species. No elements of species typical to Garden Route Granite Fynbos were observed within vegetated areas along the watercourses
- Alien invasion is high to very high, comprising most of the vegetation along the watercourses and surrounding vegetated areas.
- Ecological processes are thus primarily significantly modified, as natural and indigenous vegetation elements are largely absent from within the site.
- Fauna species include mainly species typical of urbanised and transformed areas, perhaps having the occasional visit from less common species that typically occur in natural areas that are in transit through urban area or are acclimated to the urbanised environment.

### 3.1.2 Vegetation and Ecological Processes and Corridors

Landscapes corridors are a combination of Critical Biodiversity Areas (areas required to meet conservation targets) and Ecological Support Areas that link habitats, as well as linking inland mountains to the coastline (and therefore beyond municipal boundaries). Rivers and their associated riparian or riverbank habitats often provide the basis for many of these large-scale (landscape level) ecological processes.

Critical Biodiversity Areas (CBA) are generally regarded as being critical for meeting conservation objectives for vegetation units in an optimal manner. Where a vegetation unit is not under threat (i.e. Least Concern status), there is some flexibility, its alternatives; however, as conservation status increases (a vegetation unit is under threat due to high levels of transformation), alternative options to meet conservation targets are significantly reduced. CBA 1 areas are generally natural or near natural, whereas CBA 2 are degraded and/or transformed areas where restoration would be required and/or recommended.

Ecological Support Areas (ESA) are supporting zones or areas which must be safeguarded as they are needed to prevent degradation of Critical Biodiversity Areas and formal Protected Areas. Although many ESA's consist of natural veld, there are areas of land - partially or wholly transformed or degraded - that have been classified as ESA even though they are no longer in a natural state. Although these areas are heavily degraded or transformed, they still play an important role in supporting ecological processes. This is particularly the case with riparian areas, some key catchment areas, and key pieces of corridors. ESA 1 areas are generally natural or near natural, whereas ESA 2 are degraded and/or transformed areas where restoration would be required and/or recommended. An ESA that is vegetated but not natural or near natural can still serve to retain some connectivity and support ecological processes, but in a significantly reduced manner. For example, trees in an apple orchard will provide perches for some birds and grassy groundcover will still allow for movement of some small animals such as rodents and reptiles. Certain species are significantly more at risk, as they may not be able to adapt to a modified environment, whereas others may not be affected.

While the site falls within a broader important ecologically connected area along the watercourses, the specific site is significantly transformed and surrounded by developed erven and paved roads. Remnant vegetation along watercourse is significantly degraded and transformed and thus provides limited

‘natural’ ecological value in its current state. It will serve limited connectivity support but does not and is not likely to support any substantial populations of at-risk species of conservation concern that are not adaptable to modified environments, nor provide ecological services and processes typically associated with the Critically Endangered Garden Route Granite Fynbos that occurs in the broader area. The watercourse corridors will however serve as broad level artificial habitat corridors for general movement faunal species around the broader area, but since no flora species typical of the unit are present, flora related ecological processes (such as pollination and seed dispersal) would be absent. The proposed activity, having a negligible footprint within significantly modified habitat, is thus unlikely to significantly impact or disturb these processes nor likely to alter current species composition from current baseline levels.

### 3.1.3 Flora & Fauna

No endemic and range restricted species were recorded to be present. Several species are known from the surrounding area, but unlikely to be affected by the proposed activity.

#### Red Listed, Endemic and Protected Flora

The site falls within the general distribution range of several endemic species and other species with a highly localised distribution, some of which are Critically Endangered, Endangered, Vulnerable or Rare. Some of these species are also only from a single or a few populations.

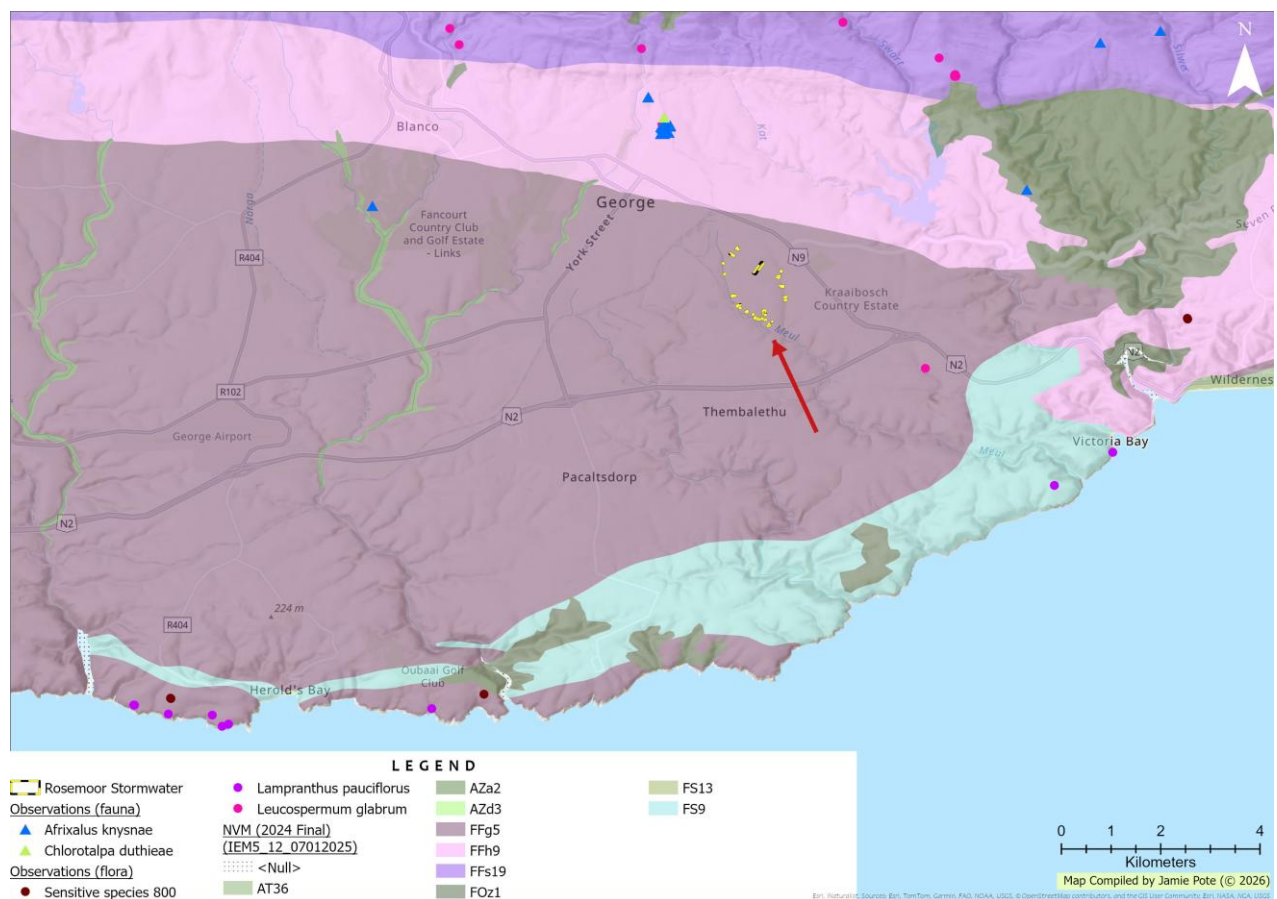


Figure 46: Distribution records of flora and fauna Species of Conservation Concern (GBIF, 26 July 2024) with known records in the vicinity of the site. NOTE some distribution records may have an offset for biosecurity purposes and/or accuracy errors but will non the less give an indication of general locality.

Table 5: Flora Species of Special Concern

| SCIENTIFIC NAME                | STATUS <sup>3</sup> | COMMENT/PRESENCE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|--------------------------------|---------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Diosma passerinoides</i>    | NEST (M), Vu        | Total population size estimated to be <5 000 mature individuals, based on records of 18 out of 25 subpopulations where species is indicated to be rare, uncommon, or only a few plants present, and with survey data of seven subpopulations indicating that the largest subpopulation consists of no more than 500 mature individuals. These populations are declining due to a number of different threats such as invasive alien plants, habitat degradation in the form of grazing and habitat loss due to protea cultivation. Not recorded on site and no known localities in close proximity that suggest high likelihood of a local occurrence.                                               |
| <i>Lampranthus pauciflorus</i> | NEST (M), En        | EOO 1270 km <sup>2</sup> , four known locations remain after most of this species' habitat has been transformed for coastal development. Habitat loss continues, especially around Plettenberg Bay, Mossel Bay and Knysna. Not recorded on site and no known localities in close proximity that suggest high likelihood of a local occurrence.                                                                                                                                                                                                                                                                                                                                                       |
| <i>Leucospermum glabrum</i>    | NEST (M), En        | Somewhat widespread distribution including a population in the northern areas of George. A restricted endemic with an extent of occurrence (EOO) ranging between 1620 and 1642 km <sup>2</sup> , and an area of occupancy (AOO) of between 152 and 156 km <sup>2</sup> . This species occurs as scattered small subpopulations with the total population not exceeding 2500 mature individuals, and each subpopulation having fewer than 250 plants. The mountains where this species occurs have been extensively surveyed. Road verges and significantly disturbed watercourses do not provide suitable habitat for this species. Not recorded on site, which is not typical of preferred habitat. |
| Sensitive species 1024         | NEST (M), En        | A range-restricted and very rare species known from four small, severely fragmented subpopulations. It has an extent of occurrence (EOO) of 971 km <sup>2</sup> . The population consists of 2 500 mature individuals, and the largest subpopulation has less than 200 plants. Not recorded on site and no known localities in close proximity that suggest high likelihood of a local occurrence.                                                                                                                                                                                                                                                                                                   |
| Sensitive species 1032         | NEST (M), Vu        | Somewhat widespread distribution including a population in the northern areas of George. Not recorded on site but found in surrounding area. Road verges and significantly disturbed watercourses do not provide suitable habitat for this species.                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Sensitive species 500          | NEST (M), En        | Somewhat widespread distribution. Not recorded on site and no known localities in close proximity that suggest high likelihood of a local occurrence.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Sensitive species 800          | NEST (M), Vu        | Formerly a very common species, now remaining mostly as small, isolated subpopulations on fragments of natural vegetation within its lowland distribution range. Not recorded on site and no known localities in close proximity that suggest high likelihood of a local occurrence.                                                                                                                                                                                                                                                                                                                                                                                                                 |

As per Table 5, no Endangered or Critically Endangered flora species were confirmed to be present nor are known to be present in the affected area. Most likely species that do occur in the broader surrounding area include *Leucospermum glabrum* & Sensitive species 1032, however none were observed on the site. The species *Diosma passerinoides*, *Lampranthus pauciflorus*, Sensitive species 1024, Sensitive species 500 & Sensitive species 800 have records in a much broader area and no records indicate a local presence.

Site observations also confirmed none being present, also confirmed to not be the typical habitat for several of the species, hence the footprint does not provide suitable habitat for these species.

<sup>3</sup> PNCO - Provincial Nature Conservation Ordinance (1974); NFA - National Forests Act of (1998); ToPS – Threatened or Protected Species; IUCN: CR - Critically Endangered, En - Endangered, Vu - Vulnerable; LC - Least Concern.



### Red Listed and Protected Fauna

As per Table 6, no Endangered or Critically fauna species were found to be present nor are known to be present in close proximity to the affected area or are likely to be directly affected by the proposed activity. The site falls within the general distribution range of a single faunal SCC as indicated in Table 6 below, however none are confirmed to be present. Since the project footprint is relatively small, is situated directly adjacent to urban and disturbed areas and also surrounded by extensive outlying areas of natural habitat, any disturbance or displacement associated with increased activity or habitat destruction as a direct result of the activity is unlikely to pose a significant negative impact faunal species and in particular the species of special concern.

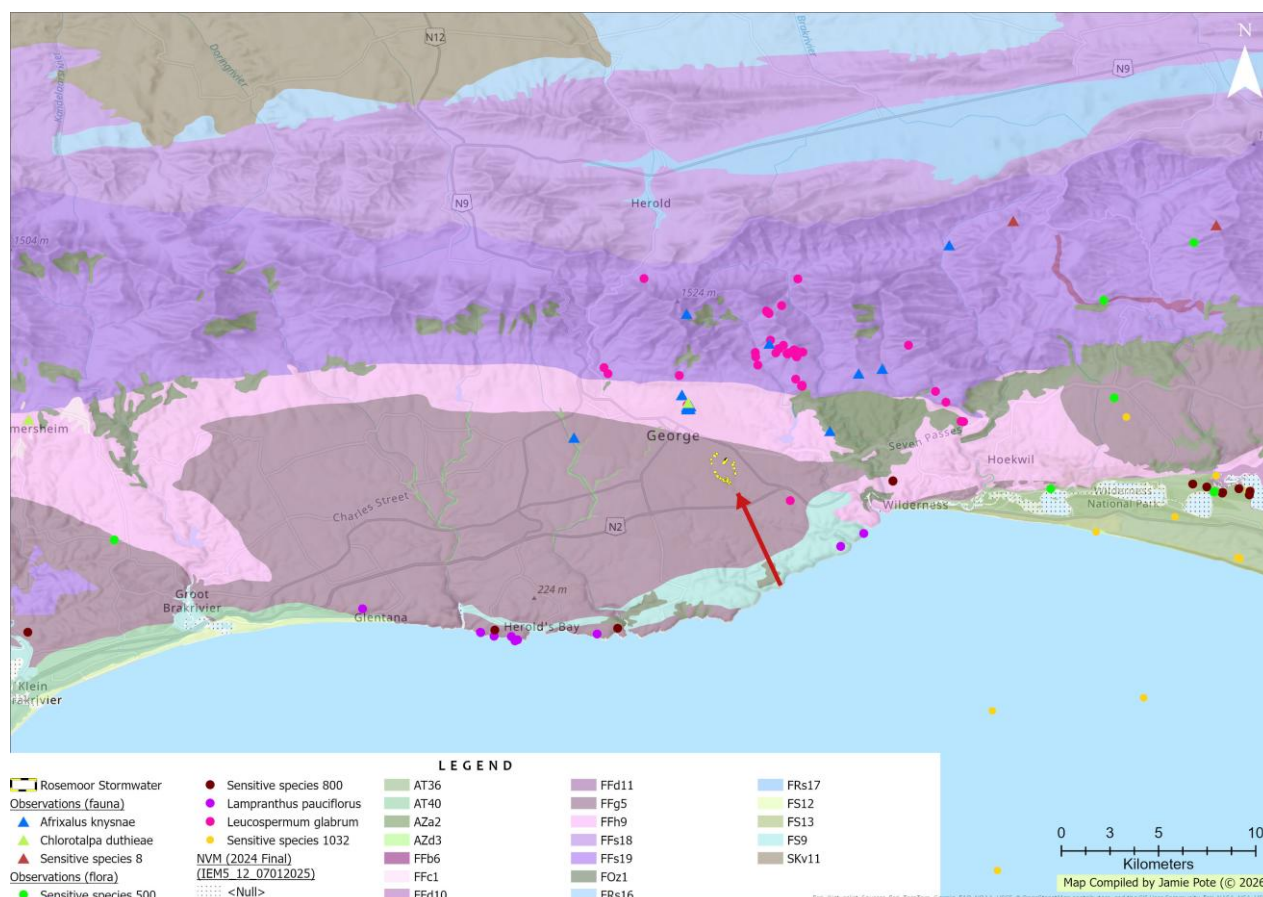


Figure 47: Distribution records of flora and fauna Species of Conservation Concern (GBIF, 26 July 2024) with known records from the broader area. NOTE some distribution records may have an offset for biosecurity purposes but will non the less give an indication of general locality (i.e. locality records in the sea).

Table 6: Fauna Species of Special Concern (SCC)

| SCIENTIFIC NAME             | COMMON NAME         | STATUS <sup>4</sup> | COMMENT/PRESENCE                                                                                                                                                                     |
|-----------------------------|---------------------|---------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Mammals</b>              |                     |                     |                                                                                                                                                                                      |
| <i>Chlorotalpa duthieae</i> | Duthies Golden Mole | NEST (M), Vu        | Known form the broader area, no evidence of any Golden Moles on site, which is primarily a landscaped garden and largely surrounded by compacted material.                           |
| Sensitive species 8         |                     | NEST (M), Vu        | Not recorded on site but records indicate a presence in the surrounding area. May be a transient visitor in developed areas, but not likely to be affected above baseline levels due |

<sup>4</sup> PNCO - Provincial Nature Conservation Ordinance (1974); ToPS – Threatened or Protected Species, IUCN: Cr - Critically - Endangered, En - Endangered, Vu - Vulnerable; LC - Least Concern.

| SCIENTIFIC NAME               | COMMON NAME                     | STATUS <sup>4</sup> | COMMENT/PRESENCE                                                                                                                                                                                                                                                                                                                |
|-------------------------------|---------------------------------|---------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                               |                                 |                     | to the proposed activity within a densely populated part of an urban area.                                                                                                                                                                                                                                                      |
| <b>Birds</b>                  |                                 |                     |                                                                                                                                                                                                                                                                                                                                 |
| <i>Bradypterus sylvaticus</i> | Knysna warbler                  | NEST (H)            | Unlikely to be affected above baseline levels by the proposed activity in an already transformed footprint.                                                                                                                                                                                                                     |
| <i>Circus ranivorus</i>       | African Marsh Harrier           | NEST (H)            |                                                                                                                                                                                                                                                                                                                                 |
| <b>Reptiles</b>               |                                 |                     |                                                                                                                                                                                                                                                                                                                                 |
| None                          |                                 |                     |                                                                                                                                                                                                                                                                                                                                 |
| <b>Amphibians</b>             |                                 |                     |                                                                                                                                                                                                                                                                                                                                 |
| <i>Afrixalus knysnae</i>      | <i>Knysna Spiny Reed Frog</i>   | NEST (M), En        | Unlikely to be present nor affected by the proposed temporary activity in a transformed footprint. While aquatic and other suitable habitat is in principle present, it is not deemed suitable due to the high levels of pollution in the watercourse and also the disturbed nature of the surrounding vegetation Not recorded. |
| <b>Invertebrates</b>          |                                 |                     |                                                                                                                                                                                                                                                                                                                                 |
| <i>Aneuryphymus montanus</i>  | Yellow-winged Agile Grasshopper | NEST (M), Vu        | No records from vicinity and not recorded on site. Unlikely to be present nor affected by the proposed temporary activity in a transformed landscape. Not recorded.                                                                                                                                                             |

Records indicate that the species *Chlorotalpa duthieae*, Sensitive species & *Afrixalus knysnae* have been recorded in the wider area, however none are likely to occur on the site. There is no evidence of any Golden Moles being present and while aquatic habitat is present, it is not deemed suitable due to the high levels of pollution in the watercourse and also the disturbed nature of the vegetation.

The birds *Bradypterus sylvaticus* & *Circus ranivorus*, as well as the insect *Aneuryphymus montanus*, while likely occurring in the surrounding area where natural vegetation is intact and more extensive, are unlikely to be affected by the proposed activity which will have a small and highly localised footprint. Improved stormwater management is also likely to improve overall aquatic health after construction.

Site observations also confirmed none being present, also confirmed to not be the typical habitat for several of the species, hence the footprint does not provide suitable habitat for these species.

No fauna PNCO permits are anticipated to be required but are recommended as a precaution as small species such as lizards, geckos and snakes may be present in the rocky landscaped areas.

### Alien Invasive Species

On 18 September 2020, the Minister of Environmental Affairs published the Alien and Invasive Species Regulations (“the Regulations”) which came into effect on the 18 October 2020 in a bid to curb the negative effects of IAPs. The Regulations call on landowners and sellers of land alike to assist the Department of Environmental Affairs to conserve our indigenous fauna and flora and to foster sustainable use of our land. Non-adherence to the Regulations by a landowner or a seller of land can result in a criminal offence punishable by a fine of up to R 5 million (R 10 million in case of a second offence) and/or a period of imprisonment of up to 10 years.

- Category 1a and 1b listed invasive species must be controlled and eradicated.
- Category 2 plants may only be grown if a permit is obtained, and the property owner ensures that the invasive species do not spread beyond his or her property.
- The growing of Category 3 species is subject to various exemptions and prohibitions.

Some invasive plants are categorised differently in different provinces. *For example:* the Spanish Broom plant is categorised as a category 1b (harmful) invasive plant in Eastern Cape and Western Cape, but it is a category 3 (less harmful) invasive plant in the other seven provinces.

Invasive alien plants have a significant negative impact on the environment by causing direct habitat destruction, increasing the risk and intensity of wildfires, and reducing surface and sub-surface water. Landowners are under legal obligation to control alien plants occurring on their properties. Alien Invasive Plants require removal according to the Conservation of Agricultural Resources Act 43 of 1983 (CARA) and the National Environmental Management: Biodiversity Act (10 of 2004; NEMBA): Alien and Invasive Species Lists (GN R598 and GN R599 of 2014). Alien control programs are long-term management projects and a clearing plan, which includes follow up actions for rehabilitation of the cleared area, is essential. This will save time, money, and significant effort. Collective management and planning with neighbours allow for more cost-effective clearing and maintenance considering aliens seeds as easily dispersed across boundaries by wind or water courses. All clearing actions should be monitored and documented to keep track of which areas are due for follow-up clearing. A general rule of thumb is to first target lightly infested areas before tackling densely invaded areas and prioritize sensitive areas such as riverbanks and wetlands. Alien grasses are among the worst invaders in lowland ecosystems adjacent to farms but are often the most difficult to detect and control.

Several exotic invasive and other weed species were noted within the site and surrounding area. Proliferation of weedy and exotic species often indicate disturbance especially during or after construction. A list of species is included in Table 7. During construction it is highly likely that species currently not on site could be introduced through the construction process. A weed management programme is recommended after construction to counter the weed proliferation that would be expected after construction.

Table 7: Alien (exotic) invasive and other weed species and status.

| SCIENTIFIC NAME                        | COMMON NAME                  | FAMILY         | STATUS <sup>5</sup>  | PRESENCE            |
|----------------------------------------|------------------------------|----------------|----------------------|---------------------|
| <i>Acacia mearnsii</i>                 | Black Wattle                 | Fabaceae       | CARA 1b              | Present, common     |
| <i>Acacia melanoxylon</i>              | Blackwood                    | Fabaceae       | CARA 2               | Present, common     |
| <i>Canna indica</i>                    | Indian shot                  | Cannaceae      | CARA 1b <sup>6</sup> | Present, common     |
| <i>Cenchrus clandestinus</i>           | Kikuyu grass                 | Poaceae        | CARA 1b              | Present, common     |
| <i>Cestrum (Pennisetum) laevigatum</i> | Inkberry                     | Solanaceae     | CARA 1b              | Present, dominant.  |
| <i>Cirsium vulgare</i>                 | Scotch thistle               | Asteraceae     | CARA 1b              | Present, common     |
| <i>Cortaderia selloana</i>             | Pampas grass                 | Poaceae        | CARA 1b              | Present, common     |
| <i>Iris pseudacorus</i>                | Yellow flag                  | Iridaceae      | CARA 1a              | Present, occasional |
| <i>Lantana camara</i>                  | Lantana                      | Verbenaceae    | CARA 1b              | Present, occasional |
| <i>Leptospermum scoparium</i>          | Australian myrtle (Tea tree) | Asteraceae     | CARA 1b              | Present, common     |
| <i>Melia azedarach</i>                 | Syringa                      | Meliaceae      | CARA 1b              | Present, common     |
| <i>Phragmites australis</i>            | Spanish Reed                 | Poaceae        | CARA 1b              | Present, common.    |
| <i>Phytolacca americana</i>            | Pokeweed                     | Phytolaccaceae | CARA 2               | Present, occasional |
| <i>Ricinus communis</i>                | Castor Oil Plant             | Euphorbiaceae  | CARA 2               | Present, common     |
| <i>Rubus cuneifolius</i>               | Bramble                      | Rosaceae       | CARA 1b              | Present, common     |
| <i>Sambucus nigra</i>                  | European elder               | Adoxaceae      | CARA 1b              | Present, common     |
| <i>Senna didymobotrya</i>              | Peanut butter Cassia         | Fabaceae       | CARA 1b              | Present, occasional |
| <i>Sesbania punicea</i>                | Sesbania                     | Fabaceae       | CARA 1b              | Present, occasional |
| <i>Solanum mauritianum</i>             | Bugweed                      | Solanaceae     | CARA 1b              | Present, common     |
| <i>Solanum sisymbriifolium</i>         | Wild tomato                  | Solanaceae     | CARA 1b              | Present, occasional |
| <i>Urtica urens</i>                    | Nettle                       | Urticaceae     | Weed                 | Present, occasional |
| <i>Verbena bonariensis</i>             | Wild verbena                 | Verbenaceae    | CARA 1b              | Present, occasional |
| <i>Vinca major</i>                     | Greater periwinkle           | Apocynaceae    | CARA 1b              | Present, occasional |

<sup>5</sup> CARA - Conservation of Agricultural Resources Act (1993); National List of Invasive Species in Terms Sections 70(1), 71(3) and 71A (2016); Weed – an exotic ruderal weed species, not indigenous but not a declared invasive species.

<sup>6</sup> 1b in protected areas and wetlands, not listed elsewhere.



### Eradication protocol

The act required the removal of these species, being the responsibility of the landowner/contractor. Several other common weed species are also present which should also be managed as part of post construction management,

Specific eradication and management procedures must be stipulated in the EMP as to the methods to be implemented to remove and control the various alien invasive species as they tend to require species specific techniques. A management plan should be incorporated into the EMP, and a detailed action plan compiled and implemented by the ECO.

### 3.1.4 Aquatic Habitat

Aquatic systems do not function in isolation and in terms of ecological processes, the aquatic systems are intricately linked to the terrestrial system. In this case the riverine and riparian community that drains the surrounding urban landscape forms an integral link between upstream and downstream communities and as a corridor for various faunal especially avifaunal species. Based on the flora species composition, this is largely an artificial ecological landscape, and while it may support an associated faunal assemblage, the proposed activity is unlikely to significantly alter the associated composition and processes above current baseline levels.

### 3.1.5 Terrestrial Vegetation Sensitivity Assessment

An overall vulnerability assessment of proposed activity, incorporating key vegetation and ecological indicators was undertaken and includes the following key criteria:

- relative levels of *intactness* in terms of overall loss of indigenous vegetation cover.
- presence, diversity, and abundance of *species of special concern* (weighted in favour of local endemic species).
- extent of *invasion* (severity and overall ecological impact), as well as the degree to which successful rehabilitation could take place.
- overall degradation incorporating above factors.
- relative importance of the vegetation communities relative to regional conservation status - indicated as vulnerability of the area because of loss.

#### Intactness

Three basic classes are differentiated as follows:

- **Low:** > 75 % of original vegetation has been removed or lost; and/or no species of special concern present that are critically endangered, endangered, or endemic with highly localised distribution.
- **Moderate:** 25 - 75 % of original vegetation has been removed/lost; and or presence of species of special concern but not having high conservation status or high levels of endemicity or highly localised distributions.
- **High:** < 25 % of original vegetation has been removed or lost; and or presence of species with a highly endemicity and or high conservation status (endangered or critically endangered).

Intactness for the site is **Very Low**.

#### Alien Invasion

Three classes are differentiated as follows:

- **Low:** no or few scattered individuals.

- **Moderate:** individual clumps of invasives present but cover less than 50% or original area.
- **High:** dense, impenetrable stands of invasives present, or cover > 50 % of area with substantial loss functioning. Rehabilitation will most likely require specialised techniques over an extended period (> 5 years).

Alien invasion for the site is **Very High**.

### Degradation

Overall Degradation is determined from the above alien invasion and intactness scores, according to the following matrix:

| INTACTNESS | INVASION            |                     |                          |
|------------|---------------------|---------------------|--------------------------|
|            | LOW                 | MODERATE            | HIGH                     |
| High       | Pristine            | Near Pristine       | Moderately Degraded      |
| Moderate   | Near Pristine       | Moderately Degraded | <b>Severely Degraded</b> |
| <b>Low</b> | Moderately Degraded | Severely Degraded   | <b>Transformed</b>       |

Degradation for the site is **Very High** (Transformed and/or Severely Degraded)

### Overall Sensitivity score

Overall vulnerability (or Sensitivity) of the vegetation within the site is calculated according to the following matrix which combines degradation and overall conservation status of the vegetation units of the site.

| DEGRADATION                                                       | CONSERVATION STATUS |                 |            |                        |
|-------------------------------------------------------------------|---------------------|-----------------|------------|------------------------|
|                                                                   | LEAST CONCERN       | VULNERABLE      | ENDANGERED | CRITICALLY ENDANGERED  |
| Severely degraded/ Transformed                                    | Very Low/Low        | Low             | Moderate   | Moderate - High        |
| Moderately degraded                                               | Low                 | Moderate        | High       | High                   |
| Ecologically Pristine or near Pristine (no such areas identified) | Moderate            | Moderate - High | High       | Very High (No-Go area) |

*Table 8: Summary of discharge point habitat.*

| STREET                     | DISCHARGE POINT            | COMMENT                                                                                                                                                                                                                  |
|----------------------------|----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Mission Rd/Miller St       | Mission Rd/Miller St       | Low sensitivity. Discharge point should terminate on edge of watercourse and measures implemented for erosion management. No issues.                                                                                     |
| Attakwa St                 | Attakwa St                 | Low sensitivity. Discharge point should terminate on edge of watercourse and measures implemented for erosion management. No issues.                                                                                     |
| Grens St                   | Grens St                   | Low sensitivity/Proposed stormwater will flow along an existing but significantly modified and eroded watercourse. Measures should be implemented to manage water flow and also recreate natural habitat where possible. |
| Allman St                  | Allmann/Widom St           | Low sensitivity. Discharge point should terminate on edge of watercourse and measures implemented for erosion management. No issues.                                                                                     |
| Pienaar St/Fotheringham St | Pienaar St/Fotheringham St | Low sensitivity. Discharge point should terminate on edge of watercourse and measures implemented for erosion management. No issues.                                                                                     |
| Truter St                  | Truter/Van Till St         | Low sensitivity. Discharge point should terminate on edge of watercourse and measures implemented for erosion management. No issues.                                                                                     |

| STREET                         | DISCHARGE POINT                | COMMENT                                                                                                                                                                                                                  |
|--------------------------------|--------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Van Till St/Aansluit St        | Van Till St                    | Low sensitivity. Within transformed/Secondary Vegetation.                                                                                                                                                                |
| Van Till St/Thwaite St         | Van Till St                    | Low sensitivity. Within transformed/Secondary Vegetation.                                                                                                                                                                |
| O'Connell ST/Mitchell Baker St | O'Connell ST/Mitchell Baker St | Low sensitivity/Proposed stormwater will flow along an existing but significantly modified and eroded watercourse. Measures should be implemented to manage water flow and also recreate natural habitat where possible. |
| Spandiel Cir (N)               | Spandiel Cir (N)               | Low sensitivity. Within transformed/Secondary Vegetation.                                                                                                                                                                |
| Spandiel Cir (S)               | Spandiel Cir (S)               | Low sensitivity. Within transformed/Secondary Vegetation.                                                                                                                                                                |
| Miller St/Mcgregor St          | Miller St                      | Low sensitivity. Within transformed/Secondary Vegetation.                                                                                                                                                                |
| Miller St                      | Miller St                      | Low sensitivity. Within transformed/Secondary Vegetation.                                                                                                                                                                |
| Miller St                      | Miller St                      | Low sensitivity. Within transformed/Secondary Vegetation.                                                                                                                                                                |
| Site Camp (Langmark St)        | Site Camp (Langmark St)        | Low sensitivity. Within transformed/Secondary Vegetation.                                                                                                                                                                |

### Habitat Sensitivity

- Almost the entire vegetated and transformed area (i.e. the roads) are designated a LOW sensitivity, where exotic and invasive species comprise most of the vegetation cover, the remainder being hardened surfaces (i.e. roads and sidewalks).
- MODERATE sensitivity portions are designated where Watercourses and riparian vegetation, although primarily exotic species) is present, due to underlying ecological importance of watercourses. However, as a caveat, it should be noted that the watercourses are significantly modified. Since the primary objective is to better manage stormwater discharge in tot e watercourses, the overall impact of the stormwater discharge features is not significantly negative within the broader context of the site and surrounds.
- No VERY HIGH sensitivity areas are identified but limited to the terrestrial environment and excludes aquatic processes, which is outside of the scope of this terrestrial assessment.

### 3.1.6 No-Go Areas

No-go areas are not identified within the site. Caution to be exercised in proximity to planted Cycads.

### 3.1.7 Potential Development Footprints

The remainder of the site outside of the identified no-go areas above is considered to be developable.





Figure 48: Vegetation Sensitivity of proposed site (Overview).



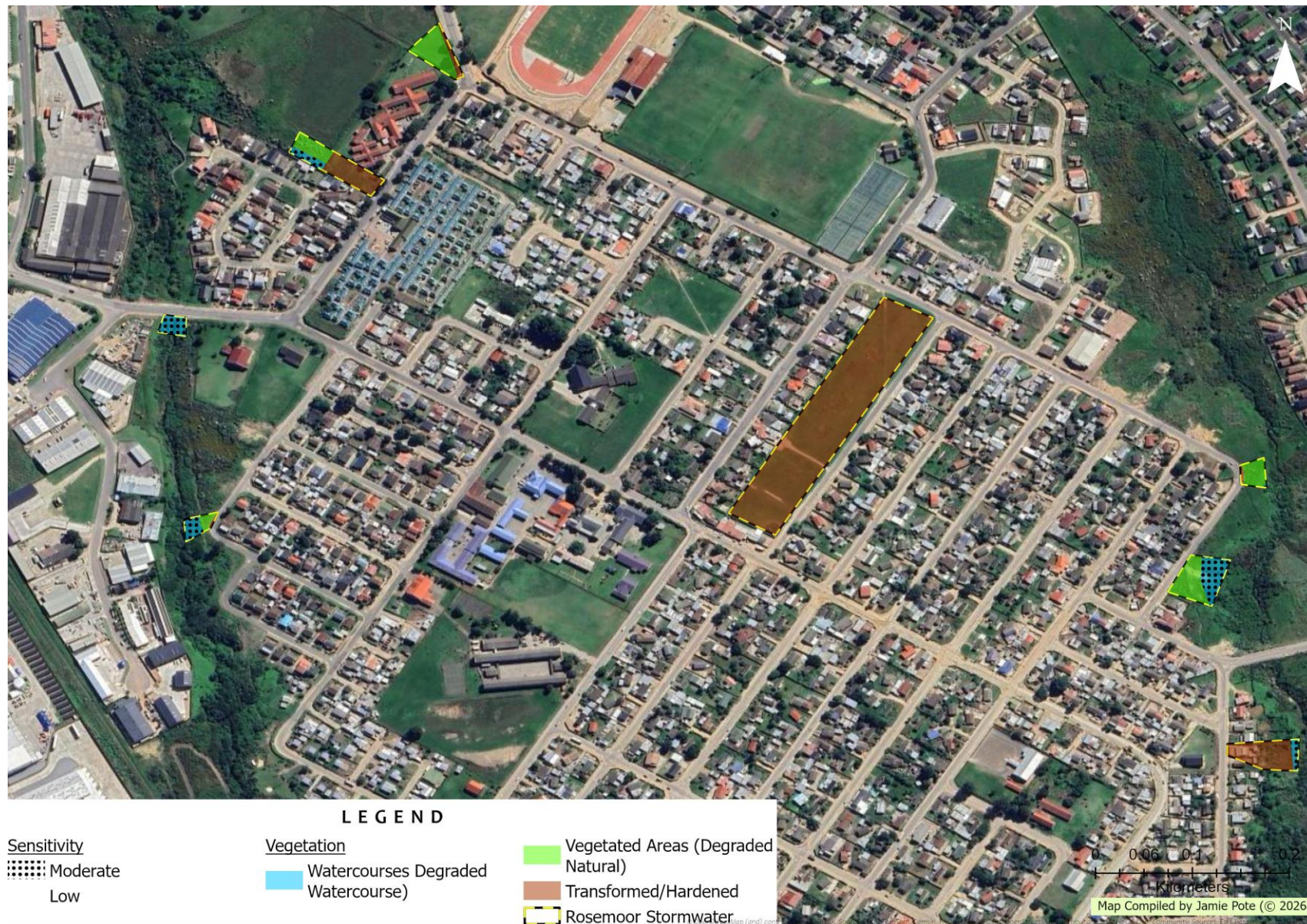


Figure 49: Vegetation Sensitivity of proposed site (North portion).





Figure 50: Vegetation Sensitivity of proposed site (South portion).



## 3.2 Risks and Potential Impacts to Biodiversity

### 3.2.1 Summary of actions, activities, or processes that require mitigation.

The main impacts associated with the unauthorised activity include the following and are described in Table 9:

1. Permanent or temporary loss of indigenous vegetation cover.
2. Loss of flora Species of Conservation Concern.
3. Susceptibility of post construction disturbed areas to invasion by exotic and alien invasive species.
4. Susceptibility of some areas to wind and water erosion associated with uncontrolled stormwater runoff.
5. Disturbances to ecological processes.
6. Aquatic and Riparian processes.
7. Loss of faunal Species of Conservation Concern.
8. Loss of Faunal Habitat and processes.

### 3.2.2 Potential Terrestrial Biodiversity Impacts (Indirect)

No significant indirect impacts are anticipated.

### 3.2.3 Potential Terrestrial Biodiversity Impacts (Direct)

Overall impacts to terrestrial biodiversity are likely to be nominal, with loss resulting from removal of small footprints within the vegetated areas. As indicated in Figure 48 to Figure 50, the proposed activity will require clearing of some vegetation along the watercourses in order to construct the stormwater discharge points.

Table 9: Potential Impacts to Terrestrial Biodiversity.

| IMPACT                     | Nature of Impact                                                                                                                                                                                                                                                                                                                                                                                          |
|----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Vegetation                 | <u>Permanent or temporary loss of indigenous vegetation</u> cover because of site clearing. Site clearing before construction will result in the blanket clearing of vegetation within the affected footprint.                                                                                                                                                                                            |
| Flora Species <sup>7</sup> | <u>Loss of flora Species of Conservation Concern</u> during pre-construction site clearing activities. Several special of concern are known from surrounding areas, which could be destroyed during site preparation, none of which were confirmed to be present.                                                                                                                                         |
| Alien Invasive Species     | <u>Susceptibility of post construction disturbed areas to invasion</u> by exotic and alien invasive species and removal of exotic and alien invasive species during construction. Post construction disturbed areas having no vegetation cover are often susceptible to invasion by weedy and alien species, which can not only become invasive but also prevent natural flora from becoming established. |
| Erosion                    | <u>Susceptibility of some areas to erosion</u> because of construction related disturbances. Removal of vegetation cover and soil disturbance may result in some areas being susceptible to soil erosion after completion of the activity.                                                                                                                                                                |
| Ecological Processes       | <u>Disturbances to ecological processes:</u> Activity may result in disturbances to ecological processes.                                                                                                                                                                                                                                                                                                 |

<sup>7</sup> Subject to findings of follow-up species survey.

| IMPACT                         | Nature of Impact                                                                                                                                                                                  |
|--------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Aquatic and Riparian processes | <u>Aquatic and Riparian processes</u> : None present/affected                                                                                                                                     |
| Faunal Species                 | <u>Loss of faunal SCC</u> due to construction activities: Activities associated with bush clearing, killing of perceived dangerous fauna, may lead to increased mortalities among faunal species. |
| Faunal Habitat                 | <u>Loss of Faunal Habitat</u> : Activity may result in the loss of habitat for faunal species, which could result in disturbance and displacement of faunal species.                              |
| Faunal Processes               | Impacts to <u>faunal processes</u> because of the activity                                                                                                                                        |

### 3.3 Assessment of Risks and Impacts to Biodiversity

#### 3.3.1 Criteria of assigning significance to potential impacts

The following methodology is to be applied in the specialist studies for the assessment of potential impacts.

| CRITERIA             | EXPLANATION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Nature of impact     | Review the type of effect that a proposed activity will have on the environment and should include “what will be affected and how?”                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Extent               | Indicate whether the impact will be: <ul style="list-style-type: none"> <li>• (S) <i>local</i> and limited to the immediate area of development (the site).</li> <li>• (L) <i>limited</i> to within 5 km of the development: or</li> <li>• (R) whether the impact may be realized regionally, nationally or even internationally.</li> </ul>                                                                                                                                                                                                                                 |
| Duration             | Review the lifetime of the impact, as being: <ul style="list-style-type: none"> <li>• (V) <i>very short term</i> (0 - 1 years),</li> <li>• (S) <i>short term</i> (1 - 5 years),</li> <li>• (M) <i>medium</i> (5 - 15 years),</li> <li>• (L) <i>long term</i> (&gt;15 years but where the impacts will cease after the operation of the site), or</li> <li>• (P) <i>permanent</i>.</li> </ul>                                                                                                                                                                                 |
| Intensity            | Establish whether the impact is destructive or innocuous and should be described as either: <ul style="list-style-type: none"> <li>• (L) <i>low</i> (where no environmental functions and processes are affected)</li> <li>• (M) <i>medium</i> (where the environment continues to function but in a modified manner) or</li> <li>• (H) <i>high</i> (where environmental functions and processes are altered such that they temporarily or permanently cease), including loss of critical endangered ecosystem and or critically endangered species (population).</li> </ul> |
| Probability          | Consider the likelihood of the impact occurring and should be described as: <ul style="list-style-type: none"> <li>• (I) <i>improbable</i> (low likelihood)</li> <li>• (P) <i>probable</i> (distinct possibility)</li> <li>• (H) <i>highly probable</i> (most likely) or</li> <li>• (D) <i>definite</i> (impact will occur regardless of prevention measures).</li> </ul>                                                                                                                                                                                                    |
| Status of the impact | Description as to whether the impact will be positive (a benefit), negative (a cost), or neutral.                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Degree of confidence | The degree of confidence in the predictions, based on the availability of information and specialist knowledge. This should be assessed as high, medium, or low.                                                                                                                                                                                                                                                                                                                                                                                                             |
| Significance         | <ul style="list-style-type: none"> <li>• (VL) <i>Very Low</i>: Considered to be negligible.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |

| CRITERIA | EXPLANATION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|          | <ul style="list-style-type: none"> <li>(L) Low: Where the impact will not have an influence on the decision or require to be significantly accommodated in the project design</li> <li>(M) Medium: Where it could have an influence on the environment which will require modification of the project design or alternative mitigation.</li> <li>(H) High: Where it could have a 'no-go' implication for the project unless mitigation or re-design is practically achievable.</li> <li>(VH) Very High: Confirmed No-Go area, no mitigation feasible, redesign and avoidance are required, where activity will have a significant permanent and irreversible impact on a critically endangered ecosystem or species population.</li> </ul> |

### 3.3.2 Significance Rating

| INTENSITY               |               | DURATION               |           |             |            |                 |
|-------------------------|---------------|------------------------|-----------|-------------|------------|-----------------|
|                         |               | PERMANENT              | LONG TERM | MEDIUM TERM | SHORT TERM | VERY SHORT TERM |
| <b>HIGH INTENSITY</b>   |               |                        |           |             |            |                 |
| <b>EXTENT</b>           | National      | Very High              | Very High | High        | High       | Medium          |
|                         | Regional      | Very High <sup>8</sup> | High      | High        | High       | Medium          |
|                         | Local         | High                   | High      | Medium      | Medium     | Medium          |
|                         | Site specific | Medium                 | Medium    | Medium      | Medium     | Medium          |
| <b>MEDIUM INTENSITY</b> |               |                        |           |             |            |                 |
| <b>EXTENT</b>           | National      | High                   | High      | High        | Medium     | Medium          |
|                         | Regional      | High                   | High      | High        | Medium     | Medium          |
|                         | Local         | Medium                 | Medium    | Medium      | Medium     | Medium          |
|                         | Site specific | Medium                 | Medium    | Medium      | Medium     | Low             |
| <b>LOW INTENSITY</b>    |               |                        |           |             |            |                 |
| <b>EXTENT</b>           | National      | Medium                 | Medium    | Medium      | Medium     | Medium          |
|                         | Regional      | Medium                 | Medium    | Medium      | Medium     | Low             |
|                         | Local         | Medium                 | Medium    | Medium      | Low        | Very Low        |
|                         | Site specific | Low                    | Low       | Low         | Very Low   | Very Low        |

### 3.3.3 Assessment of Terrestrial Biodiversity Impacts

Operations can result in a range of negative impacts on terrestrial, marine and other aquatic ecosystems if not effectively managed. Table 9 describes impacts that may potentially occur in the site (as per DEDEAT guidelines) as well indicating the relevant EMP section. The predicted significance of these during the construction phase are summarised in Table 10 and during the operational phase are summarised in Table 11.

Table 10 : Construction Phase Assessment (Refer to Sections 3.3.1 & 3.3.2 for methodology).

| Nature of impact       | Extent | Duration | Intensity | Probability | Status of the impact | Degree of confidence | Significance (before) | Significance (after) |
|------------------------|--------|----------|-----------|-------------|----------------------|----------------------|-----------------------|----------------------|
| Vegetation             | S      | S        | L         | D           | -ve                  | H                    | L                     | VL                   |
| Flora Species          | S      | S        | L         | P           | -ve                  | M                    | L                     | VL                   |
| Alien Invasive Species | S      | M        | L         | H           | -ve                  | H                    | L                     | VL                   |

<sup>8</sup> Considered a regional impact if activity will result in significant permanent and irreversible loss to a critically endangered species population or ecosystem (vegetation type)



| Nature of impact             | Extent | Duration | Intensity | Probability | Status of the impact | Degree of confidence | Significance (before) | Significance (after) |
|------------------------------|--------|----------|-----------|-------------|----------------------|----------------------|-----------------------|----------------------|
| Erosion                      | S      | M        | L         | P           | -ve                  | M                    | L                     | VL                   |
| Ecological Processes         | S      | S        | L         | P           | -ve                  | H                    | L                     | VL                   |
| Aquatic & Riparian Processes | S      | V        | L         | P           | -ve                  | M                    | M                     | L                    |
| Faunal Species               | S      | V        | L         | P           | -ve                  | M                    | L                     | VL                   |
| Faunal Habitat               | S      | V        | L         | D           | -ve                  | H                    | L                     | VL                   |
| Faunal Processes             | S      | V        | L         | P           | -ve                  | H                    | L                     | VL                   |

Table 11: Operational Phase Assessment (Refer to Sections 3.3.1 &amp; 3.3.2 for methodology).

| Nature of impact             | Extent | Duration | Intensity | Probability | Status of the impact | Degree of confidence | Significance (before) | Significance (after) |
|------------------------------|--------|----------|-----------|-------------|----------------------|----------------------|-----------------------|----------------------|
| Vegetation                   | S      | S        | L         | D           | -ve                  | H                    | L                     | VL                   |
| Flora Species                | S      | S        | L         | P           | -ve                  | M                    | L                     | VL                   |
| Alien Invasive Species       | S      | M        | L         | H           | -ve                  | H                    | L                     | VL                   |
| Erosion                      | S      | M        | L         | P           | -ve                  | M                    | L                     | VL                   |
| Ecological Processes         | S      | S        | L         | P           | -ve                  | H                    | L                     | VL                   |
| Aquatic & Riparian Processes | S      | V        | L         | P           | -ve                  | M                    | L                     | VL                   |
| Faunal Species               | S      | V        | L         | P           | -ve                  | M                    | L                     | VL                   |
| Faunal Habitat               | S      | V        | L         | D           | -ve                  | H                    | L                     | VL                   |
| Faunal Processes             | S      | V        | L         | P           | -ve                  | H                    | L                     | VL                   |

Impacts to Aquatic & Riparian Processes are expected to be medium before mitigation and Low after mitigation. All other impacts are assessed to be of low significance before mitigation and can be reduced to very low (or insignificant) with the implementation of the mitigation measures.

### 3.3.4 Potential Terrestrial Biodiversity Impacts (Cumulative)

No cumulative impacts are expected because of the development of the site providing recommendation and mitigation measures are adhered to, due to the limited disturbance area.

### 3.3.5 Terrestrial Biodiversity Impact Reversibility

In general, most impacts will have a high reversibility in the affected habitat, as well as transformed or degraded areas, except where hardening of surfaces or removal of topsoil may occur.

### 3.3.6 Impacts and Risks to Irreplaceable Biodiversity Resources

Risks to Irreplaceable Biodiversity Resources is low to very low.

### 3.3.7 Residual Risks and Uncertainties

No residual risks or uncertainties are anticipated.

## 3.4 Findings, Outcomes and Recommendations

### 3.4.1 Summary of Findings

- The vegetation on site is generally highly modified, degraded, transformed and/or comprising vegetation cover with little evidence of remnant natural vegetation (Garden Route Granite Fynbos).
- No Sensitive plant or Animal species identified as per the National Environmental Screening Tool were found to be present or likely to be present. The general vegetation cover along the remnant watercourses is primarily comprised of kikuyu grass (non-indigenous) and a wide range of invasive and weed herbaceous, shrub and tree species.
- Although areas are designated CBA 1, CBA 2 and ESA 2, these designations do not have remnant Garden Route Granite Fynbos vegetation. In terms of species composition. While the vegetated areas may provide habitat for faunal species, these are mostly species that are adapted to an urbanised environment.
- Almost the entire vegetated and transformed area (i.e. the roads) are designated a LOW sensitivity, where exotic and invasive species comprise most of the vegetation cover, the remainder being hardened surfaces (i.e. roads and sidewalks).
- MODERATE sensitivity portions are designated where Watercourses and riparian vegetation, although primarily exotic species) is present, due to underlying ecological importance of watercourses. However, as a caveat, it should be noted that the watercourses are significantly modified. Since the primary objective is to better manage stormwater discharge in tot e watercourses, the overall impact of the stormwater discharge features is not significantly negative within the broader context of the site and surrounds.
- No VERY HIGH sensitivity areas are identified but limited to the terrestrial environment and excludes aquatic processes, which is outside of the scope of this terrestrial assessment.
- No No-go areas are identified within the site footprint.
- No significant direct, indirect or cumulative impacts are anticipated.

### 3.4.2 Recommendations & Mitigation Measures

- The proposed activity is unlikely to pose any significant risk to natural ecological processes, vegetarian or plant and animal species of conservation concern due to the limited footprint and significantly degraded and/or transformed nature of the site(s).
- No PNCO protected species were recorded within any of the proposed Stormwater outlet footprints. PNCO (Provincial Nature Conservation Ordinance) permits are not likely to be required for any naturally occurring indigenous species.

Table 12 lists specific mitigation measures that must be implemented and adhered to. These must be considered to be conditions of authorisation.

Table 12: Specific Mitigation Measures and Recommendations

| IMPACT                 | MITIGATION MEASURES                                                                                                                                                                                                                       |
|------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Vegetation             | <ul style="list-style-type: none"> <li>• No clearing outside of development footprint to take place.</li> <li>• Areas surrounding the footprints should be revegetated on completion of construction.</li> </ul>                          |
| Flora Species          | <ul style="list-style-type: none"> <li>• A flora search and rescue is <u>unlikely</u> to be required and no protected flora were found to be present within a natural context.</li> </ul>                                                 |
| Alien Invasive Species | <ul style="list-style-type: none"> <li>• A suitable weed management strategy to be implemented in and around the site post construction, which is likely to result in proliferation of weeds in disturbed areas on completion.</li> </ul> |

| IMPACT                         | MITIGATION MEASURES                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|--------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Erosion                        | <ul style="list-style-type: none"> <li>Suitable measures must be implemented at all discharge points to protected against erosion.</li> <li>Areas must be rehabilitated, and a suitable indigenous grass seed mix planted where natural vegetation re-establishment does not occur.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Aquatic and Riparian processes | <ul style="list-style-type: none"> <li>Adequate measures to be implemented for erosion and stormwater management and/or dispersion at stormwater discharge points.</li> <li>Where possible, design of discharge points should accommodate measures to trap and reduce discharge of solid waste into watercourses (paper, plastic, etc), that would allow for easier ongoing cleanup.</li> </ul>                                                                                                                                                                                                                                                                                                                                 |
| Faunal Processes               | <ul style="list-style-type: none"> <li>The habitats and microhabitats present on the project site are not unique and are widespread in the general area, hence the local impact associated with the footprint above current baseline levels would be of low significance if mitigation measures are adhered to.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                      |
| Faunal Species                 | <ul style="list-style-type: none"> <li>Small mammals within the habitat on and around the affected area are generally mobile and likely to be transient to the area. Specific measures are made to reduce this risk. The risk of species of special concern is low, and it is unlikely that there will be any impact to populations of such species because of the activity.</li> <li>A faunal search and rescue is <u>unlikely</u> to be required and no protected species are likely to be affected but is recommended as a precautionary measure.</li> <li>No animals are to be harmed, trapped or killed during the course of operations other than where rescue is required and only undertaken by an expert. .</li> </ul> |

### 3.5 Site Preparation and Vegetation Clearing Plan

No flora relocation is likely to be required before commencement, and flora permits are unlikely to be required.

No fauna relocation is likely to be required before commencement, and permits were unlikely to be required for any species of conservation concern, but recommended as a precautionary measure for any small rodents and reptiles may occur, and since fauna are mobile, they may be transient to the area.

### 3.6 Open Space Management/Conservation Plan

None are applicable for this project.

### 3.7 Maintenance Management Plan

Ongoing maintenance is likely to be required in the long-term, which could include ongoing repairs to stormwater discharge points. All measures of this report, including the EMPr should be adhered for any maintenance requirements. Any excavated areas must be stabilised and rehabilitated as per the measures indicated in this report.

## 4 Organizational Capacity and Competency

Successful Implementation will be in part be dependent on the organisational capacity and competency of the applicant and any implementing agents. The following aspects are likely to pose risk to the successful mitigation of the project:



- Budget constraints – budget allocated for environmental management tends to be inadequate for construction projects.
- Organisational Structure – implementing agents may or may not have adequate capacity and competency to ensure appropriate and adequate environmental management.

## 5 Emergency Preparedness and Response

Emergency Preparedness Plan must be included in the EMPr and should address specific measures relating to the following emergency risks:

- Fire management and response.
- Spill management and incident response.
- Waste management and incident response.
- Response to emergency site shutdown, including labour and protest actions.

## 6 Stakeholder Engagement

Possible Stakeholders relating to Biodiversity could include the following key groups:

- Neighbouring Property Owners
- Local Regional and National Conservation Authorities

No Stakeholder Engagement was conducted specifically by the Specialist. Stakeholder Engagement will be undertaken by the EAP as part of the environment application public participatory process. Any comments raised relating to Biodiversity will be addressed by the specialist in the final report.

## 7 Monitoring and Review

Key monitoring activities should include the following:

1. Pre-construction
  - a) Ensure flora permits are in place timeously (PNCO only) – allow at least 1 or 2 months before commencement.
  - b) Environmental Awareness and training (EAT) – Ensure all labour are informed and plant operators are aware of risks, issues, do's and don'ts and no-go areas.
2. Bush clearing
  - a) Ensure working plant has no oil or hydraulic leaks
  - b) Check delineated footprints area not exceeded.
3. Construction
  - a) Regular checks on trenches for trapped animals and possible drowning risks
  - b) Regular checks of fences for snares
4. Rehabilitation
  - a) Check quality of topsoil and weed free.
  - b) Check for weed regrowth and manage timeously (before seed is set)
5. Operation monitoring
  - a) Weed management on ongoing basis.
  - b) Erosion to be addressed on ongoing basis

## 8 Appendices

### 8.1 Appendix A: References

General Reference Sources

- Acocks, J. P. H. 1988. *Veld Types of South Africa*. Memoirs of the Botanical Survey of South Africa, No 57. Botanical Research Institute, Department of Agriculture and Water Supply, South Africa.
- Atlas and Red List of the Reptiles of South Africa, Lesotho and Swaziland. 2014. Edited by Michael F. Bates, William R. Branch, Aaron M. Bauer, Marius Burger, Johan Marais, Graham J. Alexander & Marienne S. de Villiers. SANBI, Pretoria.
- Bates, M.F., Branch, W.R., Bauer, A.M., Burger, M., Marais, J., Alexander, G.J. & Marienne S. de Villiers. (Eds). 2014. *Atlas and Red List of the Reptiles of South Africa, Lesotho and Swaziland*. SANBI, Pretoria.
- Bromilow, C. 2001. *Problem Plants of South Africa*. A Guide to the Identification and Control of More than 300 Invasive Plants and Other Weeds. Briza Publications. Pp 258
- Child M.F., Roxburgh L., Do Linh San E., Raimondo D., Davies-Mostert H.T. 2016. *The Red List of Mammals of South Africa, Swaziland and Lesotho*. South African National Biodiversity Institute and Endangered Wildlife Trust, South Africa.
- Council for Scientific and Industrial Research. NFEPA river FEPAs 2011 [vector geospatial dataset] 2011. Available from the Biodiversity GIS website, downloaded on 20 July 2020.
- Council for Scientific and Industrial Research. NFEPA rivers 2011 [vector geospatial dataset] 2011. Available from the Biodiversity GIS website, downloaded on 20 July 2020.
- Council for Scientific and Industrial Research. NFEPA wetland clusters 2011 [vector geospatial dataset] 2011. Available from the Biodiversity GIS website, downloaded on 20 July 2020.
- Council for Scientific and Industrial Research. NFEPA wetlands vegetation 2011 [vector geospatial dataset] 2011. Available from the Biodiversity GIS website, downloaded on 20 July 2020.
- Cowling, R.M., Richardson, D.M. & Pierce, S.M. 1997. *Vegetation of Southern Africa*. Cambridge University Press.
- Esler, K.J., Milton, S.J. & Dean, W.R.J. 2006. *Karoo Veld: Ecology and Management*. Briza Publications.
- Fitzpatrick Institute of African Ornithology (2024). MammalMAP Virtual Museum. Accessed at <http://vmus.adu.org.za/?vm=MammalMAP> on 2024-01-27.
- Fitzpatrick Institute of African Ornithology (2024). OrchidMAP Virtual Museum. Accessed at <http://vmus.adu.org.za/?vm=OrchidMAP> on 2024-01-27.
- Fitzpatrick Institute of African Ornithology (2024). PHOWN Virtual Museum. Accessed at <http://vmus.adu.org.za/?vm=PHOWN> on 2024-01-27.
- FitzPatrick Institute of African Ornithology (2024). ScorpionMAP Virtual Museum. Accessed at <http://vmus.adu.org.za/?vm=ScorpionMAP> on 2024-01-27.
- Fitzpatrick Institute of African Ornithology (2024). SpiderMAP Virtual Museum. Accessed at <http://vmus.adu.org.za/?vm=SpiderMAP> on 2024-01-27.
- Fuggle, R. F. & Rabie, M. A. 2003. *Environmental Management in South Africa*. Juta & Co, Johannesburg.
- Germishuizen, G. & Meyer, N.L. (eds). 2003. *Plants of southern Africa: An annotated checklist*. Strelitzia, 14. Pretoria: National Botanical Institute.
- Golding, J. (Ed.) 2002. *Southern African Plant Red Data Lists*. Southern African Botanical Diversity Network Report No 14.
- Henderson, L. 2001. *Alien Weeds and Invasive Plants*. Plant Protection Research Institute Handbook No 12. Agricultural Research Council. Pp 300.
- Hilton-Taylor, C. 1996. *Red Data List of Southern African Plants*. National Botanical Institute.
- Hockey PAR, Dean WRJ and Ryan PG 2005. Roberts - Birds of southern Africa, VIIth ed. The Trustees of the John Voelcker Bird Book Fund, Cape Town.
- International Finance Corporation. 2012. *Performance Standards on Environmental and Social Sustainability*.
- Low, A.B. & Rebelo, A.G. 1998. *Vegetation of South Africa, Lesotho and Swaziland*. Pretoria: Department of Environmental Affairs and Tourism.

- Marnewick MD, Retief EF, Theron NT, Wright DR, Anderson TA. 2015. *Important Bird and Biodiversity Areas of South Africa*. Johannesburg: BirdLife South Africa.
- Mecenero, S., Ball, J.B., Edge, D.A., Hamer, M.L., Hening, G.A., Krüger, M., Pringle, R.L., Terblanche, R.F. & Williams, M.C. (Eds). 2013. *Conservation assessment of butterflies of South Africa, Lesotho and Swaziland: Red List and atlas*. Saftronics (Pty) Ltd., Johannesburg and Animal Demography Unit, Cape Town.
- Minter LR, Burger M, Harrison JA, Braack HH, Bishop PJ & Kloepfer D (Eds). 2004. *Atlas and Red Data book of the frogs of South Africa, Lesotho and Swaziland*. SI/MAB Series no. 9. Smithsonian Institution, Washington, D.C.
- Minter LR, Burger M, Harrison JA, Braack HH, Bishop PJ & Kloepfer D (eds). 2004. *Atlas and Red Data book of the frogs of South Africa, Lesotho and Swaziland*. SI/MAB Series no. 9. Smithsonian Institution, Washington, D.C.
- Mucina, L. & Rutherford, M.C. (Eds). 2006. *The vegetation of South Africa, Lesotho and Swaziland*, in Strelitzia 19. South African National Biodiversity Institute, Pretoria.
- Myers, N., Mittermeir, R.A., Mittermeir, C.G., De Fonseca, G.A.B. & Kent, J. 2000. *Biodiversity hotspots for conservation priorities*. Nature, 403: 853–858.
- Nel, J., Colvin, C., Le Maitre, D., Smith, J., Haines, I. 2013. *Defining South Africa's Water Source Areas*. WWF South Africa & Council for Scientific & Industrial Research (CSIR).
- Nel, J.L., Murray, K.M., Maherry, A.M., Petersen, C.P., Roux, D.J., Driver, A., Hill, L., van Deventer, H., Funke, N., Swart, E.R., Smith-Ado, L.B., Mbona, N., Downsborough, L. & Nienaber, S. 2011. *Technical Report for the National Freshwater Ecosystem Priority Areas project*. Report to the Water Research Commission, WRC Report No. 1801/2/11. ISBN 978-1-4312-0149-5.
- Pienaar, K. 2000. *The South African What Flower is That?* Struik Publishers (Pty) Ltd. Cape Town.
- Powrie, L.W. 2013. A database of biodiversity taxon names in South Africa for copy-and-paste into reports or documents. South African National Biodiversity Institute, Cape Town. Obtained from SANBI on 20 July 2020.
- Powrie, L.W. 2013. A list of South African biodiversity terms and common names for spell checking. South African National Biodiversity Institute, Cape Town. Downloaded from [www.sanbi.org](http://www.sanbi.org) on 20 July 2020.
- Powrie, L.W. 2013. A list of South African botanical names for spell checking. South African National Biodiversity Institute, Cape Town. Downloaded from [www.sanbi.org](http://www.sanbi.org) 18 July 2020.
- Powrie, L.W. 2013. A list of South African physical feature names for spell checking. South African National Biodiversity Institute, Cape Town. Downloaded from [www.sanbi.org](http://www.sanbi.org) on 20 July 2020.
- Powrie, L.W. 2013. A list of South African zoological and other (including fungi and lichen) names for spell checking. South African National Biodiversity Institute, Cape Town. Downloaded from [www.sanbi.org](http://www.sanbi.org) on 20 July 2020.
- Rouget, M., Reyers, B., Jonas, Z., Desmet, P., Driver, A., Maze, K., Egoh, B. & Cowling, R.M. 2004. *South African National Spatial Biodiversity Assessment 2004: Technical Report. Volume 1: Terrestrial Component*. Pretoria: South African National Biodiversity Institute.
- Skowno, A.L., Raimondo, D.C., Poole, C.J., Fizzotti, B. & Slingsby, J.A. (Eds.). 2019. *South African National Biodiversity Assessment 2018 Technical Report Volume 1: Terrestrial Realm*. South African National Biodiversity Institute, Pretoria. <http://hdl.handle.net/20>.
- South African National Biodiversity Institute (SANBI). 2019. *National Biodiversity Assessment 2018: The status of South Africa's ecosystems and biodiversity. Synthesis Report*. South African National Biodiversity Institute, an entity of the Department of Environment, Forestry and Fisheries, Pretoria. pp. 1–214.
- Stirton, C. H. 1987. *Plant Invaders: Beautiful, but Dangerous*. The Department of Nature and Environmental Conservation of the Cape Province Administration. Galvin and Sales, Cape Town.
- Taylor, M.R., Peacock, F., and Wanless, R.M. 2015. *Eskom Red Data Book of Birds of South Africa, Lesotho and Swaziland*.
- Taylor, P.B., Navarro, R.A., Wren-Sargent, M., Harrison, J.A. & Kieswetter, S.L. 1999. *Coordinated waterbird Counts in South Africa, 1992-1997*. Avian Demography Unit, Cape Town.



- UN Natural Value Initiative. 2009. *The Ecosystem Services Benchmark*, 2009.
- Van Wyk, A.E. & Smith, G.F. 2001. *Regions of Floristic Endemism: A Review with Emphasis on Succulents*, Umdaus Press.
- Weather Bureau. 1988. *Climate of South Africa – Climate statistics up to 1984 (WB40)*. Government Printer, Pretoria.
- Young, D.J., Harrison, J.A, Navarro, R.A., Anderson, M.A., & Colahan, B.D. (Eds). 2003. *Big birds on farms: Mazda CAR Report 1993-2001*. Avian Demography Unit: Cape Town.

#### Web Databases

- Animal Demographic Unit: <http://vmus.adu.org.za>
- Conservation International: <http://www.biodiversityhotspots.org>
- Global Biodiversity Information Facility (GBIF): <http://gbif.org>
- International Union for Conservation of Nature (IUCN) Redlist: <http://iucnredlist.org>
- Millennium Ecosystem Assessment (MEA). 2005: <https://www.millenniumassessment.org>
- Plants of Southern Africa: <http://newposa.sanbi.org>
- South African National Biodiversity Institute (SANBI) Redlist: <http://redlist.sanbi.org>
- South African Bird Atlas Project: <http://sabap2.birdmap.africa>
- United Nations Environment Programme (UNEP), *A to Z Areas of Biodiversity Importance*: <http://www.biodiversitya-z.org>
- United Nations Environment Programme (UNEP), *World Database on Protected Areas, Protected Planet*: <http://www.protectedplanet.net>
- World Resources Institute (WRI): <https://www.wri.org>

## 8.2 Appendix B: Abbreviations & Glossary

### 8.2.1 Abbreviations

|        |                                                                                                                                                                                                                                                                                                                                               |
|--------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CARA   | Conservation of Agricultural Resources Act, Act 43 of 1983                                                                                                                                                                                                                                                                                    |
| CBA    | Critical Biodiversity Area                                                                                                                                                                                                                                                                                                                    |
| DEA    | Department of Environmental Affairs ( <i>now DFFE, see below</i> )                                                                                                                                                                                                                                                                            |
| DEDEAT | Department of Economic Development, Environmental Affairs and Tourism<br>The Department of Environmental Affairs was renamed the <u>Department of Forestry, Fisheries &amp; the Environment</u> (DFFE) in April 2021, incorporating the forestry and fisheries functions from the previous Department of Agriculture, Forestry and Fisheries. |
| DFFE   |                                                                                                                                                                                                                                                                                                                                               |
| DEMC   | Desired Ecological Management Class                                                                                                                                                                                                                                                                                                           |
| DWS    | Department of Water Affairs and Sanitation                                                                                                                                                                                                                                                                                                    |
| DWAF   | Department of Water Affairs and Forestry (former department name)                                                                                                                                                                                                                                                                             |
| EA     | Environmental Authorisation                                                                                                                                                                                                                                                                                                                   |
| ECO    | Environmental Control Officer                                                                                                                                                                                                                                                                                                                 |
| EIA    | Environmental Impact Assessment                                                                                                                                                                                                                                                                                                               |
| EIR    | Environmental Impact Report                                                                                                                                                                                                                                                                                                                   |
| EMC    | Ecological Management Class                                                                                                                                                                                                                                                                                                                   |
| EMP    | Environmental Management Plan                                                                                                                                                                                                                                                                                                                 |
| EMPr   | Environmental Management Programme report                                                                                                                                                                                                                                                                                                     |
| ER     | Environmental Representative                                                                                                                                                                                                                                                                                                                  |
| ESS    | Ecosystem Services                                                                                                                                                                                                                                                                                                                            |
| IAP's  | Interested and Affected Parties                                                                                                                                                                                                                                                                                                               |
| IEM    | Integrated Environmental Management                                                                                                                                                                                                                                                                                                           |
| LM     | Local Municipality                                                                                                                                                                                                                                                                                                                            |
| masl   | meters above sea level                                                                                                                                                                                                                                                                                                                        |
| NBA    | National Biodiversity Assessment                                                                                                                                                                                                                                                                                                              |
| NEMA   | National Environmental Management Act, Act 107 of 1998                                                                                                                                                                                                                                                                                        |
| NFA    | National Forests Act                                                                                                                                                                                                                                                                                                                          |
| NEM:BA | National Environmental Management: Biodiversity Act 10 of 2004                                                                                                                                                                                                                                                                                |
| NFA    | National Forest Act, Act 84 of 1998                                                                                                                                                                                                                                                                                                           |
| PEMC   | Present Ecological Management Class                                                                                                                                                                                                                                                                                                           |
| PES    | Present Ecological State                                                                                                                                                                                                                                                                                                                      |
| PNCO   | Provincial Nature and Environment Conservation Ordinance (No. 19 of 1974).                                                                                                                                                                                                                                                                    |
| RDL    | Red Data List                                                                                                                                                                                                                                                                                                                                 |
| RHS    | Right Hand Side                                                                                                                                                                                                                                                                                                                               |
| RoD    | Record of Decision                                                                                                                                                                                                                                                                                                                            |
| SANBI  | South African National Biodiversity Institute                                                                                                                                                                                                                                                                                                 |
| SDF    | Spatial Development Framework                                                                                                                                                                                                                                                                                                                 |
| SoER   | State of the Environment Report                                                                                                                                                                                                                                                                                                               |
| SSC    | Species of Special Concern                                                                                                                                                                                                                                                                                                                    |
| ToPS   | Threatened or Protected Species                                                                                                                                                                                                                                                                                                               |
| ToR    | Terms of Reference                                                                                                                                                                                                                                                                                                                            |
| +ve    | Positive                                                                                                                                                                                                                                                                                                                                      |
| -ve    | Negative                                                                                                                                                                                                                                                                                                                                      |

## 8.2.2 Glossary

|                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Alien Invasive Species (AIS) | An alien species whose introduction and/or spread threaten biological diversity ( <a href="#">Convention on Biological Diversity</a> ). Note: “Alien invasive species” is considered to be equivalent to “invasive alien species”. An alien species which becomes established in natural or semi-natural ecosystems or habitat, is an agent of change, and threatens native biological diversity ( <a href="#">IUCN</a> ).                                                                                                               |
| Best Environmental Practice  | The application of the most appropriate combination of environmental control measures and strategies ( <a href="#">Stockholm Convention</a> ).                                                                                                                                                                                                                                                                                                                                                                                           |
| Best Management Practice     | Established techniques or methodologies that, through experience and research, have proven to lead to a desired result ( <a href="#">BBOP</a> ).                                                                                                                                                                                                                                                                                                                                                                                         |
| Biodiversity                 | Biological diversity means the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are a part; this includes diversity within species, between species and of ecosystems.                                                                                                                                                                                                                                             |
| Biodiversity Offset          | Measurable conservation outcomes resulting from actions designed to compensate for significant residual adverse biodiversity impacts arising from project development after appropriate prevention and mitigation measures have been taken. The goal of biodiversity offsets is to achieve no net loss and preferably a net gain of biodiversity on the ground with respect to species composition, habitat structure and ecosystem function and people’s use and cultural values associated with biodiversity ( <a href="#">BBOP</a> ). |
| Bioremediation               | The use of organisms such as plants or microorganisms to aid in removing hazardous substances from an area. Any process that uses microorganisms, fungi, green plants, or their enzymes to return the natural environment altered by contaminants to its original condition.                                                                                                                                                                                                                                                             |
| Boundary                     | Landscape patches have a boundary between them which can be defined or fuzzy ( <a href="#">Sanderson and Harris, 2000</a> ). The zone composed of the edges of adjacent ecosystems is the boundary.                                                                                                                                                                                                                                                                                                                                      |
| Catchment                    | In relation to a watercourse or watercourses or part of a watercourse, means the area from which any rainfall will drain into the watercourse or watercourses or part of a watercourse, through surface flow to a common point or common points.                                                                                                                                                                                                                                                                                         |
| Connectivity                 | The measure of how connected or spatially continuous a corridor, network, or matrix is. For example, a forested landscape (the matrix) with fewer gaps in forest cover (open patches) will have higher connectivity.                                                                                                                                                                                                                                                                                                                     |
| Corridors                    | Have important functions as strips of a landscape differing from adjacent land on both sides. Habitat, ecosystems or undeveloped areas that physically connect habitat patches. Smaller, intervening patches of surviving habitat can also serve as “steppingstones” that link fragmented ecosystems by ensuring that certain ecological processes are maintained within and between groups of habitat fragments.                                                                                                                        |
| Critically Endangered (CR)   | A category on the IUCN Red List of Threatened Species which indicates a taxon is considered to be facing an <b>extremely high risk of extinction in the wild</b> ( <a href="#">IUCN</a> ).                                                                                                                                                                                                                                                                                                                                               |
| Cultural Ecosystem Services  | The non-material benefits people obtain from ecosystems through spiritual enrichment, cognitive development, reflection, recreation, and aesthetic experience, including, e.g. knowledge systems, social relations, and aesthetic values ( <a href="#">Millennium Ecosystem Assessment</a> ).                                                                                                                                                                                                                                            |
| Cumulative Impacts           | The total impact arising from the project (under the control of the developer), other activities (that may be under the control of others, including other developers, local communities, government) and other background pressures                                                                                                                                                                                                                                                                                                     |



|                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                       | and trends which may be unregulated. The project's impact is therefore one part of the total cumulative impact on the environment. The analysis of a project's incremental impacts combined with the effects of other projects can often give a more accurate understanding of the likely results of the project's presence than just considering its impacts in isolation ( <a href="#">BBOP</a> ).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Data Deficient (DD)   | A taxon is Data Deficient when there is inadequate information to make a direct, or indirect, assessment of its risk of extinction based on its distribution and/or population status. A taxon in this category may be well studied, and its biology well known, but appropriate data on abundance and/or distribution are lacking. Data Deficient is therefore not a category of threat( <a href="#">IUCN</a> ).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Degraded Habitat/Land | Land that has been impacted upon by human activities (including introduction of invasive alien plants, light to moderate overgrazing, accelerated soil erosion, dumping of waste), but still retains a degree of its original structure and species composition (although some species loss would have occurred) and where ecological processes still occur (albeit in an altered way). Degraded land is capable of being restored to a near-natural state with appropriate ecological management.                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Disturbance           | An event that significantly alters the pattern of variation in the structure or function of a system, while fragmentation is the breaking up of a habitat, ecosystem, or land-use type into smaller parcels. Disturbance is generally considered a natural process.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Ecological Function   | How each of the elements in the landscape interacts based on its life cycle events [Producers, Consumers, Decomposers Transformers]. Includes the capacity of natural processes and components to provide goods and services that satisfy human needs, either directly or indirectly.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Ecological Pattern    | The contents and internal order of the landscape, or its spatial (and temporal) components. May be homogenous or heterogenous. Result from the ecological processes that produce them.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Ecological Process    | Includes <i>Physical processes</i> [Climate (precipitation, insolation), hydrology, geomorphology]; <i>Biological processes</i> [Photosynthesis, respiration, reproduction]; <i>Ecological processes</i> [Competition, predator-prey interactions, environmental gradients, life histories]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Ecological Processes  | Ecological processes typically only function well where natural vegetation remains, and where the remaining vegetation is well-connected with other nearby patches of natural vegetation. Loss and fragmentation of natural habitat severely threatens the integrity of ecological processes. Where basic processes are intact, ecosystems are likely to recover more easily from disturbances or inappropriate actions if the actions themselves are not permanent. Conversely, the more interference there has been with basic processes, the greater the severity (and longevity) of effects. Natural processes are complex and interdependent, and it is not possible to predict all the consequences of loss of biodiversity or ecosystem integrity. When a region's natural or historic level of diversity and integrity is maintained, higher levels of system productivity are supported in the long run and the overall effects of disturbances may be dampened. |
| Ecological Structure  | The composition, or configuration, and the proportion of different patches across the landscape. Relates to species diversity, the greater the diversity, the more complex the structure. A description of the organisms and physical features of environment including nutrients and climatic conditions.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Ecosystem             | All the organisms of a habitat, such as a lake or forest, together with the physical environment in which they live. A dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Ecosystem Services | A dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit. Supporting Ecosystem services are those that are necessary for the maintenance of all other ecosystem services. Some examples include biomass production, production of atmospheric oxygen, soil formation and retention, nutrient cycling, water cycling, and provisioning of habitat.                                                                                                                                                                                                                                                                                                                                                |
| Ecosystem Status   | Ecosystem status of terrestrial ecosystems is based on the degree of habitat loss that has occurred in each ecosystem, relative to two thresholds: one for maintaining healthy ecosystem functioning, and one for conserving the majority of species associated with the ecosystem. As natural habitat is lost in an ecosystem, its functioning is increasingly compromised, leading eventually to the collapse of the ecosystem and to loss of species associated with that ecosystem ( <a href="#">Millennium Ecosystem Assessment</a> ).                                                                                                                                                                                                                                 |
| Ecotone            | The transitional zone between two communities. Ecotones can arise naturally, such as a lakeshore, or can be human created, such as a cleared agricultural field from a forest. The ecotonal community retains characteristics of each bordering community and often contains species not found in the adjacent communities. Classic examples of ecotones include fencerows; forest to marshlands transitions; forest to grassland transitions; or land-water interfaces such as riparian zones in forests. Characteristics of ecotones include vegetational sharpness, physiognomic change, and occurrence of a spatial community mosaic, many exotic species, ecotonal species, spatial mass effect, and species richness higher or lower than either side of the ecotone. |
| Edge               | The portion of an ecosystem near its perimeter, where influences of the adjacent patches can cause an environmental difference between the interior of the patch and its edge. This edge effect includes a distinctive species composition or abundance in the outer part of the landscape patch. For example, when a landscape is a mosaic of perceptibly different types, such as a forest adjacent to a grassland, the edge is the location where the two types adjoin. In a continuous landscape, such as a forest giving way to open woodland, the exact edge location is fuzzy and is sometimes determined by a local gradient exceeding a threshold, as an example, the point where the tree cover falls below thirty-five percent.                                  |
| Emergent Tree      | Trees that grow above the top of the canopy                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Endangered (En)    | <u>Endangered terrestrial ecosystems</u> have lost significant amounts (more than 60 % lost) of their original natural habitat, so their functioning is compromised. A taxon (species) is Endangered when the best available evidence indicates that it meets any of the criteria for Endangered, and it is therefore considered to be facing a <u>very high risk</u> of extinction in the wild ( <a href="#">IUCN</a> ).                                                                                                                                                                                                                                                                                                                                                   |
| Endemic            | A plant or animal species, or a vegetation type, which is naturally restricted to a defined region or limited geographical area. Many endemic species have widespread distributions and are common and thus are not considered to be under any threat. They are however noted to be unique to a region, which can include South Africa, a specific province or a bioregion, vegetation type, or a localised area. In cases where it is highly localised or known only from a few or a few localities, and is under threat, it may be red listed either in terms of the South Africa Threatened Species Programme, NEMBA Threatened or Protected Species (ToPS) or the IUCN Red List of Threatened Species.                                                                  |
| Environment        | The external circumstances, conditions and objects that affect the existence and development of an individual, organism or group. These circumstances include biophysical, social, economic, historical and cultural aspects.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Estuary            | a partially or fully enclosed body of water -<br>(a) which is open to the sea permanently or periodically; and                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

|                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|---------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                       | (b) within which the sea water can be diluted, to an extent that is measurable, with fresh water drained from land.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Evolutionary Processes                | <p>The process by which genetic changes have taken place and continue to take place in populations of plants and animals over successive generations in response to environmental changes. Evolutionary Processes includes the mechanisms that produce the biodiversity of life and include Mutation and Migration (Gene Flow), Genetic Drift, Natural Selection, Common Descent, Speciation, Sexual Selection, and Biogeography. Disruptions to evolutionary processes can prevent ecosystems and species from adapting to environmental change over time. Significant fragmentation is considered to be an important disrupter of evolutionary processes.</p> <p>Series of actions which enable new species to evolve in response to changing Biodiversity is maintained by ecological processes at the micro-scale (such as in pollination and nutrient cycling via microbial action) through to the mega-scale (natural events e.g. fire, flood; migration of species along river valleys or coastal areas, quality and quantity of water feeding rivers and estuaries; marine sand movement and the seasonal mountain-to-coast migration of birds that pollinate plants).</p> |
| Exotic                                | Non-indigenous; introduced from elsewhere, may also be a weed or alien invasive species. Exotic species may be invasive or non-invasive.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Fragmentation (Habitat Fragmentation) | The 'breaking apart' of continuous habitat into distinct pieces. Causes land transformation, an important current process in landscapes as more and more development occurs.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Habitat                               | The home of a plant or animal species. Generally, those features of an area inhabited by animal or plant which are essential to its survival.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Habitat Banking                       | A market where credits from actions with beneficial biodiversity outcomes can be purchased to offset the debit from environmental damage. Credits can be produced in advance of, and without ex-ante links to, the debits they compensate for, and stored over time ( <a href="#">IEEP</a> ).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| IFC PS6                               | <a href="#">International Finance Corporation Performance Standard 6</a> – A standard guiding biodiversity conservation and sustainable management of living natural resources for projects financed by the International Finance Corporation (IFC)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Indicator                             | Information based on measured data used to represent an attribute, characteristic, or property of a system.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Indicator species                     | A species whose status provides information on the overall condition of the ecosystem and of other species in that ecosystem. They reflect the quality and changes in environmental conditions as well as aspects of community composition.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Indigenous                            | Native; occurring naturally in a defined area.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Indigenous Species (Native species)   | <p>A species that has been observed in the form of a naturally occurring and self-sustaining population in historical times (<i>Bern Convention 1979</i>).</p> <p>A species or lower taxon living within its natural range (past or present) including the area which it can reach and occupy <u>using its natural dispersal systems</u> (<i>modified after the Convention on Biological Diversity</i>)</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Indirect Impact                       | Impacts triggered in response to the presence of a project, rather than being directly caused by the project's own operations ( <a href="#">BBOP</a> )                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Instream habitat                      | Includes the physical structure of a watercourse and the associated vegetation in relation to the bed of the watercourse;                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Intact Habitat / Vegetation           | Land that has not been significantly impacted upon by man's activities. These are ecosystems that are in a near-pristine condition in terms of structure, species composition and functioning of ecological processes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Intrinsic Value                       | The inherent worth of something, independent of its value to anyone or anything else.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |



|                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|---------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Keystone Species                      | Species whose influence on ecosystem function and diversity are disproportionate to their numerical abundance. Although all species interact, the interactions of some species are more profound and far-reaching than others, such that their elimination from an ecosystem often triggers cascades of direct and indirect changes on more than a single trophic level, leading eventually to losses of habitats and extirpation of other species in the food web.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Landscape                             | An area of land that contains a mosaic of ecosystems, including human-dominated ecosystems ( <a href="#">Millennium Ecosystem Assessment</a> ).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Landscape Approach                    | Dealing with large-scale processes in an integrated and multidisciplinary manner, combining natural resources management with environmental and livelihood considerations ( <a href="#">FAO</a> ).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Landscape connectivity                | The degree to which the landscape facilitates or impedes movement among resource patches.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Least threatened / Least Concern (LC) | <p>These <u>ecosystems</u> have lost only a small proportion (more than 80 % remains) of their original natural habitat and are largely intact (although they may be degraded to varying degrees, for example by invasive alien species, overgrazing, or overharvesting from the wild).</p> <p>A <u>taxon (species)</u> is Least Concern when it has been evaluated against the criteria and does not qualify for Critically Endangered, Endangered, Vulnerable or Near Threatened. Widespread and abundant taxa are included in this category (<a href="#">IUCN</a>).</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Matrix                                | The “background ecological system” of a landscape with a high degree of connectivity.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Natural Forest (Indigenous Forest)    | <p>The definition of “natural forest” in the National Forests Act of 1998 (NFA) Section 2(1)(xx) is as follows: ‘A natural forest means a group of indigenous trees.</p> <ul style="list-style-type: none"> <li>• whose crowns are largely contiguous.</li> <li>• or which have been declared by the Minister to be a natural forest under section 7(2)?</li> </ul> <p>This definition should be read in conjunction with Section 2(1)(x) which states that ‘Forest’ includes:</p> <ul style="list-style-type: none"> <li>• A natural forest, a woodland, and a plantation</li> <li>• The forest-produce in it; and</li> <li>• The ecosystems which it makes up.</li> </ul> <p>The legal definition must be supported by a technical definition, as demonstrated by a court case in the Umzimkulu magisterial district, relating to the illegal felling of Yellowwood (<i>Podocarpus latifolius</i>) and other species in the Gonqogonqo forest. From scientific definitions (also see Appendix B) we can define natural forest as:</p> <ul style="list-style-type: none"> <li>• A generally multi-layered vegetation unit</li> <li>• Dominated by trees that are largely evergreen or semi-deciduous.</li> <li>• The combined tree strata have overlapping crowns, and crown cover is &gt;75%</li> <li>• Grasses in the herbaceous stratum (if present) are generally rare.</li> <li>• Fire does not normally play a major role in forest function and dynamics except at the fringes.</li> <li>• The species of all plant growth forms must be typical of natural forest (check for indicator species)</li> <li>• The forest must be one of the national forest types</li> </ul> |
| Near Threatened (NT)                  | A <u>taxon (species)</u> is Near Threatened when it has been evaluated against the criteria but does not qualify for Critically Endangered, Endangered or Vulnerable                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

|                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|--------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                          | now, but is close to qualifying for or is likely to qualify for a threatened category in the near future ( <a href="#">IUCN</a> ).                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Patch                    | A term fundamental to landscape ecology, is defined as a relatively homogeneous area that differs from its surroundings. Patches are the basic unit of the landscape that change and fluctuate, a process called patch dynamics. Patches have a definite shape and spatial configuration and can be described compositionally by internal variables such as number of trees, number of tree species, height of trees, or other similar measurements.                                                                                                  |
| Protected Area           | A clearly defined geographical space, recognised, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values.                                                                                                                                                                                                                                                                                                                              |
| Range restricted species | Species with a geographically restricted area of distribution. Note: Within the IFC PS6, restricted range refers to a limited <u>extent of occurrence</u> (EOO): <ul style="list-style-type: none"> <li>For terrestrial vertebrates and plants, restricted-range species are defined as those species that have an EOO less than 50,000 square kilometres (km<sup>2</sup>).</li> </ul>                                                                                                                                                                |
| Refugia                  | A location which supports an isolated or relict population of a once more widespread species. This isolation can be due to climatic changes, geography, or human activities such as deforestation and overhunting.                                                                                                                                                                                                                                                                                                                                    |
| Rehabilitation           | Measures taken to rehabilitate degraded ecosystems or restore cleared ecosystems following exposure to impacts that cannot be completely avoided and/ or minimised. Rehabilitation emphasizes the reparation of ecosystem processes, productivity and services, whereas the goals of restoration also include the re-establishment of the pre-existing biotic integrity in terms of species composition and community structure ( <a href="#">BBOP</a> ).                                                                                             |
| Resilience               | The capacity of a natural system to recover from disturbance ( <a href="#">OECD</a> ).                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Restoration              | The process of assisting the recovery of an ecosystem that has been degraded, damaged, or destroyed. An ecosystem has recovered when it contains sufficient biotic and abiotic resources to continue its development without further assistance or subsidy. It would sustain itself structurally and functionally, demonstrate resilience to normal ranges of environmental stress and disturbance, and interact with contiguous ecosystems in terms of biotic and abiotic flows and cultural interactions ( <a href="#">IFC</a> ).                   |
| Riparian                 | Pertaining to, situated on or associated with the banks of a watercourse, usually a river or stream.                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Riparian Habitat         | Includes the physical structure and associated vegetation of the areas associated with a watercourse which are commonly characterised by alluvial soils, and which are inundated or flooded to an extent and with a frequency sufficient to support vegetation of species with a composition and physical structure distinct from those of adjacent land areas.                                                                                                                                                                                       |
| River Corridors          | River corridors perform several ecological functions such as modulating stream flow, storing water, removing harmful materials from water, and providing habitat for aquatic and terrestrial plants and animals. These corridors also have vegetation and soil characteristics distinctly different from surrounding uplands and support higher levels of species diversity, species densities, and rates of biological productivity than most other landscape elements. Rivers provide for migration and exchange between inland and coastal biotas. |
| Sustainable Development  | Development that meets the needs of the present without compromising the ability of future generations to meet their own needs ( <a href="#">WCED</a> ).                                                                                                                                                                                                                                                                                                                                                                                              |
| Terrestrial              | Occurring on, or inhabiting, land.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Threatened Species       | Umbrella term for any species categorised as Critically Endangered, Endangered or Vulnerable by the IUCN Red List of Threatened Species ( <a href="#">IUCN</a> ). Any species that                                                                                                                                                                                                                                                                                                                                                                    |

|                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                  | is likely to become extinct within the foreseeable future throughout all or part of its range and whose survival is unlikely if the factors causing numerical decline or habitat degradation continue to operate ( <a href="#">EU</a> ).                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Traditional Ecological Knowledge | Knowledge, innovations and practices of indigenous and local communities around the world. Developed from experience gained over the centuries and adapted to the local culture and environment, traditional knowledge is transmitted orally from generation to generation. It tends to be collectively owned and takes the form of stories, songs, folklore, proverbs, cultural values, beliefs, rituals, community laws, local language, and agricultural practices, including the development of plant species and animal breeds. Traditional knowledge is mainly of a practical nature, particularly in such fields as agriculture, fisheries, health, horticulture, and forestry ( <a href="#">CBD</a> ). |
| Transformation                   | In ecology, transformation refers to adverse changes to biodiversity, typically habitats or ecosystems, through processes such as cultivation, forestry, drainage of wetlands, urban development or invasion by alien plants or animals. Transformation results in habitat fragmentation – the breaking up of a continuous habitat, ecosystem, or land-use type into smaller fragments.                                                                                                                                                                                                                                                                                                                        |
| Transformed Habitat/Land         | Land that has been significantly impacted upon as a result of human interferences/disturbances (such as cultivation, urban development, mining, landscaping, severe overgrazing), and where the original structure, species composition and functioning of ecological processes have been irreversibly altered. Transformed habitats are not capable of being restored to their original states.                                                                                                                                                                                                                                                                                                               |
| Tributary                        | A small stream or river flowing into a larger one.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Untransformed Habitat/Land       | Land that has not been significantly impacted upon by man's activities. These are ecosystems that are in a near-pristine condition in terms of structure, species composition and functioning of ecological processes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Vulnerable (Vu)                  | <u>Vulnerable terrestrial ecosystems</u> have lost some (more than 60 % remains) of their original natural habitat and their functioning will be compromised if they continue to lose natural habitat.<br>A <u>taxon (species)</u> is Vulnerable when the best available evidence indicates that it meets any of the criteria for Vulnerable, and it is therefore considered to be facing a high risk of extinction in the wild ( <a href="#">IUCN</a> ).                                                                                                                                                                                                                                                      |
| Watercourse                      | Natural or man-made channel through or along which water may flow.<br>A river or spring; a natural channel in which water flows regularly or intermittently; a wetland, lake or dam into which, or from which, water flows.<br>and a reference to a watercourse includes, where relevant, its bed and banks;                                                                                                                                                                                                                                                                                                                                                                                                   |
| Weed                             | An indigenous or non-indigenous plant that grows and reproduces aggressively, usually a ruderal pioneer of disturbed areas. Weeds may be unwanted because they are unsightly, or they limit the growth of other plants by blocking light or using up nutrients from the soil. They can also harbour and spread plant pathogens. Weeds are generally known to proliferate through the production of large quantities of seed.                                                                                                                                                                                                                                                                                   |
| Wetlands                         | A collective term used to describe lands that are sometimes or always covered by shallow water or have saturated soils, and where plants adapted for life in wet conditions usually grow.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |



## 8.3 Appendix C: Biodiversity Environmental Management Plan

Specific measures relating to management of Biodiversity Impacts that must be included in the project Environmental Management Programme (EMPr). This Environmental Management Plan (EMP) contains guidelines, operating procedures and rehabilitation control requirements, which will be binding on the holder of the environmental authorisation after approval of the EMP. The impacts identified and listed in Section 3.3 will be managed / controlled as set out under mitigating measures and as detailed in this section, which provides general management guidelines, which may or may not be appropriate, depending on the specific circumstances.

### 8.3.1 Protection of Flora and Fauna

The following actions must be implemented at construction phase, where deemed necessary.

- Search and rescue operations for Species of Conservation Concern must be undertaken before the commencement of site clearing activities.
- Indigenous vegetation encountered on the sites that are to be conserved and left intact.
- It is important that clearing activities are kept to the minimum and take place in a phased manner. This allows animal species to move into safe areas and prevents wind and water erosion of the cleared areas.
- Stripped vegetation should be temporarily stored during operations and to be used later to stabilise slopes. This excludes exotic invasive species.
- No animals are to be harmed or killed during the course of operations.
- Workers are NOT allowed to collect any flora or snare any faunal species. All flora and fauna remain the property of the landowner and must not be disturbed, upset or used without their expressed consent.
- It is the responsibility of the Contractor to provide sufficient fuel for cooking and heated as needed by the staff.
- No domestic animals are permitted on the sites.
- Trees and shrubs that are directly affected by the operations may be felled or cleared but only by the expressed written permission of the ECO.
- Rehabilitation of vegetation of the site must be done as described in the Rehabilitation Plans.

#### Flora Search and Rescue

The following flora relocation plan is recommended, where deemed necessary:

- Once the final layout has been determined the botanist will be consulted in order to finalise the plant relocation and vegetation clearing plan.
- Respective permits to be obtained.
- Flora search and rescue is to be conducted before vegetation clearing takes place.
- Areas should only be stripped of vegetation as and when required and once species of special concern have been relocated for that area.
- Once site clearing is to commence, the area to be cleared of vegetation will be surveyed by the vegetation and plant search and rescue team clearing under the supervision of the botanist to identify and remove species suitable for rescue and commence removal of plants.
- These species are to be replanted immediately in a suitable area of similar vegetation, where future development is unlikely to occur, or within a nearby protected area.

#### Fauna Search and Rescue

The following fauna relocation plan is recommended for inclusion in the EMP and Fauna removal permit applications, where deemed necessary:

- An on-foot search, conducted by a professional reptile handler/team, is to be carried out to search for reptiles within every possible habitat.

- Once caught, each reptile will be placed into transport containers suited for that individual reptile.
- The transport containers must be kept cool to decrease stress for the reptiles.
- The reptiles will be relocated as soon as possible after they have been caught.
- Professional equipment will be used to ensure limited harm to the reptiles and to prevent the team members from being bitten by venomous snakes.
- Nooses should not be used as they cause injury to lizards.
- Safety procedures will be in place for the release of the reptiles.
- Amphibians should be caught by hand and net.
- Amphibians must be placed into transport containers with damp substrates to avoid dehydration.
- Tadpoles may be collected, placed into water containers and released as soon as possible, where required.
- During release, the tadpoles will be allowed to acclimatize to the new water in terms of temperature, pH etc.
- Small mammals will be caught with nets and by hand. They will then be transported in carry cages and released as soon as possible.
- No immobilizers or tranquilizers will be used on the mammals.

### 8.3.2 Alien and Invasive Plan Management Plan

The following mitigation measures have been identified in order to ensure that the introduction and spread of alien invasive vegetation is minimised, where deemed necessary:

- Alien species must be removed from the site as per the National Environmental Management: Biodiversity Act (No. 10 of 2004) requirements.
- A suitable weed management strategy must be implemented in the construction phase and carried through the operational phase.
- Weeds and alien species must be cleared by hand before the rehabilitation phase of the areas. Removal of alien plants are to be done according to the Working for Water Guidelines.
- The Contractor is responsible for the removal of alien species within all areas disturbed during construction activities. Disturbed areas include (but are not limited to) access roads, construction camps, site areas and temporary storage areas.
- In consultation with relevant authorities, the Engineer may order the removal of alien plants (when necessary). Areas within the confines of the site are to be included.
- All alien plant material (including brushwood and seeds) should be removed from site and disposed of at a registered waste disposal site. Should brushwood be utilised for soil stabilization or mulching, it must be seed free.
- After clearing is completed, an appropriate cover crop may be required, should natural re-establishment of grasses not take place in a timely manner.

### 8.3.3 Fires

The following mitigation measures have been identified in order to minimise fire risks, where deemed necessary:

- The Contractor must ensure that an emergency preparedness plan is in place in order to fight accidental fires or veld fires, should they occur. The adjacent landowners/users/managers should also be informed or otherwise involved.
- Enclosed areas for food preparation should be provided and the Contractor must strictly prohibit the use of open fires for cooking and heating purposes.
- The use of branches of trees and shrubs for fire-making must be strictly prohibited.
- The Contractor should take all reasonable and active steps to avoid increasing the risk of fire through their activities on-site. No fires may be lit except at places approved by the ECO.

- The Contractor must ensure that the basic fire-fighting equipment is to the satisfaction of the Local Emergency Services.
- The Contractor must supply all living quarters, site offices, kitchen areas, workshop areas, materials, stores and any other relevant areas with tested and approved fire-fighting equipment.
- Fires and “hot work” must be restricted to demarcated areas.
- A braai facility may be considered at the discretion of the Contractor and in consultation with the ECO. The area must be away from flammable stores. All events must be under management’s supervision and a fire extinguisher will be immediately available. “Low-smoke” fuels must be used (e.g. charcoal) and smoke control regulations, if applicable, must be considered.
- The Contractor must take precautions when working with welding or grinding equipment near potential sources of combustion. Such precautions include having a suitable, tested and approved fire extinguisher immediately at hand and the use of welding curtains.

### 8.3.4 Soil Aspects

The following mitigation measures have been identified in order to minimise soil loss, where deemed necessary:

- Sufficient topsoil must be stored for later use during decommissioning, particularly from outcrop areas.
- Topsoil shall be removed from all areas where physical disturbance of the surface will occur.
- All available topsoil shall be removed after consultation with the botanist and horticulturalist prior to commencement of any operations.
- The removed topsoil shall be stored on high ground within the site footprint outside the 1:50 flood level within demarcated areas.
- Topsoil shall be kept separate from overburden and shall not be used for building or maintenance of roads.
- The stockpiled topsoil shall be protected from being blown away or being eroded. The application of a suitable grass seed/runner mix will facilitate this and reduce the minimise weeds.

### 8.3.5 Dust

The following mitigation measures have been identified in order to minimise dust, where deemed necessary:

- To manage complaints relation to impacts on the nearby communities, a dust register will be developed.
- If required, water spray vehicles will be used to control wind cause by strong winds during activities on the works.
- No over-watering of the site or road surfaces.
- Wind screens should be used to reduce wind and dust in open areas.

### 8.3.6 Infrastructural Requirements

The following mitigation measures have been identified in order to minimise impacts of infrastructure requirements, where deemed necessary:

#### Topsoil

- Topsoil shall be removed from all areas where physical disturbance of the surface will occur.
- All available topsoil shall be removed after consultation with the Regional Manager prior to commencement of any operations.



- The removed topsoil shall be stored on high ground within the footprint outside the 1:50 flood level within demarcated areas (Appendix 1)
- Topsoil shall be kept separate from overburden and shall not be used for building or maintenance of roads.
- The stockpiled topsoil shall be protected from being blown away or being eroded. The use of a suitable grass seed/runner mix will facilitate soil protection and minimise weeds/weed growth.

### **Stormwater and Erosion Control**

- Stormwater Management Plans must be developed for the site and should include the following:
  - The management of stormwater during construction.
  - The installation of stormwater and erosion control infrastructure.
  - The management of infrastructure after completion of construction.
- Temporary drainage works may be required to prevent stormwater to prevent silt laden surface water from draining into river systems in proximity to the site. Stormwater must be prevented from entering or running off site.
- To ensure that site is not subjected to excessive erosion and capable of drainage runoff with minimum risk of scour, their slopes should be profiled at a maximum 1:3 gradient.
- Diversion channels should be constructed ahead of the open cuts, and above emplacement areas and stockpiles to intercept clean runoff and divert it around disturbed areas into the natural drainage system downstream of the site.
- Rehabilitation is necessary to control erosion and sedimentation of all eroded areas (where works will take place).
- Existing vegetation must be retained as far as possible to minimise erosion problems.
- It is importation that the rehabilitation of site is planned and completed in such a way that the runoff water will not cause erosion.
- Visual inspections will be done on a regular basis with regard to the stability of water control structure, erosion and siltation.
- Sediment-laden runoff from cleared areas must be prevented from entering rivers and streams.
- No river or surface water may be affected by silt emanating from the site.

### **Site Office / Camp Sites**

- No site offices or camp sites will be constructed on the site under current operating conditions, existing structures will be used.

### **Operating Procedures in the Site**

- Construction shall only take place within the approved demarcated site.
- Construction may be limited to the areas indicated by the Regional Manager on assessment of the application.
- The holder of the environmental authorisation shall ensure that operations take place only in the demarcated areas as described in this report.
- Watering to minimise the effect of dust generation should be carried out as frequently as necessary. Noise should also be kept within reason.
- No workers will be allowed to damage or collect any indigenous plant or snare any animal.
- Grass and vegetation of the immediate environment or adapted grass / vegetation will be re-established on completion of construction activities, where applicable.
- No firewood to be collected on site and the lighting of fires must be prohibited.
- Cognisance is to be taken of the potential for endangered species occurring in the area. It is considered unlikely, however, that these species will be affected by the proposed activity, or the access road.

## Excavations

Whenever any excavation is undertaken, the following procedures shall be adhered to:

- Topsoil shall be handled as described in this EMP.
- Excavations shall take place only within the approved demarcated site.
- Excavations must follow the contour lines where possible.
- The construction site will not be left in any way to deteriorate into an unacceptable state.
- The excavated area must serve as a final depositing area for waste rock and overburden during the rehabilitation process.
- Once excavations have been filled with overburden, rocks and coarse natural materials and profiled with acceptable contours (including erosion control measures), the previously stored topsoil shall be returned to its original depth over the area.
- The area shall be fertilised, if necessary, to allow vegetation to establish rapidly. The site shall be seeded with a local or adapted indigenous seed mix in order to propagate the locally occurring flora.

## Rehabilitation of Processing and Excavation Areas

- On completion of construction, the surface of the processing areas especially if compacted due to hauling and dumping operations shall be scarified to a depth of at least 200 mm and graded to an even surface condition and the previously stored topsoil will be returned to its original depth over the area.
- The area shall be fertilised, if necessary, to allow vegetation to establish rapidly. The site shall be seeded with suitable grasses and local indigenous seed mix.
- Excavations may be used for the dumping of construction wastes. This shall be done in such a way as to aid rehabilitation.
- Waste (non-biodegradable refuse) will not be permitted to be deposited in the excavations.
- If a reasonable assessment indicates that the re-establishment of vegetation is unacceptably slow, the Regional Manager may require that the soil be analysed and any deleterious effects on the soil arising from the activity, be corrected and the area be seeded with a vegetation seed mix to his or her satisfaction. This must be done in conjunction with the ECO.
- Final rehabilitation must comply with the requirements mention in the Rehabilitation Plan.

### 8.3.7 Rehabilitation Plan

The following mitigation measures have been identified in order to maximise rehabilitation success, where deemed necessary.

## Rehabilitation Objective

The overall objective of the rehabilitation plan is to minimize adverse environmental impacts associated with the activity whilst maximizing the future utilization of the property. Significant aspects to be borne in mind in this regard is, revegetation of undeveloped footprint and stability and environmental risk. The depression and immediate area of the working must also be free of alien vegetation. Additional broad rehabilitation strategies / objectives include the following:

- Rehabilitating the worked-out areas to take place concurrently within prescribed framework established in the EMP.
- All infrastructure, equipment, plant and other items used during the construction period will be removed from the site.
- Waste material of any description, including scrap, rubble and tyres, will be removed entirely from the site and disposed of at a recognised landfill facility. It will not be permitted to be buried or burned on site.
- Final rehabilitation shall be completed within a period specified by the Regional Manager.

### Topsoil and Subsoil Replacement

Topsoil and subsoil will be stripped and stockpiled separately and only used in rehabilitation work towards the end of the operation. This is in contrast to the gravel activity where rehabilitation and topsoil replacement was earmarked at the completion of each phase.

Stripped overburden will be backfilled into the worked-out areas where needed. Stripped topsoil will be spread over the re-profiled areas to an adequate depth to encourage plant regrowth. The vegetative cover will be stripped with the thin topsoil layer to provide organic matter to the relayed material and to ensure that the seed store contained in the topsoil is not diminished. Reseeding may be required should the stockpiles stand for too long and be considered barren from a seed bank point of view. Stockpiles should ideally be stored for no longer than a year.

The topsoil and overburden will be keyed into the reprofiled surfaces to ensure that they are not eroded or washed away. The topsoiled surface will be left fairly rough to enhance seedling establishment, reduce water runoff and increase infiltration.

### Revegetation

All prepared surfaces will be seeded with suitable grass species to provide an initial ground cover and stabilize the soil surface. The following grass seed that is commonly available and suitable.

| Botanical name                                             | Common name        | Approx seed mixture /Ha |
|------------------------------------------------------------|--------------------|-------------------------|
| <i>Cynodon dactylon</i>                                    | Kweek              | 12 kg/ Ha               |
| <i>Eragrostis curvula</i>                                  | Weeping Love Grass | 6 kg/ Ha                |
| <i>Eragrostis tef</i>                                      | Teff               | 2 kg/ Ha                |
| <i>Digitaria eriantha</i>                                  | Smuts Grass        | 4 kg/ Ha                |
| Other indigenous veld grasses can be added to the seed mix |                    | ± 4 kg/Ha               |

The overall revegetation plan will, therefore, be as follows:

- Ameliorate the aesthetic impact of the site.
- Stabilise disturbed soil and rock faces.
- Minimize surface erosion and consequent siltation of natural water course located on site.
- Control wind-blown dust problems.
- Enhance the physical properties of the soil.
- Re-establish nutrient cycling.
- Re-establish a stable ecological system.

Every effort must be made to avoid unnecessary disturbance of the natural vegetation during operations.

### Drainage and Erosion Control

To control the drainage and erosion at site the following procedures will be adopted:

- Areas where construction is completed should be rehabilitated immediately.
- Areas to be disturbed in future activities will be kept as small as possible (i.e. conducting the operations in phases), thereby limiting the scale of erosion.
- Slopes will be profiled to ensure that they are not subjected to excessive erosion but capable of drainage runoff with minimum risk of scour (maximum 1:3 gradient).
- All existing disturbed areas will be re-vegetated to control erosion and sedimentation.
- Existing vegetation will be retained as far as possible to minimize erosion problems.



### Visual Impacts Amelioration

The overall visual impact of the proposed activities will be minimised by the following mitigating measures:

- Confining the footprint to an area as small as possible
- Re-topsoiling and vegetating all disturbed areas.

### 8.3.8 Monitoring and Reporting

Adequate management, maintenance and monitoring will be carried out annually by the applicant to ensure successful rehabilitation of the property until a closure certificate is obtained.

To minimise adverse environmental impacts associated with operations it is intended to adopt a progressive rehabilitation programme, which will entail carrying out the proposed rehabilitation procedures concurrently with activity.

### 8.3.9 Closure objectives and extent of alignment to pre-construction environment

#### Closure Objectives

The closure of the site will involve removal of all debris and rehabilitation of areas disturbed during the construction phase of the project. This will comprise the scarification of compacted areas, reshaping of areas, topsoiling and rehabilitating all prepared surfaces.

## 8.4 Appendix D: General Impact Rating Scale

To ensure a direct comparison between various specialist studies, six standard rating scales are defined and used to assess and quantify the identified impacts. This is necessary since impacts have several parameters that need to be assessed.

These scales are:

1. The Severity/ Benefit Scale, which assesses the importance of the impact from a purely technical perspective.
2. The Spatial Impact Scale, which assesses the extent or magnitude of the impact (the area that will be affected by the impact).
3. The Temporal Impact Scale, which assesses how long the impact will be felt. Some impacts are of a short duration, whereas others are permanent.
4. The Degree of Certainty Scale, which provides a measure of how confident the author feels about their prediction.
5. The Likelihood Scale, which provides an indication of the risk or chance of an impact taking place.
6. The Environmental Significance Scale, which assesses the importance of the impact in the overall context of the affected system or party.

To ensure integration of social and ecological impacts, to facilitate specialist assessment of impact significance, and to reduce reliance on value judgments, the severity of the impact within the scientific field in which it takes place (e.g. vegetation, fauna etc.) was assessed first. Thereafter, each impact was assessed within the context of time and space, and the probability of the impact occurring was quantified using the degree of certainty scale.

The impact was then assessed in the context of the whole environment to establish the “environmental significance” of the impact to the flora and vegetation.

The scales are described in detail below.

### 8.4.1 The Severity/ Beneficial Scale

The *severity scale* was used to scientifically evaluate how severe negative impacts would be, or how beneficial positive impacts would be on an affected system (for ecological impacts) or an affected party. This methodology attempts to remove any value judgments from the assessment, although it relies on the professional judgment of the specialist.

| NEGATIVE IMPACT                                                                                                                                                                              | POSITIVE IMPACT                                                                                                                                                                                                      |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <u>Very severe</u><br>An irreversible and permanent change to the affected system(s) which cannot be mitigated. For example, change in topography resulting from a quarry.                   | <u>Very Beneficiary</u><br>A permanent and very substantial benefit to the affected system(s) with no alternative to achieve this benefit.                                                                           |
| <u>Severe</u><br>Long-term impacts on the affected system(s) that could be mitigated. However, this mitigation would be difficult, expensive or time consuming or some combination of these. | <u>Beneficial</u><br>A long-term impact and substantial benefit to the affected system(s). Alternative ways of achieving this benefit would be difficult, expensive or time consuming, or some combination of these. |
| <u>Moderately severe</u><br>Medium- to long-term impact on the affected system(s) that could be mitigated.                                                                                   | <u>Moderately beneficial</u><br>A medium- to long-term impact of real benefit to the affected system(s) Other ways of optimising are equally difficult, expensive and time                                           |

| NEGATIVE IMPACT                                                                                                                                | POSITIVE IMPACT                                                                                                                                                                                                              |
|------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                                                | consuming (or a combination of these), as achieving them in this way.                                                                                                                                                        |
| <u>Slight</u><br>Medium- to short term impacts on the affected system(s) Mitigation is very easy, cheap, less time consuming or not necessary. | <u>Slightly beneficial</u><br>A short- to medium-term impact and negligible benefit to the affected system(s) Other ways of optimising the beneficial effects are easier, cheaper and quicker, or some combination of these. |
| <u>No effect</u><br>The system(s) is not affected by the proposed development.                                                                 | <u>Do not know/Cannot know</u><br>In certain cases, it may not be possible to determine the severity of the impact.                                                                                                          |

The severity of impacts can be evaluated with and without mitigation order to demonstrate how serious the impact is when nothing is done about it. For beneficial impacts, optimisation means anything that can enhance the benefits. However, mitigation or optimisation must be practical, technically feasible and economically viable.

### 8.4.2 Spatial and Temporal Scales

Two additional factors were considered when assessing the impacts, namely the relationship of the impact to Spatial and Temporal Scales.

The *spatial scale* (shown in italics) defines the impact at the following scales.

| SPATIAL SCALE | EXPLANATION                                                                                                                                    |
|---------------|------------------------------------------------------------------------------------------------------------------------------------------------|
| Localised     | at a localised scale (i.e. few hectares in extent). The specific area to which this scale refers is defined for the impact to which it refers. |
| Study Area    | the site, some effects to surrounding area (~10 km)                                                                                            |
| District      | the site, some effects to wider surrounding area (~100 km)                                                                                     |
| Regional      | the site, some effects to surrounding area (+250 km)                                                                                           |
| National      | Impacts will affect at a country level                                                                                                         |
| International | Impacts extend beyond country boundary                                                                                                         |

The *temporal scale* (shown in italics) defines the impact at the following scales.

| TEMPORAL SCALE | EXPLANATION                                                                    |
|----------------|--------------------------------------------------------------------------------|
| Short Term     | Less than 5 years. Many construction phase impacts will be of a short duration |
| Medium Term    | Between 5 and 20 years                                                         |
| Long Term      | Between 20 and 40 years, and from a human perspective essentially permanent.   |
| Permanent      | Over 40 years and resulting in a permanent and lasting change.                 |

### 8.4.3 The Degree of Certainty and the Likelihood Scale

It is also for each specialist to state the degree of certainty, or the confidence attached to their prediction of significance. For this reason, a 'degree of certainty' scale (shown in bold) must be used.



| DEGREE    | DESCRIPTION                                                                           |
|-----------|---------------------------------------------------------------------------------------|
| Definite: | More than 90% sure of fact. To use this one will need to substantial supportive data. |
| Probable: | Between 70% and 90% sure of fact.                                                     |
| Possible: | Between 40% and 70% sure of fact.                                                     |
| Unsure:   | Less than 40% sure of fact.                                                           |

The risk or likelihood (shown in normal font) of impacts being manifested differs. There is no doubt that some impacts would occur, but certain other (usually secondary data) impacts are not as likely and may or may not result. Although these impacts maybe severe, the likelihood of them occurring may affect their overall significance and must therefore be considered. It is therefore necessary for the author to state his estimate of the likelihood of an impact occurring, using the following likelihood scale:

| DEGREE        | DESCRIPTION                                                                                         |
|---------------|-----------------------------------------------------------------------------------------------------|
| Very unlikely | The chance of these impacts occurring is extremely slim, e.g. natural forces destroying a dam wall. |
| Unlikely      | The risk of these impacts occurring is slight.                                                      |
| May occur     | The risk of these impacts is more likely, although it is not definite.                              |
| Very Likely   | Slight chance that this impact will not occur.                                                      |
| Definite      | There is no chance that this impact will not occur.                                                 |

#### 8.4.4 The Environmental Significance Scale

The environmental significance scale is an attempt to evaluate the significance of an impact, the severity or benefit of which has already been assessed. This evaluation needs to be assessed in the relevant context, as an impact can either be ecological or social, or both. Since the severity of impacts with and without mitigation will already have been assessed, significance was only evaluated after mitigation. In many cases, this mitigation will take place, as it has been incorporated into project design. A six-point significance scale is applied as follows:

| SIGNIFICANCE        | DESCRIPTION                                                                                                                                                                                    |
|---------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Very High (6)       | Impacts considered to have a major and permanent change to natural environment and are rate as VERY HIGH, usually resulting to severe or very severe/ beneficial to highly beneficial effects. |
| High (5)            | Long term change and are rated as HIGH resulting to severe or moderately severe effects/ beneficial to moderately beneficial.                                                                  |
| Moderate (4)        | Medium to long-term effects. Impacts are rated as MODERATE with moderately severe or moderately beneficial effects.                                                                            |
| Low (3)             | Medium to short term effects. Impacts are rated as MODERATE resulting in moderately severe or moderately beneficial effects.                                                                   |
| Insignificant (2)   | Short term effects are present. Impacts are rated as SLIGHT resulting in SLIGHTLY BENEFICIAL effects. Residual effects are present but are of no consequence.                                  |
| No Significance (1) | No primary or secondary effects, resulting in NO SIGNIFICANT impact.                                                                                                                           |
| Do not Know (0)     | Not possible to determine the significance of impacts                                                                                                                                          |

### 8.4.5 Absence of Data

In certain instances, an assessment must be produced in the absence of all the relevant and necessary data, due to paucity or lack of scientific information on the study area. It is more important to identify all the likely environmental impacts than to precisely evaluate the more obvious impacts. It is important to be on the conservative side in reporting likely environmental impacts. Because assessing impacts with a lack of data is more dependent on scientific judgment, the rating on the certainty scale cannot be too high. It is for these reasons that a degree of certainty scale has been provided, as well as the categories DON'T KNOW or CAN'T KNOW.

## 8.5 Appendix E: Declaration, Specialist Profile and Registration

### DECLARATION OF THE SPECIALIST

**Note:** Duplicate this section where there is more than one specialist.

I Mr Jamie Pote....., as the appointed Specialist hereby declare/affirm the correctness of the information provided or to be provided as part of the application, and that:

- In terms of the general requirement to be independent:
  - other than fair remuneration for work performed in terms of this application, have no business, financial, personal or other interest in the development proposal or application and that there are no circumstances that may compromise my objectivity; or
  - am not independent, but another specialist (the "Review Specialist") that meets the general requirements set out in Regulation 13 of the NEMA EIA Regulations has been appointed to review my work (Note: a declaration by the review specialist must be submitted);
- In terms of the remainder of the general requirements for a specialist, have throughout this EIA process met all of the requirements;
- I have disclosed to the applicant, the EAP, the Review EAP (if applicable), the Department and I&APs all material information that has or may have the potential to influence the decision of the Department or the objectivity of any Report, plan or document prepared or to be prepared as part of the application; and
- I am aware that a false declaration is an offence in terms of Regulation 48 of the EIA Regulations.



Signature of the Specialist:

2025/04/05

Date:

N/A

Name of company (if applicable):





## Jamie Pote

SENIOR ECOLOGIST AND ENVIRONMENTAL  
SCIENTIST

### CONTACT

-  (+27) 76 888 9890
-  [jamiepote@live.co.za](mailto:jamiepote@live.co.za)
-  Port Elizabeth, South Africa
-  [Linkedin.com](https://www.linkedin.com)
-  JamiePote
-  [Bluesky-SA](https://bsky.app)

### EDUCATION

- Bachelor of Science  
*Rhodes University*  
2001 (Botany & Environmental Science)
- Bachelor of Science (Honours)  
*Rhodes University*  
2002 (Botany)
- Professional Natural Scientist  
*SACNASP*  
2016

### SERVICES

- Terrestrial Biodiversity/Ecological Assessments*
- Environmental & Ecological Risk-Assessments*
- Bioremediation, Restoration & Rehabilitation Plans*
- Environmental Management Plans & Programmes*
- GIS Mapping & Analysis & Web maps*
- Alien Invasive Management (Terrestrial)*
- Environmental Auditing & Monitoring (ECO)*
- Flora Search & Rescue & Relocation*
- Independent Environmental & Ecological review*
- Permit and License applications*
- Environmental & Mining Applications*

### ABOUT ME

*16 years broad professional experience in Biodiversity, Ecological and Vegetation Assessments on over 220 projects in southern, western and central Africa. Senior Environmental Consultant and EAP on over 50 projects in the mining, infrastructure, housing and agricultural sectors. Environmental monitoring and auditing on over 50 civil infrastructure and construction projects. Have managed all aspects of projects from inception through to implementation. GIS mapping and analytics.*

### EXPERIENCE AND CLIENTS

#### Key Sectors

- *Wind, Solar Energy Facilities*
- *Infrastructure and Housing*
- *Agriculture and Forestry*
- *Mining and Industrial*

#### Key Projects

- *Over 220 independent Biodiversity/Ecological Assessments throughout southern, western and central Africa.*
- *Mining applications and construction auditing on over 40 projects and more than 300 gravel borrow pits for the Eastern Cape Department of Roads and Public Works, Department of Transport and the South African National Roads Agency (SANRAL) throughout the Eastern Cape.*
- *South-End Precinct Mixed Use Development for Mandela Bay Development Agency - Environmental application, Ecological assessments and Construction monitoring.*
- *Coega Development Corporation IDZ projects – Ecological assessments, Flora search & rescue and Construction monitoring.*
- *Environmental applications, construction monitoring and auditing for a wide range of projects, including infrastructure and housing for various clients including the Department of Transport and SANRAL.*
- *Various agricultural expansion and infrastructure projects.*
- *Various wind and solar energy and associated infrastructure projects.*
- *Numerous infrastructure projects including electrical, water and roads.*
- *Various Environmental Management and Rehabilitation Plans.*



**herewith certifies that**  
**Jamie Robert Claude Pote**  
Registration Number: 115233  
**is a registered scientist**

in terms of section 20(3) of the Natural Scientific Professions Act, 2003  
(Act 27 of 2003)  
in the following field(s) of practice (Schedule 1 of the Act)  
Ecological Science (Professional Natural Scientist)

Effective **20 July 2016**

Expires **31 March 2026**



A handwritten signature in black ink, appearing to read 'A. Keph', written over a horizontal line.

Chairperson

A handwritten signature in black ink, appearing to read 'N. Maseko', written over a horizontal line.

Chief Executive Officer



To verify this certificate scan this code

## **PROJECT EXPERIENCE**

### PERFORMANCE STANDARD BIODIVERSITY AND CRITICAL HABITAT ASSESSMENTS (IFC PS6)

- DBSA Environmental & Social Safeguards Standards 9: Biodiversity Conservation and Sustainable Management Assessment: The Ilitha Fibre Project, Ethekeini 2021
- Critical Habitat & Biodiversity Assessment - Roggeveld Wind Energy Project 2020
- Biodiversity Assessment for Kalukundi Copper/Cobalt Mine, Democratic Republic of Congo 2008

### TERRESTRIAL BIODIVERSITY ASSESSMENTS AND COMPLIANCE STATEMENTS

- Terrestrial Biodiversity Assessment (Addo BSD Offices) 2021
- Terrestrial Biodiversity Assessment (Blaauwater Farms) 2021
- Terrestrial Biodiversity Assessment (Buffelshoek Farm, Loerie) 2021
- Terrestrial Biodiversity & Aquatic Assessment & Review (Falcon Ridge Dam) 2021
- Terrestrial Biodiversity Assessment (Gubenxa Valley Deciduous Fruit) 2021
- Terrestrial Biodiversity Assessment (Little Chelsea Mixed-use) 2021
- Terrestrial Biodiversity Compliance Statement (Maidenhead Farm) 2021
- Terrestrial Biodiversity Review, Mulilo Total Hydra Storage Project Grid Interconnection 2021
- Terrestrial Biodiversity Compliance Statement (Lahlangubo River Bridge) 2021
- Terrestrial Biodiversity Assessment (Mbashe access roads - 3 sites) 2021
- Terrestrial Biodiversity Assessment (Burlington Farm Citrus Development, Cookhouse) 2020
- Terrestrial Biodiversity Compliance Statement: CHDM Cluster 9 Phase 3D Pipeline 2020
- Terrestrial Biodiversity Review, Mulilo Total Hydra Storage Project BESS 2020
- Terrestrial Biodiversity Assessment (Mbashe housing projects, Dutywa & Willowvale) 2020
- Terrestrial Biodiversity Assessment (Helpmekaar Dam, Tarkastad) 2020
- Terrestrial Biodiversity Assessment (Herbertsdale pipeline, Mossel Bay) 2020
- Terrestrial Biodiversity Assessment (Keurbooms Erf 155, Keurboomstrand) 2020
- Terrestrial Biodiversity Assessment (Lowmar Hydroelectric Project, Cradock) 2020
- Terrestrial Biodiversity Assessment (Mossel Bay Gas Power Plant) 2020
- Terrestrial Biodiversity Assessment (Erf 1820, Mthatha) 2020
- Terrestrial Biodiversity Assessment (Newlyn Manganese Terminal, Coega SEZ) 2020
- Terrestrial Biodiversity Assessment Thornhill Phase 2 Sanitation Link 2020

### ENERGY PROJECTS (WIND FARM AND PHOTOVOLTAIC INFRASTRUCTURE)

- Preliminary Biodiversity Screening for Chrisdelina Ranch Agricultural Project, Kizenga District 2020
- Preliminary Biodiversity Screening and GIS mapping for Balekani Photovoltaic Solar Project 2020
- Preliminary Biodiversity Screening and GIS mapping for Sihhoye Photovoltaic Solar Project 2020
- Preliminary Biodiversity Screening and GIS mapping Mpaka Photovoltaic Solar Project 2020
- Preliminary Biodiversity Screening and GIS mapping for Chiwelwa Hydroelectric project 2020
- Ecological Assessment for Vermaak Boerdery Hydro Turbine (Cookhouse), Eastern Cape 2020
- Ecological Assessment for Windcurrent Wind Farm, Eastern Cape 2012
- Ecological Assessment for Universal Windfarm, NMB 2011
- Ecological Assessment for Inca Energy Windfarm, Northern Cape 2011
- Ecological Assessment for Broadlands Photovoltaic Farm, Eastern Cape 2011
- Botanical Assessment for Electrawinds Windfarm Coega, NMB 2010
- Botanical Assessment and Open Space Management Plan for Mainstream WEF Phase 2, Eastern Cape 2010

### SPECIALISED ECOLOGICAL REPORTS AND REVIEWS

- Rebels Vlei Riparian delineation 2021



Mr Jamie Pote (BSc (Hons) PR. Sci. Nat.)

|                                                                                                                    |      |
|--------------------------------------------------------------------------------------------------------------------|------|
| • Buck Kraal Dam Rehabilitation Plan Review                                                                        | 2020 |
| • Rehabilitation Plan for Hitgeheim Farm (Farm 960), Sunland, Eastern Cape                                         | 2017 |
| • Green Star Rating Ecological Assessment for SANRAL office, Bay West City, NMBM                                   | 2015 |
| • Section 24G Assessment and Rehabilitation Plan for Bingo Farm, Eastern Cape                                      | 2014 |
| • Mapping and Ecological services for Congo Agriculture, Republic of Congo                                         | 2013 |
| • Rehabilitation Plan for Nieu Bethesda, Eastern Cape                                                              | 2011 |
| • Mapping of pipeline for Kenton Water Board, Eastern Cape                                                         | 2010 |
| • Rehabilitation Plan for N2 Upgrade - Coega to Colchester, NMB                                                    | 2010 |
| • Representative for landowner group for Seaview burial Park, NMB                                                  | 2010 |
| • Botanical Sensitivity Analysis for LSDF, Greenbushes-Hunters Retreat, NMB                                        | 2008 |
| • Forestry Rehabilitation Assessment Report for Amahlathi Forest Rehabilitation, Eastern Cape                      | 2007 |
| • Botanical & Riparian Assessment for Orange River Weirs-Boegoeberg, Douglas Dam and Sendelingsdrif, Northern Cape | 2006 |
| • Botanical Assessment for State of the Environment Report for Chris Hani District Municipality SoER, Eastern Cape | 2003 |

ROAD AND RAILWAY INFRASTRUCTURE PROJECTS

|                                                                                  |      |
|----------------------------------------------------------------------------------|------|
| • Ecological Assessment for CDC IDZ Mn Terminal, conveyor and railway line, NMB  | 2013 |
| • Ecological Assessment Review for Penhoek Road widening, Eastern Cape           | 2012 |
| • Ecological Assessment for R61 road widening, Eastern Cape                      | 2012 |
| • Botanical Assessment for Chelsea RD - Walker Drive Ext., NMB                   | 2010 |
| • Botanical Assessment for Motherwell - Blue Water Bay Road, NMB                 | 2010 |
| • Ecological Assessment for Port St John Road, Eastern Cape                      | 2010 |
| • Botanical Basic Assessment for Bholani Village Rd, Port St Johns, Eastern Cape | 2009 |
| • Botanical Report, EMP and Rehab Plan for Coega-Colchester N2 Upgrade, NMB      | 2009 |
| • Botanical Assessment for Manganese Conveyor Screening Report, NMB              | 2008 |
| • Ecological Assessment for Road Layout for Whiskey Creek- Kenton, Eastern Cape  | 2006 |

MINING PROJECTS

|                                                                                                                                |      |
|--------------------------------------------------------------------------------------------------------------------------------|------|
| • Ecological Assessment for Bochum Borrow Pits, Limpopo                                                                        | 2013 |
| • Ecological Assessment and Mining and Rehabilitation Plan for Greater Soutpansberg Mining Project, Limpopo (3 proposed Mines) | 2013 |
| • Ecological Assessment for Thulwe Road Borrow Pits, Limpopo                                                                   | 2013 |
| • Ecological Assessment and Mining and Rehabilitation Plan for Baghana Mining, Ghana                                           | 2010 |
| • Botanical Assessment for Zwartbosch Quarry, Eastern Cape                                                                     | 2008 |
| • Botanical description & map production for Quarry - Rudman Quarry, Eastern Cape                                              | 2008 |
| • Botanical Basic Assessment, Rehab Plan & Maps for Borrow Pit - Rocklands/Patensie, Eastern Cape                              | 2008 |
| • Botanical Assessment & Maps for Sandman Sand Gravel Mine, Eastern Cape                                                       | 2008 |
| • Botanical Assessment & GIS maps for Shamwari Borrow Pit, Eastern Cape                                                        | 2008 |
| • Detailed Botanical Assessment, EMP and Rehab Plan for Kalukundi Copper/Cobalt Mine, Democratic Republic of Congo             | 2008 |
| • Botanical Assessment, Rehab Plan & Maps for Borrow Pit Humansdorp/Oyster Bay, Eastern Cape                                   | 2008 |
| • Botanical Assessment, Rehab Plan & Maps for AWRM - Cala, Eastern Cape                                                        | 2008 |
| • Botanical Assessment, Rehab Plan & Maps for AWRM - Camdeboo, Eastern Cape                                                    | 2008 |
| • Botanical Assessment, Rehab Plan & Maps for AWRM - Somerset East, Eastern Cape                                               | 2008 |
| • Botanical Assessment, Rehab Plan & Maps for AWRM - Nkonkobe, Eastern Cape                                                    | 2008 |
| • Botanical Assessment, Rehab Plan & Maps for AWRM - Ndlambe, Eastern Cape                                                     | 2008 |
| • Botanical Assessment, Rehab Plan & Maps for AWRM - Blue Crane Route, Eastern Cape                                            | 2008 |

Mr Jamie Pote (BSc (Hons) PR. Sci. Nat.)

|                                                                                                                                 |      |
|---------------------------------------------------------------------------------------------------------------------------------|------|
| • Botanical Assessment, EMP and Rehabilitation Plan for AWRM - Cathcart, Eastern Cape                                           | 2008 |
| • Botanical Assessment, GIS maps and Rehab Plan for Mthatha Prospecting, Eastern Cape                                           | 2008 |
| • Regional Botanical Map for mining prospecting permit, Welkom                                                                  | 2008 |
| • Botanical Assessment for Scoping Report and Detailed Botanical Assessment and Rehab Plan for Elitheni Coal Mine, Eastern Cape | 2007 |
| • Botanical Assessment, Rehab Plan & Maps for Borrow Pit - Oyster Bay, Eastern Cape                                             | 2007 |
| • Botanical Assessment, Rehab Plan & Maps for Borrow Pit - Bathurst/GHT, Eastern Cape                                           | 2007 |
| • Botanical Assessment, Rehab Plan & Maps for Borrow Pit - Jeffreys Bay, Eastern Cape                                           | 2007 |
| • Botanical Assessment, Rehab Plan & Maps for Borrow Pit - Storms River/Kareedouw, Eastern Cape                                 | 2007 |
| • Biophysical Assessment for Humansdorp Quarry, Eastern Cape                                                                    | 2006 |
| • Botanical Assessment, Rehab Plan & Maps for Quarry-Cathcart & Somerset East, Eastern Cape                                     | 2006 |
| • Botanical Assessment, Rehab Plan & Maps for Quarry - Despatch Quarry, NMB                                                     | 2006 |
| • GIS Mapping & Botanical Assessment and Rehab Plan for Quarry - JBay Crushers, Eastern Cape                                    | 2006 |
| • Botanical Assessment, EMP and Rehabilitation Plan for Polokwane Silicon Smelter, Limpopo                                      | 2006 |
| • Application for Mining Permit for Bruce Howarth Quarry, Eastern Cape                                                          | 2006 |

POWERLINE INFRASTRUCTURE PROJECTS

|                                                                                                           |      |
|-----------------------------------------------------------------------------------------------------------|------|
| • Ecological Assessment: Dieprivier-Karreedouw 132kV Powerline realignment, Kouga LM                      | 2016 |
| • Eskom Ecological Walkdown: Dieprivier-Karreedouw 132 kV Powerline, Kouga LM                             | 2016 |
| • Eskom Solar one Ecological Walkdown: Nieuwehoop 400 kV powerline                                        | 2015 |
| • Rehabilitation Plan and Auditing for Grassridge-Poseidon Powerline Rehab, Eastern Cape                  | 2013 |
| • Ecological Assessment for Dieprivier Karreedouw 132kV Powerline, Eastern Cape                           | 2012 |
| • Flora and Fauna search and Rescue plan for Van Stadens Windfarm Powerline, NMB                          | 2012 |
| • Botanical Assessment for Dedisa-Grassridge Powerline, Eastern Cape                                      | 2010 |
| • Ecological Assessment for Grahamstown-Kowie Powerline, Eastern Cape                                     | 2010 |
| • Species of Special Concern Mapping Transmission Line for San Souci to Nivens Drift 132kV powerline, NMB | 2009 |
| • Botanical Assessment for Eskom Powerline - Albany-Kowie, Eastern Cape                                   | 2009 |
| • Botanical Assessment for Eskom 132 kV Dedisa Grassridge Power line-Coega, NMB                           | 2006 |
| • Botanical Assessment for Eskom Power line – Tyalara-Wilo, Eastern Cape                                  | 2006 |
| • Botanical Assessment for Steynsburg - Teebus 132 kV powerline, Eastern Cape                             | 2004 |

PIPELINE INFRASTRUCTURE PROJECTS

|                                                                                                    |      |
|----------------------------------------------------------------------------------------------------|------|
| • Terrestrial Biodiversity Assessment for Thornhill Phase 2 Sanitation Link, Ndlambe, Eastern Cape | 2020 |
| • Botanical Assessment for Ngqamakhwe Regional Water Supply Scheme (Phase 3)                       | 2018 |
| • Ecological Assessment for Butterworth Emergency Bulk Water Supply Scheme                         | 2017 |
| • Ecological Assessment for Karringmelkspruit Emergency Bulk Water Supply (Lady Grey)              | 2017 |
| • Ecological Assessment for Wanhoop-Willowmore Bulk Water Supply, Eastern Cape                     | 2016 |
| • Ecological Assessment for Steytlerville Bulk Water Supply, Eastern Cape (Phase 4)                | 2013 |
| • Ecological Assessment for Steytlerville Bulk Water Supply, Eastern Cape (Phase 5)                | 2013 |
| • Detailed Ecological Assessment for Suikerbos Pipeline, Gauteng                                   | 2012 |
| • Basic Botanical Assessment for Wanhoop farm pipeline, Eastern Cape                               | 2010 |
| • Basic Botanical Assessment for Chatty Sewer, NMB                                                 | 2010 |
| • Species of Special Concern Mapping for Seaview Pipeline, NMB                                     | 2009 |
| • Species of Special Concern Mapping for Chelsea Bulk Water Pipeline, NMB                          | 2009 |
| • Map Production for Russell Rd Stormwater, NMB                                                    | 2008 |
| • Basic Botanical Assessment for Albany Pipeline, Eastern Cape                                     | 2008 |
| • Environmental Risk Assessment for Elands River pipeline, Eastern Cape                            | 2007 |

Mr Jamie Pote (BSc (Hons) PR. Sci. Nat.)

- Detailed Botanical Assessment for Motherwell Pipeline, NMB 2007
- Detailed Botanical Assessment, GIS maps for Erasmuskloof Pipeline, Eastern Cape 2007
- Botanical & Floristic Report for Hankey pipeline, Eastern Cape 2006
- Detailed Botanical Assessment for Port Alfred water pipeline, Eastern Cape 2004

GENERAL INFRASTRUCTURE DEVELOPMENT PROJECTS

- Ecological Assessment for Amalinda crossing, BCM, Eastern Cape 2019
- Ecological Assessment for Cookhouse Bridge rehabilitation and temporary deviation, Eastern Cape 2019
- Ecological Assessment for Nelson Mandela University Access Road, NMB 2019
- Botanical Assessment for Zachtevelei Dam (Lady Grey), Eastern Cape 2017
- Botanical Assessment for Gcebula River bridge (Peddie), Eastern Cape 2017
- Botanical Assessment for Kouga Dam wall upgrade, Eastern Cape 2012
- Botanical Assessment for Jansenville Cemetery, Eastern Cape 2009
- Botanical Assessment for Radar Mast construction for South African Weather Service – BCM & NMB 2008
- Botanical Assessment and GIS mapping for golf course realignment for East London Golf Course, BCM, Eastern Cape 2007
- Botanical Assessment for PE Airport Extention, NMB 2006
- Botanical Assessment for Kidd's Beach Desalination Plant, BCM, Eastern Cape 2006

HOUSING DEVELOPMENT PROJECTS

- Terrestrial Biodiversity Assessment for Erf 1820 Mthatha, KSDM, Eastern Cape 2020
- Ecological Assessment for Erf 599 Walmer Mixed Use Development, Nelson Mandela Bay 2019
- Ecological Assessment Portion 21-23 and 41 of Farm 807, Gonubie, Buffalo City 2019
- Ecological Assessment for Emerald Sky Housing Project, BCMM 2019
- Ecological Assessment for Erf 14, Kabega, Port Elizabeth 2017
- Ecological Assessment for Fairwest Rental Housing, Port Elizabeth 2017
- Ecological Assessment for Hankey Housing, Kouga District Municipality 2015
- Ecological Assessment for Lebowakgoma Housing, Limpopo 2013
- Ecological Assessment for Giyani Development, Limpopo 2013
- Ecological Assessment for Palmietfontein Development, Limpopo 2013
- Ecological Assessment for Seshego Development, Limpopo 2013
- Botanical Assessment for Sheerness Road, BCM, Eastern Cape 2013
- Ecological Assessment for Ethembeni Housing, NMB 2012
- Ecological Assessment for Pelana Housing, Limpopo 2012
- Flora Search and Rescue Plan for Kwanobuhle Housing, Western Cape 2011
- Botanical Assessment for The Craggs 288/03, Western Cape 2010
- Ecological Assessment Revision Report for Fairview Housing, NMB 2010
- Botanical Assessment, EMP and Open Space Management Plan for Hornlee Housing Development, Western Cape 2010
- Botanical Assessment for Little Ladywood, Western Cape 2010
- Botanical Assessment and Open Space Management Plan for Motherwell NU31, NMB 2010
- Botanical Assessment and Open Space Management Plan for Plett 443/07, Western Cape 2010
- Botanical Assessment for Willow Tree Farm, NMB 2010
- Botanical Assessment for Kouga RDP Housing, Eastern Cape 2009
- Botanical Assessment for Fairview Erf 1226 (Wonderwonings), NMB 2009
- Species List Compilation for Zeekoerivier Humansdorp, Eastern Cape 2009
- Botanical Assessment for Woodlands Golf Estate (Farm 858), BCM, Eastern Cape 2009



Mr Jamie Pote (BSc (Hons) PR. Sci. Nat.)

|                                                                                             |      |
|---------------------------------------------------------------------------------------------|------|
| • Botanical Assessment for Plettenberg Bay - 438/4, Western Cape                            | 2009 |
| • Vegetation Assessment for Kwanokuthula RDP housing project, Western Cape                  | 2008 |
| • Site screening assessment for Greenbushes Site screening, NMB                             | 2008 |
| • Botanical Assessment for Fairfax development, Eastern Cape                                | 2008 |
| • Botanical Assessment for Plettenberg Bay Brakkloof 50&51, Western Cape                    | 2008 |
| • Botanical Assessment, GIS mapping for Theescombe Erf 325, NMB                             | 2008 |
| • Site Screening for Mount Road, NMB                                                        | 2008 |
| • Botanical Assessment for Greenbushes Farm 40 Swinburne 404, NMB                           | 2008 |
| • Botanical Assessment for Greenbushes 130, NMB                                             | 2008 |
| • Botanical Assessment for Greenbushes Kuyga no. 10, NMB                                    | 2008 |
| • Botanical Assessment for Plettenberg Bay - 438/24, Western Cape                           | 2007 |
| • Botanical Assessment for Plettenberg Bay - Olive Hills 438/7, Western Cape                | 2007 |
| • Botanical Assessment for Gonubie Portion 809/9, BCM, Eastern Cape                         | 2006 |
| • Botanical Assessment for Glengariff Farm 723, BCM, Eastern Cape                           | 2006 |
| • Botanical Assessment for Gonubie Portion 809/10, BCM, Eastern Cape                        | 2006 |
| • Botanical Assessment for Gonubie Portion 809/4 & 5, BCM, Eastern Cape                     | 2006 |
| • Botanical Assessment for Plettenberg bay - Ladywood 438/1&3, Western Cape                 | 2006 |
| • Botanical Assessment and Rehab Plan for Winterstrand Desalination Plant, BCM              | 2006 |
| • Botanical Assessment for Bosch Hoogte, NMB                                                | 2006 |
| • Botanical Assessment for Plettenberg bay Farm 444/38, Western Cape                        | 2006 |
| • Botanical Assessment for Plettenberg Bay - 444/27, Western Cape                           | 2006 |
| • Botanical Assessment for Leisure Homes, BCM, Eastern Cape                                 | 2006 |
| • Botanical Basic Assessment for Trailees Wetland Assessment, Eastern Cape                  | 2005 |
| • Botanical Assessment and Rehab Plan for Arlington Racecourse - PE, NMB                    | 2005 |
| • Botanical Assessment for Smart Stone, NMB                                                 | 2005 |
| • Botanical Assessment for Peninsular Farm (Port Alfred), Eastern Cape                      | 2005 |
| • Botanical Assessment for Mount Pleasant - Bathurst, Eastern Cape                          | 2005 |
| • Botanical Assessment and RoD amendments for Colchester Erven 1617 & 1618 (Riverside), NMB | 2005 |
| • Basic Botanical Assessment for Parsonsvelei 3/4, Eastern Cape                             | 2005 |
| • Botanical Assessment for Bridgemead – Malabar PE, NMB                                     | 2004 |

AGRICULTURAL PROJECTS

|                                                                                            |      |
|--------------------------------------------------------------------------------------------|------|
| • Ecological Assessment for Vermaak Boerdery Hydro Turbine (Cookhouse)2020                 | 2020 |
| • Thornhill Eggland Specialist Ecological Assessment                                       | 2020 |
| • Ecological Assessment for Citrus expansion on Hitgeheim Farm, Sunland, Eastern Cape      | 2015 |
| • Ecological Assessment for Citrus expansion on farm 960, Patensie (AIN du Preez Boerdery) | 2014 |
| • Ecological Assessment for Doornkraal Pivot (Hankey), Eastern Cape                        | 2014 |
| • Ecological Assessment for Tzaneen Chicken Farm, Limpopo                                  | 2013 |
| • Botanical Assessment and Open Space Management Plan for Kudukloof, NMB                   | 2010 |
| • Botanical Assessment and Open Space Management Plan for Landros Veeplaats, NMB           | 2010 |
| • Botanical Assessment and Flora Relocation Plan for Wildemans Plaas, NMB                  | 2006 |

GOLF ESTATE AND RESORT DEVELOPMENT PROJECTS

|                                                                                            |      |
|--------------------------------------------------------------------------------------------|------|
| • Species List& Comments Report for Kidds Beach Golf Course, BCM, Eastern Cape             | 2009 |
| • Botanical Assessment for Plettenberg Bay -Farm 288/03, Western Cape                      | 2009 |
| • Botanical Assessment for Rockcliff Golf Course, BCM, Eastern Cape                        | 2008 |
| • Botanical Assessment for Rockcliff Resort Development, BCM, Eastern Cape                 | 2007 |
| • Botanical Assessment, EMP and Rehabilitation Plan for Tiffendel Ski Resort, Eastern Cape | 2006 |

Mr Jamie Pote (BSc (Hons) PR. Sci. Nat.)

MIXED USE DEVELOPMENT PROJECTS

- Ecological Assessment for South-End Precinct Mixed Use Development, Nelson Mandela Bay 2018
- Botanical Assessment, EMP and Open Space Management Plan for Bay West City, NMB 2010
- Botanical Assessment, GIS maps, Open Space and Rehab Plans for Fairview Erf 1082, NMB 2009
- Botanical Assessment and GIS maps for Utopia Estate PE, NMB 2008
- Botanical Assessment and GIS mapping for Madiba Bay Leisure Park, NMB 2007
- Botanical Assessment and GIS mapping for Madiba Bay Leisure Park, NMB 2007
- Botanical Basic Assessment for Cuyler Manor (Farm 320), Uitenhage, NMB 2007

BUSINESS AND INDUSTRIAL DEVELOPMENT PROJECTS

- Ecological Assessment for Parsonsvei Erf 984 & 1134 Parsonsvei, NMB 2020
- Mthatha Retails and Service Center 2020
- Ecological Assessment for Walmer Erf 11667 - Bidfood Warehousing Development, NMB 2020
- Ecological Assessment for Portion 87 of the Farm Little Chelsea No 10, NMB 2020
- Ecological Assessment for Bay West City ENGEN Service Station, NMB 2015
- Ecological Assessment for Green Star grading for SANRAL, NMB 2014
- Ecological Assessment for OTGC Tank Farm, NMB 2012
- Botanical Assessment and Open Space Management Plan for Petro SA Refinery, Coega IDZ, NMB 2010
- Botanical Assessment for Bluewater Bay Erf 805, NMB 2009
- Ecological Assessment for Bay West City, NMB 2007
- Botanical Assessment for Kenton Petrol Station, Eastern Cape 2005
- Botanical Assessment and RoD amendments for Colchester Petrol Station, NMB 2005

ECO-ESTATE DEVELOPMENT PROJECTS

- Botanical Re-Assessment of Swanlake Eco Estate, Aston Bay, Eastern Cape 2018
- Detailed Botanical Assessment and Open Space Management Plan for Olive Hills, Western Cape 2010
- Botanical Assessment and EMP for Zwartbosch Road, Eastern Cape 2010
- Botanical Assessment - Poultry Farm for Coega Kammaskloof Farm 191, NMB 2008
- Botanical Assessment - Housing development for Coega Ridge, NMB 2008
- Botanical Assessment, Rehabilitation Plan, EMP and GIS maps for Amanzi Estate, NMB, 2008
- Botanical Assessment for Roydon Game farm, Queenstown, Eastern Cape 2007
- Botanical Assessment for Winterstrand Estate (Farm 1008), BCM, Eastern Cape 2007
- Botanical Assessment for Homeleigh Farm 820, BCM, Eastern Cape 2007
- Botanical Basic Assessment, Rehab Plan & Maps for Candlewood, Tsitsikamma, Western Cape 2007
- Botanical Assessment, EMP and Rehab Plan for Carpe Diem Eco development, Eastern Cape 2007
- Botanical Assessment, EMP and Rehabilitation Plan for Seaview Eco-estate, NMB 2006
- Botanical Assessment for Kidd's Beach portion 1076, BCM, Eastern Cape 2006
- Botanical Assessment for Palm Springs, Kidds Beach East London, BCM, Eastern Cape 2006
- Botanical Assessment for Nahoon Farm 29082, BCM, Eastern Cape 2006
- Botanical Assessment for Rosehill Farm, Eastern Cape 2005
- Botanical Assessment for Resolution Game Farm, Eastern Cape 2005
- Botanical Assessment for Gonubie Portion 809/11, BCM, Eastern Cape 2005
- Botanical Assessment for Kidd's Beach portion 1075, BCM, Eastern Cape 2005

FLORA AND FAUNA RELOCATION PLANS, PERMITS AND IMPLEMENTATION

- Flora Search and Rescue for Nelson Mandela University Phase 2 & 3 Residences, Eastern Cape 2020

Mr Jamie Pote (BSc (Hons) PR. Sci. Nat.)

|                                                                                                    |      |
|----------------------------------------------------------------------------------------------------|------|
| • Flora Search and Rescue for Fairwest Housing Estate, Nelson Mandela Bay, Eastern Cape            | 2019 |
| • Flora Search and Rescue for Utopia Estate, Nelson Mandela Bay, Eastern Cape                      | 2019 |
| • Flora Search and Rescue for Citrus expansion on Boschkraal Citrus Farm, Sunland, Eastern Cape    | 2018 |
| • Flora Search and Rescue for Wanhoop pipeline, Willowmore, Eastern Cape                           | 2018 |
| • Flora Search and Rescue for Wilgekloof pipeline, Willowmore, Eastern Cape                        | 2018 |
| • Flora Search and Rescue for Citrus expansion on Hitgeheim Farm (Farm 960), Sunland, Eastern Cape | 2017 |
| • Flora Search and Rescue for Steytlerville Bulk Water Supply, Eastern Cape (Phase 5)              | 2016 |
| • Flora Search and Rescue for Citrus expansion on Farm 960, Patensie (AIN du Preez Boerdery)       | 2016 |
| • Flora Search and Rescue for Steytlerville Bulk Water Supply & WTW, Eastern Cape (Phase 4)        | 2015 |
| • Flora and Fauna Search and Rescue for Riversbend Citrus Farm, NMB                                | 2014 |
| • Flora and Fauna Search and Rescue for Mainstream Windfarm, Eastern Cape                          | 2013 |
| • Flora Search and Rescue for Steytlerville Bulk Water Supply, Eastern Cape (Phase 1, 2 & 3)       | 2013 |
| • Flora and Fauna Search and Rescue for OTGC Tank Farm, Coega IDZ, NMB                             | 2013 |
| • Flora and Fauna Search and Rescue for Jeffreys Bay School, Eastern Cape                          | 2013 |
| • Flora Search and Rescue Plan for Red Cap Wind Farm, Eastern Cape                                 | 2012 |
| • Flora Relocation for Disco Poultry Farm, NMB                                                     | 2010 |
| • Flora Relocation for Mainstream Windfarm, Eastern Cape                                           | 2010 |

ENVIRONMENTAL MANAGEMENT PLANS

|                                                                                                                                                                                     |      |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| • Final Environmental Management Programme (EMPr) and Maintenance Management Plan for South End Precinct Mixed Use Zone, Nelson Mandela Bay Municipality                            | 2020 |
| • Final Environmental Management Programme (EMPr) for Coega Land-Based Aquaculture Development Zone (ADZ), Coega Industrial Development Zone (IDZ), Nelson Mandela Bay Municipality | 2019 |
| • Basic Botanical Assessment for Kromensee EMP (Jeffries Bay), Eastern Cape                                                                                                         | 2010 |
| • Wetland Management Plan for NMB Portnet, NMB                                                                                                                                      | 2010 |
| • Baseline Botanical Study, Vegetation mapping and EMP for Local Nature Reserve for Plettenberg Bay Lookout LNA, Western Cape                                                       | 2009 |
| • Biodiversity & Ecological Processes for Bathurst-Commonage, Eastern Cape                                                                                                          | 2006 |
| • EMP for Kromensee EMP (Jeffries Bay), Eastern Cape                                                                                                                                | 2006 |
| • Floral Survey for Mbotyi Conservation Assessment, Eastern Cape                                                                                                                    | 2005 |
| • Identifying and Assessment on Aquatic Weeds for Pumba Private Game Reserve, Eastern Cape                                                                                          | 2005 |

BASIC ASSESSMENT APPLICATION PROJECTS (DEDEAT)

|                                                                                              |      |
|----------------------------------------------------------------------------------------------|------|
| • Basic Assessment Application for Parsonsvei Erf 984 & 1134 Parsonsvei                      | 2020 |
| • Construction of Deviation and Rehabilitation of Bridge along DR02481 road                  | 2020 |
| • Basic Assessment Application for Vermaak Boerdery Hydro Turbine (Cookhouse)                | 2020 |
| • Basic Assessment Application for Walmer Erf 11667 Bidfood Warehousing Development          | 2020 |
| • Basic Assessment Application for Portion 87 of the Farm Little Chelsea No 10               | 2020 |
| • Basic Assessment Application for Nelson Mandela University Access Road, NMB                | 2019 |
| • Basic Assessment, WULA and Borrow Pit/Quarry Mining Application, Clarkebury Rd, Idutywa    | 2019 |
| • Basic Assessment Application for Erf 599 Walmer Mixed Use Development, Nelson Mandela Bay  | 2019 |
| • Basic Assessment Application for Cookhouse Bridge rehabilitation and temporary deviation   | 2019 |
| • Basic Assessment Application for Erf 14 Kabega, NMBM                                       | 2017 |
| • Basic Assessment Application for Hankey Housing, Kouga District Municipality               | 2017 |
| • Basic Assessment Application for Fairwest Rental Housing, Nelson Mandela Bay               | 2017 |
| • Basic Assessment Application for Citrus expansion on Hitgeheim Farm, Sunland, Eastern Cape | 2015 |



Mr Jamie Pote (BSc (Hons) PR. Sci. Nat.)

- Basic Assessment Application for Hankey Housing, Kouga District Municipality 2015
- Basic Assessment Application for Citrus expansion on farm 960, Patensie (AIN du Preez Boerdery) 2014
- Basic Assessment Application for South-End Precinct Mixed Use Development, Nelson Mandela Bay 2018

MINING PERMIT/ENVIRONMENTAL MANAGEMENT PROGRAMME APPLICATIONS (DMR)

- Mining BAR/EMP's for Blue Crane Route & Camdeboo LM 12 Borrow Pits – (DoT) 2019
- Mining BAR/EMP's for Elundini LM 6 Borrow Pits (DoT)
- Mining BAR/EMP's for Baviaans LM 6 Borrow Pits (DoT)
- Mining BAR/EMP's for Kouga & Koukamma LM 12 Borrow Pits (DoT)
- Mining BAR/EMP's for Sakhisizwe & Engcobo LM 12 Borrow Pits (DoT)
- Mining BAR/EMP's for Senqu LM 12 Borrow Pits (DoT)
- Mining BAR/EMP's for 24 Borrow Pits in 6 districts within the Eastern Cape – (SANRAL) 2018
- Mining BAR/EMP's for Ingquza Hill LM Borrow Pits – (SANRAL) 2017
- Mining BAR/EMP's for Baviaans LM Borrow Pits – (DRPW) 2017
- Mining BAR/EMP's for Senqu LM Borrow Pits – (DRPW) 2017
- Mining BAR/EMP's for Kouga/Koukamma LM Borrow Pits – (DRPW) 2017
- Mining BAR/EMP's for Inkwanca (Enoch Mgijima) LM Borrow Pits – (DRPW) 2017
- Mining BAR/EMP's for Kouga/Koukamma LM Borrow Pits – (DRPW) 2017
- Mining BAR/EMP's for Sakhisizwe/Engcobo LM Borrow Pits – (DRPW) 2017
- Mining BAR/EMP's for Raymond Mahlaba LM Borrow Pits – (DRPW) 2017
- Mining BAR/EMP's for Camdeboo LM Borrow Pits – (DRPW) 2017
- Mining BAR/EMP's for Elundini LM Borrow Pits – (DRPW) 2017
- Mining BAR/EMP's for Emalahleni/Intsika Yethu LM Borrow Pits – (DRPW) 2017
- Mining BAR/EMP's for Nkonkobe LM Borrow Pits – (SANRAL) 2016
- Mining BAR/EMP's for Mbhashe LM Borrow Pits – (SANRAL) 2016
- Mining BAR/EMP's for Mbizana LM Borrow Pits – (SANRAL) 2016
- Mining BAR/EMP's for Senqu LM Borrow Pits – (SANRAL) 2016
- Mining BAR/EMP's for Elundini LM Borrow Pits – (SANRAL) 2016
- Mining BAR/EMP's for Emalahleni LM Borrow Pits – (SANRAL) 2016
- Mining BAR/EMP's for Emalahleni LM Borrow Pits – (DRPW) 2016
- Mining BAR/EMP's for Ikwezi/Baviaans LM Borrow Pits – (DRPW) 2016
- Mining BAR/EMP's for Chris Hani DM Borrow Pits - MR00716 (Tarkastad) (DRPW) 2015
- Mining BAR/EMP's for Chris Hani DM Borrow Pits - Intsika Yethu and Emalahleni (DRPW) 2015
- Mining BAR/EMP's for Joe Gqabi DM Borrow Pits - Senqu (DRPW) 2015
- Mining BAR/EMP's for Makana/Ndlambe LM Borrow Pits - Sarah Baartman (DRPW) 2015
- Mining BAR/EMP's for Amahlathi LM Borrow Pits - Amatole (DRPW) 2015
- Mining BAR/EMP's for Mbashe/Mqume LM Borrow Pits - Amatole (DRPW) 2015
- Mining BAR/EMP's for Sundays River Valley LM Borrow Pits - Sarah Baartman (DRPW) 2015
- Mining BAR/EMP's for Kouga LM Borrow Pits - Sarah Baartman (DRPW) 2015
- Mining BAR/EMP's for Chris Hani DM Borrow Pits - MR00716 (DRPW) 2014
- Mining BAR/EMP's for Chris Hani DM Borrow Pits - DR02581 (DRPW) 2014
- Mining BAR/EMP's for Chris Hani DM Borrow Pits - DR08041, DR08247, DR08248 & DR08504 (DRPW) 2014
- Mining BAR/EMP's for Chris Hani DM Borrow Pits - DR08599, DR08601 & DR08570 (DRPW) 2014
- Mining BAR/EMP's for Chris Hani DM Borrow Pits - DR08235, DR08551 & DR08038 (DRPW) 2014
- Mining BAR/EMP's for Alfred Nzo DM Borrow Pits - DR08092, DR08093 & DR08649 (DRPW) 2014
- Mining BAR/EMP's for Alfred Nzo DM Borrow Pits - DR08090, DR08412, DR08425, DR08129, DR08109, DR08106, DR08104 & DR08099 - Matatiele (DRPW) 2014

Mr Jamie Pote (BSc (Hons) PR. Sci. Nat.)

ENVIRONMENTAL COMPLIANCE AUDITING

- Environmental Compliance Audit (Habata Boerdery) 2021
- Environmental Compliance Audit (Sontule Farm) 2021

ENVIRONMENTAL MANAGEMENT, AUDITING, COMPLIANCE AND MONITORING PROJECTS

- Environmental Auditing Services Pre-construction and Construction (Rocky Coast Farm) 2021
- Environmental Auditing Services (Middledrift Breeder Facility) 2021
- Coega Aquaculture Development Zone Environmental Compliance and Monitoring for Construction (24 Months) 2020
- Construction of NMU West End Student Residences Phases 1 & 3 Environmental Control Office (30 Months) 2020
- Environmental Auditing and construction monitoring for construction of Phase 1 River Park (South End Precinct) 2020
- Waste Management License audit for Bedford Recycling project 2020
- Auditing for Construction of Fairwest Village Housing Project 2019
- Auditing for Construction of Utopia Estate monthly auditing 2019
- ECO for DRPW IRM Road Maintenance projects, Baviaans LM 2019
- ECO for DRPW IRM Road Maintenance projects, Senqu LM 2019
- ECO for DRPW IRM Road Maintenance projects, Kouga/Koukamma LM 2019
- ECO for DRPW IRM Road Maintenance projects, Sakhisizwe/Engcobo LM 2019
- ECO for DRPW IRM Road Maintenance projects, Elundini LM 2019
- ECO for DRPW IRM Road Maintenance projects, Emalahleni/Intsika Yethu LM 2019
- ECO for Construction of Fairwest Village Housing Project 2019
- ECO for Construction of Utopia Estate Mixed Use Project 2019
- ECO for Construction of NMU West End Student Residences Phases 1 & 3 2019
- ECO for Construction of Eco-Pullets pullet rearing facility, Paterson 2018
- ECO for DRPW IRM Road Maintenance projects, Raymond Mahlaba LM 2018
- ECO for DRPW IRM Road Maintenance projects, Inkwanca (Enoch Mgiijima) LM 2018
- ECO for Citrus expansion on Farm 960, Patensie (AIN du Preez Boerdery) 2017
- ECO for Citrus expansion on Hitgeheim Farm (Farm 960), Sunland, Eastern Cape 2017
- DEO for improvement of national route R67 section 5 from Whittlesea (km 0.00) to Swart Kei river (km 15.40) – Murray & Roberts 2017
- ECO for SANRAL RRP Road Maintenance projects, Mbizana LM 2017
- ECO and Botanical Specialist for the special maintenance of national route R61 Section 2 from Elinus Farm (km 42.2) to N10 (km 85.0) (SANRAL) 2016
- Environmental Control Officer (ECO): Construction of NSRI Slipway - Port Elizabeth Harbour 2016
- ECO for SANRAL RRP Road Maintenance projects, Mbashe LM 2016
- ECO for SANRAL RRP Road Maintenance projects, Nkonkobe LM 2016
- ECO for SANRAL RRP Road Maintenance projects, Mbizana LM 2016
- ECO for SANRAL RRP Road Maintenance projects, Senqu LM 2016
- ECO for SANRAL RRP Road Maintenance projects, Elundini LM 2016
- ECO and Environmental Management for closure of Bushmans River Landfill site 2016
- ECO for DRPW IRM Road Maintenance projects, Amahlathi Municipality 2015
- ECO for DRPW IRM Road Maintenance projects, Makana/Ndlambe Municipality 2015
- ECO for DRPW IRM Road Maintenance projects, Mbashe/Mqume Municipality 2015
- ECO for DRPW IRM Road Maintenance projects, Port St Johns, Mbizana, Ingquza Hill LM's 2015
- ECO for Riversbend Citrus Farm, NMB 2014
- ECO for Alfred Nzo DM Road resurfacing - DR08071, DR08649, DR08092, DR08418, DR08452, DR08015, DR08085, DR08639 & DR08073, Eastern Cape - MSBA 2014



Mr Jamie Pote (BSc (Hons) PR. Sci. Nat.)

|                                                                               |      |
|-------------------------------------------------------------------------------|------|
| • ECO Audits for Koukamma Flood Damage Road Repairs – Hatch Goba              | 2014 |
| • EMP and ECO for Utopia Estate, NMB                                          | 2013 |
| • Final EMP submission for Seaview Garden Estate, NMB                         | 2012 |
| • ECO audits for NMB Road surfacing, NMB (multiple contacts)                  | 2011 |
| • EMP submission and ECO for Seaview Garden Estate, NMB                       | 2010 |
| • ECO for Mainstream Windfarm wind monitoring mast installation, Eastern Cape | 2010 |
| • EMP and ECO for Sinati Golf Estate EMP, BCM, Eastern Cape                   | 2009 |
| • Flora Relocation Plan and Permit application for Wildemans Plaas, NMB       | 2006 |

ENVIRONMENTAL SCREENING PROJECTS

|                                                                                                    |      |
|----------------------------------------------------------------------------------------------------|------|
| • Somerset East Stormwater Environmental Screening Report                                          | 2021 |
| • Woodlands Diary Road Upgrade Environmental Screening Report, Kouga LM                            | 2021 |
| • Risk Assessment and Screening for proposed Heatherbank access road, NMB                          | 2020 |
| • Environmental Screening Report for Proposed Life Hospital parking expansion, NMB                 | 2019 |
| • Environmental Screening Report for Erf 984 & 1134 development, Parsonslei, NMB                   | 2019 |
| • Environmental Screening Report for proposed Khayaletu School, Buffalo City                       | 2018 |
| • Environmental Screening Report for Proposed Housing Development of Erf 8700, Kabega Park, NMB    | 2017 |
| • Environmental Screening Report for Proposed Housing Development of Erf 14, Kabega Park, NMB      | 2017 |
| • Environmental Screening Report for Proposed Fairvest Social Housing project, Fairview, NMB       | 2016 |
| • Environmental Screening Report for Development of Little Chelsea No 25, NMB                      | 2016 |
| • Terrestrial Vegetation Risk Assessment for proposed Skietnek Citrus Farm development (Kirkwood)  | 2015 |
| • Preliminary Environmental Risk Assessment: NSRI Slipway Port Elizabeth                           | 2015 |
| • Environmental Screening Report for Proposed Development of a Dwelling on Erf 899, Theescombe     | 2015 |
| • Environmental Screening Report for Proposed Development on Erf 559, Walmer, Port Elizabeth       | 2015 |
| • Environmental Screening Report for Proposed Housing Scheme Development of Erf 8709, Wells Estate | 2015 |
| • Environmental Screening Report for Development of Portion 10 of Little Chelsea No 87, NMB        | 2015 |

SECTION 24G APPLICATIONS

|                                                                               |      |
|-------------------------------------------------------------------------------|------|
| • 12 000 ML Dam constructed on farm 960, Patensie (MGM Trust)                 | 2015 |
| • Illegal clearing of 20 Ha of lands on Hitgeheim Farm, Sunland, Eastern Cape | 2015 |

CONFERENCES AND PUBLICATIONS

- Pote, J., Shackleton, C.M., Cocks, M. & Lubke, R. 2006. *Fuelwood harvesting and selection in Valley Thicket, South Africa*. *Journal of Arid Environments*, 67: 270-287.
- Pote, J., Cocks, M., Dold, T., Lubke, R.A. and Shackleton, C. 2004. *The homegarden cultivation of indigenous medicinal plants in the Eastern Cape*. *Indigenous Plant Use Forum*, 5 - 8 July 2004, Augsburg Agricultural School, Clanwilliam, Western Cape.
- Pote, J. & Lubke, R.A. 2003. *The selection of indigenous species suitable for use as fuelwood and building materials as a replacement of invasive species that are currently used by the under-privileged in the Grahamstown commonage*. *Working for Water Inaugural Research Symposium* 19 - 21 August 2003, Kirstenbosch. Poster presentation.
- Pote, J. & Lubke, R.A. 2003. *The screening of indigenous pioneer species for use as a substitute cover crop for rehabilitation after removal of woody alien species by WfW in the grassy fynbos biome in the Eastern Cape*. *Working for Water Inaugural Research Symposium* 19 - 21 August 2003, Kirstenbosch, South Africa.



Mr Jamie Pote (BSc (Hons) PR. Sci. Nat.)

OTHER RESEARCH EXPERIENCE

- Resource assessment of bark stripped trees in indigenous forests in Weza/Kokstad area (June 2000; Dr C. Geldenhuis & Mr. M. Kaplin).
- Working for Water research project for indigenous trees for woodlots (December 2000/January 2001; Prof R.A. Lubke, Rhodes University).
- Project coordinator and leader of the REFYN project – A BP conservation gold award: Conservation and Restoration of Grassy-Fynbos. A multidisciplinary project focusing on management, restoration and public awareness/education (2001 – 2002).
- Conservation Project Management Training Workshops: Royal Geographical Society, London 2001 – Fieldwork Techniques, Habitat Assessment, Biological Surveys, Project Planning, Public Relations and Communications, Risk Assessment, Conservation Education
- Selection and availability of wood in Crossroads village, Eastern Cape, South Africa. Honours Research Project 2002. Supervisors: Prof. R.A. Lubke & Prof. C. Shackleton.
- Floral Morphology, Pollination and Reproduction in Cyphia (LOBELIACEAE). Honours Research Project 2002. Supervisor: Mr. P. Phillipson.
- Forestry resource assessment of bark-stripped species in Amatola District (December 2002; Prof R.A. Lubke).
- Homegarden Cultivation of Medicinal Plants in the Amathole area. Postgraduate Research Project (2003-2005; Prof R.A. Lubke, Prof C.M. Shackleton and Ms C.M., Cocks).

## 8.6 Appendix F: Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Biodiversity

### **SCOPE**

The protocol (*Procedures for the assessment and minimum criteria for reporting on identified environmental themes in terms of sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, when applying for environmental authorisation (GN 320, 20 March 2020)*) provides the criteria for the assessment and reporting of impacts on terrestrial biodiversity for activities requiring environmental authorisation.

The protocol (*Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of sections 24(5)(a) and (h) and 44 of NEMA, gazetted on 30 October 2020*), provides the criteria for the assessment and reporting of impacts on plant and animal species for activities requiring environmental authorisation.

These protocols replace the requirements of Appendix 6 of the Environmental Impact Assessment Regulation<sup>9</sup>.

The assessment and minimum reporting requirements of this protocol are associated with a level of environmental sensitivity identified by the national web based environmental screening tool (<https://screening.environment.gov.za/screeningtool>). The requirements for terrestrial biodiversity are for landscapes or sites which support various levels of biodiversity. The relevant terrestrial biodiversity data in the screening tool has been provided by the South African National Biodiversity Institute<sup>10</sup>.

### **SITE SENSITIVITY VERIFICATION AND MINIMUM REPORT CONTENT REQUIREMENTS**

Prior to commencing with a specialist assessment, the current use of the land and the potential environmental sensitivity of the site under consideration as identified by the screening tool must be confirmed by undertaking a site sensitivity verification.

2.1. The site sensitivity verification must be undertaken by an environmental assessment practitioner or a specialist.

2.2. The site sensitivity verification must be undertaken through the use of:

- (a) a desk top analysis, using satellite imagery,
- (b) a preliminary on-site inspection; and
- (c) any other available and relevant information.

2.3. The outcome of the site sensitivity verification must be recorded in the form of a report that:

- (a) confirms or disputes the current use of the land and environmental sensitivity as identified by the screening tool, such as new developments or infrastructure, the change in vegetation cover or status etc.;
- (b) contains a motivation and evidence (e.g., photographs) of either the verified or different use of the land and environmental sensitivity; and
- (c) is submitted together with the relevant assessment report prepared in accordance with the requirements of the Environmental Impact Assessment Regulations.

<sup>9</sup> The Environmental Impact Assessment Regulations, as promulgated in terms of Section 24 (5) of the National Environmental Management Act, 1998 (Act 107 of 1998).

<sup>10</sup> The biodiversity dataset has been provided by the South African National Biodiversity Institute (for details of the dataset, click on the options button to the right of the various biodiversity layers on the screening tool).

## TERRESTRIAL BIODIVERSITY SPECIALIST ASSESSMENT AND MINIMUM REPORT CONTENT REQUIREMENTS

| ASSESSMENT AND REPORTING OF IMPACTS ON TERRESTRIAL BIODIVERSITY    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |   |
|--------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|
| 1                                                                  | General Information                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |   |
| 1.1                                                                | An applicant intending to undertake an activity identified in the scope of this protocol, on a site identified on the screening tool as being "very high sensitivity" for terrestrial biodiversity, must submit a Terrestrial Biodiversity Specialist Assessment.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | ✓ |
| 1.2                                                                | An applicant intending to undertake an activity identified in the scope of this protocol on a site identified by the screening tool as being 'low sensitivity' for terrestrial biodiversity, must submit a Terrestrial Biodiversity Compliance Statement.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | ✓ |
| 1.3                                                                | However, where the information gathered from the site sensitivity verification differs from the designation of 'very high' terrestrial biodiversity sensitivity on the screening tool and it is found to be of a 'low' sensitivity, then a Terrestrial Biodiversity Compliance Statement must be submitted.                                                                                                                                                                                                                                                                                                                                                                                                                                                 | ✓ |
| 1.4                                                                | Similarly, where the information gathered from the site sensitivity verification differs from that identified as having a 'low' terrestrial biodiversity sensitivity on the screening tool, a Terrestrial Biodiversity Specialist Assessment must be conducted.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | ✓ |
| 1.5                                                                | If any part of the proposed development footprint falls within an area of 'very high' sensitivity, the assessment and reporting requirements prescribed for the 'very high' sensitivity apply to the entire footprint, excluding linear activities for which impacts on terrestrial biodiversity are temporary and the land in the opinion of the terrestrial biodiversity specialist, based on the mitigation and remedial measures, can be returned to the current state within two years of the completion of the construction phase, in which case a compliance statement applies. Development footprint in the context of this protocol means the area on which the proposed development will take place and includes any area that will be disturbed. | ✓ |
| VERY HIGH SENSITIVITY RATING for terrestrial biodiversity features |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |   |
| 2                                                                  | Terrestrial Biodiversity Specialist Assessment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |   |
| 2.1                                                                | The assessment must be prepared by a specialist registered with the South African Council for Natural Scientific Professionals (SACNASP) with expertise in the field of terrestrial biodiversity.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |   |
| 2.2                                                                | The assessment must be undertaken on the preferred site and within the proposed development footprint.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |   |
| 2.3                                                                | The assessment must provide a baseline description of the site which includes, as a minimum, the following aspects:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |   |
| 2.3.1                                                              | a description of the ecological drivers or processes of the system and how the proposed development with impact these;                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |   |
| 2.3.2                                                              | ecological functioning and ecological processes (e.g. fire, migration, pollination, etc.) that operate within the preferred site;                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |   |
| 2.3.3                                                              | the ecological corridors that the proposed development would impede including migration and movement of flora and fauna;                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |   |
| 2.3.4                                                              | the description of any significant terrestrial landscape features (including rare or important flora-faunal associations, presence of strategic water source areas (SWSAs) or freshwater ecosystem priority area (FEPA) sub catchments);                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |   |
| 2.3.5                                                              | a description of terrestrial biodiversity and ecosystems on the preferred site, including:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |   |
| (a)                                                                | main vegetation types;                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |   |
| (b)                                                                | threatened ecosystems, including listed ecosystems as well as locally important habitat types identified;                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |   |



|         | ASSESSMENT AND REPORTING OF IMPACTS ON TERRESTRIAL BIODIVERSITY                                                                                                                                                                   |  |
|---------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| (c)     | ecological connectivity, habitat fragmentation, ecological processes and fine- scale habitats; and                                                                                                                                |  |
| (d)     | species, distribution, important habitats (e.g. feeding grounds, nesting sites, etc.) and movement patterns identified;                                                                                                           |  |
| 2.3.6   | the assessment must identify any alternative development footprints within the preferred site which would be of 'low' sensitivity as identified by the screening tool and verified through the site sensitivity verification; and |  |
| 2.3.7   | the assessment must be based on the results of a site inspection undertaken on the preferred site and must identify:                                                                                                              |  |
| 2.3.7.1 | terrestrial critical biodiversity areas (CBAs), including:                                                                                                                                                                        |  |
| (a)     | the reasons why an area has been identified as a CBA;                                                                                                                                                                             |  |
| (b)     | an indication of whether or not the proposed development is consistent with maintaining the CBA in a natural or near natural state or in achieving the goal of rehabilitation;                                                    |  |
| (c)     | the impact on species composition and structure of vegetation with an indication of the extent of clearing activities in proportion to remaining extent of the ecosystem type(s);                                                 |  |
| (d)     | the impact on ecosystem threat status;                                                                                                                                                                                            |  |
| (e)     | the impact on explicit subtypes in the vegetation;                                                                                                                                                                                |  |
| (f)     | the impact on overall species and ecosystem diversity of the site; and                                                                                                                                                            |  |
| (g)     | the impact on any changes to threat status of populations of species of conservation concern in the CBA;                                                                                                                          |  |
| 2.3.7.2 | terrestrial ecological support areas (ESAs), including:                                                                                                                                                                           |  |
| (a)     | the impact on the ecological processes that operate within or across the site;                                                                                                                                                    |  |
| (b)     | the extent the proposed development will impact on the functionality of the ESA; and                                                                                                                                              |  |
| (c)     | loss of ecological connectivity (on site, and in relation to the broader landscape) due to the degradation and severing of ecological corridors or introducing barriers that impede migration   and movement of flora and fauna;  |  |
| 2.3.7.3 | protected areas as defined by the National Environmental Management: Protected Areas Act, 2004 including                                                                                                                          |  |
| (a)     | an opinion on whether the proposed development aligns with the objectives or purpose of the protected area and the zoning as per the protected area management plan;                                                              |  |
| 2.3.7.4 | priority areas for protected area expansion, including-                                                                                                                                                                           |  |
| (a)     | the way in which in which the proposed development will compromise or contribute to the expansion of the protected area   network;                                                                                                |  |
| 2.3.7.5 | SWSAs (strategic water source areas) including:                                                                                                                                                                                   |  |
| (a)     | the impact(s) on the terrestrial habitat of SWSA; and                                                                                                                                                                             |  |
| (b)     | the impacts of the proposed development on the SWSA water quality and quantity (e.g. describing potential increased runoff leading to increased sediment load in water courses),                                                  |  |
| 2.3.7.6 | FEPA sub catchments, including-                                                                                                                                                                                                   |  |
| (a)     | the impacts of the proposed development on habitat condition and species in the FEPA sub catchment;                                                                                                                               |  |
| 2.3.7.7 | indigenous forests, including:                                                                                                                                                                                                    |  |
| (a)     | impact on the ecological integrity of the forest and                                                                                                                                                                              |  |

|        | ASSESSMENT AND REPORTING OF IMPACTS ON TERRESTRIAL BIODIVERSITY                                                                                                                                                                                                                                  |   |
|--------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|
| (b)    | percentage of natural or near natural indigenous forest area lost and a statement on the implications in relation to the remaining areas.                                                                                                                                                        |   |
| 2.4    | The findings of the assessment must be written up in a Terrestrial Biodiversity Specialist Assessment Report                                                                                                                                                                                     |   |
| 3.     | Terrestrial Biodiversity Specialist Assessment Report                                                                                                                                                                                                                                            |   |
| 3.1    | The Terrestrial Biodiversity Specialist Assessment Report must contain, as a minimum, the following information:                                                                                                                                                                                 |   |
| 3.1.1  | contact details of the specialist, their SACNASP registration number, their field of expertise and a curriculum vitae;                                                                                                                                                                           |   |
| 3.1.2  | a signed statement of independence by the specialist;                                                                                                                                                                                                                                            |   |
| 3.1.3  | a statement on the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment,                                                                                                                                                            |   |
| 3.1.4  | description of the methodology used to undertake the site verification and impact assessment and site inspection, including equipment and modeling used, where relevant;                                                                                                                         |   |
| 3.1.5  | a description of the assumptions made and any uncertainties or gaps in knowledge or data as well as a statement of the timing and intensity of site inspection observations;                                                                                                                     |   |
| 3.1.6  | a location of the areas not suitable for development, which are to be avoided during construction and operation (where relevant);                                                                                                                                                                |   |
| 3.1.7  | additional environmental impacts expected from the proposed development;                                                                                                                                                                                                                         |   |
| 3.1.8  | any direct, indirect and cumulative impacts of the proposed development;                                                                                                                                                                                                                         |   |
| 3.1.9  | the degree to which impacts and risks can be mitigated;                                                                                                                                                                                                                                          |   |
| 3.1.10 | the degree to which the impacts and risks can be reversed;                                                                                                                                                                                                                                       |   |
| 3.1.11 | the degree to which the impacts and risks can cause loss of irreplaceable resources;                                                                                                                                                                                                             |   |
| 3.1.12 | proposed impact management actions and impact management outcomes proposed by the specialist for inclusion in the Environmental Management Programme (EMPr),                                                                                                                                     |   |
| 3.1.13 | A motivation must be provided if there were development footprints identified as per paragraph 2.3.6 above that were identified as having a 'low' terrestrial biodiversity sensitivity and that were not considered appropriate,                                                                 |   |
| 3.1.14 | a substantiated statement based on the findings of the specialist assessment, regarding the acceptability, or not, of the proposed development, if it should receive approval or not; and                                                                                                        |   |
| 1.1.15 | any conditions to which this statement is subjected.                                                                                                                                                                                                                                             |   |
| 3.2    | The findings of the Terrestrial Biodiversity Specialist Assessment must be incorporated into the Basic Assessment Report or the Environmental Impact Assessment Report, including the mitigation and monitoring measures as identified, which must be incorporated into the EMPr where relevant. |   |
| 3.3    | A signed copy of the assessment must be appended to the Basic Assessment Report or Environmental Impact Assessment Report.                                                                                                                                                                       |   |
|        | <b>LOW SENSITIVITY RATING – for terrestrial biodiversity features</b>                                                                                                                                                                                                                            |   |
| 4      | Terrestrial Biodiversity Compliance Statement                                                                                                                                                                                                                                                    | ✓ |
| 4.1    | The compliance statement must be prepared by a specialist registered with the SACNASP and having expertise in the field of ecological sciences.                                                                                                                                                  | ✓ |
| 4.2    | The compliance statement must:                                                                                                                                                                                                                                                                   | ✓ |
| 4.2.1  | be applicable to the preferred site and proposed development footprint;                                                                                                                                                                                                                          | ✓ |
| 4.2.2  | confirm that the site is of 'low' sensitivity for terrestrial biodiversity; and                                                                                                                                                                                                                  | ✓ |

|       | ASSESSMENT AND REPORTING OF IMPACTS ON TERRESTRIAL BIODIVERSITY                                                                                                                                                                                                                    |     |
|-------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| 4.2.3 | indicate whether or not the proposed development will have any impact on the biodiversity feature.                                                                                                                                                                                 | ✓   |
| 4.3   | The compliance statement must contain, as a minimum, the following information:                                                                                                                                                                                                    | ✓   |
| 4.3.1 | the contact details of the specialist, their SACNASP registration number, their field of expertise and a curriculum vitae;                                                                                                                                                         | ✓   |
| 4.3.2 | a signed statement of independence by the specialist;                                                                                                                                                                                                                              | ✓   |
| 4.3.3 | a statement on the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment;                                                                                                                                              | ✓   |
| 4.3.4 | a baseline profile description of biodiversity and ecosystems of the site;                                                                                                                                                                                                         | ✓   |
| 4.3.5 | the methodology used to verify the sensitivities of the terrestrial biodiversity features on the site, including equipment and modeling used, where relevant;                                                                                                                      | ✓   |
| 4.3.6 | in the case of a linear activity, confirmation from the terrestrial biodiversity specialist that, in their opinion, based on the mitigation and remedial measures propped, the land can be returned to the current state within two years of completion of the construction phase; | ✓   |
| 4.3.7 | where required, proposed impact management outcomes or any monitoring requirements for inclusion in the EMPr;                                                                                                                                                                      | ✓   |
| 4.3.8 | a description of the assumptions made and any uncertainties or gaps in knowledge or data; and                                                                                                                                                                                      | ✓   |
| 4.3.9 | any conditions to which this statement is subjected.                                                                                                                                                                                                                               | EAP |
| 4.4   | A signed copy of the compliance statement must be appended to the Basic Assessment Report or Environmental Impact Assessment Report.                                                                                                                                               | EAP |

#### **ANIMAL SPECIES SPECIALIST ASSESSMENT AND MINIMUM REPORT CONTENT REQUIREMENTS**

|     | ASSESSMENT AND REPORTING OF IMPACTS ON TERRESTRIAL BIODIVERSITY                                                                                                                                                                                                                                                                                                                                                                 |   |
|-----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|
| 1   | General Information                                                                                                                                                                                                                                                                                                                                                                                                             |   |
| 1.1 | An applicant intending to undertake an activity identified in the scope of this protocol, on a site identified by the screening tool as being of “very high” or “high” sensitivity for terrestrial animal species must submit a Terrestrial Animal Species Specialist Assessment Report.                                                                                                                                        | ✓ |
| 1.2 | An applicant intending to undertake an activity identified in the scope of this protocol on a site identified by the screening tool as being of “medium sensitivity” for terrestrial animal species must submit either a Terrestrial Animal Species Specialist Assessment Report or a Terrestrial Animal Species Compliance Statement, depending on the outcome of a site inspection undertaken in accordance with paragraph 4. | ✓ |
| 1.3 | An applicant intending to undertake an activity identified in the scope of this protocol on a site identified by the screening tool as being of “low” sensitivity for terrestrial animal species must submit a Terrestrial Animal Species Compliance Statement.                                                                                                                                                                 | ✓ |
| 1.4 | Where the information gathered from the site sensitivity verification differs from the screening tool designation of “very high” or “high”, for terrestrial animal species sensitivity and it is found to be of a “low” sensitivity, then a Terrestrial Animal Species Compliance Statement must be submitted.                                                                                                                  | ✓ |
| 1.5 | Where the information gathered from the site sensitivity verification differs from the screening tool designation of “low” terrestrial animal species sensitivity and it is found to be of a “very high” or “high” terrestrial animal species sensitivity, a Terrestrial Animal Species Specialist Assessment must be conducted.                                                                                                | ✓ |
| 1.6 | If any part of the development falls within an area of confirmed “very high” or “high” sensitivity, the assessment and reporting requirements prescribed for the “very high”                                                                                                                                                                                                                                                    | ✓ |



|       | ASSESSMENT AND REPORTING OF IMPACTS ON TERRESTRIAL BIODIVERSITY                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |   |
|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|
|       | or “high” sensitivity, apply to the entire development footprint. Development footprint in the context of this protocol means, the area on which the proposed development will take place and includes the area that will be disturbed or impacted.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |   |
| 1.7   | The Terrestrial Animal Species Specialist Assessment and the Terrestrial Animal Species Compliance Statement must be undertaken within the study area.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | ✓ |
| 1.8   | Where the nature of the activity is not expected to have an impact on species of conservation concern (SCC) beyond the boundary of the preferred site, the study area means the proposed development footprint within the preferred site.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | ✓ |
| 1.9   | Where the nature of the activity is expected to have an impact on SCC beyond the boundary of the preferred site, the project areas of influence (PAOI) must be determined by the specialist in accordance with Species Environmental Assessment Guideline <sup>11</sup> , and the study area must include the PAOI, as determined.                                                                                                                                                                                                                                                                                                                                                                                                                                                            | ✓ |
|       | <b>VERY HIGH AND HIGH SENSITIVITY RATING for terrestrial animal species</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |   |
| 2     | Terrestrial Animal Species Specialist Assessment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |   |
|       | <b>VERY HIGH SENSITIVITY RATING</b><br>Critical habitat for range-restricted species <sup>12</sup> of conservation concern, that have a global range of less than 10 km <sup>2</sup> .<br>SCC listed on the IUCN Red List of Threatened Species <sup>13</sup> or on South Africa’s National Red List website <sup>14</sup> as Critically Endangered, Endangered or Vulnerable according to the IUCN Red List 3.1. Categories and Criteria or listed as Nationally Rare.<br>Species aggregations that represent ≥1% of the global population size of a species, over a season, and during one or more key stages of its life cycle.<br>The number of mature individuals that ranks the site among the largest 10 aggregations known for the species.<br>These areas are irreplaceable for SCC. | ✓ |
| 4.6   | Where SCC are found on site or have been confirmed to be likely present, a Terrestrial Animal Species Specialist Assessment must be submitted in accordance with the requirements specified for “very high” and “high” sensitivity in this protocol.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | ✓ |
| 4.7   | Similarly, where no SCC are found on site during the site inspection or the presence is confirmed to be unlikely, a Terrestrial Animal Species Compliance Statement must be submitted.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | ✓ |
| 5     | <b>LOW SENSITIVITY RATING – for terrestrial animal species</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |   |
|       | Terrestrial Animal Species Compliance Statement<br>Areas where no natural habitat remains.<br>Natural areas where there is no suspected occurrence of SCC.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |   |
| 5.1   | The compliance statement must be prepared by a SACNASP registered specialist under one of the two fields of practice (Zoological Science or Ecological Science).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | ✓ |
| 5.2   | The compliance statement must:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | ✓ |
| 5.2.1 | be applicable to the study area;                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | ✓ |
| 5.2.2 | confirm that the study area, is of “low” sensitivity for terrestrial animal species; and                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | ✓ |

<sup>11</sup> Available at <https://bgis.sanbi.org/>

<sup>12</sup> Species with a geographically restricted area of distribution.

<sup>13</sup> <https://www.iucnredlist.org/>

<sup>14</sup> This category includes the categories Extremely Rare, Critically Rare and Rare

|       | ASSESSMENT AND REPORTING OF IMPACTS ON TERRESTRIAL BIODIVERSITY                                                                                                       |   |
|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|
| 5.2.3 | indicate whether or not the proposed development will have any impact on SCC.                                                                                         | ✓ |
| 5.3   | The compliance statement <sup>15</sup> must contain, as a minimum, the following information:                                                                         | ✓ |
| 5.3.1 | contact details and relevant experience as well as the SACNASP registration number of the specialist preparing the compliance statement including a curriculum vitae; | ✓ |
| 5.3.2 | a signed statement of independence by the specialist;                                                                                                                 | ✓ |
| 5.3.3 | a statement on the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment;                                 | ✓ |
| 5.3.4 | a description of the methodology used to undertake the site survey and prepare the compliance statement, including equipment and modelling used where relevant;       | ✓ |
| 5.3.5 | the mean density of observations/ number of samples sites per unit area <sup>15</sup> .                                                                               | ✓ |
| 5.3.6 | where required, proposed impact management actions and outcomes or any monitoring requirements for inclusion in the EMPr;                                             | ✓ |
| 5.3.7 | a description of the assumptions made and any uncertainties or gaps in knowledge or data; and                                                                         | ✓ |
| 5.3.8 | any conditions to which the compliance statement is subjected.                                                                                                        | ✓ |
| 6.    | A signed copy of the Terrestrial Animal Species Compliance Statement must be appended to the Basic Assessment Report or the Environmental Impact Assessment Report.   | ✓ |

#### PLANT SPECIES SPECIALIST ASSESSMENT AND MINIMUM REPORT CONTENT REQUIREMENTS

|          | ASSESSMENT AND REPORTING OF IMPACTS ON TERRESTRIAL BIODIVERSITY                                                                                                                                                                                                                                                                                                                                                                             |   |
|----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|
| <b>1</b> | <b>General Information</b>                                                                                                                                                                                                                                                                                                                                                                                                                  |   |
| 1.1      | An applicant intending to undertake an activity identified in the scope of this protocol, on a site identified by the screening tool as being of “very high” or “high” sensitivity for <u>terrestrial plant species</u> must submit a <b>Terrestrial Plant Species Specialist Assessment Report</b> .                                                                                                                                       | ✓ |
| 1.2      | An applicant intending to undertake an activity identified in the scope of this protocol on a site identified by the screening tool as being of “medium sensitivity” for <u>terrestrial plant species</u> must submit <b>either a Terrestrial Plant Species Specialist Assessment Report or a Terrestrial Plant Species Compliance Statement</b> , depending on the outcome of a site inspection undertaken in accordance with paragraph 4. | ✓ |
| 1.3      | An applicant intending to undertake an activity identified in the scope of this protocol on a site identified by the screening tool as being of “low” sensitivity for <u>terrestrial plant species</u> must submit a <b>Terrestrial Plant Species Compliance Statement</b> .                                                                                                                                                                | ✓ |
| 1.4      | Where the information gathered from the site sensitivity verification differs from the screening tool designation of “very high” or “high”, for terrestrial plant species sensitivity and it is found to be of a “low” sensitivity, then a <b>Terrestrial Plant Species Compliance Statement</b> must be submitted.                                                                                                                         | ✓ |
| 1.5      | Where the information gathered from the site sensitivity verification differs from the screening tool designation of “low” terrestrial plant species sensitivity and it is found to be of a “very high” or “high” terrestrial plant species sensitivity, a <b>Terrestrial Plant Species Specialist Assessment</b> must be conducted.                                                                                                        | ✓ |
| 1.6      | If any part of the development falls within an area of confirmed “very high” or “high” sensitivity, the assessment and reporting requirements prescribed for the “very high” or “high” sensitivity, apply to the entire development footprint. Development footprint in the context of this protocol means, the area on which the proposed development will take place and includes the area that will be disturbed or impacted.            | ✓ |
| 1.7      | The <b>Terrestrial Plant Species Specialist Assessment</b> and the <b>Terrestrial Plant Species</b>                                                                                                                                                                                                                                                                                                                                         | ✓ |

<sup>15</sup> An example of a what is contained in a Compliance Statement for Animal Species Impact Assessment can be found in the Species Environmental Impact Assessment Guideline

| ASSESSMENT AND REPORTING OF IMPACTS ON TERRESTRIAL BIODIVERSITY            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |   |
|----------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|
|                                                                            | <b>Compliance Statement</b> must be undertaken within the <i>study area</i> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |   |
| 1.8                                                                        | Where the nature of the activity <b>is not</b> expected to have an impact on species of conservation concern (SCC) beyond the boundary of the preferred site, the study area means the proposed development footprint within the preferred site.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | ✓ |
| 1.9                                                                        | Where the nature of the activity <b>is</b> expected to have an impact on SCC beyond the boundary of the preferred site, the <i>project areas of influence</i> (PAOI) must be determined by the specialist in accordance with <i>Species Environmental Assessment Guideline</i> <sup>16</sup> , and the study area must include the PAOI, as determined.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | ✓ |
| <b>VERY HIGH AND HIGH SENSITIVITY RATING for terrestrial plant species</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |   |
| 2                                                                          | <b>Terrestrial Plant Species Specialist Assessment</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |   |
|                                                                            | <p><u>VERY HIGH SENSITIVITY RATING</u></p> <ol style="list-style-type: none"> <li>1. Critical habitat for range-restricted species<sup>17</sup> of conservation concern, that have a global range of less than 10 km<sup>2</sup>.</li> <li>2. SCC listed on the IUCN Red List of Threatened Species<sup>18</sup> or on South Africa's National Red List website<sup>19</sup> as Critically Endangered, Endangered or Vulnerable according to the IUCN Red List 3.1. Categories and Criteria or listed as Nationally Rare.</li> <li>3. Species aggregations that represent ≥1% of the global population size of a species, over a season, and during one or more key stages of its life cycle.</li> <li>4. The number of mature individuals that ranks the site among the largest 10 aggregations known for the species.</li> </ol> <p>These areas are irreplaceable for SCC.</p> <p><u>HIGH SENSITIVITY RATING</u></p> <ol style="list-style-type: none"> <li>1. Confirmed habitat for SCC.</li> <li>2. SCC, listed on the IUCN Red List of Threatened Species or South Africa's National Red List website as Critically Endangered, Endangered or Vulnerable, according to the IUCN Red List 3.1. Categories and Criteria and under the national category of Rare.</li> </ol> <p>These areas are unsuitable for development due to a very likely impact on SCC.</p> | ✓ |
| 2.3.12                                                                     | identify any <u>alternative development footprints</u> within the preferred site which would be of "low" or "medium" sensitivity as identified by the screening tool and verified through the site sensitivity verification.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | ✓ |
| 2.4                                                                        | The findings of the assessment must be written up in a <b>Terrestrial Plant Species Specialist Assessment Report</b> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | ✓ |
| 3                                                                          | <b>Terrestrial Plant Species Specialist Assessment Report</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | ✓ |
| 3.1.13                                                                     | a <u>motivation must be provided</u> if there were any development footprints identified as per paragraph 2.3.12 above that were identified as having "low" or "medium" terrestrial plant species sensitivity and were not considered appropriate.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | ✓ |
| 4                                                                          | <b>MEDIUM SENSITIVITY SPECIES OF CONSERVATION CONCERN CONFIRMATION</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |   |
|                                                                            | <b>MEDIUM SENSITIVITY RATING – for terrestrial plant species:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |   |
|                                                                            | <ol style="list-style-type: none"> <li>1. <u>Suspected habitat for SCC</u> based either on there being records for this species collected in the past, prior to 2002, or <u>being a natural area included in a habitat suitability model</u><sup>20</sup>.</li> <li>2. SCC listed on the IUCN Red List of Threatened Species or South Africa's National Red List website as Critically Endangered, Endangered or Vulnerable according to the IUCN Red List 3.1. Categories and Criteria and under the national category of Rare.</li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | ✓ |

<sup>16</sup> Available at <https://bgis.sanbi.org/>

<sup>17</sup> Species with a geographically restricted area of distribution.

<sup>18</sup> <https://www.iucnredlist.org/>

<sup>19</sup> This category includes the categories Extremely Rare, Critically Rare and Rare

<sup>20</sup> The methodology by which habitat suitability models have been developed are explained within the Species Environmental Assessment Guideline.



| ASSESSMENT AND REPORTING OF IMPACTS ON TERRESTRIAL BIODIVERSITY |                                                                                                                                                                                                                                                            |   |
|-----------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|
| 4.6                                                             | Where SCC are found on site or have been confirmed to be likely present, a <b>Terrestrial Plant Species Specialist Assessment</b> must be submitted in accordance with the requirements specified for “very high” and “high” sensitivity in this protocol. | ✓ |
| 4.7                                                             | Similarly, where no SCC are found on site during the site inspection or the presence is confirmed to be unlikely, a <b>Terrestrial Plant Species Compliance Statement</b> must be submitted.                                                               | ✓ |
| 5                                                               | <b>LOW SENSITIVITY RATING – for terrestrial plant species</b>                                                                                                                                                                                              |   |
|                                                                 | <b>Terrestrial Plant Species Compliance Statement</b>                                                                                                                                                                                                      | ✓ |
|                                                                 | 1. Areas where no natural habitat remains.                                                                                                                                                                                                                 |   |
|                                                                 | 2. Natural areas where there is no suspected occurrence of SCC.                                                                                                                                                                                            |   |
| 5.1                                                             | The compliance statement must be prepared by a SACNASP registered specialist under one of the two fields of practice (Botanical Science or Ecological Science).                                                                                            | ✓ |
| 5.2                                                             | The compliance statement must:                                                                                                                                                                                                                             | ✓ |
| 5.2.1                                                           | be applicable to the study area;                                                                                                                                                                                                                           | ✓ |
| 5.2.2                                                           | confirm that the study area, is of “low” sensitivity for terrestrial plant species; and                                                                                                                                                                    | ✓ |
| 5.2.3                                                           | indicate whether or not the proposed development will have any impact on SCC.                                                                                                                                                                              | ✓ |
| 5.3                                                             | The compliance statement <sup>21</sup> must contain, as a minimum, the following information:                                                                                                                                                              | ✓ |
| 5.3.1                                                           | contact details and relevant experience as well as the SACNASP registration number of the specialist preparing the compliance statement including a curriculum vitae;                                                                                      | ✓ |
| 5.3.2                                                           | a signed statement of independence by the specialist;                                                                                                                                                                                                      | ✓ |
| 5.3.3                                                           | a statement on the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment;                                                                                                                      | ✓ |
| 5.3.4                                                           | a description of the methodology used to undertake the site survey and prepare the compliance statement, including equipment and modelling used where relevant;                                                                                            | ✓ |
| 5.3.5                                                           | where required, proposed impact management actions and outcomes or any monitoring requirements for inclusion in the EMP;                                                                                                                                   | ✓ |
| 5.3.6                                                           | a description of the assumptions made and any uncertainties or gaps in knowledge or data;                                                                                                                                                                  | ✓ |
| 5.3.7                                                           | the mean density of observations/ number of samples sites per unit area <sup>22</sup> ; and                                                                                                                                                                | ✓ |
| 5.3.8                                                           | any conditions to which the compliance statement is subjected.                                                                                                                                                                                             | ✓ |
| 6                                                               | A signed copy of the <b>Terrestrial Plant Species Compliance Statement</b> must be appended to the Basic Assessment Report or the Environmental Impact Assessment Report.                                                                                  | ✓ |

<sup>21</sup> An example of a what is contained in a Compliance Statement for Plant Species Impact Assessment can be found in the Species Environmental Impact Assessment Guideline

<sup>22</sup> Refer to the Species Environmental Assessment Guideline

## 8.7 Site Sensitivity Verification Report

### 8.7.1 Background

Sharples Environmental Services cc (SES) has been appointed by Lyners Engineers on behalf of the George Municipality (applicant), to conduct the Environmental Impact Assessment process for the proposed upgrading of stormwater infrastructure of Rosemoor, George, Western Cape (Figure 51). As part of this application, a Terrestrial Biodiversity, Plant & Animal Specialist Assessment is required. assessment is required to support the necessary environmental applications.



Figure 51: Site locality.

### 8.7.2 Activity Location and Description

The site is situated within a transformed developed suburb, that is drained by a network of vegetated watercourses. The development proposal construction of stormwater discharge points within the vegetated areas adjacent to the watercourses in order to facilitate improved and controlled stormwater discharge.

### 8.7.3 Purpose of Report

The “Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of sections 24 (5) (a) and (h) and 44 of the Act, when applying for Environmental Authorisation”, as published on 20 March, 2020 in National Gazette, No. 43110 in terms of NEMA (Act 107 of 1998) sections 24(5)(a), (h) and 44, lists protocols and minimum report requirements for environmental impacts on terrestrial biodiversity and provides the criteria for the assessment and reporting of impacts on terrestrial biodiversity for activities requiring environmental authorisation. The assessment and minimum reporting requirements of this protocol are associated with a level of environmental sensitivity identified by the National web based Environmental Screening Tool. Prior to

commencing with a specialist assessment, the current use of the land and the environmental sensitivity of the site under consideration, identified by the screening tool, must be confirmed by undertaking a **site sensitivity verification**, which must include the following.

4. The site sensitivity verification must be undertaken by an environmental assessment practitioner or a specialist.
5. The site sensitivity verification must be undertaken through the use of:
  - a. a desk top analysis, using satellite imagery.
  - b. a preliminary on-site inspection; and
  - c. any other available and relevant information.
6. The outcome of the site sensitivity verification must be recorded in the form of a report that:
  - a. confirms or disputes the current use of the land and environmental sensitivity as identified by the screening tool.
  - b. contains a motivation and evidence of either the verified or different use of the land and environmental sensitivity; and
  - c. is submitted together with the relevant assessment report prepared in accordance with the requirements of the Environmental Impact Assessment Regulations.

The National Web Based Screening Tool was used to generate the potential environmental sensitivity of the site which has then been compared to various online and other databases and information sources in order to verify and confirm the validity of the screening tool findings. This was further supported with on-site observations and analysis of most recent aerial photography.

This terrestrial biodiversity site verification has been undertaken as per the requirements of the Procedures for the assessment and minimum criteria for reporting on identified environmental themes in terms of sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, when applying for environmental authorisation (GN 320, 20 March 2020).

#### 8.7.4 Data sources and references

Data sources that were utilised for this report include the following:

- National (DFFE) Web Based Screening Tool – to generate the sites potential environmental sensitivity.
- National Vegetation Map 2018 (NVM, 2018), Mucina & Rutherford (2006) and National Biodiversity Assessment or Red Listed Ecosystems (NBA/RLE, 2022) – description of vegetation types, species (including endemic) and most recent vegetation unit conservation status.
- National and Regional Legislation including Provincial Nature Conservation Ordinance (P.N.C.O). NEM:BA Threatened or Protected Species (ToPS).
- Botanical Database of Southern Africa (BODATSA) and New Plants of Southern Africa (POSA) – lists of plant species and potential species of concern found in the general area (SANBI.)
- International Union for Conservation of Nature (IUCN) - Red List of Threatened Species.
- Animal Demography Unit Virtual Museum (VM) – potential faunal species.
- Global Biodiversity Information Facility (GBIF) – potential flora & faunal species.
- National Red Books and Lists - mammals, reptiles, frogs, dragonflies & butterflies.
- National Freshwater Ecosystem Priority Areas assessment (NFEPA, 2011) - important catchments.
- National Protected Areas Expansion Strategy (NPAES, 2018) and South Africa Protected Area database (2020) – protected area information.
- SANBI BGIS – All other biodiversity GIS datasets.
- Western Cape Biodiversity Spatial Plan (2017).
- Aerial Imagery – Google Earth, ESRI, Chief Surveyor General (<http://csg.dla.gov.za>).
- Cadastral and other topographical country data - Chief Surveyor General (<http://csg.dla.gov.za>).



- Other sources may include peer-reviewed journals, regional and local assessments, and studies in the general location of the project and its area of influence, landscape prioritization schemes (Key Biodiversity Areas), systematic conservation planning assessments and plans (as above), and any pertinent masters and doctoral theses, among others.

This terrestrial biodiversity assessment has been undertaken as per the requirements of the Procedures for the assessment and minimum criteria for reporting on identified environmental themes in terms of sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, when applying for environmental authorisation (GN 320, 20 March 2020).

### 8.7.5 Site visit

A site inspection was conducted on **23 July 2024**, during mid-winter and a follow up site visit (early autumn) for additional infrastructure. The site falls within a temperate climate with rainfall occurring throughout the year but is often higher in winter, hence for the purposes of this report, a single site visit is deemed to be adequate, specifically due to the disturbed nature of the site.

### 8.7.6 Assumptions, Uncertainties and Gaps in Knowledge

The findings and recommendations of this report may be susceptible to the following uncertainties and limitation:

- No assessment has been made of aquatic aspects relating to any wetlands, pans, and/or rivers/steep ecosystems outside of the scope of a terrestrial biodiversity report. Refer to separate reporting.
- Any botanical surveys based upon a limited sampling time-period, may not reflect the actual species composition of the site due to seasonal variations in flowering times. Additionally, the composition of fire adapted vegetation may vary depending on level of maturity or time since last burn. As far as possible, site collected data has been supplemented with desktop and database-centred distribution data.
- As far as possible, site collected data has been supplemented with desktop and database-centred distribution data as well as previous studies undertaken in the area.

### 8.7.7 National Environmental Screening Tool

The DEA Screening Tool indicates the following, summarised in Table 1:

- Terrestrial Biodiversity is Very High (Figure 52).
- Plant species sensitivity is Low & Moderate (Figure 53).
- Animal Species sensitivity is High (Figure 54).
- Aquatic Sensitivity is Very High (Figure 55).

Table 13: Summary of Screening tool designations.

| Terrestrial Sensitivity | Feature(s) in proximity                                                                                                               |
|-------------------------|---------------------------------------------------------------------------------------------------------------------------------------|
| Very High               | CBA 1: Terrestrial, CBA 2: Terrestrial, SWSA (SW Outeniqua) & Garden Route Granite Fynbos (Critically Endangered)                     |
| High                    | None                                                                                                                                  |
| Medium                  | None                                                                                                                                  |
| Low                     | Present                                                                                                                               |
| Plant Sensitivity       |                                                                                                                                       |
| Very High               | None                                                                                                                                  |
| High                    | None                                                                                                                                  |
| Medium                  | <i>Lampranthus pauciflorus</i> , <i>Leucospermum glabrum</i> , <i>Diosma passerinoides</i> , Sensitive species 1024, 1032, 800 & 500. |

|                            |                                                                                                                                           |
|----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| Low                        | Present                                                                                                                                   |
| <b>Animal Sensitivity</b>  |                                                                                                                                           |
| Very High                  | None                                                                                                                                      |
| High                       | <i>Circus ranivorus</i> & <i>Bradypterus sylvaticus</i> (Birds)                                                                           |
| Medium                     | <i>Afraxalus knysnae</i> (Amphibian), <i>Chlorotalpa duthieae</i> , Sensitive species 8 (Mammal) & <i>Aneuryphymus montanus</i> (Insects) |
| Low                        | Present                                                                                                                                   |
| <b>Aquatic Sensitivity</b> |                                                                                                                                           |
| Very High                  | CBA 1: Aquatic, SWSA (SW Outeniqua) & Wetlands - Eastern Fynbos-Renosterveld Bioregion (Valley-bottom)                                    |
| High                       | None                                                                                                                                      |
| Medium                     | None                                                                                                                                      |
| Low                        | None                                                                                                                                      |

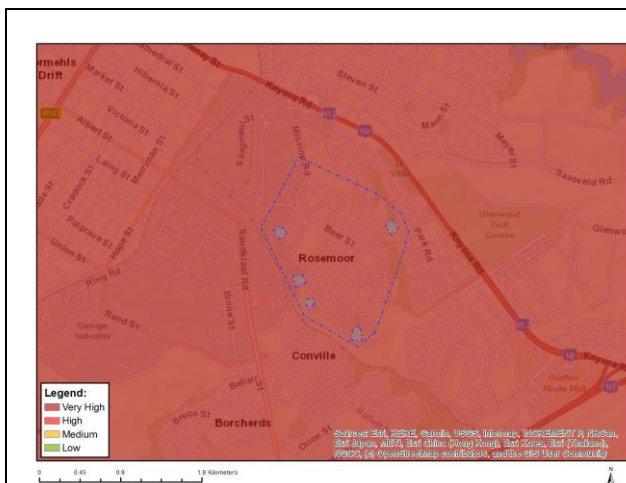


Figure 52: Terrestrial Biodiversity Sensitivity

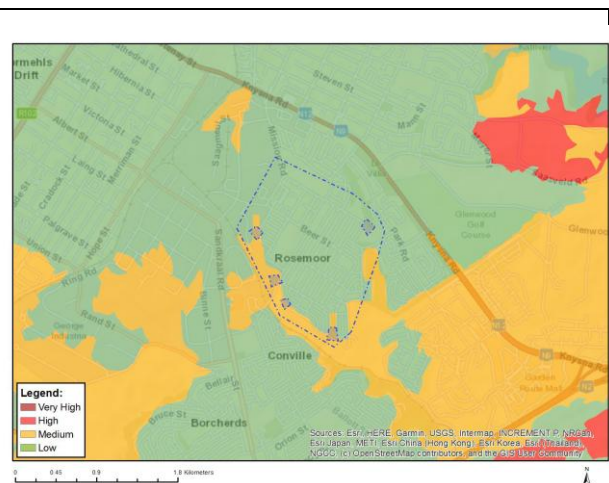


Figure 53: Plant Species Sensitivity

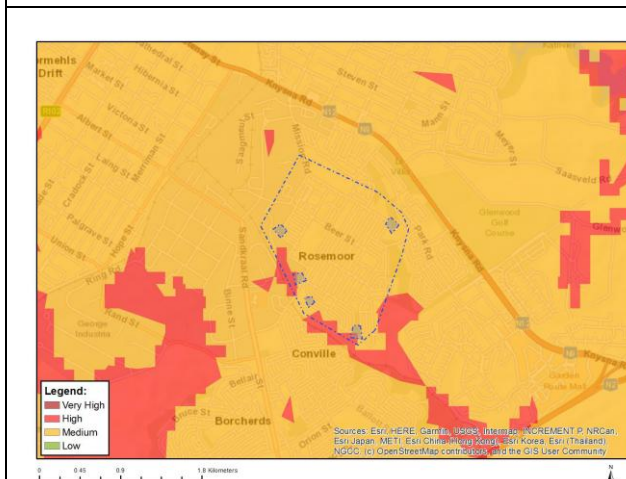


Figure 54: Animal Species Sensitivity

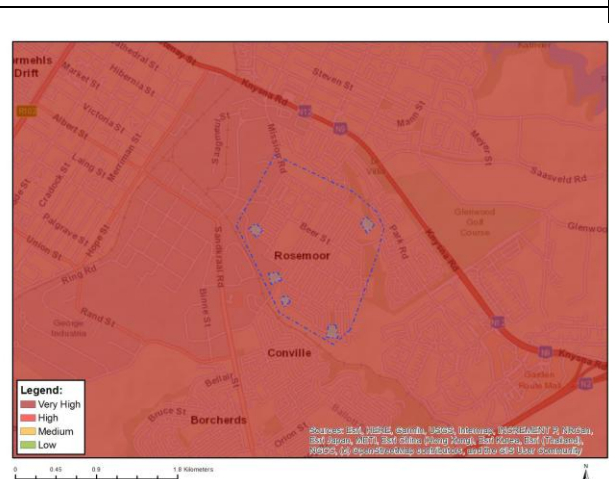


Figure 55: Aquatic Sensitivity

The site assessment will also physically screen for the presence of the listed, and other possible species and/or sensitivities that are not identified in the screening tool in addition to those that are flagged. Not all features are directly affected, but being in proximity, the risks associated with the activity will be investigated further and addressed in the report.

The following is deduced from the DFFE [National Environmental Screening Tool](#):

- The terrestrial biodiversity theme is Very-High due to the proposed stormwater discharge points being within or on the edge of designated CBA 1, 2 & ESA areas. The Very High sensitivity designation

is disputed as the entire site is situated on the edge of an urban area with little to no natural vegetation remaining. Vegetation cover is largely comprised of exotic species, and while it will serve limited ecological function, the specific proposed activity, if implemented responsibly and following the recommended mitigation and management actions, can be considered low risk.

- Several flora (plant) species regarded as being of concern are flagged as potentially being present (Medium sensitivity) and are assessed further in the report, however none were found to be present during the site visit and are furthermore due to the transformed nature of the site, it is not deemed to be suitable habitat for any functional species population. The Medium sensitivity designation is thus disputed as the site, which is situated on the edge of an urban area, is within a developed landscape and has hardened surfaces (roads and sidewalks) and/or landscaped gardens with little to no remnant natural vegetation, that will have limited ecological function.
- Several fauna (animal) species regarded as being of concern are flagged as potentially being present (High sensitivity) and are assessed further in the report. Due to the limited size of the site and transformed nature of the surrounding landscape, the site would not be deemed to be viable for any species population. The Medium/High sensitivity designation is thus disputed as the site, which is situated on the edge of an urban area, is within a developed landscape and has hardened surfaces (roads and sidewalks) with little to no remnant natural vegetation that have limited ecological function nor provide suitable habitat other than for temporarily transient fauna species (i.e. such as perching in a tree). The watercourses and riparian vegetation are likely highly polluted and thus not suited to the amphibian species.
- The aquatic sensitivity is Very High due to falling within designated CBA 1: Aquatic, SWSA (SW Outeniqua) & Wetlands - Eastern Fynbos-Renosterveld Bioregion (Valley-bottom). While the site does have a network of watercourses, these are largely modified, being within an urban context, subject to unmanaged stormwater discharge and also having significantly modified (or exotic) vegetation cover. The proposed stormwater infrastructure is thus likely to improve aquatic functioning in the long-term.
- The impacts are assessed further in the relevant report sections in the accompanying report.

## 8.7.8 Findings, Outcomes and Recommendations

### Terrestrial Biodiversity

Site verification of the Terrestrial Biodiversity sensitivities is summarised in Table 14 and depicted in Figure 56, where CBA is green and ESA is light blue/yellow. The CBA and ESA designation are primarily associated with feature adjacent to the site and/or outside of the proposed development/activity footprint.

Table 14: Terrestrial Biodiversity Features flagged in the National Environmental Screening Tool.

| Feature                      | COMMENT |                                                                                                                                                                                                                                                                                                         |
|------------------------------|---------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Critical Biodiversity Area 1 | CBA 1   | <b>Dispute</b> – the site is within an urban area and is vegetation cover is significantly altered where little to no natural vegetation remains, and since any vegetation restoration implies that vegetation would be in a secondary context and thus would strictly speaking not be CBA 1 but CBA 2. |
| Critical Biodiversity Area 2 | CBA 2   | <b>Partially Agree</b> – In principle it would be possible to restore indigenous vegetation, however the likelihood in the short term is not considered to be high, without significant cost. A part of this process would be to formalise and improve stormwater                                       |



| Feature                  |       | COMMENT                                                                                                                                                                                                                                                                             |
|--------------------------|-------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                          |       | runoff and discharge into the watercourses, so the proposed activity could indirectly improve overall localised ecological functioning.                                                                                                                                             |
| Ecological Support Areas | ESA 2 | <b>Partially Agree</b> – the site does provide some ecological connectivity and supports ecological processes, be-it in a significantly altered or modified form. In light of the modified nature, the proposed activity is not seen to exceed current baseline disturbance levels. |

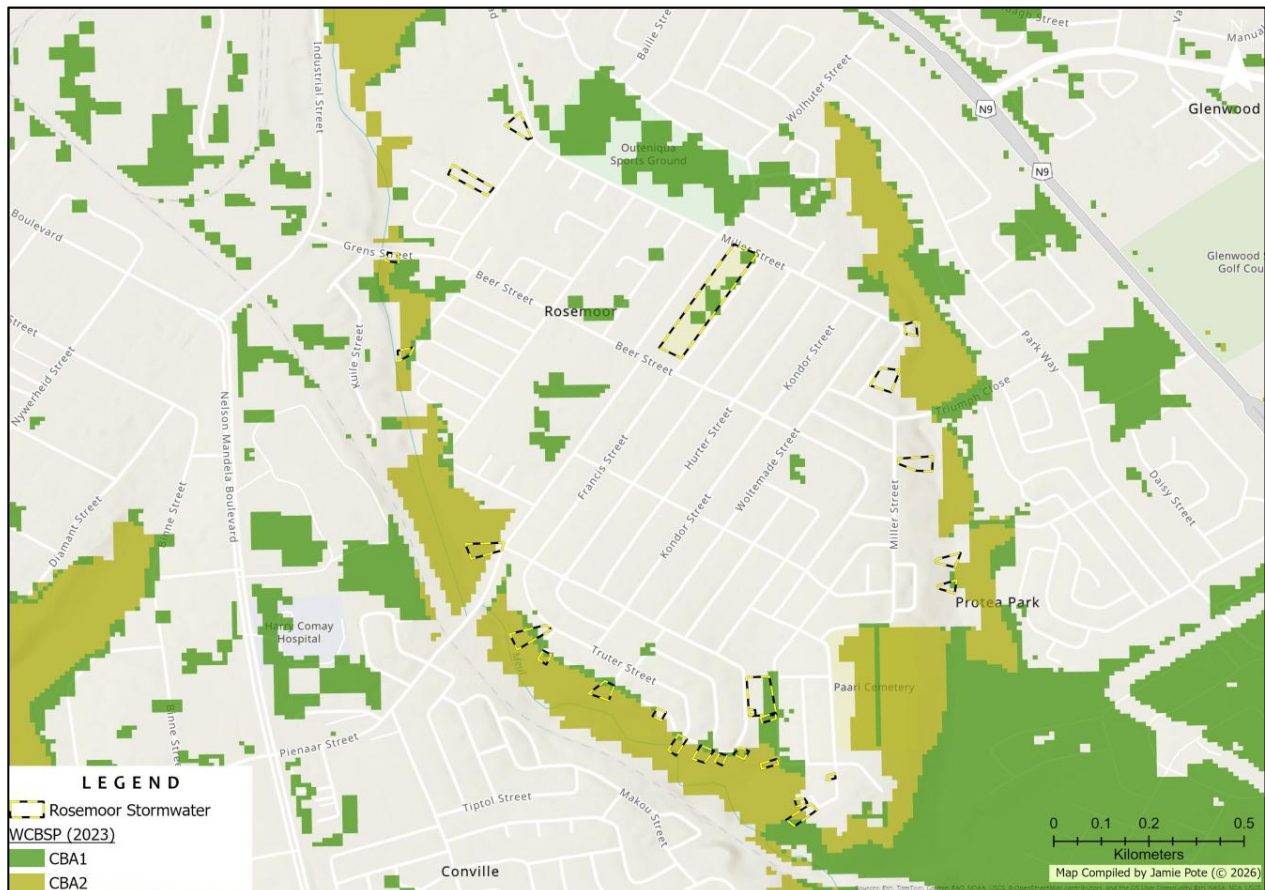


Figure 56: Western Cape Biodiversity Spatial Plan (2017). The site does overlap with some designated CBA 1, CBA 2 and ESA 2 areas.

A CBA 1 designation implies natural vegetation is present, whereas CBA 2 implies restoration is required. In light of the significant lack of indigenous species and high levels of disturbance and/or alien invasion, the correct CBA/ESA designations would need to be ESA 2 and possibly CBA 2. It is questionable if the broader vegetated areas along the watercourses would ever achieve a state that would support conservation (i.e. CBA), without significant changes to municipal management and well as resident behaviour, well outside the scope of this assessment; however, they do serve a somewhat role in supporting local ecological processes and connectivity, and with some rehabilitation (which includes construction and improvement of stormwater discharge), this is likely to improve.

Ecological processes should be considered within a landscape level and since the ecological areas are within a significantly modified and fragmented urban landscape, the minor impacts of the proposed stormwater infrastructure discharge points will have a negligible impact.

### Plant Species (Flora)

National Environmental Screening Tool flagged several flora species. Almost the entire site is situated within a significantly altered and degraded landscape, where little natural vegetation remains. No significant pockets of natural vegetation were found that might provide suitable habitat for these species and it is confirmed that no species of conservation concern having an elevated status and/or limited distribution range as flagged in the screening tool are present.

The SSVR thus disputes the flagged flora ('plant') species of conservation concern and medium plant species designations.

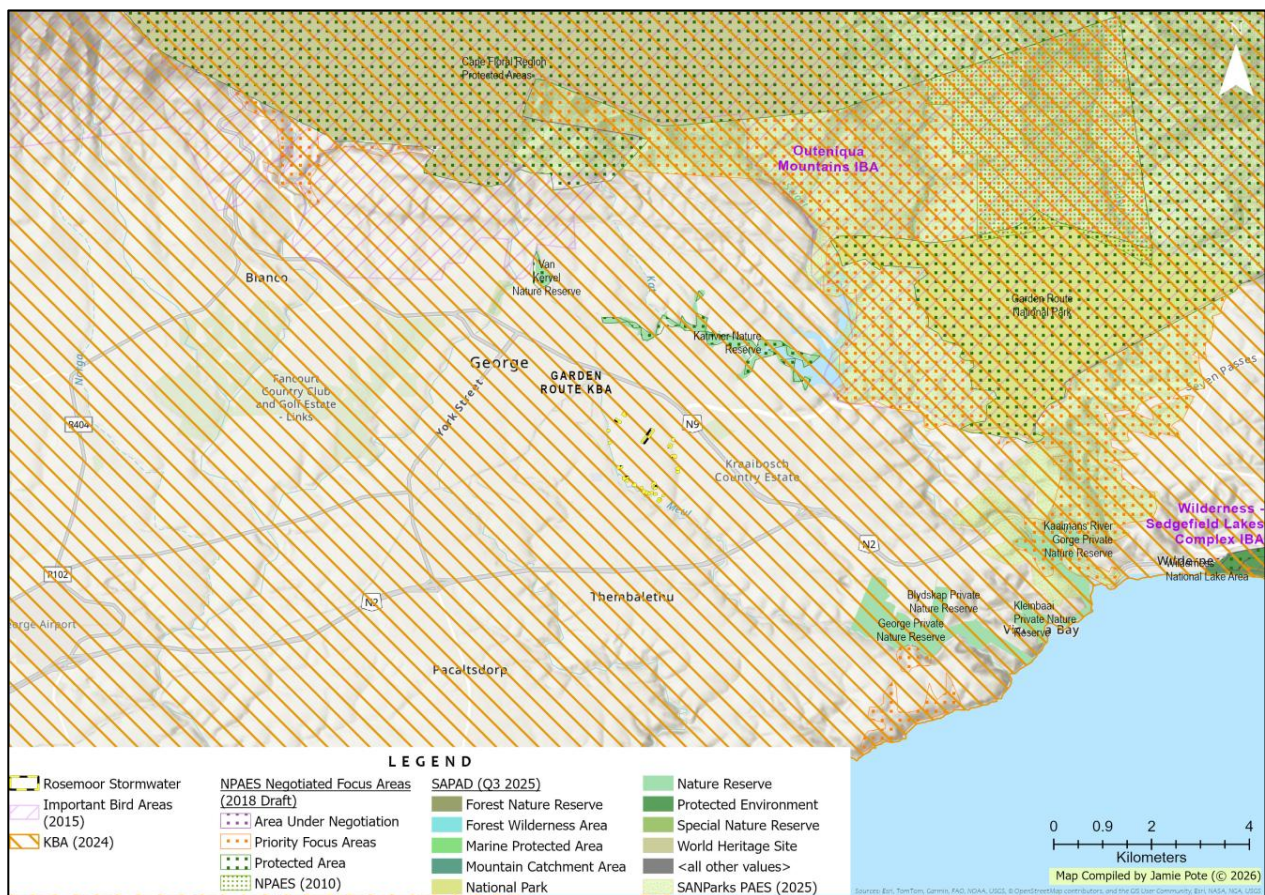


Figure 57: Protected Areas and NPAES in vicinity.

### Animal Species (Fauna)

National Environmental Screening Tool flagged several fauna species. Almost the entire site is situated within a significantly altered and degraded landscape, where little natural vegetation remains. No significant pockets of natural vegetation were found that might provide suitable habitat for these species and it is confirmed that no species of conservation concern having an elevated status and/or limited distribution range as flagged in the screening tool are present.

The SSVR thus disputes the flagged fauna ('animal') species of conservation concern designations and High animal species designations.



## Aquatic

Wetland and River features are present in the broader area, including the watercourses within the urban area. Aquatic aspects are beyond the scope of this Terrestrial Biodiversity assessment but is given consideration in terms of terrestrial processes that may be influenced by the terrestrial vegetation. Based on the terrestrial vegetation composition, the watercourse would be deemed to be significantly modified, having little to no remnant natural vegetation and a high proliferation of weed and invasive alien species. The very high aquatic sensitivity it thus questionable, but outside the scope of this terrestrial assessment which does not include any water quality analysis.

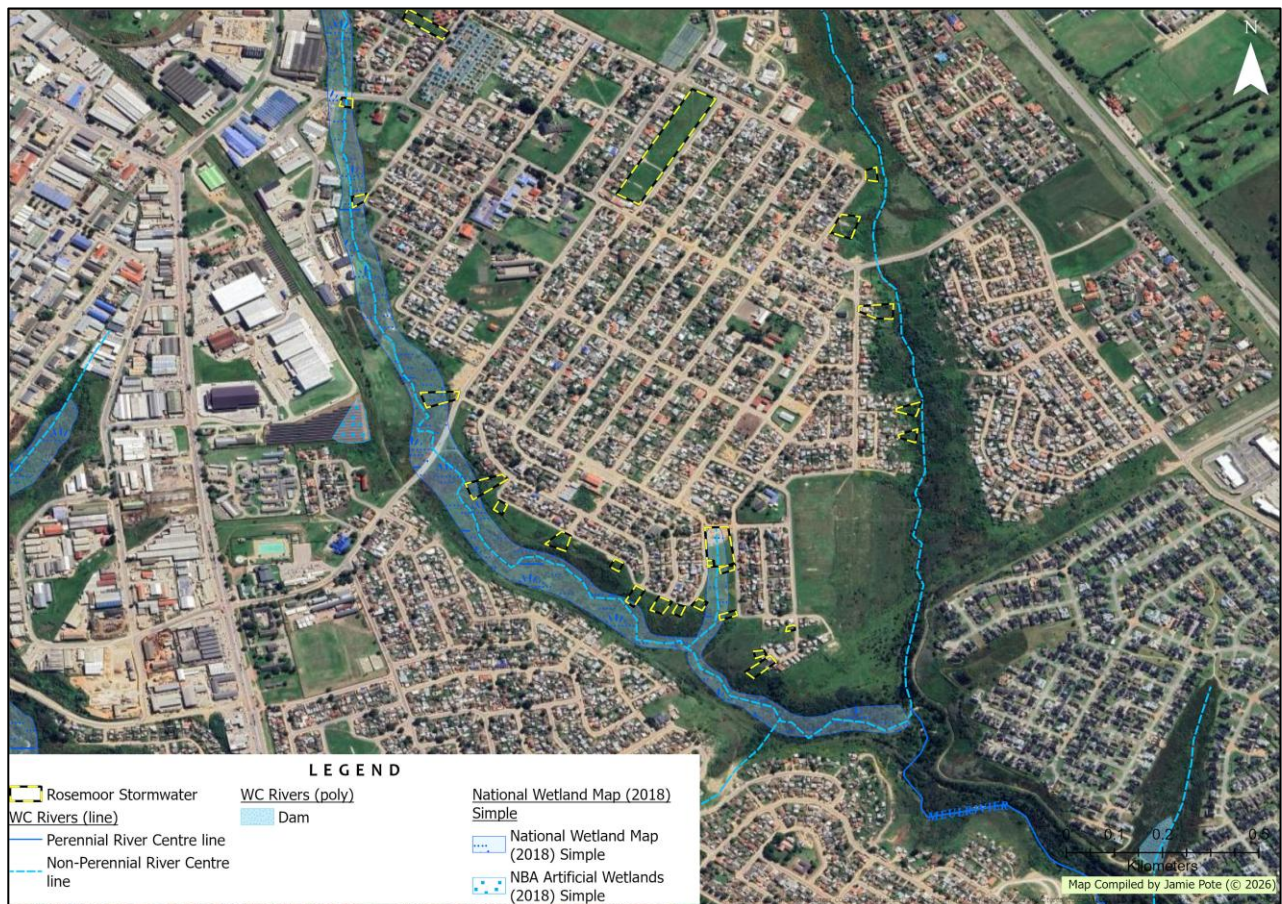


Figure 58: Rivers, FEPAs & SWSA's.

## 8.7.9 Conclusions

The site verification thus confirms that the site does not fall within a terrestrial biodiversity screening tool designated CBA area, as there is no evidence of any ecologically significant remaining natural vegetation as the site is almost entirely transformed as the footprint is within a degraded, transformed urban landscape, which will have limited and modified ecological function. In principle, the proposed improvement of stormwater discharge infrastructure could result in an overall improvement to the ecological function of the area.

It further disputes that any of the screening tool flagged flora or fauna species of conservation concern are likely to be affected by the proposed activity within a degraded, modified and transformed landscape.



PAGE INTENTIONALLY LEFT BLANK

END

## **Appendix C: DFFE Pesticide Policy:**



## forestry, fisheries & the environment

Department:  
Forestry, Fisheries and the Environment  
**REPUBLIC OF SOUTH AFRICA**

### ***ENVIRONMENTAL PROGRAMMES PESTICIDE POLICY FOR THE CONTROL OF ALIEN INVASIVE SPECIES***

| Originated By: |                                                     | Reviewed By:      | Recommended By:      | Approved By:           |
|----------------|-----------------------------------------------------|-------------------|----------------------|------------------------|
| Name/Section:  | Directorate: National Southern & Western Programmes | Dr Christo Marais | Ms Nonhlanhla Mkhize | Ms Nomfundo Tshabalala |
| Designation    | D: N, S&WP                                          | CD: NRM           | DDG: EP              | DG                     |
| Signature:     |                                                     |                   |                      |                        |
| Date:          |                                                     |                   |                      |                        |



## Table of Contents

|                                                                                               |    |
|-----------------------------------------------------------------------------------------------|----|
| <b>DOCUMENT CONTROL PAGE</b> .....                                                            | 5  |
| <b>TERMINOLOGY</b> .....                                                                      | 6  |
| <b>LIST OF RELEVANT LEGISLATION</b> .....                                                     | 9  |
| <b>PURPOSE:</b> .....                                                                         | 10 |
| <b>APPLICATION:</b> .....                                                                     | 10 |
| <b>INTRODUCTION:</b> .....                                                                    | 10 |
| <b>OBJECTIVES FOR THE USE OF PESTICIDES FOR INVASIVE ALIEN SPECIES CONTROL</b> .....          | 11 |
| <b>METHODS OF CONTROL</b> .....                                                               | 12 |
| <b>A. Invasive Alien Plants</b> .....                                                         | 12 |
| 1. Selection of appropriate methods of control shall be based on the following criteria:..... | 12 |
| 1.1 Species to be controlled.....                                                             | 12 |
| 1.2 Size of plants.....                                                                       | 12 |
| 1.3 Density of stands.....                                                                    | 14 |
| 1.4 Accessibility of terrain.....                                                             | 14 |
| 1.5 Environmental considerations.....                                                         | 14 |
| 1.6 Desirable vegetation.....                                                                 | 14 |
| 1.7 Disposal of vegetation.....                                                               | 15 |
| <b>B. Non Plant Invasives</b> .....                                                           | 15 |
| <b>LONG TERM CONTROL PROGRAMMES</b> .....                                                     | 17 |
| 2.1 Considerations .....                                                                      | 17 |
| <b>SELECTION OF PESTICIDES</b> .....                                                          | 18 |
| 3.1 Pesticides .....                                                                          | 18 |
| 3.2 Operator safety.....                                                                      | 18 |
| 3.3 Environmental safety.....                                                                 | 19 |
| 3.4 Availability.....                                                                         | 19 |
| <b>TRAINING</b> .....                                                                         | 20 |
| 4.1 Supervisors.....                                                                          | 20 |
| 4.2 Operators.....                                                                            | 21 |
| <b>COSTING OPERATIONS OR PROGRAMMES</b> .....                                                 | 21 |
| 5.2 Follow-up treatments.....                                                                 | 21 |
| 5.3 Biomonitoring.....                                                                        | 21 |
| <b>PROVISION OF EQUIPMENT</b> .....                                                           | 22 |
| 6.1 Application equipment.....                                                                | 22 |

|                                                  |                                                                                                                                                                                                      |           |
|--------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| 6.2                                              | Equipment brands.....                                                                                                                                                                                | 22        |
| 6.3                                              | Tools.....                                                                                                                                                                                           | 22        |
| 6.4                                              | Replacements.....                                                                                                                                                                                    | 22        |
| 6.5                                              | Handheld sprayers .....                                                                                                                                                                              | 22        |
| 6.6                                              | Measuring equipment.....                                                                                                                                                                             | 22        |
| 6.7                                              | Containers.....                                                                                                                                                                                      | 22        |
| <b>STORAGE, HANDLING AND TRANSPORTATION.....</b> |                                                                                                                                                                                                      | <b>22</b> |
| 7.1                                              | Storage.....                                                                                                                                                                                         | 22        |
| 7.2                                              | Isolation.....                                                                                                                                                                                       | 22        |
| 7.3                                              | Accessibility.....                                                                                                                                                                                   | 23        |
| 7.4                                              | Construction.....                                                                                                                                                                                    | 23        |
| 7.5                                              | Equipment.....                                                                                                                                                                                       | 24        |
| 7.6                                              | Handling.....                                                                                                                                                                                        | 24        |
| 7.7                                              | In field observations.....                                                                                                                                                                           | 25        |
| 7.8                                              | Transportation <sup>5,7</sup> .....                                                                                                                                                                  | 25        |
| 7.9                                              | Disposal <sup>11,12,13,15</sup> .....                                                                                                                                                                | 25        |
| <b>PUBLIC SAFETY.....</b>                        |                                                                                                                                                                                                      | <b>26</b> |
| 8.1                                              | Due regard must be paid at all times to the health and safety of the public.....                                                                                                                     | 26        |
| 8.2                                              | Public should be kept out of operational areas where any hazards exist. Warning notices should be displayed to this effect where necessary.....                                                      | 26        |
| 8.3                                              | Pesticides must only be applied strictly according to label recommendations.....                                                                                                                     | 26        |
| 8.4                                              | Product and spray mixtures should be stored so that they are inaccessible to the public..                                                                                                            | 26        |
| 8.5                                              | Treatment of areas within 50 m of habitations, schools, hospitals and public areas (e.g. parks) should be avoided or only carried out in consultation with the parties effected. ....                | 26        |
| 8.6                                              | Public should be informed of control operations in their area by means of verbal communication, notices, pamphlets, the press etc prior to the commencement of spray operations.....                 | 26        |
| <b>ENVIRONMENTAL SAFETY.....</b>                 |                                                                                                                                                                                                      | <b>26</b> |
| 9.1                                              | Area contamination must be minimised by careful accurate application with a minimum amount of pesticide to achieve good control.....                                                                 | 26        |
| 9.2                                              | All care must be taken to prevent contamination of any water bodies. This includes due care in storage, application, cleaning equipment and disposal of containers, product and spray mixtures. .... | 26        |
| 9.3                                              | Equipment should be washed where there is no danger of contaminating water sources and washings used in the next spray mix. ....                                                                     | 26        |
| 9.4                                              | To avoid damage to indigenous or other desirable vegetation product should be selected that will have the least effect on non-target vegetation.....                                                 | 27        |

|                                                                                                                                                                                                                                               |           |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| <b>APPLICATION .....</b>                                                                                                                                                                                                                      | <b>27</b> |
| 10.1 Equipment.....                                                                                                                                                                                                                           | 27        |
| 10.2 Rates of Application. ....                                                                                                                                                                                                               | 27        |
| 10.3 Precautions. ....                                                                                                                                                                                                                        | 27        |
| 10.4 Adjuvants. ....                                                                                                                                                                                                                          | 28        |
| 10.5 Water Sources.....                                                                                                                                                                                                                       | 28        |
| <b>WEATHER CONDITIONS.....</b>                                                                                                                                                                                                                | <b>28</b> |
| 11.1 Applications should not be carried out under unfavourable weather conditions that could affect the control obtained or endanger nearby desirable vegetation, water bodies or personnel.<br>28                                            |           |
| 11.2 Label recommendations regarding suitable application conditions must be followed. ....                                                                                                                                                   | 28        |
| 11.3 The following conditions must be taken into consideration, depending on the method of application. ....                                                                                                                                  | 28        |
| 11.4 Conditions of target plants. ....                                                                                                                                                                                                        | 29        |
| <b>MIXING PESTICIDES .....</b>                                                                                                                                                                                                                | <b>29</b> |
| 12.1 Mixing must take place according to label instructions. ....                                                                                                                                                                             | 29        |
| 12.2 Suitable protective clothing must be worn when handling pesticide concentrates <sup>8,14</sup> .....                                                                                                                                     | 29        |
| 12.3 Liquid pesticide concentrates should be added to the half full tank of water which is then topped up with water. ....                                                                                                                    | 29        |
| 12.4 Adjuvants should be added to the tank as per the label instruction prior to the addition of the pesticide when buffering and afterwards for adjuvants and dyes.....                                                                      | 29        |
| 12.5 Do not mix pesticide concentrates together before adding them to the tank. Consult product labels. ....                                                                                                                                  | 29        |
| 12.6 Proper mixing in knapsacks and hand held applicators is difficult and spray mixtures should be mixed in bulk containers or if necessary (e.g. wettable powders) buckets before pouring into the knapsacks or hand held applicators. .... | 29        |
| 12.7 Spray mixtures should be agitated continuously as recommended. This is essential after they have been standing for a while.....                                                                                                          | 29        |
| <b>CALIBRATION .....</b>                                                                                                                                                                                                                      | <b>29</b> |
| 13.1 Application equipment must be correctly calibrated to obtain optimum results and prevent wastage through over-application. ....                                                                                                          | 29        |
| 13.2 Calibration should be carried out in the area to be treated. ....                                                                                                                                                                        | 29        |
| 13.3 Calibration should be checked frequently during application. The following should be checked: .....                                                                                                                                      | 29        |
| <b>ESTIMATED VOLUMES OF PRODUCT PER HECTARE.....</b>                                                                                                                                                                                          | <b>30</b> |
| <b>HERBICIDE DOSAGE AND LITRES PER HECTARE SUMMARY .....</b>                                                                                                                                                                                  | <b>30</b> |
| <b>ANNEXURE 1: CHEMICAL GROUPS AND HAZARD GROUPS OF PESTICIDES.....</b>                                                                                                                                                                       | <b>48</b> |



DOCUMENT CONTROL PAGE

| Document Control Page  |                                                                                                                                                                                                                       |
|------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Document Title         | Environmental Programmes Pesticide Policy                                                                                                                                                                             |
| Creation Date          | June 2012                                                                                                                                                                                                             |
| Revision Date          | June 2021                                                                                                                                                                                                             |
| Effective Date         |                                                                                                                                                                                                                       |
| Pesticide Policy Owner | Chief Directorate: NRM                                                                                                                                                                                                |
| Distribution           | NRM, Finance, Internal Audit Risk & Ethics, Corporate & Legal Services, Strategic Services, Supply Chain management, EP branch (internal Stakeholders) and National treasury, Auditor-General (external stakeholders) |

**APPROVAL**

\_\_\_\_\_

**Name:**

**Designation: Director-General**

**Date:** \_\_\_\_\_

## TERMINOLOGY

## Abbreviations

| Acronym      | Meaning                                                                                               |
|--------------|-------------------------------------------------------------------------------------------------------|
| AIS          | Alien Invasive Species                                                                                |
| CD: NRM      | Chief Directorate: Natural Resource Management                                                        |
| COIDA        | Compensation for Occupational Injuries and Diseases Act (COIDA) (Act 130 of 1993)                     |
| DDG          | Deputy Director General                                                                               |
| DFFE         | Department of Forestry, Fisheries and the Environment                                                 |
| DG           | Director General                                                                                      |
| D: N, S & WP | Director: National, Southern & Western Programmes                                                     |
| EDC          | Endocrine disrupting chemical                                                                         |
| EP           | Environmental Programmes                                                                              |
| EPWP         | Expanded Public Works Programmes                                                                      |
| ESRA         | Environmental Social Risk Assessment                                                                  |
| FAO          | Food and Agriculture Organization                                                                     |
| GHS          | UN Global Harmonization System of Classification and Labelling of Chemicals, known as the Purple book |
| HA           | Hectare                                                                                               |
| HHP          | Highly hazardous pesticide                                                                            |
| IPM          | Integrated Pest Management                                                                            |
| MANCO        | Management Committee                                                                                  |
| NEM:BA       | National Environmental Management: Biodiversity Act                                                   |
| NRM          | Natural Resource Management                                                                           |
| OHS          | Occupational Health and Safety                                                                        |
| PIC          | Prior informed consent                                                                                |
| POE-T        | Polyethoxylated tallow amine                                                                          |
| PPE          | Personal Protective Equipment                                                                         |
| SCM          | Supply Chain Management                                                                               |
| SDS          | Safety Data Sheet                                                                                     |
| SP           | Service Provider                                                                                      |
| SPCA         | Society for the Prevention of Cruelty to Animals                                                      |
| WFW          | Working for Water                                                                                     |
| WHO          | World Health Organization                                                                             |

## Terminology

| Terminology               | Definition                                                                                                                                                                                                                                                                                  |
|---------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Absorption route          | Includes ingestion, inhalation or absorption through the skin or mucous membranes of the pesticide                                                                                                                                                                                          |
| Acute toxicity            | Acute toxicity refers to those adverse effects occurring following oral or dermal administration of a single dose of a substance, or multiple doses given within 24 hours, or an inhalation exposure of 4 hours.                                                                            |
| Bioaccumulation           | Bioaccumulation is the process by which toxins enter the food web by building up in individual organisms                                                                                                                                                                                    |
| Biological exposure index | Value for assessing biomonitoring results, intended as a reference guideline for use in the likelihood of adverse health effects. It generally represents the level of metabolites that are most likely to be observed in the specimens collected from employees exposed to pesticides with |

|                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|-----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                         | inhalation exposure at the occupational exposure limit or body burden threshold                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Biomagnification                        | Biomagnification is the process by which toxins are passed from one trophic level to the next (and thereby increase in concentration) within a food web.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Biomonitoring                           | Biomonitoring is a tool of health-related environmental monitoring with which populations are examined for their exposure to pollutants from the environment using bioassays. A component of medical surveillance.                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Biopesticide                            | Biopesticides are certain types of pesticides derived from such natural materials as animals, plants, bacteria, and certain minerals.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Carcinogenicity                         | Is any pesticide or mixtures of pesticides that induces cancer or increase the incidence of cancer as classified by GHS as either category 1 (known carcinogen) or category 2 (suspected carcinogen) and falls in hazard group 2                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| CAS number                              | Chemical identity number or name given to each pesticide which is its unique identifying number in accordance with the nomenclature systems of the International Union of Pure and Applied Chemistry                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Container Management Programme          | The Container Management Programme should provide for the safe, effective and responsible management of all of the empty pesticide containers from the collection to the disposal.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Developmental and reproductive toxicity | <b>Developmental toxicity</b> pertains to adverse toxic effects to the developing embryo or foetus. Chemicals cause developmental toxicity by two ways. They can act directly on cells of the embryo or foetus causing cell death or cell damage, leading to abnormal organ development. A chemical might also induce a mutation in a parent's germ cell which is transmitted to the fertilized ovum. Some mutated fertilized ova develop into abnormal embryos.<br><b>Reproductive toxicity</b> is defined as adverse effects of a chemical substance on sexual function and fertility in adult males and females, as well as developmental toxicity in the offspring |
| Ecotoxicity                             | Ecotoxicology is the study of toxic effects caused by natural or man-made substances on biota.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Engineering control measures            | Control measures that remove or reduce exposure of persons to pesticides by means of engineering methods, a step in the Hierarchy of Control                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Environmental fate                      | The environmental fate of pesticides depends on the physical and chemical properties of the pesticide as well as the environmental conditions. ... Once a pesticide has been released into the environment, it can be broken down by exposure to sunlight (photolysis) exposure to water (hydrolysis)                                                                                                                                                                                                                                                                                                                                                                  |
| Exposed                                 | Exposed to a highly hazardous pesticide or Hazardous chemical agent                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| GHS concentration limit                 | Minimum concentration of a pesticide, expressed as a percentage to trigger the classification that a pesticide can be classified as highly hazardous                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Hazard class                            | The nature of a physical, health or environmental hazard under the GHS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Hazard classification                   | GHS hazard classes and hazard categories assigned to various pesticides                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Hazard category                         | A division of the hazard criteria within the hazard class in the GHS where these hazard categories compare hazard severity within the hazard class, this is not a comparison of hazard categories                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Hazard pictogram                        | Graphical composition, including a symbol plus graphical elements such as border, background pattern or colour that is intended to convey specific                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |



|                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                  | information, that is assigned in the GHS to a hazard class or hazard category                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Hazard statement                 | A statement assigned in GHS to a hazard class or hazard category describing the nature of the hazards of the pesticides, including degree of hazard if appropriate                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Hazardous chemical waste         | Hazardous chemical waste is defined as a chemicals/pesticides that pose a hazard to human health or the environment when improperly managed.                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Hierarchy of Control             | The hierarchy of control is a system for controlling risks that pesticides pose. The hierarchy of control is a step-by-step approach to eliminating or reducing risks and it ranks risk controls from the highest level of protection and reliability through to the lowest and least reliable protection.                                                                                                                                                                                                                                                                                                |
| Highly hazardous Pesticide       | HHP's are pesticides that are acknowledged to present particularly high levels of acute or chronic hazards to health or environment according to internationally accepted classification systems such as WHO or Global Harmonized System (GHS)                                                                                                                                                                                                                                                                                                                                                            |
| Integrated Pest Management       | IPM is an ecosystem-based strategy that focuses on long-term prevention of pests or their damage through a combination of techniques such as biological control, habitat manipulation, modification of cultural practices, and use of resistant varieties. Pesticides are used only after monitoring indicates they are needed according to established guidelines, and treatments are made with the goal of removing only the target organism. Pest control materials are selected and applied in a manner that minimizes risks to human health, beneficial and nontarget organisms, and the environment |
| Medical surveillance             | A planned programme or periodic examination, which may include clinical examinations, biological monitoring or medical tests of employees by an occupational health practitioner or in prescribed cases, by an occupational medicine practitioner.                                                                                                                                                                                                                                                                                                                                                        |
| monitoring                       | Planning, carrying out and recording results of a measurement programme                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| OEL                              | Occupational exposure limit is the limit value set by the Minister, which represents the airborne concentration of a pesticide, where the exposure standard can be, a) an eight-hour time-weighted average, b) a ceiling limit, c) a short-term exposure limit                                                                                                                                                                                                                                                                                                                                            |
| Obsolete pesticide               | Obsolete pesticides are defined by the FAO as stockpiled pesticides that can no longer be used for their original purpose or any other purpose and therefore require proper disposal.                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Persistent Organic Pollutants    | Persistent organic pollutants (POPs) are toxic chemicals that adversely affect human health and the environment around the world.                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Pesticide Lifecycle Management   | Pesticide lifecycle management encompasses a range of elements from legislation, regulation, manufacturing, application, risk reduction, monitoring, and enforcement to disposal of pesticide waste.                                                                                                                                                                                                                                                                                                                                                                                                      |
| Precautionary principle          | Essentially the precautionary principle directs that action be taken to reduce risk from pesticides in the face of uncertain but suggestive evidence of harm                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Precautionary statement          | A phrase prescribed by GHS that describes recommended measures that should be taken to minimise or prevent adverse effects resulting from exposure to pesticides or improper handling or storage of pesticides                                                                                                                                                                                                                                                                                                                                                                                            |
| Prior informed consent procedure | The Prior Informed Consent (PIC) procedure is a means of sharing information globally regarding certain chemicals and pesticides that have                                                                                                                                                                                                                                                                                                                                                                                                                                                                |

|                                  |                                                                                                                                                                                                                                                                                                        |
|----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                  | been considered hazardous to human health and/or the environment by the Conference of the Parties.                                                                                                                                                                                                     |
| Risk assessment                  | A programme to determine any risk from exposure to a pesticide and the steps taken to remove, reduce control or mitigate such risks posed by said pesticide                                                                                                                                            |
| Safety data sheet                | SDS, a document that is aligned to the GHS providing information on hazard classification, properties of pesticides, procedures for handling and working with pesticides in a safe manner and the ecotoxicity information on pesticides and emergency information and numbers for accidental spillages |
| sensitizer                       | A pesticide that causes people to develop allergic skin reactions in normal tissue after repeated exposure, includes dermal and respiratory sensitizers                                                                                                                                                |
| signal word                      | The word 'danger' or 'warning' used on GHS labels to indicate to the reader the potential hazard as well as the potential severity                                                                                                                                                                     |
| Toxicity rating                  | The quality of being poisonous, especially the degree of virulence of a toxic microbe or of a poison.                                                                                                                                                                                                  |
| Waste management Programme (WMP) | A WMP prescribes measures for the collection, temporary storage and safe disposal of the waste streams associated with the project and includes provisions for the recovery, re-use and recycling of waste                                                                                             |

#### LIST OF RELEVANT LEGISLATION

National Water Act, 1998 (Act 36 of 1998)

National Forest Act, 1998 (Act 84 of 1998)

National Environmental Management Act, 1998 (Act 107 of 1998)

National Environmental Management Act, 1998 (Act 107 of 1998): *Regulations to domesticate the requirements of the Rotterdam Convention on the prior informed consent procedure to certain hazardous chemicals and pesticides in International Trade, 2021, published as Government Notice No. 413 of 12 May 2021*

National Environmental: Waste Act, 2014 (Act 26 of 2014)

Occupational Health and Safety Act, 1993 (Act 85 of 1993)

Occupational Health and Safety Act, 1993 (Act 85 of 1993): *Hazardous Chemical Agent Regulations, 2021, published as Government Notice No. R280 of 29 March 2021*

Farm Feeds, Fertilizers, Agricultural Remedies and Stock remedies Act, 1947 (Act 36 of 1947)

National Aviation Act. 1962 (Act 74 of 1962)

SABS 072: (The Code of Practice for the Safe Handling of Pesticides)

SANS 10228:2010 (The Code of Practice for the Identification and Classification of Dangerous Goods for transport)

SANS 10118:2011 Edition 3.01: The Aerial Application of Pesticides.

SANS 10206:2010 The handling, storage and disposal of Pesticides.

OHSAS 45001:2016: Health and Safety Management Component (Clause 8.1)

#### PURPOSE:

To provide guidelines and practical advice to departmental staff and service providers on current pesticides available, international obligations and biomonitoring requirements with regards to using some pesticides that have health impacts and mitigation measures for these.

#### APPLICATION:

The EP Pesticide Policy will apply to all persons who use pesticides to carry out work for the Department as part of their work as an employee or Service Provider either directly or as a contractor or subcontractor.

#### INTRODUCTION:

The EP Pesticide Policy complies with all international conventions on pesticide management such as the Stockholm convention<sup>1</sup>, Rotterdam convention<sup>2</sup>, Basel convention<sup>3</sup> and Bamako<sup>4</sup> convention.

The Stockholm convention deals with persistent organic pollutants such as the dirty dozen that have been banned internationally due to their impacts on human health and these have all been removed from the EP pesticide policy as the EP pesticide policy follows the precautionary principle of the Hierarchy of Control in the Code of Conduct of Pesticide Management<sup>5</sup> which eliminates and substitutes all highly hazardous pesticides (HHP's) as the first stage of mitigation for protection of human health and the environment.

The Rotterdam convention deals with Prior Informed Consent (PIC) pesticides through Annexure III where all pesticides listed under Annexure III have been banned thus their import into the receiving country has to be approved by the receiving country and be reported to the Rotterdam secretariat and all conditions regarding their import needs to be met. Paraquat has currently been listed under Annexure III and thus removed from the EP policy due to the Precautionary Principle adopted.

The Basel Convention deals with trans boundary movement of hazardous chemical wastes, disposal of empty pesticide containers, obsolete pesticide disposal and pesticide container management.

The Bamako Convention is specific to Africa and is related to the Basel Convention regarding all the categories listed above and includes the banning of pesticides being imported into Africa that are close to their expiry date making Africa a dumping ground for near expired pesticides. Both of these conventions are critical for implementation in the EP Pesticides Policy for implementation of the container management programme for empty pesticide containers.

The EP Pesticide Policy aims to implement pesticide lifecycle management by implementing all the stages the pesticide might pass through from when the pesticide is procured to its degradation in the environment after use, or its destruction as an unused or obsolete product. For the purposes of this

policy, the life cycle includes procurement, distribution, storage, transport, use and final disposal or the pesticide product and/or its container<sup>5</sup>.

**The Service Provider is responsible for the procuring pesticides and may make use of the RT12 (Transversal Contract by national Treasury) to procure pesticides at the same price as government, providing that National Treasury approval is in place and that the pesticides are only used for this Project. The Service Provider is required to Comply to the Departments EP Pesticide Policy. The Department shall, whenever requested by the Service Provider, facilitate the process of obtaining approval from National Treasury for the Service Provider to use RT12 (Transversal Contract by National Treasury) to procure pesticides at the same price as government. The Service Provider will not only be responsible for procuring pesticides but also to implement, manage, store, handle, transport and dispose of the empty pesticide containers and obsolete pesticides in line with the EP Pesticide Policy implementing responsible container management programmes and adopting responsible pesticide lifecycle management.**

#### OBJECTIVES FOR THE USE OF PESTICIDES FOR INVASIVE ALIEN SPECIES CONTROL

1. To implement a long-term strategy for the initial and long-term control of invasive alien species.
2. To ensure the safety of operators involved in the control operations and public in the operational area in compliance with the EP biomonitoring protocols<sup>6</sup> for pesticides in hazard groups 1-6 and 9 & 10 (Annexure 1), Regulations for Hazardous Chemicals Agents<sup>7</sup> and Guidelines for Personal Protection when handling and Applying Pesticides<sup>8</sup>.
3. To ensure that there is minimal environmental impact in the short-term and that there are no long-term adverse effects on the environment resulting from the application of pesticides, to humans and the environment, environmental risk assessments are required for pesticides in hazard groups 7 and 8<sup>6</sup> (Annexure 1).
4. To ensure that the application takes place in the most cost effective way within objectives 2 and 3, taking the recommendations into account as listed in the **WFW Species and Pesticide list** spreadsheet that accompanies this policy.
5. To attain these objectives DFFE EP management shall be responsible for:
  - 5.1 Determining areas and species to be controlled and setting priorities.
  - 5.2 Deciding upon appropriate methods of pesticide and biopesticide control.
  - 5.3 Drawing up short and long-term control programmes.
  - 5.4 Selection of suitable pesticides and biopesticides.
6. Establishing training requirements for EP personnel and contractors and ensuring that the training takes place
7. Costing control programmes.
8. Sourcing suitable pesticide and biopesticide equipment suppliers and obtaining product and equipment at the best prices. Ensuring compliance to government transversal contracts, such as RT 12.
9. Ensuring that pesticide applications take place within all relevant legislation, including international legislation and conventions.
10. Ensuring proper medicals, biomonitoring and medical surveillance is done on all pesticide operators and staff exposed to pesticides in compliance to legislative requirements<sup>6,7,9</sup>.



## METHODS OF CONTROL

### A. Invasive Alien Plants

#### 1. Selection of appropriate methods of control shall be based on the following criteria:

- Species to be controlled
- Size of target plants
- Density of stand
- Accessibility of terrain
- Environmental safety
- Disposal of dead vegetation

##### 1.1 Species to be controlled.

- 1.1.1 Pesticides selected for control shall be registered for use on that species under the conditions specified under Act 36, the label and minor use registrations.
- 1.1.2 Selection should be based on the WfW species and pesticide spreadsheet, Croplife suggestions, minor use registrations, labels and information brochures issued by suppliers.

##### 1.2 Size of plants.

The following methods of control are appropriate for age or size target plants:

###### 1.2.1 Seedlings.

1.2.1.1 *Hand pulling or hoeing.* Hand pulling should be carried out in sparse stands under conditions where seedlings are easily removed from the soil. Operators should be supplied with suitable gloves or other hand protection<sup>6</sup>. Hoeing is also most suited to sparse stands. Seedlings should be severed below the soil surface or removed from the soil. Soil disturbance should be minimized to reduce re-germination.

1.2.1.2 *Foliar applications of pesticides/ biopesticides* can be carried out in dense stands or open stands. For dense stands suitable fan nozzles for overall application should be fitted. Sprayers should be fitted with pressure or flow regulators. In stands where individual plants are treated solid cone nozzles should be fitted. This is the same for biopesticide applications, except the carrier is a medium grade mineral oil such as canola oil.

###### 1.2.2 Saplings.

1.2.2.1 *Hand pulling, hoeing or brashing.* Where appropriate hand pulling or hoeing should be carried out as recommended for seedlings. Brashing is recommended for Eucalyptus species seedlings. Brashing is done using a hand saw or hatchet. The programme does not currently use this method.

- 1.2.2.2 *Foliar sprays.* Overall application or individual plant spraying can be carried out, depending on the density of the stand. Fan nozzles should be fitted for overall spraying and solid cone nozzles for individual plant treatment. Pressure or flow regulators should be fitted to sprayers for overall application. Spraying should be restricted to plants waist height or lower, but ensure there is sufficient foliage to carry the applied pesticide to the root system. Foliar applications should not be done with volatilizing pesticides due to human health inhalation risk being too high to mitigate<sup>9</sup>, alternative methods should be implemented here.
- 1.2.2.3 *Basal stem treatments.* Applications using pesticides registered for this method that DO NOT use diesel as a carrier are allowed (such as Turbador). No diesel applications allowed due to environmental risks. Stems with a diameter up to 50 mm should be treated to a height of 250 mm and stems above 50mm diameters to a height of 500 mm. This method is only suitable for stems up to 100 mm in diameter with smooth live bark. Application is by means of a low pressure coarse droplet spray from a narrow angle, solid cone nozzle.
- 1.2.2.4 *Cut stump treatments.* Stems should be cut as low as practical as stipulated on the label and in the EP best practices guidelines. Pesticides are applied in water as recommended for the pesticide. No diesel applications are allowed. The gel applications need to be painted on the whole cut surface and should be 10mm in thickness. Biopesticides can be applied using the same method as for pesticides, but in canola oil as the carrier.
- 1.2.2.5 *Mature trees.* These should be regarded as trees above shoulder height or robust bushes 12-18 months or older.
- 1.2.2.6.1 *Strip barking.* Bark must be removed from approximately waist height to the bottom of the stem. All bark must be removed to below ground level for good results. Where clean de-barking is not possible due to crevices in the stem or where exposed roots are present, a combination of bark removal and basal stem treatments should be carried out. Handsaws (such as silky zubats) or hatchets (silky nata hatchets) should be used for de-barking.
- 1.2.2.6.2 *Ring barking.* A band of bark is removed around the stem, 10cm wide and situated as close to the ground as possible. Ensure all bark, phloem and cambium tissue is removed within the band.
- 1.2.2.6.3 *Frilling or partial frilling.* Cuts should be made through the bark into the sapwood by means of a bush knife or light axe and a suitable pesticide applied into the cuts. In a full frill the cuts join or overlap along the circumference of the stem. This is the standard method for most species to be frilled. A partial frill has cuts spaced along the stem circumference and is only used where a pesticide is very effective on a particular species.
- 1.2.2.6.4 *Stem injection.* Pesticide solutions are applied directly into pre-mad

holes in the stem and cladodes of certain cactus species using a sheep dose applicator. This application method is only used on rare occasions when biocontrol is not available for the species as biocontrol is the preferred method.

- 1.2.2.11 *Soil application.* Pesticide granules are applied directly to the soil under the trees in the dosage rates stipulated on the label. This method is mostly used for bush encroachers. Care must be taken when applying and the application must be timed with the rainfall. Risk assessments must be done for all soil applications as all the soil application pesticides fall within hazard criterion 7 and 8 (Annexure 1).

1.3 Density of stands.

- 1.3.1 Overall applications can be made to dense stands of seedlings or saplings. Where other desirable vegetation is present (e.g. grass cover), selective pesticides that will not damage the grass or other desirable vegetation cover should be applied. Fan nozzles and pressure regulators should be fitted to sprayers. The non-target species kill rate and acceptable non target criteria must be agreed to prior to application. Aerial applications with biopesticides can also be used. Risk assessments must be done to determine the acceptable non target criteria.
- 1.3.2 Where dense stands of big trees, resulting in a large bio-mass, treatment of standing trees may be appropriate to obviate the problem of disposing of felled trees. Where there is a danger of dead trees falling into water courses they should be cut down and removed and the stumps treated with a suitable pesticide. Risk assessments must be done if there is a risk to riparian areas and a rehabilitation plan be put into place to mitigate these risks.

1.4 Accessibility of terrain.

- 1.4.1 In inaccessible areas such as mountainous areas or where no access roads exist, methods of control where a minimum amount of transportation of equipment and pesticide is involved should be given preference. Appropriate gel applied pesticides should be considered or nomix products.

1.5 Environmental considerations.

- 1.5.1 Protection of the environment is of prime importance. Riparian areas, where most alien vegetation infestations occur, require a particularly careful approach. Only pesticides that are approved for use in riparian areas should be used. Only aquatic safe products that are polyethoxylated tallow amine free can be used in riparian and aquatic systems. Consult the technical manager for these products. Washing of equipment or disposal of waste spray mixture or washings is prohibited in or near water courses where contamination of water can occur, including aquifer or ground water contamination<sup>5-9</sup>.

1.6 Desirable vegetation.

- 1.6.1 Where desirable vegetation is present, e.g. grass cover in pastures or the margins of forests, methods of control must be selected that will cause minimum damage to the desirable vegetation. Alternative methods to foliar spraying should be adopted where there is a danger of damage to adjacent desirable plants occurring. The non-target species kill rate must also be determined prior to the control after a risk assessment (ESRA) is done.

1.7 Disposal of vegetation.

- 1.7.1 Where possible utilizable wood should be removed after felling from properly stacked and piled wood sources. Brush piles in certain environmental conditions is not ideal, and in these situations, the brush/cut biomass should be removed or spread out over the entire area to minimise the risks.
- 1.7.2 Brushwood is often burned on purpose or accidentally. If burning is planned, brushwood should be spread out rather than stacked to limit soil damage as intense fires result in stacked brushwood destroying soil structure and preventing grass establishment for many years.
- 1.7.3 If there is a danger of damaging fires, unusable trees should be left standing as this will result in a less intense fire. This can only be done for wood in landscape areas.
- 1.7.4 Felled trees or trees in danger of falling in water courses should be removed so that they do not cause blockages with resulting problems of flooding and damage to infrastructure such as roads and fences. The felled trees should not be stacked within 20m of the riverbank/shore to comply with the National Water Act.

**B. Non Plant Invasives**

1. Selection of appropriate methods of control shall be based on the following criteria:

- Priority species
- Availability of best practise
- Availability of registered pesticides
- Integrated Pest Management Practices

1.1 Priority species

- 1.1.1 Priority species will be guided by the National Environmental Management: Biodiversity Act, 10 of 2004, Alien and Invasive Species Lists, 2016.
- 1.1.2 Priority species will be divided into categories as listed in the AIS lists as follows;
- 1.1.2.1 List 1: National list of Invasive Terrestrial and Freshwater Plant Species
- 1.1.2.2 List 2: National list of Invasive Marine Plant Species



- 1.1.2.3 List 3: National list of Invasive Mammal Species
- 1.1.2.4 List 4: National list of Invasive Bird Species
- 1.1.2.5 List 5: national list of Invasive Reptile Species
- 1.1.2.6 List 6: National list of Invasive Amphibian Species
- 1.1.2.7 List 7: National list of Invasive Freshwater Fish species
- 1.1.2.8 List 8: National list of Invasive Terrestrial Invertebrate Species
- 1.1.2.9 List 9: National list of Invasive Freshwater Invertebrate Species
- 1.1.2.10 List 10: National list of Invasive Marine Invertebrate Species
- 1.1.2.11 List 11: National list of Invasive Microbial Species
- 1.1.3 At least one species should be selected for control from each list based on their priority within their list and their risk to human health and the environment
- 1.1.4 Pesticides selected for control of priority species must be registered for use on the selected species under Act 36 of 1947.
- 1.1.5 Selection should be based on the WfW species and pesticide spreadsheet, Croplife suggestions, minor use registrations, labels and information brochures issued by suppliers.
- 1.2 Availability of best practise
  - 1.2.1 Best practice methods contains integrated methods with a portion of pesticides in some form, whether by spraying, baiting or treatment of waterbodies with piscicides. Strict guidelines need to be adhered to when implementing these.
- 1.3 Availability of registered pesticides
  - 1.3.1 Registered pesticides for non-plant programmes are not readily available in South Africa.
  - 1.3.2 There are a variety of rodenticides registered for mice control with varying effectiveness but huge impacts on non-target organisms such as birds as brodifacoum, coumatetralyl and difenacoum are secondary poisoners and anti-coagulants but cholecalciferol is not and should be the preferable product (see WFW species and pesticide spreadsheet).
  - 1.3.3 Avicides are generally used in the form of baiting and there is currently only one avicide registered as a restricted use pesticides for the use on house crows and is held by the City of Cape Town. The health impacts of this avicide is concerning and relates to the operators and the utmost care needs to be taken when applying the bait, thus the EP biomonitoring protocols need to be strictly adhered to<sup>6</sup>, as well and the PPE guidelines<sup>14</sup>.
  - 1.3.4 Piscicides are generally applied as solutions to waterbodies to control invasive alien fish and once the invasive alien fish have been removed from the system, a solution of potassium permanganate is released into the system to render the piscicide inert. There is currently only one piscicide registered under an emergency registration in South Africa as a restricted use pesticide for the control of invasive alien fish.
- 1.4 Integrated Pest Management (IPM) Practises
  - 1.4.1 (IPM) in relation to non-plant invasives relates to a combination of control methods utilised to combat these species to reduce the amount of pesticides needed for their management and/or control

- 1.4.2 Mammals are generally controlled using a combination of trapping and shooting as pesticides are considered inhumane by organizations such as the SPCA
- 1.4.3 Birds are generally controlled with a combination of trapping using a Judas bird, baiting with pesticide laced bait, and nest destruction and egg removal from nests.
- 1.4.4 Invertebrates such as invasive wasps are controlled by fumigating their nests
- 1.4.5 Amphibians are caught and humanely exterminated.

## LONG TERM CONTROL PROGRAMMES

- 2.1 In areas where after initial control of alien vegetation has taken place and regrowth of the species and/or other undesirable vegetation will occur, the programme should be so structured that a minimum of regrowth will occur and a follow-up programme will be actioned. The following must be taken into consideration:
  - 2.1.1 *Species coppicing.* Many species coppice from cut stumps and/or roots. Cut stumps must be thoroughly treated within 15 minutes of cutting according to label recommendations to minimise regrowth. Root coppice from species such as grey poplar (*Populus canescens*) and silver wattle (*Acacia dealbata*) occurs rapidly and control measures must be undertaken before plants become too large to be controlled with foliar sprays. Coppicing stumps should be treated before coppice reaches head height. Biopesticides should also be considered where practical and available.
  - 2.1.2 *Seedling control.* Germination of Acacia species takes place rapidly after a fire and control measures must be put in place as soon as possible to minimise the quantity of pesticide used and the cost of application. Selective pesticides should be used where there is a danger of damage to grass present. Biopesticides should also be considered.
  - 2.1.3 *Burning.* Burning should be considered part of the control programme to get rid of unwanted brushwood or to stimulate even growth of seedlings so that follow-up control measures are easier.
  - 2.1.4 *Rehabilitation.* Where the danger of erosion exists or where the re-establishment of pastures is desired after clearing, rehabilitation of the area with grasses or other suitable plants should be carried out. The advice of pasture / rehabilitation / ecology experts should be sought in planning this operation. Other erosion control measures such as the building of weirs should be undertaken where necessary.
  - 2.1.5 *Monitoring.* Monitoring of control and/or eradication programmes should be done to ensure extirpation of the invasive alien species from the area/catchment

and reported to DFFE Biosecurity unit for compliance with the NEM:BA AIS regulations promulgated in 2014.

- 2.1.6 *Data reporting.* All data should be reported to DFFE National Office and kept on file to comply with reporting requirements.

## SELECTION OF PESTICIDES

- 3.1 Pesticides are selected in accordance with the “WfW species and pesticide spreadsheet” by the Technical unit. The selection of pesticides should be based on the following criteria and any deviation from this point must be approved by the management committee (MANCO). Consult the NRM Technical Advisor.

3.1.1 *State Tender.* Most of the pesticides are found on The State Tender Contract – RT 12. These pesticides must be purchased in accordance with the correct procurement procedures as laid down by the department and National Treasury. The status of the State Tender Contract changes from time to time and it is therefore imperative that the latest version is used. For the latest version please contact your Regional DFFE:NRM Office.

3.1.2 *Efficacy.* Where alternative products are available for the same purpose, advice should be sought on the efficacy of these products under the prevailing application conditions. Biopesticides should be the priority as the environmental impacts are limited after biocontrol.

3.1.3 *Cost.* Where different methods of application exist the cost of application and retreatment, in addition to the cost of the product shall be taken into consideration in deciding on which pesticide to apply. The non-target effects and toxicity to human health and the environment should also be taken into account when deciding on a product. The ecotoxicity and environmental fate for all the pesticides is available in the species and pesticide spreadsheet. Biopesticides should be considered, but biocontrol is the priority if available for the species under investigation.

## 3.2 Operator safety.

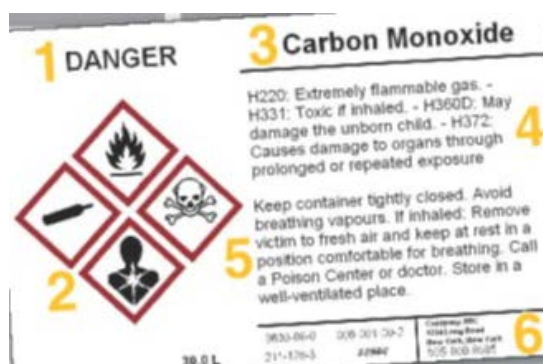
3.2.1 All measures must be taken to ensure the safety of the operators<sup>6,8</sup> and where choices exist preference should be given to the safest product. Check the label colour band.

3.2.2 The following table gives the toxicity rating according to the label colour band according to the WHO Recommended Classification of Pesticides by Hazard<sup>10</sup>:

|               |                                       |
|---------------|---------------------------------------|
| <b>BLUE</b>   | <b>SLIGHTLY HAZARDOUS - CAUTION</b>   |
| <b>YELLOW</b> | <b>MODERATELY HAZARDOUS - HARMFUL</b> |
| <b>RED</b>    | <b>TOXIC TO VERY TOXIC</b>            |

The new GHS labelling guidelines indicate that the labels will not have colour bands anymore but will have 6 compulsory label elements as follows<sup>9</sup>:

1. Signal word  
Indicates relative level of hazard. "Danger" is used for most severe instances while "Warning" is less severe.
2. Symbols (hazard pictograms)  
Convey health, physical and environmental hazard information with red diamond pictograms. May use a combination of one to five symbols.
3. Product name or identifiers  
Identifies the chemical or substance. Should match the product name or identifier used on the SDS.
4. Hazard statements  
Phrases that describe the nature of the hazardous products and often the degree of the hazard.
5. Precautionary statements  
Phrases associated with each hazard statement that describe general preventative, response, storage or disposal precautions.
6. Manufacturer Information  
Company name, address & telephone number



An example of a new GHS pesticide label with the 6 compulsory label elements.

3.2.3 Label recommendations regarding safety must be strictly observed in line with legislation<sup>6-10</sup>.

### 3.3 Environmental safety.

- 3.3.1 Pesticides that have the least impact on the environment shall be used where no effective biopesticides or biocontrol is available.
- 3.3.2 Every precaution shall be taken to ensure that these products are safely stored, handled and applied.

### 3.4 Availability.



- 3.4.1 Products should be readily available from suppliers in the areas of use to limit quantities stored in line with legislative requirements<sup>3,4</sup>.

## TRAINING

All contractors (or one of their employees) who apply pesticide for gain in the EP Programme must attend and pass the approved WfW Limited Pest Control Certified Pesticide Course or its equivalent. All Project Managers, in order to effectively manage the pesticide operations in their projects, must attend and pass the approved Pest Control Operators Course or its equivalent.

Operating teams shall be trained in the following aspects of pesticide use. Teams must receive training before commencing operations. Training shall be appropriate for the situations where teams will operate and specialized training or teams operating under specialized conditions, e.g. indigenous forests or soil applied pesticides, may be necessary.

### 4.1 Supervisors. Team supervisors shall receive training in the following:

- 4.1.1 Pesticide awareness. Basic training on the mode of action of pesticides, safety and human health impacts.
- 4.1.2 Operator safety. Handling of concentrates and spray mixtures, personal hygiene and protective clothing.
- 4.1.3 Safe storage of product at depots and operational sites and spray mixtures at operational sites in line with the international conventions and Waste Management Programme<sup>11</sup>.
- 4.1.4 Mixing. Handling of concentrates and mixing techniques and safety procedures.
- 4.1.5 Safety procedures to be observed during transportation of product, spray mixtures, equipment and personnel in line with legislative requirements<sup>3,4</sup>.
- 4.1.6 Care and maintenance of application equipment, saws etc.
- 4.1.7 Record keeping in respect of quantities of product/spray mixtures used, area treated, person hours per area/operation, stock control.
- 4.1.8 Planning. Advanced planning for follow-up operations, transportation, equipment and spares requirements, product procurement and availability. Team management.
- 4.1.9 First aid. Actions to be taken in case of accidental contamination, suspected and actual poisoning, chronic poisoning, eye contamination and other physical injuries.
- 4.1.10 Health of operators. Persons unsuitable for use as application operators, e.g. chronically ill, persons with disabilities, pregnant women. Allergic reactions. Wearing of protective apparel. Hygiene<sup>5-9</sup>.
- 4.1.11 Disposal of general waste.
- 4.1.12 Disposal of pesticide waste, triple rinsing procedures and management of pesticide spillage according to best management practise and Waste Management Programme<sup>3,4,11</sup>.
- 4.1.12 Managing major and minor spills, accident sites.
- 4.1.13 Calibrating application equipment.

- 4.1.14 Environmental safety.
- 4.1.15 Application techniques. Correct application to obtain most cost effective results.
- 4.1.16 Suitable and unsuitable application conditions.

4.2 Operators. Operators should receive training in the following:

- 4.2.1 Pesticide awareness - the purpose and functioning of pesticides and the need for correct application.
- 4.2.2 Pesticide applicator – ensure knowledge of pesticides and human health impacts and environmental impacts.
- 4.2.3 Safe handling of concentrates and spray mixtures, toxicity of pesticides, protective clothing, safe application, personal hygiene and disposal of waste in line with legislative requirements<sup>6-10</sup>.
- 4.2.4 Application techniques. Correct, thorough application. Preventing waste.
- 4.2.5 Care of equipment. Cleaning and disposal of washings.
- 4.4.6 Cleaning of empty containers. Triple rinse procedure and proper disposal of empty containers<sup>3,4,11</sup>.

## COSTING OPERATIONS OR PROGRAMMES

- 5.1 Prior to the commencement of any control operations or programmes an assessment shall be made on the cost, based on the following:
  - 5.1.1 Cost of pesticides and co-formulants.
  - 5.1.2 Quantity, to be based on:
    - 5.1.1.1 Method of application
    - 5.1.1.2 Size and density of target plants.
    - 5.1.1.3 Size and density of the non-plant infestation
    - 5.1.1.3 Dilution rates
  - 5.1.3 Adjuvant/surfactants required.
  - 5.1.4 Personnel costs. Number of person hours per area/operation.
  - 5.1.5 Cost of equipment, spares and maintenance.
  - 5.1.6 Cost of transportation, storage and other incidental costs.
- 5.2 Follow-up treatments such as seedling and/or coppice control must be similarly costed and built into the total cost of the control operation.
- 5.3 The cost of the biomonitoring and medical surveillance of spray operators and workers should be built into the overall cost of the control operation.

## PROVISION OF EQUIPMENT

- 6.1 Application equipment shall be standardised and obtained from approved suppliers.
- 6.2 Use of the following brand of knapsacks has been approved. CP 3, CP 15, Matabi, Solo, AgrimexA18, Osatu. (On placing an order for knapsacks, ensure the quote includes the approved nozzles and pressure regulator or constant flow valves, and a replacement set.)
  - 6.2.1 Where appropriate sprayers must be fitted with pressure regulators or flow regulators.
  - 6.2.2 Spares must be readily available and spares such as nozzles, plumbers tape, nuts, screws, hose and washers must be carried with teams. Suppliers must be consulted on spares requirements.
  - 6.2.3 The following nozzles or their equivalents shall be used as standard: TG-1, FL-5VS and TF-VS2 or their equivalents.
- 6.3 The teams should have the necessary tools, e.g. spanners, screwdrivers, pliers, to carry out necessary maintenance and repairs in the field.
- 6.4 Malfunctioning nozzles should be replaced in the field and no attempt should be made to clean them. Cleaning should be done at the workshop/store using preferably compressed air and water.
- 6.5 Small hand held sprayers should be standardised on to Polispray or equivalent and Hack-pack applicators.
- 6.6 Suitable plastic measuring cylinders, beakers and mixing containers must be available and only used for pesticide mixing.
- 6.7 Containers must always be provided for clean water for personal use.

## STORAGE, HANDLING AND TRANSPORTATION

- 7.1 Storage.

All storage facilities shall comply with the requirements of Croplife South Africa<sup>11</sup>, Regulations for Hazardous Chemical Agents 2021<sup>7</sup>, Occupational Health and Safety Act 85 of 1993, FAO Pesticide Storage and Stock Control Manual<sup>12</sup> and the FAO Guidelines for retail distribution of Pesticides with particular Reference to Storage and Handling at the Point of Supply to Users in Developing Countries<sup>13</sup>. These can be summarised as follows:
- 7.2 Isolation.

Where possible, a store should preferably be a separate building and should not be sited near a dwelling house, hospitals, schools, shops, food markets, livestock buildings or where fodder, fuel or other flammable materials are stored<sup>12</sup>. A minimum of five meters between the store and the other buildings is recommended. If part of a complex, the store must be totally sealed off from the rest of the complex, i.e. no free movement of air between the storage area and the rest of the complex. **The store should be far away from watercourses, wells and other supplies of water for domestic and stock animal use that could be contaminated by spillages or leaks from the store<sup>12,13</sup>. The site should not be in an area with high groundwater levels which may be subject to seasonal flooding nor adjacent to areas subject to seasonal flooding.**

7.3 Accessibility.

When planning a store bear in mind the ease of access for delivery or dispatch. Also consider the possibility of a fire and the need to be able to approach the building from all sides. There should be easy access for pesticide delivery vehicles. There should be access on at least three sides of the building for fire-fighting vehicles and equipment in an event of an emergency.

7.4 Construction.

7.4.1 Floor.

Earth, timber, bitumen, PVC or linoleum, coarse unscreened or disintegrating concrete is not acceptable. The floor should be made of impervious material or of slats over a concrete-lined sump into which chemical spills can drain to be neutralised. The floor area should be slightly raised at the edges to prevent spills from leaking out of the building and flood water from getting in<sup>12</sup>. Another option is smooth screeded concrete, however sealed, steel container floors are also acceptable. The doorway should be banded to a minimum height of 200 mm and this, as well as all wall to floor joints, should be made watertight. The purpose of the band is to contain spills or fire water which could cause damage to the environment and prevent water (e.g. flood run-off) entering the store.

7.4.2 Walls.

Walls should preferably be brick or concrete block with airbricks or vents 200 mm from the floor and near or at roof level. Containers are acceptable if there is adequate ventilation 200 mm from floor level and near roof level. The container should where possible be placed in a shaded area. If this is not possible ensure good permanent ventilation. The store walls should have outside sills that drain spilled chemicals into a sump. Internal walls should be smooth and free from cracks and ledges to allow for easy cleaning<sup>12</sup>. There should be walls between sections to act as fire breaks.

7.4.3 Roof.

The roof should be constructed of a light material, possibly glass fibre or asbestos substitute which collapses in an event of a fire to allow smoke and fumes to get out and avoid explosions. The material should be firm however so that it is not blown away during severe wind or storms. The roof should be leak-free and have some form of insulation to maintain temperatures at a reasonable level. Vent in the roof will allow for the escape of hot air during the summer months.

7.4.4 Doors.

Steel doors with an effective locking system are preferred. A wooden door should have a security gate to reduce the risk of forced entry. Containers with fitted security gates can be left open to cool the contents during the heat of the day. Only authorized personnel should have access to keys and be allowed in the store. There should be an emergency exit in addition to the entry and exit doors, preferably at the other end of the store.

7.4.5 Windows.

It is important to note that windows should not be built into a store if there are alternative means of ventilation and lighting; otherwise they should be shaded (or



prevent sunlight from heating the pesticides causing them to degrade and/or volatilise) and barred or burglar bars installed to prevent unauthorised entry<sup>12</sup>.

7.4.6 Lighting.

There should be sufficient lighting (200 lux) to allow for reading of product labels. If electric lighting is required it must be secure in order to reduce fire risk. Electric fittings should be mineral insulated or armoured cable should be used with flame/dust-proof fittings<sup>12</sup>. The mains control should be outside the store itself.

7.4.7 Sanitation.

Staff should have immediate access to washing facilities with running water, soap and towels. They should be encouraged to use it frequently. An eye wash bottle or similar object must be available at all times for the flushing of contamination from the eyes should it occur. A shower facility is recommended.

7.4.8 *Ventilation*

Ventilation is one of the most important requirements within the store as it prevents the build-up of vapours. Toxic vapours may affect the health of the store workers and flammable vapours are a fire risk. Ventilation also keeps the store as cool as possible. This is important as pesticides deteriorate more slowly and therefore last longer in a cooler environment. Many pesticides are destabilised by high temperatures, which in exceptional cases may even cause explosions. The ventilation area should be equivalent to 1/150 of the floor area, or outside doors should be open for at least six hours per week. Exhaust fans should be fitted to large stores, preferably on a time-delay switch. Roof- and floor-level ventilation is required to extract light fumes, hot air and heavy vapours<sup>12</sup>.

7.5 Equipment.

7.5.1 Equip the room with a table of suitable strength and height to facilitate reading of labels, decanting and measuring out of Pesticides.

7.5.2 Measuring jugs, funnels, pumps and buckets must be kept on hand and kept specifically for the purpose of measuring out Pesticides. Do not use household items for this purpose.

7.5.3 For the sake of good housekeeping, have on hand a broom, spade and a supply of dry fine soil as absorbent material to contain and absorb spills (spill kit). This is available in "kit form" from a number of suppliers.

7.6 Handling.

7.6.1 The handling of pesticides concentrates requires strict precautions and personnel handling product concentrates must be fully aware of precautions to be observed.

7.6.2 Suitable protective clothing must be available and use thereof is compulsory.

7.6.2.1 Chemical resistant plastic aprons, butile rubber gloves or chemical resistant nitrile gloves and eye protection and half-face respirator must be worn when handling concentrates<sup>6,8,14</sup>.

7.6.3 Adequate hygiene aids such as plentiful water, soap, towels and eye wash must be readily available.

- 7.6.4 Suitable absorbent material such as fine dry soil and cleaning equipment must be available to handle accidental spillage, including hazardous materials spill kits<sup>12,13</sup>.
- 7.6.5 In the case of spillage, the spill must be contained immediately and cleaned up with absorbent material such as fine dry soil and the relevant spill kit. The contaminated material should then be disposed of according to the guidelines<sup>7,12,13</sup>.
- 7.6.6 Concentrates should if possible be decanted in a safe, suitable place and not in the field. Such a handling and mixing area should have a hard impermeable floor, be bunded and have an adequate sump to accommodate run-off from washing, flooding or fire containment. A 1m<sup>3</sup>sump /10m<sup>2</sup>floor space is recommended.
- 7.6.7 Concentrates and mixtures should never be decanted into or be mixed in drinking bottles or other food containers.
- 7.6.8 Suitable equipment must be available to prepare spray mixtures. These include plastic measuring cylinders and beakers, mixing containers (buckets) and funnels.
- 7.7 In the field the following must be observed:
  - 7.7.1 If concentrates must be handled in the field, observe the precautions listed under 7.6.1, 7.6.2, 7.6.3, 7.6.4, 7.6.5, 7.6.6, 7.6.7 and 7.6.8
  - 7.7.2 Spray mixtures must be kept in leak-proof, non-spill containers. The containers should be kept away from personal belongings, foodstuff, drinking water and eating and living areas.
  - 7.7.3 Containers should stand on suitable absorbent material, for example, a large piece of thick hessian sack, which will absorb minor drips, out of direct sunlight in a cool place.
  - 7.7.4 Containers must be kept at least 20m away from water bodies to prevent possible contamination.
  - 7.7.5 Filling sites should be selected to prevent damage to desirable vegetation and to enable spillage to be cleaned up and disposed of.
  - 7.7.6 Spray mixture containers must be clearly labelled and only reused for the specific pesticide.
  - 7.7.7 Application equipment and containers should not be cleaned on site but at a suitable designated area at the store.
  - 7.7.8 Suitable protective clothing, overalls, rubber boots, gloves and eye protection must be worn by operators when handling and applying Pesticides<sup>6,8,14</sup>.
- 7.8 Transportation<sup>5,7</sup>.
  - 7.8.1 Pesticides and application equipment must be carried on a separate vehicle or in a part of the vehicle isolated from people, food and clothing.
  - 7.8.2 Vehicles should carry absorbent material to absorb any spillage.
  - 7.8.3 Pesticides and equipment must be secured to prevent spillage and damage.
  - 7.8.4 Pesticides, spray mixtures and equipment must not be left unattended where there is a danger of theft or abuse.
  - 7.8.5 Pesticides should not be left uncovered in the sun but in shaded areas and covered.
- 7.9 Disposal<sup>11,12,13,15</sup>.
  - 7.9.1 A designated officer should be responsible to ensure that pesticide containers are correctly and safely disposed of, according to Croplife guidelines.

- 7.9.2 Empty containers must be triple rinsed and disposed of after use and not be used for any other purpose. Under no circumstances may containers be taken home for personal use.
- 7.9.3 Empty containers should be returned to the store for safe keeping and disposal under the Waste Management Programme.
- 7.9.4 Where arrangements have been made containers should be returned to the supplier.
- 7.9.5 Containers that have to be destroyed should be triple rinsed, punctured and flattened. See attached pamphlets for details of triple rinsing and details of accredited suppliers in the Waste Management Programme for collection of empty containers.
- 7.9.5 Only sufficient spray mixture that can be used in a day should be prepared. Left- over material should be returned to the depot for safe storage and re-use in the spray mixture the following day.
- 7.9.6 Certain spray mixtures should not be left standing overnight and should be safely disposed of. Consult the product label. If mixtures can be left overnight with no adverse effects, they should be kept to reduce costs and pollution from pesticide and wash water.

## **PUBLIC SAFETY**

- 8.1 Due regard must be paid at all times to the health and safety of the public.
- 8.2 Public should be kept out of operational areas where any hazards exist. Warning notices should be displayed to this effect where necessary.
- 8.3 Pesticides must only be applied strictly according to label recommendations.
- 8.4 Product and spray mixtures should be stored so that they are inaccessible to the public.
- 8.5 Treatment of areas within 50 m of habitations, schools, hospitals and public areas (e.g. parks) should be avoided or only carried out in consultation with the parties effected.
- 8.6 Public should be informed of control operations in their area by means of verbal communication, notices, pamphlets, the press etc prior to the commencement of spray operations.

## **ENVIRONMENTAL SAFETY**

Most alien vegetation control operations are carried out in riparian situations which are regarded as environmentally sensitive. Non-plant control operations need to follow the same instructions in order to minimize the impact of the operation on the natural environment the following must be observed.

- 9.1 Area contamination must be minimised by careful accurate application with a minimum amount of pesticide to achieve good control.
- 9.2 All care must be taken to prevent contamination of any water bodies. This includes due care in storage, application, cleaning equipment and disposal of containers, product and spray mixtures.
- 9.3 Equipment should be washed where there is no danger of contaminating water sources and washings used in the next spray mix.

9.4 To avoid damage to indigenous or other desirable vegetation product should be selected that will have the least effect on non-target vegetation.

9.4.1 Coarse droplet nozzles should be fitted to avoid drift onto neighbouring vegetation, e.g. TG-1 or equivalent.

9.5 Only polyethoxylated tallow amine free, or aquatic safe herbicide formulations should be used in the riparian and aquatic environments so as to limit the impact on aquatic invertebrates.

## APPLICATION

### 10.1 Equipment.

Only application equipment and accessories specified (see PROVISION OF EQUIPMENT) shall be used by operating teams.

10.1.1 Equipment shall be inspected regularly between and during applications and necessary repairs carried out<sup>12</sup>.

10.1.2 Leaking sprayers or sprayers not applying correctly should be withdrawn until repairs have been carried out. Spare applicators and parts should always be available so as not to impede operations<sup>12,13</sup>.

10.1.3 Ensure that correct nozzles are fitted and pressure settings are checked regularly.

10.1.4 Where possible use low water volumes to keep turn around (refilling) time down to a minimum. Caution must be observed to limit drift when using minimum output nozzles<sup>12</sup>.

10.1.5 Always ensure that knapsacks are filled to 70% capacity. In aquatic programmes, never fill the knapsacks more than 50% to increase buoyancy of the sprayer in aquatic environments.

10.1.6 Equipment must be emptied and cleaned thoroughly after spraying ceases. Spray mixture must not be left in the apparatus overnight.

10.1.7 Apparatus should be stored under lock and key when not in use.

### 10.2 Rates of Application.

10.2.1 Products shall be mixed and applied at rates recommended on the label. This shall not be deviated from without consultation with Working for Water Technical Advisor and suppliers.

10.2.2 Applications should be checked regularly to ensure that they comply with recommendations.

### 10.3 Precautions.

10.3.1 Appropriate protective clothing must be changed and washed regularly and should be removed immediately if contaminated<sup>6-9</sup>.

10.3.2 Spillage must be attended to immediately and appropriately disposed of<sup>3,4,7,1,12,13</sup>.

10.3.3 Application teams must be trained to avoid damage to non-target species.



10.3.4 Contamination of all water bodies must be strictly avoided.

10.3.5 Hygiene aids - clean water, soap, towels and eye wash must always be available to spray operators.

#### 10.4 Adjuvants.

10.4.1 Where recommended adjuvants (wetting and spreading agents) should be added to spray mixtures. Adjuvants should always be mixed in accordance with label recommendations. Recommended adjuvant must be used as stipulated on the pesticide label.

10.4.2 Dye must be added to all applications where the product has no built in dye to ensure that no target species are missed and plants are correctly treated.

10.4.3 In areas where alkaline water is used for spraying the use of a buffering agent may be necessary. Consult the product label. Buffers should always be added to the water before the herbicide.

10.4.4 In sensitive areas where drift must be controlled, the use of drift control agents may be necessary. Seek expert advice on the use of these agents.

#### 10.5 Water Sources.

10.5.1 Only clean water may be used for spray mixtures.

10.5.2 Where particulate matter occurs in water, e.g. water drawn from rivers, the water must be filtered to avoid nozzle blockages.

10.5.3 Funnels with filters should be used for filling or filters should be fitted in the application equipment.

10.5.4 Where large volumes of water are transported, tankers or tanks should be fitted with buffer plates particularly where operating in rough terrain.

10.5.5 The product label should be consulted regarding the quality of water suitable for the specific pesticide.

### WEATHER CONDITIONS

11.1 Applications should not be carried out under unfavourable weather conditions that could affect the control obtained or endanger nearby desirable vegetation, water bodies or personnel.

11.2 Label recommendations regarding suitable application conditions must be followed.

11.3 The following conditions must be taken into consideration, depending on the method of application.

11.3.1 Application to wet or dew covered plants.

11.3.2 Imminent rain, moist or humid conditions.

11.3.3 Wind conditions <15km/h

11.3.4 Hot, dry conditions and volatility of active ingredients under high temperatures

#### 11.4 Conditions of target plants.

11.4.1 Poor results may result if target plants are not in a suitable condition for treatment. The following conditions may result in poor control.

11.4.1.1 Water stressed plants.

11.4.1.2 Water logged plants.

11.4.1.3 Dormant plants.

11.5 Seasonal variability. Some non-plant invasive species do not feed on bait in some seasons due to high availability of food.

### MIXING PESTICIDES

12.1 Mixing must take place according to label instructions.

12.2 Suitable protective clothing must be worn when handling pesticide concentrates<sup>8,14</sup>.

12.3 Liquid pesticide concentrates should be added to the half full tank of water which is then topped up with water.

12.4 Adjuvants should be added to the tank as per the label instruction prior to the addition of the pesticide when buffering and afterwards for adjuvants and dyes.

12.5 Do not mix pesticide concentrates together before adding them to the tank. Consult product labels.

12.6 Proper mixing in knapsacks and hand held applicators is difficult and spray mixtures should be mixed in bulk containers or if necessary (e.g. wettable powders) buckets before pouring into the knapsacks or hand held applicators.

12.7 Spray mixtures should be agitated continuously as recommended. This is essential after they have been standing for a while.

### CALIBRATION

13.1 Application equipment must be correctly calibrated to obtain optimum results and prevent wastage through over-application.

13.2 Calibration should be carried out in the area to be treated.

13.3 Calibration should be checked frequently during application. The following should be checked:

13.3.1 Correct spray pressure.

13.3.2 Correct nozzle size and spray pattern.

13.3.3 Correct nozzle output.

13.3.4 Volume of application over a specific area.

## ESTIMATED VOLUMES OF PRODUCT PER HECTARE

THIS IS FOR PLANNING PURPOSES AND TO BE USED, AS A GUIDE TO CALCULATE THE REQUIRED HERBICIDE NEEDED TO TREAT THE INTENDED AREA. (THIS IS NOT FOR CALIBRATION PURPOSES.)

AS THERE IS NO OR LITTLE DIFFERENCE IN HERBICIDE USE FOR A CLOSED OR DENSE STAND, THE VOLUMES PER HECTARE ARE GIVEN FOR A DENSE / CLOSED STAND OF THE SPECIFIC SPECIES. FOR LOWER INFESTATIONS, VOLUMES SHOULD BE REDUCED ACCORDINGLY.

THE % FIGURE OF THE DENSE/CLOSED APPLICATION RATE FOR THE LOWER INFESTATION GROUPS IS CALCULATED AT THE MID POINT OF THE DENSITY RANGE. IE MEDIUM, 25% TO 50% THE MID POINT IS 37.5%

THEREFORE IF THE RECOMMENDED RATE IS 6 LITRES OF A SPECIFIC PRODUCT PER HECTARE, THE RATE FOR A MEDIUM DENSITY WILL BE 37.5% OF THE 6 LITRES. THIS WILL BE EQUAL TO 2.25 LITRES PER HECTARE.

|                |   |                |
|----------------|---|----------------|
| DENSE          | = | 75 % OF CLOSED |
| MEDIUM         | = | 40 % OF CLOSED |
| SCATTERED      | = | 15 % OF CLOSED |
| VERY SCATTERED | = | 3 % OF CLOSED  |
| OCCASIONAL     | = | 1 % OF CLOSED  |
| RARE           | = | 1 % OF CLOSED  |

- **FOR WATER BASED APPLICATIONS, A SUITABLE ADJUVANT (WETTER) SHOULD BE ADDED WHERE RECOMMENDED ON THE LABEL. THE WETTER QUANTITIES CAN BE CALCULATED AS A RATIO (%) OF THE HERBICIDE QUANTITY, AS THE LABEL PRESCRIBES. E.G. IF HERBICIDE IS 1% MIX AND WETTER IS 0.1%, HALF THE HERBICIDE QUANTITY IS THE WETTER QUANTITY. OR IT CAN BE CALCULATED AS % WETTER REQUIRED X TOTAL MIXTURE TO BE APPLIED / HA = Lt (0.1% X 300Lt =1.5Lt)**

**RATE PER HECTARE FOR DENSE / CLOSED STAND – 1.75 l / ha**

## HERBICIDE DOSAGE AND LITRES PER HECTARE SUMMARY

The list of PESTICIDES, BIOCONTROL and BIOPESTICIDES are available in the WfW species and herbicide spreadsheet obtainable from the Technical Manager. Please ensure that you have the latest version. The following page contains a table of active ingredients and a list of some brand names that can be used. For more examples please consult the “Master species and herbicides spreadsheet” issued by the Technical Unit. This guide is updated from time to time, as new pesticides are being developed and registered as an ongoing process.

However before choosing other products please consult the National Office Technical Advisor. *The \** indicates the Biopesticides available.

**Table 1: Herbicide Table**

| Active ingredients               | Trade names    | Restrictions                            | Comments                                                                                                                                            | Hazard criteria |
|----------------------------------|----------------|-----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| <i>Cylindrobasidium leave*</i>   | Stumpout       | None                                    | Only registered for <i>A. Cyclops</i> , <i>A. mearnsii</i> , <i>A. dealbata</i> , <i>A. decurrans</i> , <i>A. melanoxylon</i> , <i>A. pycnantha</i> | None            |
| <i>Colletrotrichum acutatum*</i> | Hakea gummosis | Grahamstown hakea resistant to pathogen | Only used on <i>Hakea sericea</i> , <i>H. drupacea</i> and <i>H. sericifolia</i><br><br>Effective on all growth stages                              | None            |
| <i>Puccinia eupatori*</i>        | Leaf pathogen  |                                         | Only for <i>C. macrocephalum</i>                                                                                                                    | None            |
| <i>Uromycladium tepperianum*</i> | Rust fungus    |                                         | Only for <i>A. saligna</i>                                                                                                                          | None            |
| <i>Cercospora rodmannii*</i>     |                |                                         | Only for <i>E. crassipes</i>                                                                                                                        | None            |
| <i>Mycovellociella lantanae*</i> | Leaf pathogen  |                                         | Only for <i>L. camara</i>                                                                                                                           | None            |
| <i>Pasalora agaritinae*</i>      | Leaf pathogen  |                                         | Only for <i>A. adenopora</i>                                                                                                                        | None            |
| <i>Entyloma ageratinae*</i>      | Leaf pathogen  |                                         | Only for <i>A. riparia</i>                                                                                                                          | None            |
| <i>Puccinia abrupt*</i>          | Leaf pathogen  |                                         | Only for <i>P. hysterophorus</i>                                                                                                                    | None            |
| <i>Puccinia xanthii*</i>         | Leaf pathogen  |                                         | Only for <i>P. hysterophorus</i>                                                                                                                    | None            |



| Active ingredients                      | Trade names                     | Restrictions                                                         | Comments                                                 | Hazard criteria                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|-----------------------------------------|---------------------------------|----------------------------------------------------------------------|----------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Prospodium transformans</i> *        | Leaf pathogen                   |                                                                      | Only for <i>T. sans</i>                                  | None                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Triclopyr 270 g/L<br>+ Clopyralid 90g/L | Confront<br>Astra               | Eye irritant, skin irritant<br><br>Don't use in aquatic environments |                                                          | 2- acute toxicity to mammals and birds<br><br>GHS 07 WARNING<br><br><br>5 – Developmental and reproductive toxicity<br><br>GHS08 DANGER<br><br><br>8 – Persistence in soil/water and soil absorption potential & biomagnification & bioaccumulation<br><br>GHS09 WARNING<br> |
| Fluroxypyr 200g/L                       | Starane<br>Tomahawk<br>Voloxypr | Exclusion period                                                     | Limited species on Starane and Voloxypr<br><br>Flammable | 8 – Persistence in soil/water and soil absorption potential & bio magnification & bioaccumulation<br><br>GHS09 WARNING<br>                                                                                                                                                                                                                                                                                                                         |
| Picloram 80g/L + Fluroxypyr 80g/L       | Plenum                          | Don't use in aquatic environments<br><br>Eye and skin irritant       | Toxic to aquatic invertebrates                           | 2- acute toxicity to mammals and birds<br><br>GHS 07 WARNING<br>                                                                                                                                                                                                                                                                                                                                                                                   |

| Active ingredients                                                           | Trade names | Restrictions                         | Comments            | Hazard criteria                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|------------------------------------------------------------------------------|-------------|--------------------------------------|---------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                              |             |                                      |                     | <p>3 - Carcinogenicity<br/>GHS07 WARNING</p>  <p>6 – Endocrine Disrupting Chemicals (EDC)<br/>GHS08 DANGER</p>  <p>7 – Acute toxicity to aquatic organisms<br/>GHS09 WARNING</p>  <p>8 – Persistence in soil/water and soil absorption potential &amp; bio magnification &amp; bioaccumulation<br/>GHS09 WARNING</p>  |
| Picloram (as potassium salt) 54g/L + Triclopyr (as triethylamine salt) 46g/L | Kaput gel   | Limited species registered currently | No mixing necessary | <p>2- acute toxicity to mammals and birds<br/>GHS 07 WARNING</p>  <p>3 - Carcinogenicity<br/>GHS07 WARNING</p>                                                                                                                                                                                                                                                                                                                                                                             |

| Active ingredients                      | Trade names        | Restrictions                              | Comments                              | Hazard criteria                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-----------------------------------------|--------------------|-------------------------------------------|---------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                         |                    |                                           |                                       | <p>5 – Developmental and reproductive toxicity</p> <p>GHS08 DANGER</p>  <p>6 – Endocrine Disrupting Chemicals (EDC)</p> <p>GHS08 DANGER</p>  <p>7 – Acute toxicity to aquatic organisms</p> <p>GHS09 WARNING</p>  <p>8 – Persistence in soil/water and soil absorption potential &amp; bio magnification &amp; bioaccumulation</p> <p>GHS09 WARNING</p>  |
| 2-4D (as dimethyl amine salt)<br>480g/L | 2,4D<br>2,4D Amine | Limited registrations, herbaceous species | Weedy species such as <i>D. ferox</i> | <p>2- acute toxicity to mammals and birds</p> <p>GHS 07 WARNING</p>  <p>3 - Carcinogenicity</p> <p>GHS07 WARNING</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |

| Active ingredients                         | Trade names       | Restrictions                                                                                                     | Comments                                                                                           | Hazard criteria                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|--------------------------------------------|-------------------|------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                            |                   |                                                                                                                  |                                                                                                    | <br>5 – Developmental and reproductive toxicity<br>GHS08 DANGER<br><br>8 – Persistence in soil/water and soil absorption potential & bio magnification & bioaccumulation<br>GHS09 WARNING<br> |
| Glyphosate (as isopropylamine salt) 360g/L | Enviro-glyphosate | Not to be used in riparian or aquatic environments, unless tallow amine free adjuvants incorporated              | Ensure polyethoxylated tallow amine free as some of the products are toxic to aquatic environments | 2- acute toxicity to mammals and birds<br>GHS 07 WARNING<br>                                                                                                                                                                                                                                                                                                       |
| Glyphosate (as isopropylamine salt) 480g/L | Seismic           | Only seismic tallow amine free and recommended for aquatic weed control                                          | Polyethoxylated tallow amine free only                                                             | 2- acute toxicity to mammals and birds<br>GHS 07 WARNING<br>                                                                                                                                                                                                                                                                                                       |
| Glyphosate (as sodium salt) 500g/L         | Kilo              | Kilo registered for aquatic weeds, polyethoxylated tallow amine free. 3km exclusion zone for aerial applications | Poisonous if swallowed, eye irritant                                                               | 2- acute toxicity to mammals and birds<br>GHS 07 WARNING<br>                                                                                                                                                                                                                                                                                                       |



| Active ingredients                    | Trade names            | Restrictions                                                                                              | Comments               | Hazard criteria                                                                                                                                                                                                                                                                                                                                                                     |
|---------------------------------------|------------------------|-----------------------------------------------------------------------------------------------------------|------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Glyphosate (as sodium salt)<br>700g/L | Kilo max               | Registered for aquatic weeds<br><br>Polyethoxylated tallow amine free<br><br>Aerial spray exclusion zones | Eye irritant           | 2- acute toxicity to mammals and birds<br><br>GHS 07 WARNING<br><br>                                                                                                                                                                                                                             |
| Imazapyr 100 g/L                      | Chopper<br><br>Hatchet | Hatchet, limited registrations                                                                            | Poisonous if swallowed | 2- acute toxicity to mammals and birds<br><br>GHS 07 WARNING<br><br><br><br>8 – Persistence in soil/water and soil absorption potential& bio magnification & bioaccumulation<br><br>GHS09 WARNING<br><br>   |
| Imazapyr 250g/L                       | Format                 | Consult the technical unit for minor use registrations                                                    |                        | 2- acute toxicity to mammals and birds<br><br>GHS 07 WARNING<br><br><br><br>8 – Persistence in soil/water and soil absorption potential& bio magnification & bioaccumulation<br><br>GHS09 WARNING<br><br> |

| Active ingredients                        | Trade names        | Restrictions                                | Comments                                    | Hazard criteria                                                                                                                                                                                                                                                                                                                                            |
|-------------------------------------------|--------------------|---------------------------------------------|---------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Chlorimuron ethyl<br>500g/L               | Extreme<br>Nicanor | Bush<br>encroachment<br>only                | Consult<br>technical unit<br>for assistance | 2- acute toxicity to<br>mammals and<br>birds<br><br>GHS 07 WARNING<br><br><br>7 – Acute toxicity<br>to aquatic<br>organisms<br><br>GHS09 WARNING<br>                                 |
| Metsulfuron<br>methyl 600g/L              | Brushoff<br>Climax | 28 days<br>withholding<br>period            | Eyes, nose skin<br>irritant                 | 2- acute toxicity to<br>mammals and<br>birds<br><br>GHS 07 WARNING<br><br><br>7 – Acute toxicity<br>to aquatic<br>organisms<br><br>GHS09 WARNING<br>                             |
| Picloram (as<br>potassium salt)<br>240g/L | Access<br>Browser  | Not to be used<br>as foliar<br>applications |                                             | 2- acute toxicity to<br>mammals and<br>birds<br><br>GHS 07 WARNING<br><br><br>3 - Carcinogenicity<br><br>GHS07 WARNING<br><br><br>6 – Endocrine<br>Disrupting<br>Chemicals (EDC) |

| Active ingredients     | Trade names | Restrictions                                                                         | Comments                                  | Hazard criteria                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|------------------------|-------------|--------------------------------------------------------------------------------------|-------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                        |             |                                                                                      |                                           | <p>GHS08 DANGER</p>  <p>7 – Acute toxicity to aquatic organisms</p> <p>GHS09 WARNING</p>  <p>8 – Persistence in soil/water and soil absorption potential &amp; bio magnification &amp; bioaccumulation</p> <p>GHS09 WARNING</p>  |
| Tebuthiuron<br>200g/kg | Molopo      | <p>Bush encroachment only</p> <p>Consult the technical unit PRIOR to application</p> | Extremely residual in soil, acutely toxic | <p>2- acute toxicity to mammals and birds</p> <p>GHS 07 WARNING</p>  <p>7 – Acute toxicity to aquatic organisms</p> <p>GHS09 WARNING</p>  <p>8 – Persistence in soil/water and soil absorption potential &amp; bio magnification &amp; bioaccumulation</p> <p>GHS09 WARNING</p>                                   |

| Active ingredients     | Trade names       | Restrictions                                                                  | Comments                                  | Hazard criteria                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|------------------------|-------------------|-------------------------------------------------------------------------------|-------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                        |                   |                                                                               |                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Tebuthiuron<br>500g/L  | Molopo            | Bush encroachment only<br><br>Consult the technical unit PRIOR to application | Extremely residual in soil, acutely toxic | 2- acute toxicity to mammals and birds<br><br>GHS 07 WARNING<br><br><br>7 – Acute toxicity to aquatic organisms<br><br>GHS09 WARNING<br><br><br>8 – Persistence in soil/water and soil absorption potential & bio magnification & bioaccumulation<br><br>GHS09 WARNING<br> |
| Tebuthiuron<br>800g/kg | Molopo<br>Limpopo | Bush encroachment only<br><br>Consult the technical unit PRIOR to application | Extremely residual in soil, acutely toxic | 2- acute toxicity to mammals and birds<br><br>GHS 07 WARNING<br><br><br>7 – Acute toxicity to aquatic organisms<br><br>GHS09 WARNING<br><br><br>8 – Persistence in soil/water and soil absorption                                                                                                                                                           |



| Active ingredients                       | Trade names                                 | Restrictions                                                                                                         | Comments                                                                                    | Hazard criteria                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|------------------------------------------|---------------------------------------------|----------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                          |                                             |                                                                                                                      |                                                                                             | <p>potential &amp; bio magnification &amp; bioaccumulation</p> <p>GHS09 WARNING</p>                                                                                                                                                                                                                                                                                                                                                                           |
| Triclopyr (as butoxy ethyl ester) 240g/L | Ranger                                      | <p>Eye irritant</p> <p>Volatile over 25 degrees</p>                                                                  | <p>Toxic to fish and animals</p> <p>Skin and eye irritant</p>                               | <p>2- acute toxicity to mammals and birds</p> <p>GHS 07 WARNING</p>  <p>5 – Developmental and reproductive toxicity</p> <p>GHS08 DANGER</p>  <p>8 – Persistence in soil/water and soil absorption potential &amp; bio magnification &amp; bioaccumulation</p> <p>GHS09 WARNING</p>  |
| Triclopyr (as butoxy ethyl ester) 480g/L | <p>Garlon</p> <p>Triclon</p> <p>Viroaxe</p> | <p>Volatile over 25 degrees</p> <p>Do not use in riparian and aquatic environments</p> <p>Diesel mix not allowed</p> | <p>Toxic to fish and animals</p> <p>Skin and eye irritant</p> <p>Poisonous if swallowed</p> | <p>2- acute toxicity to mammals and birds</p> <p>GHS 07 WARNING</p>  <p>5 – Developmental and reproductive toxicity</p> <p>GHS08 DANGER</p>                                                                                                                                                                                                                                                                                                                 |

| Active ingredients                                            | Trade names           | Restrictions                                                                                          | Comments                                                                     | Hazard criteria                                                                                                                                                                                                                                                                                                                                                 |
|---------------------------------------------------------------|-----------------------|-------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                               |                       |                                                                                                       |                                                                              | <br>8 – Persistence in soil/water and soil absorption potential & bio magnification & bioaccumulation<br>GHS09 WARNING<br>                                                                |
| Triclopyr (as pyridyloxy compound) 360 g/L                    | Lumberjack<br>Timbrel | Adjuvant as indicated on the label                                                                    | Skin, eye irritant, burns<br>Flammable<br>Possible weed resistant            | 2- acute toxicity to mammals and birds<br>GHS 07 WARNING<br><br>8 – Persistence in soil/water and soil absorption potential & bio magnification & bioaccumulation<br>GHS09 WARNING<br> |
| Triclopyr (as butoxy ethyl ester) 240g/L + Aminopyralid 30g/L | Garlon max            | Volatile over 25 degrees<br>Do not use in riparian and aquatic environments<br>Diesel mix not allowed | Toxic to fish and animals<br>Skin and eye irritant<br>Poisonous if swallowed | 2- acute toxicity to mammals and birds<br>GHS 07 WARNING<br><br>5 – Developmental and reproductive toxicity<br>GHS08 DANGER<br>                                                       |

| Active ingredients                                                                      | Trade names    | Restrictions                                                                | Comments              | Hazard criteria                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-----------------------------------------------------------------------------------------|----------------|-----------------------------------------------------------------------------|-----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                         |                |                                                                             |                       | <p>7 – Acute toxicity to aquatic organisms</p> <p>GHS09 WARNING</p>  <p>8 – Persistence in soil/water and soil absorption potential &amp; bio magnification &amp; bioaccumulation</p> <p>GHS09 WARNING</p>                                                                                                                                                                              |
| <p>Triclopyr (as thiethyl ammonium) 120g/L + Aminopyralid (as triisopropanol) 12g/L</p> | Confront super | <p>Eye irritant, skin irritant</p> <p>Don't use in aquatic environments</p> | Limited registrations | <p>2- acute toxicity to mammals and birds</p> <p>GHS 07 WARNING</p>  <p>5 – Developmental and reproductive toxicity</p> <p>GHS08 DANGER</p>  <p>7 – Acute toxicity to aquatic organisms</p> <p>GHS09 WARNING</p>  <p>8 – Persistence in soil/water and soil absorption potential &amp; bio</p> |

| Active ingredients                    | Trade names                                   | Restrictions                                                                          | Comments                                                                                  | Hazard criteria                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|---------------------------------------|-----------------------------------------------|---------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                       |                                               |                                                                                       |                                                                                           | <p>magnification &amp; bioaccumulation</p> <p>GHS09 WARNING</p>                                                                                                                                                                                                                                                                                                                                                                                           |
| Bromacil 250g/L +<br>Tebuthion 250g/L | Bundu                                         | Bush encroachers only                                                                 |                                                                                           | <p>2- acute toxicity to mammals and birds</p> <p>GHS 07 WARNING</p>  <p>7 – Acute toxicity to aquatic organisms</p> <p>GHS09 WARNING</p>  <p>8 – Persistence in soil/water and soil absorption potential&amp; bio magnification &amp; bioaccumulation</p> <p>GHS09 WARNING</p>  |
| Wetter/Adjuvant                       | H&R crop oil<br>BP crop oil<br>Actipron super | Ensure the adjuvant used is the approved adjuvant as per the relevant herbicide label | Please see the master species and herbicide list for which formulations require adjuvants |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Blue/red/white dye                    | Ecoblue<br>Ecowhite                           | Only marker dyes or pigments to be used, not food colouring                           |                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |



| Active ingredients                                         | Trade names                         | Restrictions                   | Comments | Hazard criteria |
|------------------------------------------------------------|-------------------------------------|--------------------------------|----------|-----------------|
| Blue Dye<br>=Approximately 0.5% per litre water            | Medium = 37.5% of Closed/Dense      |                                |          |                 |
| Medium = 37.5% of Closed/Dense                             | Medium = 37.5% of Closed/Dense      | Medium = 37.5% of Closed/Dense |          |                 |
| Red Dye (diesel)<br>= Approximately 0.5% per litre diesel. | Very Scattered = 3% of Closed/Dense |                                |          |                 |
|                                                            | Occasional = 0.5% of Closed/Dense   |                                |          |                 |
|                                                            | Rare = 0.5% of Closed/Dense         |                                |          |                 |

Table 2: Pesticide table

| Active ingredients    | Trade names   | Restrictions                         | Comments                                 | Hazard criteria                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|-----------------------|---------------|--------------------------------------|------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Brodifacoum 0.025g/kg | Pest off bait | Control of mice on off-shore Islands | Secondary poisoner<br><br>Anti-coagulant | <p>2- acute toxicity to mammals and birds<br/>GHS 07 WARNING</p>  <p>7 – Acute toxicity to aquatic organisms<br/>GHS09 WARNING</p>  <p>8 – Persistence in soil/water and soil absorption potential &amp; bio magnification &amp; bioaccumulation<br/>GHS09 WARNING</p>  |

| Active ingredients                 | Trade names         | Restrictions                                                                                                                                              | Comments                                                                       | Hazard criteria                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|------------------------------------|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2,2,2-trichloroethylidene          | Alphachloralose     | To not use near water bodies.<br>Toxic if swallowed.<br><br>Inhalation risk<br><br>CNS depressant                                                         | Used as a sedative in invasive bird control such as Mallard control programmes | 2- acute toxicity to mammals and birds<br><br>GHS06 – DANGER<br><br><br><br>GHS 07 WARNING<br><br><br>7 – Acute toxicity to aquatic organisms<br>GHS09 WARNING<br><br><br>8 – Persistence in soil/water and soil absorption potential & bio magnification & bioaccumulation<br>GHS09 WARNING<br><br> |
| 3-chloro-p-toluidine hydrochloride | DRC-1336/Starlicide | Toxic if swallowed<br><br>Toxic in contact with skin<br><br>Skin irritation, eye irritation<br><br>Inhalation risk<br><br>Toxic to aquatic environments 4 | Avicide powder to mix into bait to control corvids                             | 2- acute toxicity to mammals and birds<br><br>GHS06 – DANGER<br><br><br><br>GHS 07 WARNING<br><br><br>7 – Acute toxicity to aquatic organisms<br>GHS09 WARNING<br><br><br>8 – Persistence in soil/water and soil                                                                                                                                                                    |

| Active ingredients                                                | Trade names | Restrictions                                                                                  | Comments                                                                                                                                    | Hazard criteria                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-------------------------------------------------------------------|-------------|-----------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                   |             |                                                                                               |                                                                                                                                             | absorption potential & bio magnification & bioaccumulation<br>GHS09 WARNING<br>                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| 1,2,12,12a-tetrahydrochromeno[3,4-b]furo[2,3-h]chromen-6(6aH)-one | Rotenone    | Toxic if swallowed<br><br>Causes skin and eye irritation<br><br>Toxic to aquatic environments | Used to control invasive fish, monitoring programmes necessary to ensure recovery after potassium permanganate recovery process implemented | 2- acute toxicity to mammals and birds<br><br>GHS06 – DANGER<br><br><br>GHS 07 WARNING<br><br>7 – Acute toxicity to aquatic organisms<br>GHS09 WARNING<br><br><br>8 – Persistence in soil/water and soil absorption potential & bio magnification & bioaccumulation<br>GHS09 WARNING<br> |

**References:**

1. UNEP, 2019. Stockholm Convention on Persistent organic Pollutants (POPs). United Nations Environment Programme, Secretariat of the Stockholm Convention, September 2020. Available from <https://www.chm.pops.int>
2. UNEP, 2020. Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade. United Nations Environment Programme and Food and Agriculture Organization, Secretariat of the Rotterdam Convention, August 2020.

3. UNEP, 2019. Basel Convention on the Control of Trans boundary Movements of Hazardous Wastes and their Disposal. United Nations Environment Programme, Secretariat of the Basel Convention, April, 2020.
4. UNEP, 1991. Bamako Convention on the Ban of the Import into Africa and the Control of Trans boundary Movement and management of Hazardous Wastes within Africa. United Nations Environment Programme, Secretariat of the Bamako Convention, April 1991.
5. FAO & WHO, 2014. The International Code of Conduct on Pesticide Management. Food and Agriculture Organization of the United Nations & World Health Organization, Rome, 2014. Available from [www.fao.org/publications](http://www.fao.org/publications)
6. Muir.D & Taliep.M, 2021. EP Biomonitoring protocols for pesticide management. Internal document available from D. Muir.
7. DOEL, 2021. Regulations for Hazardous Chemical Agents. Occupational health and Safety Act, 1993. Notice No. 44348, published Government Gazette, 29 March 2021. Available from: <https://www.pgwonline.co.za>
8. FAO & WHO, 2020. International Code of Conduct on Pesticide Management: Guidelines for Personal Protection when Handling and Applying Pesticides. Food and Agriculture Organization of the United Nations & World Health Organization, Rome, 2020. Available from: <https://www.fao.org/publications>
9. UN, 2011. Globally Harmonised System of Classification and Labelling of Chemicals (GHS). 4<sup>th</sup> Revised Edition. United Nations, New York and Geneva, 2011. Available from: [http://www.unece.org/trans/danger/publi/ghs/implementation\\_e.html](http://www.unece.org/trans/danger/publi/ghs/implementation_e.html)
10. WHO, 2009. The WHO Recommended Classification of Pesticides by Hazard and Guidelines to Classification. International Programme on Chemical safety (IPCS). Inter-Organization Programme for Sound Management of Chemicals (IOMC), World Health Organization, Stuttgart, 2010. Available from: [http://www.unece.org/trans/danger/publi/ghs/ghs\\_rev03/03files\\_e.html](http://www.unece.org/trans/danger/publi/ghs/ghs_rev03/03files_e.html).
11. Croplife SA, 2018. Waste Management Programme: Guidelines for the Responsible Disposal of the Triple Rinsed Empty Plastic Pesticide Containers. December 2018 Edition. Available from Croplife SA.
12. FAO, 1996. Pesticide storage and stock control manual. FAO Pesticide Disposal Series 3. Food and Agriculture Organization of the United Nations, Rome, 1996. Available from: <https://www.fao.org/publications/>
13. FAO, 1988. Guidelines for Retail Distribution of Pesticides with Particular reference to Storage and Handling at the Point of Supply to Users in Developing Countries. Food and Agriculture Organization of the United Nations, Rome. October 1988. Available from: <https://www.fao.org/publications/>
14. Muir, D. & Taliep, M. 2020. EP Job category PPE Spreadsheet 2020. Internal document. Available from: D. Muir
15. FAO & WHO, 2008. International Code of Conduct on the Distribution and Use of Pesticides: Guidelines on Management Options for Empty Pesticide Containers. Food and Agriculture Organization of the United Nations & World Health Organization. Rome, May 2008. Available from: <https://www.fao.org/publications/>



**ANNEXURE 1: CHEMICAL GROUPS AND HAZARD GROUPS OF PESTICIDES**

**This must be read in conjunction with the International Chemical Groups and Hazard groups and listed in *UN, 2011. Globally Harmonised System of Classification and Labelling of Chemicals (GHS). 4<sup>th</sup> Revised Edition. United Nations, New York and Geneva, 2011.***

| HERBICIDES FOR ALIEN PLANT CONTROL |                |                               |                                       |              |                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                        |                |                                                                       |       |                                                                                                                                                                                                                                                        |       |                          |
|------------------------------------|----------------|-------------------------------|---------------------------------------|--------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|-----------------------------------------------------------------------|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|--------------------------|
|                                    |                |                               |                                       |              |                                                                                                                                                                                                                                                                                                          | PPE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                        |                | Medical Biomonitoring                                                 |       | Frequency and Duration                                                                                                                                                                                                                                 |       |                          |
|                                    | Chemical group | MOA                           | Examples                              | Hazard Group | Hazard Criterion                                                                                                                                                                                                                                                                                         | Type                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Pictogram                                                                                                                                              | Classification | Blood                                                                 | Urine | Blood                                                                                                                                                                                                                                                  | Urine | Environmental monitoring |
| 1                                  | Imidazolinones | Group 2: ALS: AHAS inhibitors | Imazapyr ( Chopper, Hatchet, Arsenal) | 2            | <p><b>Acute toxicity to mammals and birds</b></p> <p><b>GHS07</b></p> <p><b>WARNING</b></p> <p></p> <p>H319 (causes serious eye irritation)</p> <p>H335 (Respiratory irritant)</p> <p>H315 (causes skin irritation)</p> | <p>1.Chemically resistant nitrile gloves</p> <p>2.Type 3 and Type 4 protective clothing</p> <p></p> <p></p> <p>3.Safety boots</p> <p></p> <p>4.Face &amp; Eye protection</p> <p></p> <p>5.Half-face respirators</p> <p></p> <p>6.Particulate air filters for respirators</p> <p></p> <p>7.Apron/ Knapjack</p> <p></p> <p>8. Long-sleeved shirts</p> | <p>EN 374:2016</p> <p>EN 14605:2005</p> <p>EN 345: 1993</p> <p>EN ISO 20345</p> <p>EN 166:2001<br/>EN 140, EN149, EN 143:200</p> <p>R95, R99, R100</p> | N/A            | 5cc fresh urine sample refrigerated. Tested using ELIZA dipstick test | N/A   | <p>1.All workers need to be tested before they start working.</p> <p>2.If the worker sprays 8 hours per day for 5 days per week, an additional test is needed every 2 years.</p> <p>3. All workers need to be tested once they leave the programme</p> |       |                          |

|   |               |                               |                                                                    |   |                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                   |                                                            |     |                                                                                     |     |                                                                                                                                                                                                                     |                                                            |
|---|---------------|-------------------------------|--------------------------------------------------------------------|---|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|-----|-------------------------------------------------------------------------------------|-----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|
|   |               |                               |                                                                    |   |                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                   |                                                            |     |                                                                                     |     |                                                                                                                                                                                                                     |                                                            |
|   |               |                               |                                                                    | 8 | <p><b>Persistence in soil/water and soil absorption potential &amp; bio magnification &amp; bioaccumulation</b></p> <p><b>GHS09 WARNING</b></p>  <p>H412 (harmful to aquatic life with long lasting effects)</p> |                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                   |                                                            |     |                                                                                     |     |                                                                                                                                                                                                                     | Hazard criterion 7 and 8 are linked to environmental risks |
| 2 | Sulfonylureas | Group 2: ALS: AHAS inhibitors | Metsulfuron-methyl (Brush-off, Climax, Forester, Extreme, Nikanor) | 7 | <p>Acute toxicity to aquatic organisms</p> <p><b>GHS09 WARNING</b></p>  <p>H400 (Very toxic to aquatic life)</p>                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                   |                                                            |     |                                                                                     |     |                                                                                                                                                                                                                     |                                                            |
|   |               |                               |                                                                    | 2 | <p>Acute toxicity to mammals and birds</p> <p><b>GHS07 WARNING</b></p>  <p>H315 (causes skin irritation)</p> <p>H335 (Respiratory tract irritant)</p> <p>H319 (Causes serious eye irritation)</p>              | <p>1. Chemically resistant nitrile gloves</p> <p>2. Type 3 and Type 4 protective clothing</p>    |    | <p>EN 374:2016</p> <p>EN 14605:2005</p> <p>EN 345:1993</p> | N/A | <p>5cc fresh urine sample refrigerated.</p> <p>Tested using ELIZA dipstick test</p> | N/A | <p>1. All workers need to be tested before they start working.</p> <p>2. If the worker sprays 8 hours per day for 5 days per week, an additional test is needed every 2 years.</p> <p>3. All workers need to be</p> |                                                            |

STRATEGY: ENVIRONMENTAL PROGRAMMES PESTICIDE POLICY, 2021

|  |                  |                           |                                      |   |                                                                                                                                                                                                                                                                                           |                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                 |                                                                                       |  |                                                                          |  |                                                                                                                                                                                                                                       |  |
|--|------------------|---------------------------|--------------------------------------|---|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|--|--------------------------------------------------------------------------|--|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
|  |                  |                           |                                      |   |                                                                                                                                                                                                                                                                                           | 3.Safety boots<br>4.Face & Eye protection<br>5.Half-face respirators<br>6.Particulate air filters for respirators<br>7.Apron/ Knapjack<br>8. Long-sleeved shirts | <br><br>                                                                                               | EN ISO 20345<br><br>EN 166:2001<br>EN 140,<br>EN149, EN 143:200<br><br>R95, R99, R100 |  |                                                                          |  | tested once they leave they programme                                                                                                                                                                                                 |  |
|  | Carboxylic acids | Group 4: Synthetic auxins | Picloram (Access, Browser, Scrubber) | 2 | Acute toxicity to mammals and birds<br>GHS07<br>WARNING<br><br>H302 (harmful if swallowed)<br>H312 (harmful in contact with skin)<br>H319 (Causes serious eye irritation)<br>H332 (harmful if inhaled) | 1.Chemically resistant nitrile gloves<br>2.Type 3 and Type 4 protective clothing<br>3.Safety boots<br>4.Face & Eye protection                                    | <br><br><br> | EN 374:2016<br><br>EN 14605:2005<br><br>EN 345: 1993<br><br>EN ISO 20345              |  | 5cc fresh urine sample refrigerated.<br>Tested using ELIZA dipstick test |  | 1.All workers need to be tested before they start working.<br>2.If the worker sprays 8 hours per day for 5 days per week, an additional test is needed every year.<br>3. All workers need to be tested once they leave they programme |  |



|  |  |  |  |   |                                                                                                                                                                                 |                                                                                                                                        |                                                                                                                                                                            |                                                                                       |                                                                          |  |                                                                                                                                                                                                                                                          |  |  |
|--|--|--|--|---|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|--------------------------------------------------------------------------|--|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|
|  |  |  |  |   |                                                                                                                                                                                 | <p>5.Half-face respirators</p> <p>6.Particulate air filters for respirators</p> <p>7.Apron/ Knapjack</p> <p>8. Long-sleeved shirts</p> | <br> | <p>EN 166:2001<br/>EN 140,<br/>EN149, EN<br/>143:200</p><br><p>R95, R99,<br/>R100</p> |                                                                          |  |                                                                                                                                                                                                                                                          |  |  |
|  |  |  |  | 3 | <p>Carcinogenicity<br/>GHS07<br/>WARNING</p>  <p>H335 (May cause respiratory irritation)</p> | Same as above                                                                                                                          | Same as above                                                                                                                                                              | Same as above                                                                         | 20cc fresh blood sample. AChE tests done with Test-Mate model 400 device |  | <p>1.All workers need to be tested before they start working.<br/>2.If the worker sprays 8 hours per day for 5 days per week, an additional test needs to be done every 2 years..<br/>3. All workers need to be tested once they leave the programme</p> |  |  |

|  |  |  |  |   |                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                             |                                                                                     |                                                                                                                                                                                                                                                                            |  |  |  |
|--|--|--|--|---|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|
|  |  |  |  |   |                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                             |                                                                                     |                                                                                                                                                                                                                                                                            |  |  |  |
|  |  |  |  | 6 | <div>Endocrine Disrupting Chemicals (EDC)<br/>GHS08 DANGER</div> <div></div> <div>H370 (causes damage to organs – lungs)</div> | <div>1.Chemically resistant nitrile gloves</div> <div>2.Type 3 and Type 4 protective clothing</div> <div><br/></div> <div>Type 5 protective clothing</div> <div></div> <div>3.Safety boots</div> <div>4.Face &amp; Eye protection</div> <div>5.Half-face respirators</div> <div>6.Particulate air filters for respirators</div> <div>7.Apron/ Knapjack</div> <div>8. Long-sleeved shirts</div> | <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> | <div>EN ISO 20345</div> <div>EN 166:2001</div> <div>EN140<br/>EN 149</div> <div>EN 143:2000</div> <div>R95, R99, R100</div> | <div>20cc fresh blood sample. AChE tests done with Test-Mate model 400 device</div> | <div>1.All workers need to be tested before they start working.</div> <div>2.If the worker sprays 8 hours per day for 5 days per week, an additional test needs to be done every 2 years..</div> <div>3. All workers need to be tested once they leave the programme</div> |  |  |  |

|  |               |                           |                            |   |                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                       |                                                                                                                                                                                    |                                                      |                                                                       |                                                                                                                                                                    |  |  |  |
|--|---------------|---------------------------|----------------------------|---|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------|-----------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|
|  |               |                           |                            |   |                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                       |                                                                                                                                                                                    |                                                      |                                                                       |                                                                                                                                                                    |  |  |  |
|  |               |                           |                            | 7 | Acute toxicity to aquatic organisms<br>GHS09<br>WARNING<br><br>H400 (Very toxic to aquatic life)                                                                                                                                                 |                                                                                                                                                                                                                                                                       |                                                                                                                                                                                    |                                                      |                                                                       |                                                                                                                                                                    |  |  |  |
|  |               |                           |                            | 8 | Persistence in soil/water and soil absorption potential & bio magnification & bioaccumulation<br>GHS09<br>WARNING<br><br>H410 (Very toxic to aquatic life with long lasting effects)<br>H412 (harmful to aquatic life with long lasting effects) |                                                                                                                                                                                                                                                                       |                                                                                                                                                                                    |                                                      |                                                                       |                                                                                                                                                                    |  |  |  |
|  | Phenoxy acids | Group 4: Synthetic auxins | Alkylchloro phenoxy (2,4D) | 2 | Acute toxicity to mammals and birds<br>GHS07<br>WARNING<br><br>H302 (Harmful if swallowed)<br>H317 ( May cause an allergic reaction)                                                                                                           | 1.Chemical ly resistant nitrile gloves<br><br>2.Type 3 and Type 4 protective clothing<br><br> | <br><br> | EN 374:2016<br><br>EN 14605:2005<br><br>EN 345: 1993 | 5cc fresh urine sample refrigerated. Tested using ELIZA dipstick test | 1.All workers need to be tested before they start working.<br>2.If the worker sprays 8 hours per day for 5 days per week, an additional test is needed every year. |  |  |  |

STRATEGY: ENVIRONMENTAL PROGRAMMES PESTICIDE POLICY, 2021

|  |  |  |   |                                                                                                                                                                     |                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                          |                                                                                    |  |                                                                                                                                                                                                                   |  |                                                                 |
|--|--|--|---|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|--|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|-----------------------------------------------------------------|
|  |  |  |   |                                                                                                                                                                     | H318 (causes serious eye damage)                                                                                                                                                                                                                                 | 3.Safety boots<br><br>4.Face & Eye protection<br><br>5.Half-face respirators<br><br>6.Particulate air filters for respirators<br><br>7.Apron/ Knapjack                                                                                                                                                                                                         | <br><br><br> | EN ISO 20345<br><br>EN 166:2001<br>EN 140, EN149, EN 143:200<br><br>R95, R99, R100 |  |                                                                                                                                                                                                                   |  | 3. All workers need to be tested once they leave they programme |
|  |  |  | 3 | Carcinogenicity<br>GHS07<br>WARNING<br><br>H335 (May cause respiratory irritation) | 1.Chemically resistant nitrile gloves<br><br>2.Type 3 and Type 4 protective clothing<br><br><br>3.Safety boots<br><br>4.Face & Eye protection<br><br>5.Half-face respirators | <br><br><br> | EN 374:2016<br><br>EN 14605:2005<br><br>EN 345: 1993<br><br>EN ISO 20345<br><br>EN 166:2001                                                                                                                                                                                                                                                              | 20cc fresh blood sample.<br>AChE tests done with Test-Mate model 400 device        |  | 1.All workers need to be tested before they start working.<br>2.If the worker sprays 8 hours per day for 5 days per week, an additional test needs to be done every 2 years..<br>3. All workers need to be tested |  |                                                                 |



|  |  |  |  |   |                                                                                                                                                                                                             |                                                                                                                 |                                                                                       |                           |                                                                          |  |                                                                                                                 |  |  |
|--|--|--|--|---|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------|--------------------------------------------------------------------------|--|-----------------------------------------------------------------------------------------------------------------|--|--|
|  |  |  |  |   |                                                                                                                                                                                                             | 6.Particulate air filters for respirators                                                                       |    | EN 140, EN149, EN 143:200 |                                                                          |  | once they leave the programme                                                                                   |  |  |
|  |  |  |  |   |                                                                                                                                                                                                             | 7.Apron/ Knapjack                                                                                               |    | R95, R99, R100            |                                                                          |  |                                                                                                                 |  |  |
|  |  |  |  | 5 | Developmental & Reproductive toxicity<br>GHS08 DANGER<br><br>H361<br>(Suspected of damaging fertility or the unborn child) | 1.Chemically resistant nitrile gloves                                                                           |    | EN ISO 20345              | 20cc fresh blood sample. AChE tests done with Test-Mate model 400 device |  | 1.All workers need to be tested before they start working.                                                      |  |  |
|  |  |  |  |   |                                                                                                                                                                                                             | 2.Type 3 and Type 4 protective clothing                                                                         |    | EN 166:2001               |                                                                          |  | 2.If the worker sprays 8 hours per day for 5 days per week, an additional test needs to be done every 2 years.. |  |  |
|  |  |  |  |   |                                                                                                                                                                                                             | <br>Type 5 protective clothing |   | EN140 EN 149              |                                                                          |  | 3. All workers need to be tested once they leave the programme                                                  |  |  |
|  |  |  |  |   |                                                                                                                                                                                                             | 3.Safety boots                                                                                                  |  | EN 143:2000               |                                                                          |  |                                                                                                                 |  |  |
|  |  |  |  |   |                                                                                                                                                                                                             | 4.Face & Eye protection                                                                                         |  | R95, R99, R100            |                                                                          |  |                                                                                                                 |  |  |
|  |  |  |  |   |                                                                                                                                                                                                             | 5.Half-face respirators                                                                                         |  |                           |                                                                          |  |                                                                                                                 |  |  |
|  |  |  |  |   |                                                                                                                                                                                                             | 6.Particulate air                                                                                               |  |                           |                                                                          |  |                                                                                                                 |  |  |

|  |  |  |                                                                                                                   |   |                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                |                                                      |  |                                                                       |  |                                                                                                                                                                                                      |  |  |
|--|--|--|-------------------------------------------------------------------------------------------------------------------|---|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------|--|-----------------------------------------------------------------------|--|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|
|  |  |  |                                                                                                                   |   |                                                                                                                                                                                                                                                                    | filters for respirators                                                                                                                                                                                                                                                                                                                                        |                                                      |  |                                                                       |  |                                                                                                                                                                                                      |  |  |
|  |  |  |                                                                                                                   |   |                                                                                                                                                                                                                                                                    | 7. Apron/ Knapjack                                                                                                                                                                                                                                                                                                                                             |                                                      |  |                                                                       |  |                                                                                                                                                                                                      |  |  |
|  |  |  |                                                                                                                   |   |                                                                                                                                                                                                                                                                    | 8. Long-sleeved shirts                                                                                                                                                                                                                                                                                                                                         |                                                      |  |                                                                       |  |                                                                                                                                                                                                      |  |  |
|  |  |  |                                                                                                                   |   | Persistence in soil/water and soil absorption potential & bio magnification & bioaccumulation<br>GHS09<br>WARNING<br><br>H412 (Harmful to aquatic life with long lasting effects) |                                                                                                                                                                                                                                                                                                                                                                |                                                      |  |                                                                       |  |                                                                                                                                                                                                      |  |  |
|  |  |  |                                                                                                                   | 8 |                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                |                                                      |  |                                                                       |  |                                                                                                                                                                                                      |  |  |
|  |  |  | Pyridine compounds as butoxy ethyl esters (Garlon 4, Garlon max, Nuvogon, Triclon, Viroaxe, Tricloxmax, Turbador) | 2 | Acute toxicity to mammals and birds<br>GHS07<br>WARNING<br><br>H302 (Harmful if swallowed)<br>H317 ( May cause an allergic reaction)                                            | 1. Chemical ly resistant nitrile gloves<br><br>2. Type 3 and Type 4 protective clothing<br><br> | EN 374:2016<br><br>EN 14605:2005<br><br>EN 345: 1993 |  | 5cc fresh urine sample refrigerated. Tested using ELIZA dipstick test |  | 1. All workers need to be tested before they start working.<br>2. If the worker sprays 8 hours per day for 5 days per week, an additional test is needed every 2 years.<br>3. All workers need to be |  |  |

|  |  |  |  |   |                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                 |                                                                          |  |                                                                                                                                                                                                                             |                                       |  |
|--|--|--|--|---|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|--|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|--|
|  |  |  |  |   | H319 (causes serious eye irritation)<br>H373 (May cause damage to organs – heart, liver, kidneys)                                                                                                 | 3.Safety boots<br><br>4.Face & Eye protection<br><br>5.Half-face respirators<br><br>6.Particulate air filters for respirators<br><br>7.Apron/ Knapjack                                                                                                                                                                                                                                                           | <br><br><br><br>                                                                                                  | EN ISO 20345<br><br>EN 166:2001<br>EN 140, EN149, EN 143:200<br><br>R95, R99, R100              |                                                                          |  |                                                                                                                                                                                                                             | tested once they leave they programme |  |
|  |  |  |  | 5 | Developmental and Reproductive toxicity<br>GHS08 DANGER<br><br>H360 (May damage fertility or the unborn child) | 1.Chemically resistant nitrile gloves<br><br>2.Type 3 and Type 4 protective clothing<br><br><br>Type 5 protective clothing<br><br><br>3.Safety boots | <br><br><br><br><br><br> | EN ISO 20345<br><br>EN 166:2001<br><br>EN140<br>EN 149<br><br>EN 143:2000<br><br>R95, R99, R100 | 20cc fresh blood sample. AChE tests done with Test-Mate model 400 device |  | 1.All workers need to be tested before they start working.<br>2.If the worker sprays 8 hours per day for 5 days per week, an additional test needs to be done every 5 years..<br>3. All workers need to be tested once they |                                       |  |

|  |                           |                           |                                                                            |   |                                                                                                                                                                                                                                                                    |                                                                                                                                                |                                                                                                                                                                            |                                  |  |                                                   |                     |                                                                                      |  |
|--|---------------------------|---------------------------|----------------------------------------------------------------------------|---|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|--|---------------------------------------------------|---------------------|--------------------------------------------------------------------------------------|--|
|  |                           |                           |                                                                            |   |                                                                                                                                                                                                                                                                    | 4.Face & Eye protection<br>5.Half-face respirators<br>6.Particulate air filters for respirators<br>7.Apron/ Knapjack<br>8. Long-sleeved shirts | <br> |                                  |  |                                                   | leave the programme |                                                                                      |  |
|  |                           |                           |                                                                            | 8 | Persistence in soil/water and soil absorption potential & bio magnification & bioaccumulation<br>GHS09<br>WARNING<br><br>H411 (Toxic to aquatic life with long lasting effects) |                                                                                                                                                |                                                                                                                                                                            |                                  |  |                                                   |                     |                                                                                      |  |
|  | Quinoline carboxylic acid | Group 4: Synthetic auxins | Pyridine compounds such As Triclopyr as amine salts (Lumberjack , Timbrel) | 2 | Acute toxicity to mammals and birds<br>GHS07<br>WARNING<br>                                                                                                                     | 1.Chemically resistant nitrile gloves<br>2.Type 3 and Type 4                                                                                   |                                                                                       | EN 374:2016<br><br>EN 14605:2005 |  | 5cc fresh urine sample refrigerated. Tested using |                     | 1.All workers need to be tested before they start working.<br>2.If the worker sprays |  |



STRATEGY: ENVIRONMENTAL PROGRAMMES PESTICIDE POLICY, 2021

|  |  |  |  |   |                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                |  |                     |  |                                                                                                                                                     |
|--|--|--|--|---|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|--|---------------------|--|-----------------------------------------------------------------------------------------------------------------------------------------------------|
|  |  |  |  |   | <p>H302 (Harmful if swallowed)<br/>H317 ( May cause an allergic reaction)<br/>H318 (Causes serious eye damage)<br/>H315 (Causes skin irritation)<br/>H335 (may cause respiratory irritation)<br/>H336 (may cause drowsiness or dizziness)<br/>H360 (may damage fertility or the unborn child)</p> | <p>protective clothing</p>      <p>3.Safety boots</p> <p>4.Face &amp; Eye protection</p> <p>5.Half-face respirators</p> <p>6.Particulate air filters for respirators</p> <p>7.Apron/ Knapjack</p> |       | <p>EN 345: 1993</p> <p>EN ISO 20345</p> <p>EN 166:2001<br/>EN 140, EN149, EN 143:200</p> <p>R95, R99, R100</p> |  | ELIZA dipstick test |  | 8 hours per day for 5 days per week, an additional test is needed every 2 years.<br>3. All workers need to be tested once they leave they programme |
|  |  |  |  | 8 | <p>Persistence in soil/water and soil absorption potential &amp; bio magnification &amp; bioaccumulation</p> <p>GHS09<br/>WARNING</p>  <p>H411 (Toxic to aquatic life with</p>                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                |  |                     |  |                                                                                                                                                     |

STRATEGY: ENVIRONMENTAL PROGRAMMES PESTICIDE POLICY, 2021

|  |                           |                           |                                                                      |   |                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                          |                                                                       |                                                                                                                                                                                                                                          |  |  |  |
|--|---------------------------|---------------------------|----------------------------------------------------------------------|---|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|
|  |                           |                           |                                                                      |   | long lasting effects)                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                          |                                                                       |                                                                                                                                                                                                                                          |  |  |  |
|  | Quinoline carboxylic acid | Group 4: Synthetic auxins | Pyridine compounds such as fluroxypyr (Tomahawk, Starane, Voloxypyr) | 8 | Persistence in soil/water and soil absorption potential & bio magnification & bioaccumulation<br>GHS09<br>WARNING<br><br>H411 (Toxic to aquatic life with long lasting effects)                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                          |                                                                       |                                                                                                                                                                                                                                          |  |  |  |
|  | Quinoline carboxylic acid | Group 4: Synthetic auxins | Pyridine compounds such as Aminopyralids ( Sendero)                  | 2 | Acute toxicity to mammals and birds<br>GHS07<br>WARNING<br><br>H315 (Causes skin irritation)<br>H318 (causes serious eye damage)<br>H319 (Causes serious eye irritation)<br>H335 (may cause respiratory irritation) | 1.Chemically resistant nitrile gloves<br><br>2.Type 3 and Type 4 protective clothing<br><br>3.Safety boots<br><br>4.Face & Eye protection<br><br>5.Half-face respirators<br><br>6.Particulate air | <br><br><br><br> | EN 374:2016<br><br>EN 14605:2005<br><br>EN 345: 1993<br><br>EN ISO 20345<br><br>EN 166:2001<br>EN 140, EN149, EN 143:200 | 5cc fresh urine sample refrigerated. Tested using ELIZA dipstick test | 1.All workers need to be tested before they start working.<br>2.If the worker sprays 8 hours per day for 5 days per week, an additional test is needed every 2 years.<br>3. All workers need to be tested once they leave they programme |  |  |  |

|  |              |                           |                                                                                     |   |                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                      |  |                                  |  |                                                         |  |                                                                                                                   |  |
|--|--------------|---------------------------|-------------------------------------------------------------------------------------|---|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|----------------------------------|--|---------------------------------------------------------|--|-------------------------------------------------------------------------------------------------------------------|--|
|  |              |                           |                                                                                     |   | filters for respirators                                                                                                                                                                                                                                           |                                                                                                                                                                                   |  |                                  |  |                                                         |  |                                                                                                                   |  |
|  |              |                           |                                                                                     |   | 7. Apron/ Knapjack                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                      |  | R95, R99, R100                   |  |                                                         |  |                                                                                                                   |  |
|  |              |                           |                                                                                     | 7 | Acute toxicity to aquatic organisms<br>GHS09<br>WARNING<br><br>H400 (Very toxic to aquatic life)                                                                                 |                                                                                                                                                                                                                                                                      |  |                                  |  |                                                         |  |                                                                                                                   |  |
|  |              |                           |                                                                                     | 8 | Persistence in soil/water and soil absorption potential & bio magnification & bioaccumulation<br>GHS09<br>WARNING<br><br>H411 (Toxic to aquatic life with long lasting effects) |                                                                                                                                                                                                                                                                      |  |                                  |  |                                                         |  |                                                                                                                   |  |
|  | Combinations | Group 4: Synthetic auxins | Quinoline carboxylic acid such as Picloram + Pyridine compound such as Fluroxypyr ( | 2 | Acute toxicity to mammals and birds<br>GHS07<br>WARNING<br><br>H302 (harmful if swallowed)                                                                                     | 1. Chemically resistant nitrile gloves<br><br>2. Type 3 and Type 4 protective clothing<br> |  | EN 374:2016<br><br>EN 14605:2005 |  | 5cc fresh urine sample refrigerated. Tested using ELIZA |  | 1. All workers need to be tested before they start working.<br>2. If the worker sprays 8 hours per day for 5 days |  |

STRATEGY: ENVIRONMENTAL PROGRAMMES PESTICIDE POLICY, 2021

|  |  |  |                       |   |                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                       |                                                                                                               |                  |                                                                                                                                                                                                            |                                                                                                                                                  |  |
|--|--|--|-----------------------|---|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|--|
|  |  |  | Plenum,<br>Gladiator) |   | H312 (harmful<br>in contact with<br>skin)<br>H319 (Causes<br>serious eye<br>irritation)<br>H332 (harmful if<br>inhaled)                                                        | <br><br>3.Safety<br>boots<br><br>4.Face &<br>Eye<br>protection<br><br>5.Half-face<br>respirators<br><br>6.Particula<br>te air<br>filters for<br>respirators<br><br>7.Apron/<br>Knapjack                                        | <br><br><br><br><br><br> | EN 345:<br>1993<br><br>EN ISO<br>20345<br><br>EN 166:2001<br>EN 140,<br>EN149, EN<br>143:200<br><br>R95, R99,<br>R100 |                                                                                                               | dipstick<br>test |                                                                                                                                                                                                            | per week, an<br>additional test<br>is needed<br>every 2 years.<br>3. All workers<br>need to be<br>tested once<br>they leave<br>they<br>programme |  |
|  |  |  |                       | 3 | Carcinogenicity<br>GHS07<br>WARNING<br><br>H335 (May<br>cause<br>respiratory<br>irritation) | 1.Chemical<br>ly resistant<br>nitrile<br>gloves<br><br>2.Type 3<br>and Type 4<br>protective<br>clothing<br><br><br><br>3.Safety<br>boots | <br><br><br><br>                                                                                      | EN 374:2016<br><br>EN<br>14605:2005<br><br>EN 345:<br>1993<br><br>EN ISO<br>20345                                     | 20cc<br>fresh<br>blood<br>sample.<br>AChE<br>tests<br>done<br>with<br>Test-<br>Mate<br>model<br>400<br>device |                  | 1.All<br>workers<br>need to be<br>tested<br>before<br>they start<br>working.<br>2.If the<br>worker<br>sprays 8<br>hours per<br>day for 5<br>days per<br>week, an<br>additional<br>test needs<br>to be done |                                                                                                                                                  |  |



STRATEGY: ENVIRONMENTAL PROGRAMMES PESTICIDE POLICY, 2021

|  |  |  |  |   |                                                                                                                                                                                                |                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                         |                                                                                 |  |                                                                                                                                                                                                                                                |  |  |
|--|--|--|--|---|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------|--|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|
|  |  |  |  |   |                                                                                                                                                                                                | <p>4.Face &amp; Eye protection</p> <p>5.Half-face respirators</p> <p>6.Particulate air filters for respirators</p> <p>7.Apron/ Knapjack</p>                                            | <br><br><br>                                                                                             | <p>EN 166:2001<br/>EN 140,<br/>EN149, EN 143:200</p> <p>R95, R99, R100</p>                              |                                                                                 |  | <p>every 2 years..<br/>3. All workers need to be tested once they leave the programme</p>                                                                                                                                                      |  |  |
|  |  |  |  | 6 | <p>Endocrine Disrupting Chemicals (EDC)<br/>GHS08 DANGER</p>  <p>H370 (causes damage to organs – lungs)</p> | <p>1.Chemically resistant nitrile gloves</p> <p>2.Type 3 and Type 4 protective clothing</p> <p>Type 5 protective clothing</p> <p>3.Safety boots</p> <p>4.Face &amp; Eye protection</p> | <br><br><br><br> | <p>EN ISO 20345</p> <p>EN 166:2001</p> <p>EN140<br/>EN 149</p> <p>EN 143:2000</p> <p>R95, R99, R100</p> | <p>20cc fresh blood sample. AChE tests done with Test-Mate model 400 device</p> |  | <p>1.All workers need to be tested before they start working.<br/>2.If the worker sprays 8 hours per day for 5 days per week, an additional test needs to be done every 2 years..<br/>3. All workers need to be tested once they leave the</p> |  |  |

STRATEGY: ENVIRONMENTAL PROGRAMMES PESTICIDE POLICY, 2021

|  |  |  |   |                                                                                                                                                                                                                                                                         |                                                                                                                        |                                                                                                                                                                            |  |  |  |           |  |  |
|--|--|--|---|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|-----------|--|--|
|  |  |  |   |                                                                                                                                                                                                                                                                         | 5. Half-face respirators<br>6. Particulate air filters for respirators<br>7. Apron/ Knapjack<br>8. Long-sleeved shirts | <br> |  |  |  | programme |  |  |
|  |  |  | 7 | Acute toxicity to aquatic organisms<br>GHS09<br>WARNING<br><br>H400 (Very toxic to aquatic life)                                                                                       |                                                                                                                        |                                                                                                                                                                            |  |  |  |           |  |  |
|  |  |  | 8 | Persistence in soil/water and soil absorption potential & bio magnification & bioaccumulation<br>GHS09<br>WARNING<br><br>H410 (Very toxic to aquatic life with long lasting effects) |                                                                                                                        |                                                                                                                                                                            |  |  |  |           |  |  |

STRATEGY: ENVIRONMENTAL PROGRAMMES PESTICIDE POLICY, 2021

|  |              |                           |                                                                                                               |   |                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                        |  |                                                                       |  |                                                                                                                                                                                                                                                   |  |  |
|--|--------------|---------------------------|---------------------------------------------------------------------------------------------------------------|---|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|--|-----------------------------------------------------------------------|--|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|
|  |              |                           |                                                                                                               |   | H412 (harmful to aquatic life with long lasting effects)                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                        |  |                                                                       |  |                                                                                                                                                                                                                                                   |  |  |
|  | Combinations | Group 4: Synthetic auxins | Pyridine compounds such as Fluroxypyr + Pyridine compounds such as Triclopyr as Pyridyloxy compound ( Impala) | 2 | <p>Acute toxicity to mammals and birds<br/>GHS07<br/>WARNING</p>  <p>H302 (Harmful if swallowed)<br/>H317 ( May cause an allergic reaction)<br/>H319 (causes serious eye irritation)<br/>H373 (May cause damage to organs – heart, liver, kidneys)</p> | <p>1.Chemical ly resistant nitrile gloves</p> <p>2.Type 3 and Type 4 protective clothing</p>   <p>3.Safety boots</p>  <p>4.Face &amp; Eye protection</p>  <p>5.Half-face respirators</p>  <p>7.Apron/ Knapjack</p>  <p>8. Long-sleeved shirt</p> | <p>EN 374:2016</p> <p>EN 14605:2005</p> <p>EN 345: 1993</p> <p>EN ISO 20345</p> <p>EN 166:2001<br/>EN 140, EN149, EN 143:200</p> <p>R95, R99, R100</p> |  | 5cc fresh urine sample refrigerated. Tested using ELIZA dipstick test |  | <p>1.All workers need to be tested before they start working.<br/>2.If the worker sprays 8 hours per day for 5 days per week, an additional test is needed every 2 years.<br/>3. All workers need to be tested once they leave they programme</p> |  |  |

[illegible]



|  |              |                           |                                                                                                                  |   |                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                  |  |  |  |  |  |  |
|--|--------------|---------------------------|------------------------------------------------------------------------------------------------------------------|---|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|--|--|--|--|--|--|
|  |              |                           |                                                                                                                  |   |                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                  |  |  |  |  |  |  |
|  |              |                           |                                                                                                                  | 8 | <p>Persistence in soil/water and soil absorption potential &amp; bio magnification &amp; bioaccumulation</p> <p>GHS09<br/>WARNING</p>  <p>H411 (Toxic to aquatic life with long lasting effects)</p>                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                  |  |  |  |  |  |  |
|  | Combinations | Group 4: Synthetic auxins | Quinoline carboxylic acid such as Picloram + Pyridine compound such Triclopyr as trimethylamine salt (Kaput gel) | 2 | <p>Acute toxicity to mammals and birds</p> <p>GHS07<br/>WARNING</p>  <p>H302 (harmful if swallowed)<br/>H312 (harmful in contact with skin)<br/>H315 (causes skin irritation)<br/>H317(May cause allergic skin reaction)<br/>H319 (Causes serious eye irritation)<br/>H332 (harmful if inhaled)<br/>H335 (May cause respiratory irritation)</p> | <p>1.Chemically resistant nitrile gloves</p>  <p>2.Type 3 and Type 4 protective clothing</p>    <p>3.Safety boots</p>  <p>4.Face &amp; Eye protection</p>  <p>5.Half-face respirators</p>  <p>6.Particulate air</p> | <p>EN 374:2016</p> <p>EN 14605:2005</p> <p>EN 345: 1993</p> <p>EN ISO 20345</p> <p>EN 166:2001<br/>EN 140, EN149, EN 143:200</p> |  |  |  |  |  |  |

|  |  |  |  |   |                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                |                                                                          |                                                                                                                                                                                                                                                 |  |  |  |
|--|--|--|--|---|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|
|  |  |  |  |   | H336 (may cause drowsiness or dizziness)                                                                                                                              | filters for respirators                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | R95, R99, R100                                                                                                                                 |                                                                          |                                                                                                                                                                                                                                                 |  |  |  |
|  |  |  |  | 3 | Carcinogenicity<br>GHS07<br>WARNING<br><br>H335 (May cause respiratory irritation) | 1.Chemically resistant nitrile gloves<br><br>2.Type 3 and Type 4 protective clothing<br><br><br>3.Safety boots<br><br>4.Face & Eye protection<br><br>5.Half-face respirators<br><br>6.Particulate air filters for respirators<br><br>7.Apron/ Knapjack | <br><br><br><br><br><br><br><br><br><br> | EN 374:2016<br><br>EN 14605:2005<br><br>EN 345: 1993<br><br>EN ISO 20345<br><br>EN 166:2001<br>EN 140, EN149, EN 143:200<br><br>R95, R99, R100 | 20cc fresh blood sample. AChE tests done with Test-Mate model 400 device | 1.All workers need to be tested before they start working.<br>2.If the worker sprays 8 hours per day for 5 days per week, an additional test needs to be done every 2 years..<br>3. All workers need to be tested once they leave the programme |  |  |  |

|  |  |  |  |   |                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                 |                                                                          |                                                                                                                                                                                                                                                 |  |  |  |
|--|--|--|--|---|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|
|  |  |  |  |   |                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                 |                                                                          |                                                                                                                                                                                                                                                 |  |  |  |
|  |  |  |  | 5 | Developmental and Reproductive toxicity<br>GHS08 DANGER<br><br>H360 (May damage fertility or the unborn child) | 1.Chemically resistant nitrile gloves<br><br>2.Type 3 and Type 4 protective clothing<br><br><br>Type 5 protective clothing<br><br><br>3.Safety boots<br><br>4.Face & Eye protection<br><br>5.Half-face respirators<br><br>6.Particulate air filters for respirators<br><br>7.Apron/ Knapjack<br><br>8. Long-sleeved shirts | <br><br><br><br><br><br><br><br><br><br><br><br> | EN ISO 20345<br><br><br>EN 166:2001<br><br><br>EN140<br>EN 149<br><br><br>EN 143:2000<br><br><br>R95, R99, R100 | 20cc fresh blood sample. AChE tests done with Test-Mate model 400 device | 1.All workers need to be tested before they start working.<br>2.If the worker sprays 8 hours per day for 5 days per week, an additional test needs to be done every 5 years..<br>3. All workers need to be tested once they leave the programme |  |  |  |

|  |  |  |  |   |                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                 |                                                                                     |                                                                                                                                                                                                                                                                            |  |  |  |  |
|--|--|--|--|---|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|--|
|  |  |  |  |   |                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                 |                                                                                     |                                                                                                                                                                                                                                                                            |  |  |  |  |
|  |  |  |  | 6 | <div>Endocrine Disrupting Chemicals (EDC)<br/>GHS08 DANGER</div> <div></div> <div>H370 (causes damage to organs – lungs)</div> | <div>1.Chemically resistant nitrile gloves</div> <div></div> <div>2.Type 3 and Type 4 protective clothing</div> <div></div> <div>Type 5 protective clothing</div> <div></div> <div>3.Safety boots</div> <div></div> <div>4.Face &amp; Eye protection</div> <div></div> <div>5.Half-face respirators</div> <div></div> <div>6.Particulate air filters for respirators</div> <div></div> <div>7.Apron/ Knapjack</div> <div>8. Long-sleeved shirts</div> | <div>EN ISO 20345</div> <div>EN 166:2001</div> <div>EN140<br/>EN 149</div> <div>EN 143:2000</div> <div>R95, R99,<br/>R100</div> | <div>20cc fresh blood sample. AChE tests done with Test-Mate model 400 device</div> | <div>1.All workers need to be tested before they start working.</div> <div>2.If the worker sprays 8 hours per day for 5 days per week, an additional test needs to be done every 2 years..</div> <div>3. All workers need to be tested once they leave the programme</div> |  |  |  |  |



|  |              |                           |                                                                              |   |                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                               |                                         |  |                                                                |  |                                                                                                          |  |  |
|--|--------------|---------------------------|------------------------------------------------------------------------------|---|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|--|----------------------------------------------------------------|--|----------------------------------------------------------------------------------------------------------|--|--|
|  |              |                           |                                                                              |   |                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                               |                                         |  |                                                                |  |                                                                                                          |  |  |
|  |              |                           |                                                                              | 7 | <p>Acute toxicity to aquatic organisms<br/>GHS09<br/>WARNING</p>  <p>H400 (Very toxic to aquatic life)</p>                                                                                                                                                                                                                     |                                                                                                                                                               |                                         |  |                                                                |  |                                                                                                          |  |  |
|  |              |                           |                                                                              | 8 | <p>Persistence in soil/water and soil absorption potential &amp; bio magnification &amp; bioaccumulation<br/>GHS09<br/>WARNING</p>  <p>H410 (Very toxic to aquatic life with long lasting effects)<br/>H411 (Toxic to aquatic life with long lasting effects)<br/>H412 (harmful to aquatic life with long lasting effects)</p> |                                                                                                                                                               |                                         |  |                                                                |  |                                                                                                          |  |  |
|  | Combinations | Group 4: Synthetic auxins | Pyridine compounds such Triclopyr as amine salt + Pyridine compounds such as | 2 | <p>Acute toxicity to mammals and birds<br/>GHS07<br/>WARNING</p>                                                                                                                                                                                                                                                             | <p>1.Chemically resistant nitrile gloves</p>  <p>2.Type 3 and Type 4</p> | <p>EN 374:2016</p> <p>EN 14605:2005</p> |  | <p>5cc fresh urine sample refrigerated. Tested using ELIZA</p> |  | <p>1.All workers need to be tested before they start working.<br/>2.If the worker sprays 8 hours per</p> |  |  |

STRATEGY: ENVIRONMENTAL PROGRAMMES PESTICIDE POLICY, 2021

|  |  |  |                                    |   |                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                       |                                                                                                               |                  |                                                                                                                                                                                              |                                                                                                                                                                    |  |
|--|--|--|------------------------------------|---|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
|  |  |  | Clopyralid<br>(Confront,<br>Astra) |   | H302 (Harmful<br>if swallowed)<br>H315 (Causes<br>skin irritation)<br>H317 ( May<br>cause an<br>allergic<br>reaction)<br>H318 (causes<br>serious eye<br>damage)<br>H319 (causes<br>serious eye<br>irritation)<br>H335 (May<br>cause<br>respiratory<br>irritation)<br>H373 (May<br>cause damage<br>to organs –<br>heart, liver,<br>kidneys) | protective<br>clothing<br><br>3.Safety<br>boots<br><br>4.Face &<br>Eye<br>protection<br><br>5.Half-face<br>respirators<br><br>6.Particula<br>te air<br>filters for<br>respirators<br><br>7.Apron/<br>Knapjack | <br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br> | EN 345:<br>1993<br><br>EN ISO<br>20345<br><br>EN 166:2001<br>EN 140,<br>EN149, EN<br>143:200<br><br>R95, R99,<br>R100 |                                                                                                               | dipstick<br>test |                                                                                                                                                                                              | day for 5 days<br>per week, an<br>additional test<br>is needed<br>every 2 years.<br>3. All workers<br>need to be<br>tested once<br>they leave<br>they<br>programme |  |
|  |  |  |                                    | 5 | Developmental<br>and<br>Reproductive<br>toxicity<br>GHS08 DANGER<br><br>H360 (May<br>damage fertility<br>or the unborn<br>child)                                                                                                                        | 1.Chemical<br>ly resistant<br>nitrile<br>gloves<br><br>2.Type 3<br>and Type 4<br>protective<br>clothing<br><br><br>Type 5<br>protective<br>clothing<br>                                                                                                                                    | <br><br><br><br><br><br><br><br><br><br>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | EN ISO<br>20345<br><br>EN 166:2001<br><br>EN140<br>EN 149                                                             | 20cc<br>fresh<br>blood<br>sample.<br>AChE<br>tests<br>done<br>with<br>Test-<br>Mate<br>model<br>400<br>device |                  | 1.All<br>workers<br>need to be<br>tested<br>before<br>they start<br>working.<br>2.If the<br>worker<br>sprays 8<br>hours per<br>day for 5<br>days per<br>week, an<br>additional<br>test needs |                                                                                                                                                                    |  |

|  |  |  |  |   |                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                          |                                   |  |  |                                                                                              |  |  |
|--|--|--|--|---|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|--|--|----------------------------------------------------------------------------------------------|--|--|
|  |  |  |  |   |                                                                                                                                                                                                                                              | <br>3.Safety boots<br>4.Face & Eye protection<br>5.Half-face respirators<br>6.Particulate air filters for respirators<br>7.Apron/ Knapjack<br>8. Long-sleeved shirts | <br><br><br> | EN 143:2000<br><br>R95, R99, R100 |  |  | to be done every 5 years..<br>3. All workers need to be tested once they leave the programme |  |  |
|  |  |  |  | 8 | Persistence in soil/water and soil absorption potential & bio magnification & bioaccumulation<br>GHS09<br>WARNING<br><br>H411 (Toxic to aquatic life with |                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                          |                                   |  |  |                                                                                              |  |  |

STRATEGY: ENVIRONMENTAL PROGRAMMES PESTICIDE POLICY, 2021

|  |              |                           |                                                                                           |   |                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                |                                     |                                                                       |                                        |                                                                                                                                                                                                                                          |  |
|--|--------------|---------------------------|-------------------------------------------------------------------------------------------|---|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|-----------------------------------------------------------------------|----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
|  |              |                           |                                                                                           |   | long lasting effects)                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                |                                     |                                                                       |                                        |                                                                                                                                                                                                                                          |  |
|  | Combinations | Group 4: Synthetic auxins | Pyridine compounds such as Triclopyr as triethyl ammonium + Aminopyralid (Confront super) | 2 | Acute toxicity to mammals and birds<br>GHS07<br>WARNING<br><br>H317 (May cause an allergic skin reaction)<br>H318 (Causes serious eye damage)<br>H319 (Causes serious eye irritation)<br>H315 (Causes skin irritation)<br>H335 (may cause respiratory irritation)<br>H336 ( may cause drowsiness or dizziness) | 1.Chemically resistant nitrile gloves<br><br>2.Type 3 and Type 4 protective clothing<br><br><br>3.Safety boots<br><br>4.Face & Eye protection<br><br><br>5.Half-face respirators<br><br><br>6.Particulate air filters for respirators<br><br><br>7.Apron/ Knapjack<br> | <br><br><br><br><br><br><br><br><br><br> | EN 374:2016<br><br>EN 14605:2005<br><br>EN 345: 1993<br><br>EN ISO 20345<br><br>EN 166:2001<br>EN 140, EN149, EN 143:200<br><br>R95, R99, R100 |                                     | 5cc fresh urine sample refrigerated. Tested using ELIZA dipstick test |                                        | 1.All workers need to be tested before they start working.<br>2.If the worker sprays 8 hours per day for 5 days per week, an additional test is needed every 2 years.<br>3. All workers need to be tested once they leave they programme |  |
|  |              |                           |                                                                                           | 5 | Developmental and Reproductive toxicity<br>GHS08 DANGER                                                                                                                                                                                                                                                                                                                                         | 1.Chemically resistant nitrile gloves                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | EN ISO 20345                                                                                                                                   | 20cc fresh blood sample. AChE tests |                                                                       | 1.All workers need to be tested before |                                                                                                                                                                                                                                          |  |



|  |  |  |   |                                                         |                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                             |                                      |  |                                                                                                                                                                                                          |  |  |
|--|--|--|---|---------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|--------------------------------------|--|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|
|  |  |  |   |                                                         | <br>H360 (may damage fertility or the unborn child) | 2.Type 3 and Type 4 protective clothing<br><br><br>Type 5 protective clothing<br><br>3.Safety boots<br><br>4.Face & Eye protection<br><br>5.Half-face respirators<br><br>6.Particulate air filters for respirators<br><br>7.Apron/ Knapjack<br><br>8. Long-sleeved shirts | EN 166:2001<br><br>EN140<br>EN 149<br><br>EN 143:2000<br><br>R95, R99, R100 | done with Test-Mate model 400 device |  | they start working.<br>2.If the worker sprays 8 hours per day for 5 days per week, an additional test needs to be done every 5 years..<br>3. All workers need to be tested once they leave the programme |  |  |
|  |  |  | 7 | Acute toxicity to aquatic organisms<br>GHS09<br>WARNING |                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                             |                                      |  |                                                                                                                                                                                                          |  |  |

|  |              |                           |                                                                                        |   |                                                                                                                                                                                                                                                                                                                                |                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                |                                                                         |  |                                                                          |  |                                                                                                                                                                                                                                         |  |
|--|--------------|---------------------------|----------------------------------------------------------------------------------------|---|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------|--|--------------------------------------------------------------------------|--|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
|  |              |                           |                                                                                        |   | <br>H400 (Very toxic to aquatic life)                                                                                                                                                                                                         |                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                |                                                                         |  |                                                                          |  |                                                                                                                                                                                                                                         |  |
|  |              |                           |                                                                                        | 8 | Persistence in soil/water and soil absorption potential & bio magnification & bioaccumulation<br>GHS09<br>WARNING<br><br>H410 (Very toxic to aquatic life with long lasting effects)<br>H11 (Toxic to aquatic life with long lasting effects) |                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                |                                                                         |  |                                                                          |  |                                                                                                                                                                                                                                         |  |
|  | Combinations | Group 4: Synthetic auxins | Pyridine compounds such as Triclopyr as Butoxy ethyl ester + Aminopyralid (Garlon Max) | 2 | Acute toxicity to mammals and birds<br>GHS07<br>WARNING<br><br>H302 (Harmful if swallowed)<br>H315 (causes skin irritation)<br>H317 (May cause an allergic reaction)<br>H318 (causes serious eye damage)                                    | 1.Chemically resistant nitrile gloves<br>2.Type 3 and Type 4 protective clothing<br>3.Safety boots<br>4.Face & Eye protection | <br><br><br> | EN 374:2016<br><br>EN 14605:2005<br><br>EN 345:1993<br><br>EN ISO 20345 |  | 5cc fresh urine sample refrigerated.<br>Tested using ELIZA dipstick test |  | 1.All workers need to be tested before they start working.<br>2.If the worker sprays 8 hours per day for 5 days per week, an additional test is needed every 2 years.<br>3. All workers need to be tested once they leave the programme |  |

|  |  |  |  |   |                                                                                                                                                                                                          |                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                         |                                                                                 |  |                                                                                                                                                                                                                                                            |  |  |
|--|--|--|--|---|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------|--|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|
|  |  |  |  |   | <p>H319 (causes serious eye irritation)<br/>H335 (may cause respiratory irritation)<br/>H336 (may cause drowsiness or dizziness)<br/>H373 (May cause damage to organs – heart, liver, kidneys)</p>       | <p>5. Half-face respirators<br/><br/>6. Particulate air filters for respirators<br/><br/>7. Apron/ Knapjack</p>                                                                                    | <br><br>                                                                                                                                                                                                                                                                                     | <p>EN 166:2001<br/>EN 140,<br/>EN149, EN 143:200</p> <p>R95, R99, R100</p>                              |                                                                                 |  |                                                                                                                                                                                                                                                            |  |  |
|  |  |  |  | 5 | <p>Developmental and Reproductive toxicity<br/>GHS08 DANGER</p>  <p>H360 (May damage fertility or the unborn child)</p> | <p>1. Chemically resistant nitrile gloves<br/><br/>2. Type 3 and Type 4 protective clothing<br/><br/>Type 5 protective clothing<br/><br/>3. Safety boots<br/><br/>4. Face &amp; Eye protection</p> | <br><br><br><br><br><br><br> | <p>EN ISO 20345</p> <p>EN 166:2001</p> <p>EN140<br/>EN 149</p> <p>EN 143:2000</p> <p>R95, R99, R100</p> | <p>20cc fresh blood sample. AChE tests done with Test-Mate model 400 device</p> |  | <p>1. All workers need to be tested before they start working.<br/>2. If the worker sprays 8 hours per day for 5 days per week, an additional test needs to be done every 5 years..<br/>3. All workers need to be tested once they leave the programme</p> |  |  |

|  |         |                                                               |                       |   |                                                                                                                                                                                                                                                                        |                                                                                                                    |                                                                                                                                                                                |                                  |  |                                                                       |  |                                                                                                                              |  |
|--|---------|---------------------------------------------------------------|-----------------------|---|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|--|-----------------------------------------------------------------------|--|------------------------------------------------------------------------------------------------------------------------------|--|
|  |         |                                                               |                       |   |                                                                                                                                                                                                                                                                        | 5.Half-face respirators<br>6.Particulate air filters for respirators<br>7.Apron/Knapjack<br>8. Long-sleeved shirts |                                                                                             |                                  |  |                                                                       |  |                                                                                                                              |  |
|  |         |                                                               |                       | 8 | Persistence in soil/water and soil absorption potential & bio magnification & bioaccumulation<br>GHS09<br>WARNING<br><br>H410 (Very toxic to aquatic life with long lasting effects) |                                                                                                                    |                                                                                                                                                                                |                                  |  |                                                                       |  |                                                                                                                              |  |
|  | Uracils | Group 5: Photosynthetic inhibitors at Photosystem II, Site A. | Bromacil (Bushwacker) | 2 | Acute toxicity to mammals and birds<br>GHS07<br>WARNING<br><br>H302 (Harmful if swallowed)                                                                                          | 1.Chemically resistant nitrile gloves<br>2.Type 3 and Type 4 protective clothing                                   | <br> | EN 374:2016<br><br>EN 14605:2005 |  | 5cc fresh urine sample refrigerated. Tested using ELIZA dipstick test |  | 1.All workers need to be tested before they start working.<br>2.If the worker sprays 8 hours per day for 5 days per week, an |  |



|  |  |  |  |   |                                                                                                                                                                                                  |                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                    |  |  |  |                                                                                                                     |  |
|--|--|--|--|---|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|--|--|--|---------------------------------------------------------------------------------------------------------------------|--|
|  |  |  |  |   | <p>H315 (Causes skin irritation)<br/>H319 (Causes serious eye irritation)<br/>H335 (may cause respiratory irritation)</p>                                                                        | <br><p>3.Safety boots</p> <p>4.Face &amp; Eye protection</p> <p>5.Half-face respirators</p> <p>6.Particulate air filters for respirators</p> <p>7.Apron/ Knapjack</p> | <br><br><br> | <p>EN 345: 1993</p> <p>EN ISO 20345</p> <p>EN 166:2001<br/>EN 140,<br/>EN149, EN 143:200</p> <p>R95, R99, R100</p> |  |  |  | <p>additional test is needed every 2 years.<br/>3. All workers need to be tested once they leave they programme</p> |  |
|  |  |  |  | 7 | <p>Acute toxicity to aquatic organisms<br/>GHS09<br/>WARNING</p> <br><p>H400 (Very toxic to aquatic life)</p> |                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                    |  |  |  |                                                                                                                     |  |
|  |  |  |  | 8 | <p>Persistence in soil/water and soil absorption potential &amp; bio magnification &amp; bioaccumulation<br/>GHS09<br/>WARNING</p>                                                               |                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                    |  |  |  |                                                                                                                     |  |

|       |                                                               |                               |   |                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                |                                                                       |                                                                                                                                                                                                                                         |  |  |  |  |
|-------|---------------------------------------------------------------|-------------------------------|---|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|--|
|       |                                                               |                               |   |                                                                                                                                                                             | <br>H410 (Very toxic to aquatic life with long lasting effects)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                |                                                                       |                                                                                                                                                                                                                                         |  |  |  |  |
| Ureas | Group 7: Photosynthetic inhibitors at Photosystem II, Site B. | Tebuthiuron (Limpopo, Molopo) | 2 | Acute toxicity to mammals and birds<br>GHS07<br>WARNING<br><br>H302 (Harmful if swallowed) | 1.Chemically resistant nitrile gloves<br><br>2.Type 3 and Type 4 protective clothing<br><br><br>3.Safety boots<br><br>4.Face & Eye protection<br><br><br>5.Half-face respirators<br><br>6.Particulate air filters for respirators<br><br>7.Apron/ Knapjack<br> | EN 374:2016<br><br>EN 14605:2005<br><br>EN 345: 1993<br><br>EN ISO 20345<br><br>EN 166:2001<br>EN 140, EN149, EN 143:200<br><br>R95, R99, R100 | 5cc fresh urine sample refrigerated. Tested using ELIZA dipstick test | 1.All workers need to be tested before they start working.<br>2.If the worker sprays 8 hours per day for 5 days per week, an additional test is needed every 2 years.<br>3. All workers need to be tested once they leave the programme |  |  |  |  |

|  |              |                                   |                                |   |                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                       |                                                                          |  |                                                                       |  |                                                                                                                                                                                                                                         |  |
|--|--------------|-----------------------------------|--------------------------------|---|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|--|-----------------------------------------------------------------------|--|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
|  |              |                                   |                                | 7 | Acute toxicity to aquatic organisms<br>GHS09<br>WARNING<br><br>H400 (Very toxic to aquatic life)                                                                                                                 |                                                                                                                                                                                                                       |                                                                          |  |                                                                       |  |                                                                                                                                                                                                                                         |  |
|  |              |                                   |                                | 8 | Persistence in soil/water and soil absorption potential & bio magnification & bioaccumulation<br>GHS09<br>WARNING<br><br>H410 (Very toxic to aquatic life with long lasting effects)                             |                                                                                                                                                                                                                       |                                                                          |  |                                                                       |  |                                                                                                                                                                                                                                         |  |
|  | Combinations | Group 5 (Uracil) + Group 7 (urea) | Bromacil + Tebuthiuron (Bundu) | 2 | Acute toxicity to mammals and birds<br>GHS07<br>WARNING<br><br>H302 (Harmful if swallowed)<br>H315 (Causes skin irritation)<br>H319 (Causes serious eye irritation)<br>H335 (may cause respiratory irritation) | 1.Chemically resistant nitrile gloves<br>2.Type 3 and Type 4 protective clothing<br><br>3.Safety boots<br>4.Face & Eye protection | EN 374:2016<br><br>EN 14605:2005<br><br>EN 345: 1993<br><br>EN ISO 20345 |  | 5cc fresh urine sample refrigerated. Tested using ELIZA dipstick test |  | 1.All workers need to be tested before they start working.<br>2.If the worker sprays 8 hours per day for 5 days per week, an additional test is needed every 2 years.<br>3. All workers need to be tested once they leave the programme |  |

|  |  |  |  |   |                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                            |                                                                                       |  |  |  |  |  |  |
|--|--|--|--|---|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|--|--|--|--|--|--|
|  |  |  |  |   | <p>5. Half-face respirators</p> <p>6. Particulate air filters for respirators</p> <p>7. Apron/ Knapjack</p>                                                                                                                                                                                     | <br> | <p>EN 166:2001<br/>EN 140,<br/>EN149, EN<br/>143:200</p><br><p>R95, R99,<br/>R100</p> |  |  |  |  |  |  |
|  |  |  |  | 7 | <p>Acute toxicity to aquatic organisms</p> <p>GHS09</p> <p>WARNING</p>  <p>H400 (Very toxic to aquatic life)</p>                                                                                               |                                                                                                                                                                            |                                                                                       |  |  |  |  |  |  |
|  |  |  |  | 8 | <p>Persistence in soil/water and soil absorption potential &amp; bio magnification &amp; bioaccumulation</p> <p>GHS09</p> <p>WARNING</p>  <p>H410 (Very toxic to aquatic life with long lasting effects)</p> |                                                                                                                                                                            |                                                                                       |  |  |  |  |  |  |



STRATEGY: ENVIRONMENTAL PROGRAMMES PESTICIDE POLICY, 2021

|  |          |                                        |                                                                                            |   |                                                                                                                                                                                |                                                                                    |                                                                                       |                                          |  |                                                                       |  |                                                                                                                                                                                                                                         |  |
|--|----------|----------------------------------------|--------------------------------------------------------------------------------------------|---|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|------------------------------------------|--|-----------------------------------------------------------------------|--|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
|  |          |                                        |                                                                                            |   |                                                                                                                                                                                | 1.Chemically resistant nitrile gloves                                              |                                                                                       | EN 374:2016                              |  | 5cc fresh urine sample refrigerated. Tested using ELIZA dipstick test |  | 1.All workers need to be tested before they start working.<br>2.If the worker sprays 8 hours per day for 5 days per week, an additional test is needed every 2 years.<br>3. All workers need to be tested once they leave the programme |  |
|  |          |                                        |                                                                                            |   |                                                                                                                                                                                | 2.Type 3 and Type 4 protective clothing                                            |    | EN 14605:2005                            |  |                                                                       |  |                                                                                                                                                                                                                                         |  |
|  |          |                                        |                                                                                            |   |                                                                                                                                                                                |  |    | EN 345: 1993                             |  |                                                                       |  |                                                                                                                                                                                                                                         |  |
|  |          |                                        |                                                                                            |   |                                                                                                                                                                                | 3.Safety boots                                                                     |    | EN ISO 20345                             |  |                                                                       |  |                                                                                                                                                                                                                                         |  |
|  |          |                                        |                                                                                            |   |                                                                                                                                                                                | 4.Face & Eye protection                                                            |    |                                          |  |                                                                       |  |                                                                                                                                                                                                                                         |  |
|  |          |                                        |                                                                                            |   |                                                                                                                                                                                | 5.Half-face respirators                                                            |    | EN 166:2001<br>EN 140, EN149, EN 143:200 |  |                                                                       |  |                                                                                                                                                                                                                                         |  |
|  |          |                                        |                                                                                            |   |                                                                                                                                                                                | 6.Particulate air filters for respirators                                          |   |                                          |  |                                                                       |  |                                                                                                                                                                                                                                         |  |
|  |          |                                        |                                                                                            |   |                                                                                                                                                                                | 7.Apron/ Knapjack                                                                  |  | R95, R99, R100                           |  |                                                                       |  |                                                                                                                                                                                                                                         |  |
|  | Glycines | Group 9: Inhibitors of EPSP synthesis. | Phosphonoglycines such as Glyphosate isopropylamine salts (Seismic, tampleweed) POE-T free | 2 | Acute toxicity to mammals and birds<br>GHS07 WARNING<br><br>H318 (Causes serious eye damage) |                                                                                    |                                                                                       |                                          |  |                                                                       |  |                                                                                                                                                                                                                                         |  |
|  | Glycines | Group 9: Inhibitors of EPSP synthesis. | Phosphonoglycines such as Glyphosate sodium salts (Kilo max)                               | 2 | Acute toxicity to mammals and birds<br>GHS07 WARNING<br>                                    | 1.Chemically resistant nitrile gloves                                              |  | EN 374:2016                              |  | 5cc fresh urine sample refrigerated. Tested using ELIZA dipstick test |  | 1.All workers need to be tested before they start working.<br>2.If the worker sprays 8 hours per day for 5 days per week, an                                                                                                            |  |
|  |          |                                        |                                                                                            |   |                                                                                                                                                                                | 2.Type 3 and Type 4 protective clothing                                            |  | EN 14605:2005                            |  |                                                                       |  |                                                                                                                                                                                                                                         |  |

STRATEGY: ENVIRONMENTAL PROGRAMMES PESTICIDE POLICY, 2021

|  |          |                                        |                                                                                       |   |                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                |  |                                                                       |                                                                                                                                                                                                                                        |                                                                                                                        |  |
|--|----------|----------------------------------------|---------------------------------------------------------------------------------------|---|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|--|-----------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|--|
|  |          |                                        |                                                                                       |   | <div>H318 (Causes serious eye damage)</div> <div></div> <div>3.Safety boots</div> <div>4.Face &amp; Eye protection</div> <div>5.Half-face respirators</div> <div>6.Particulate air filters for respirators</div> <div>7.Apron/ Knapjack</div>                                                                                                           | <div></div> <div></div> <div></div> <div></div> | <div>EN 345: 1993</div> <div>EN ISO 20345</div> <div>EN 166:2001<br/>EN 140, EN149, EN 143:200</div> <div>R95, R99, R100</div> |  |                                                                       |                                                                                                                                                                                                                                        | <div>additional test is needed every 2 years.<br/>3. All workers need to be tested once they leave the programme</div> |  |
|  | Glycines | Group 9: Inhibitors of EPSP synthesis. | Phosphonoglycines such as glyphosate (all GBH's containing POE-T such as Roundup etc) | 2 | <div>Acute toxicity to mammals and birds<br/>GHS07 WARNING</div> <div></div> <div>H318 (Causes serious eye damage)</div> <div></div> <div>1.Chemically resistant nitrile gloves</div> <div>2.Type 3 and Type 4 protective clothing</div> <div>3.Safety boots</div> | <div></div> <div></div> <div></div>                                                                                          | <div>EN 374:2016</div> <div>EN 14605:2005</div> <div>EN 345: 1993</div> <div>EN ISO 20345</div>                                |  | 5cc fresh urine sample refrigerated. Tested using ELIZA dipstick test | <div>1.All workers need to be tested before they start working.<br/>2.If the worker sprays 8 hours per day for 5 days per week, an additional test is needed every 2 years.<br/>3. All workers need to be tested once they leave</div> |                                                                                                                        |  |

STRATEGY: ENVIRONMENTAL PROGRAMMES PESTICIDE POLICY, 2021

|  |  |  |  |   |                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                          |                                                                          |  |                                                                                                                                                                                                                                                      |                |  |
|--|--|--|--|---|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|--|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|--|
|  |  |  |  |   |                                                                                                                                                                                                                                                                                                        | 4.Face & Eye protection                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                          |                                                                          |  |                                                                                                                                                                                                                                                      | they programme |  |
|  |  |  |  |   |                                                                                                                                                                                                                                                                                                        | 5.Half-face respirators                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                    | EN 166:2001<br>EN 140,<br>EN149, EN<br>143:200                                                                                           |                                                                          |  |                                                                                                                                                                                                                                                      |                |  |
|  |  |  |  |   |                                                                                                                                                                                                                                                                                                        | 6.Particulate air filters for respirators                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                          |                                                                          |  |                                                                                                                                                                                                                                                      |                |  |
|  |  |  |  |   |                                                                                                                                                                                                                                                                                                        | 7.Apron/ Knapjack                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                    | R95, R99,<br>R100                                                                                                                        |                                                                          |  |                                                                                                                                                                                                                                                      |                |  |
|  |  |  |  | 3 | <p>Carcinogenicity<br/>GHS07<br/>WARNING</p>  <p>H335 (May cause respiratory irritation)<br/>H336 (may cause drowsiness or dizziness)<br/>H315 (Causes skin irritation)<br/>H319 (causes serious eye irritation)</p> | <p>1.Chemically resistant nitrile gloves</p> <p>2.Type 3 and Type 4 protective clothing</p> <p>3.Safety boots</p> <p>4.Face &amp; Eye protection</p> <p>5.Half-face respirators</p> <p>6.Particulate air</p> | <br><br><br><br> | <p>EN 374:2016</p> <p>EN 14605:2005</p> <p>EN 345: 1993</p> <p>EN ISO 20345</p> <p>EN 166:2001<br/>EN 140,<br/>EN149, EN<br/>143:200</p> | 20cc fresh blood sample. AChE tests done with Test-Mate model 400 device |  | <p>1.All workers need to be tested before they start working.</p> <p>2.If the worker sprays 8 hours per day for 5 days per week, an additional test needs to be done every 2 years..</p> <p>3. All workers need to be tested once they leave the</p> |                |  |

STRATEGY: ENVIRONMENTAL PROGRAMMES PESTICIDE POLICY, 2021

|  |                  |                   |                                  |   |                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                         |                                                                          |  |                                                                       |           |                                                                                                                                                                                                                           |  |
|--|------------------|-------------------|----------------------------------|---|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|--|-----------------------------------------------------------------------|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
|  |                  |                   |                                  |   |                                                                                                                                                                                                                                                                                     | filters for respirators                                                                                                                                                                                                                                                             |                                                                                                                                                                                      |                                                                          |  |                                                                       | programme |                                                                                                                                                                                                                           |  |
|  |                  |                   |                                  |   |                                                                                                                                                                                                                                                                                     | 7.Apron/<br>Knapjack                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                         | R95, R99,<br>R100                                                        |  |                                                                       |           |                                                                                                                                                                                                                           |  |
|  |                  |                   |                                  | 8 | Persistence in soil/water and soil absorption potential & bio magnification & bioaccumulation<br>GHS09<br>WARNING<br><br>H411 (Toxic to aquatic life with long lasting effects)                    |                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                         |                                                                          |  |                                                                       |           |                                                                                                                                                                                                                           |  |
|  | Organoarsenicals | Group 17: Unknown | Monosodium methylarsenate (MSMA) | 2 | Acute toxicity to mammals and birds<br>GHS07<br>WARNING<br><br>H302 (Harmful if swallowed)<br>H315 (causes skin irritation)<br>H319 (Causes serious eye irritation)<br>H332 (Harmful if inhaled) | 1.Chemically resistant nitrile gloves<br>2.Type 3 and Type 4 protective clothing<br><br>3.Safety boots<br> | <br><br> | EN 374:2016<br><br>EN 14605:2005<br><br>EN 345: 1993<br><br>EN ISO 20345 |  | 5cc fresh urine sample refrigerated. Tested using ELIZA dipstick test |           | 1.All workers need to be tested before they start working.<br>2.If the worker sprays 8 hours per day for 5 days per week, an additional test is needed every 2 years.<br>3. All workers need to be tested once they leave |  |



|  |  |  |  |   |                                                                                                                                                                                                                 |                                           |                                                                                       |                                                |                                                                          |  |                                                                                                                                                                                                                                                 |                |  |
|--|--|--|--|---|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|---------------------------------------------------------------------------------------|------------------------------------------------|--------------------------------------------------------------------------|--|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|--|
|  |  |  |  |   |                                                                                                                                                                                                                 | 4.Face & Eye protection                   |    |                                                |                                                                          |  |                                                                                                                                                                                                                                                 | they programme |  |
|  |  |  |  |   |                                                                                                                                                                                                                 | 5.Half-face respirators                   |    | EN 166:2001<br>EN 140,<br>EN149, EN<br>143:200 |                                                                          |  |                                                                                                                                                                                                                                                 |                |  |
|  |  |  |  |   |                                                                                                                                                                                                                 | 6.Particulate air filters for respirators |    |                                                |                                                                          |  |                                                                                                                                                                                                                                                 |                |  |
|  |  |  |  |   |                                                                                                                                                                                                                 | 7.Apron/ Knapjack                         |    | R95, R99,<br>R100                              |                                                                          |  |                                                                                                                                                                                                                                                 |                |  |
|  |  |  |  | 3 | Carcinogenicity<br>GHS07<br>WARNING<br><br>H335 (May cause respiratory irritation)<br>H336 (May cause drowsiness or dizziness) | 1.Chemically resistant nitrile gloves     |    | EN 374:2016                                    | 20cc fresh blood sample. AChE tests done with Test-Mate model 400 device |  | 1.All workers need to be tested before they start working.<br>2.If the worker sprays 8 hours per day for 5 days per week, an additional test needs to be done every 2 years..<br>3. All workers need to be tested once they leave the programme |                |  |
|  |  |  |  |   |                                                                                                                                                                                                                 | 2.Type 3 and Type 4 protective clothing   |    | EN 14605:2005                                  |                                                                          |  |                                                                                                                                                                                                                                                 |                |  |
|  |  |  |  |   |                                                                                                                                                                                                                 | 3.Safety boots                            |  | EN 345: 1993                                   |                                                                          |  |                                                                                                                                                                                                                                                 |                |  |
|  |  |  |  |   |                                                                                                                                                                                                                 | 4.Face & Eye protection                   |  | EN ISO 20345                                   |                                                                          |  |                                                                                                                                                                                                                                                 |                |  |
|  |  |  |  |   |                                                                                                                                                                                                                 | 5.Half-face respirators                   |  | EN 166:2001<br>EN 140,<br>EN149, EN<br>143:200 |                                                                          |  |                                                                                                                                                                                                                                                 |                |  |
|  |  |  |  |   |                                                                                                                                                                                                                 | 6.Particulate air                         |                                                                                       |                                                |                                                                          |  |                                                                                                                                                                                                                                                 |                |  |

|  |  |  |  |   |                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                       |                                                                                                               |  |                                                                                                                                                                                                                                                                                                                          |  |  |  |
|--|--|--|--|---|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|--|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|
|  |  |  |  |   |                                                                                                                                                                                                                                                                                                                  | filters for respirators                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                    |                                                                                                               |  |                                                                                                                                                                                                                                                                                                                          |  |  |  |
|  |  |  |  |   |                                                                                                                                                                                                                                                                                                                  | 7.Apron/<br>Knapjack                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                       | R95, R99,<br>R100                                                                                             |  |                                                                                                                                                                                                                                                                                                                          |  |  |  |
|  |  |  |  | 6 | Endocrine<br>Disrupting<br>Chemicals (EDC)<br>GHS08 DANGER<br><br>H371 (may<br>cause damage<br>to organs<br>(kidneys and<br>liver)<br>H372 (causes<br>damage to<br>organs through<br>prolonged<br>effect (liver and<br>kidneys) | 1.Chemical<br>ly resistant<br>nitrile<br>gloves<br><br>2.Type 3<br>and Type 4<br>protective<br>clothing<br><br>Type 5<br>protective<br>clothing<br><br>3.Safety<br>boots<br><br>4.Face &<br>Eye<br>protection<br><br>5.Half-face<br>respirators<br><br>6.Particula<br>te air<br>filters for<br>respirators<br> | EN ISO<br>20345<br><br>EN 166:2001<br><br>EN140<br>EN 149<br><br>EN 143:2000<br><br>R95, R99,<br>R100 | 20cc<br>fresh<br>blood<br>sample.<br>AChE<br>tests<br>done<br>with<br>Test-<br>Mate<br>model<br>400<br>device |  | 1.All<br>workers<br>need to be<br>tested<br>before<br>they start<br>working.<br>2.If the<br>worker<br>sprays 8<br>hours per<br>day for 5<br>days per<br>week, an<br>additional<br>test needs<br>to be done<br>every 2<br>years..<br>3. All<br>workers<br>need to be<br>tested<br>once they<br>leave the<br>programm<br>e |  |  |  |

|  |               |                                             |                                                                               |   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                |  |                                                                                                   |  |                                                                                                                                                                                                                                                                                                                   |  |
|--|---------------|---------------------------------------------|-------------------------------------------------------------------------------|---|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|---------------------------------------------------------------------------------------------------|--|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
|  |               |                                             |                                                                               |   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 7.Apron/<br>Knapjack                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                |  |                                                                                                   |  |                                                                                                                                                                                                                                                                                                                   |  |
|  |               |                                             |                                                                               |   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 8. Long-<br>sleeved<br>shirts                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                |  |                                                                                                   |  |                                                                                                                                                                                                                                                                                                                   |  |
|  |               |                                             |                                                                               |   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                |  |                                                                                                   |  |                                                                                                                                                                                                                                                                                                                   |  |
|  | Bipyridyliums | Group 22:<br>Cell<br>membrane<br>disruptors | Diquat<br>dibromide<br>(Scuba,<br>Midstream)<br>& Paraquat<br>(Gramoxone<br>) | 2 | <p>Acute toxicity<br/>to mammals<br/>and birds<br/>GHS06 DANGER</p>  <p>H301( Toxic if<br/>swallowed)<br/>H311(Toxic in<br/>contact with<br/>skin)<br/>H330(Fatal if<br/>inhaled)</p> <p>GHS07<br/>WARNING</p>  <p>H315(Causes<br/>skin irritation)<br/>H319(causes<br/>serious eye<br/>irritation)<br/>H335(May<br/>cause<br/>respiratory<br/>irritation)<br/>H372(Causes<br/>damage to<br/>organs)</p> | <p>1.Chemical<br/>ly resistant<br/>nitrile<br/>gloves</p> <p>2.Type 3<br/>and Type 4<br/>protective<br/>clothing</p> <p>3.Safety<br/>boots</p> <p>4.Face &amp;<br/>Eye<br/>protection</p> <p>5.Half-face<br/>respirators</p> <p>6.Particula<br/>te air<br/>filters for<br/>respirators</p> <p>7.Apron/<br/>Knapjack</p> |       | <p>EN 374:2016</p> <p>EN<br/>14605:2005</p> <p>EN 345:<br/>1993</p> <p>EN ISO<br/>20345</p> <p>EN 166:2001<br/>EN 140,<br/>EN149, EN<br/>143:200</p> <p>R95, R99,<br/>R100</p> |  | 5cc fresh<br>urine<br>sample<br>refrigerat<br>ed.<br>Tested<br>using<br>ELIZA<br>dipstick<br>test |  | <p>1.All workers<br/>need to be<br/>tested before<br/>they start<br/>working.<br/>2.If the<br/>worker sprays<br/>8 hours per<br/>day for 5 days<br/>per week, an<br/>additional test<br/>is needed<br/>every 2 years.<br/>3. All workers<br/>need to be<br/>tested once<br/>they leave<br/>they<br/>programme</p> |  |

STRATEGY: ENVIRONMENTAL PROGRAMMES PESTICIDE POLICY, 2021

|  |  |  |  |   |                                                                                                                                                                                                                                                                  |  |  |  |  |  |  |  |  |
|--|--|--|--|---|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|--|--|--|--|--|
|  |  |  |  |   |                                                                                                                                                                                                                                                                  |  |  |  |  |  |  |  |  |
|  |  |  |  | 7 | Acute toxicity to aquatic organisms<br><br>H400 (Very toxic to aquatic life)                                                                                                    |  |  |  |  |  |  |  |  |
|  |  |  |  | 8 | Persistence in soil/water and soil absorption potential & bio magnification & bioaccumulation<br>GHS09<br>WARNING<br><br>H411 (Toxic to aquatic life with long lasting effects) |  |  |  |  |  |  |  |  |

PESTICIDES FOR NON-PLANT INVASIVES CONTROL

|   |                |                                    |                                       |              |                                                                                                                                            | PPE                                    |                                                                                       |                                 | Medical Biomonitoring               |       | Frequency and Duration                       |       | Environmental monitoring |
|---|----------------|------------------------------------|---------------------------------------|--------------|--------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|---------------------------------------------------------------------------------------|---------------------------------|-------------------------------------|-------|----------------------------------------------|-------|--------------------------|
|   | Chemical group | MOA                                | Examples                              | Hazard Group | Hazard Criterion                                                                                                                           | Type                                   | Pictogram                                                                             | Classification                  | Blood                               | Urine | Blood                                        | Urine |                          |
| 1 | Rodenticides   | Inhibits vitamin K, anti-coagulant | Difenacoum, Brodifacoum Coumatetralyl | 2            | Acute Toxicity to mammals and birds<br>GHS06 DANGER<br> | 1. Chemically resistant nitrile gloves |  | EN ISO 20345<br><br>EN 166:2001 | 20cc fresh blood sample. AChE tests |       | 1. All workers need to be tested before they |       |                          |



STRATEGY: ENVIRONMENTAL PROGRAMMES PESTICIDE POLICY, 2021

|  |  |  |   |                                                                                                                                                     |                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                      |                                                                   |                                                                                                                                                                                                              |  |  |
|--|--|--|---|-----------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------|-------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|
|  |  |  |   |                                                                                                                                                     | <p>H300 (Fatal if swallowed)<br/>H310 (Fatal in contact with skin)<br/>GHS07<br/>WARNING</p>  <p>H373 (Causes damage to organs through prolonged or repeated exposure – blood)</p> | <p>2.Type 3 and Type 4 protective clothing</p>   <p>Type 5 protective clothing</p>  <p>3.Safety boots</p> <p>4.Face &amp; Eye protection</p> <p>5.Half-face respirators</p> <p>6.Particulate air filters for respirators</p> <p>7.Apron/ Knapjack</p> <p>8. Long-sleeved shirts</p> |       | <p>EN140<br/>EN 149</p> <p>EN 143:2000</p> <p>R95, R99,<br/>R100</p> | <p>done with Test-Mate model 400 device</p>                       | <p>start working.<br/>2.If the worker sprays 8 hours per day for 5 days per week, an additional test needs to be done every 2 years..<br/>3. All workers need to be tested once they leave the programme</p> |  |  |
|  |  |  | 5 | <p>Developmental and Reproductive toxicity<br/>GHS08 DANGER</p>  | <p>1.Chemically resistant nitrile gloves</p> <p>2.Type 3 and Type 4</p>                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                         | <p>EN ISO 20345</p> <p>EN 166:2001</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | <p>20cc fresh blood sample. AChE tests done</p>                      | <p>1.All workers need to be tested before they start working.</p> |                                                                                                                                                                                                              |  |  |

|  |  |  |   |                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                      |                                                            |                                                                                                                                                                                              |  |  |
|--|--|--|---|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------|------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|
|  |  |  |   |                                                                                                                                                                                                   | <p>H360D (May damage the unborn child)</p> <p>protective clothing</p>  <p>Type 5 protective clothing</p>  <p>3.Safety boots</p>  <p>4.Face &amp; Eye protection</p>  <p>5.Half-face respirators</p> <p>6.Particulate air filters for respirators</p>  <p>7.Apron/ Knapjack</p> <p>8. Long-sleeved shirts</p> |      | <p>EN140<br/>EN 149</p> <p>EN 143:2000</p> <p>R95, R99,<br/>R100</p> | <p>with Test-Mate model 400 device</p>                     | <p>2.If the worker sprays 8 hours per day for 5 days per week, an additional test needs to be done every 2 years..</p> <p>3. All workers need to be tested once they leave the programme</p> |  |  |
|  |  |  | 6 | <p>Endocrine Disrupting Chemicals (EDC)</p> <p>GHS08 DANGER</p>  <p>H372 (Causes damage to organs through)</p> | <p>1.Chemically resistant nitrile gloves</p>  <p>2.Type 3 and Type 4 protective clothing</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                | <p>EN ISO 20345</p> <p>EN 166:2001</p>                               | <p>20cc fresh blood sample. AChE tests done with Test-</p> | <p>1.All workers need to be tested before they start working.</p> <p>2.If the worker</p>                                                                                                     |  |  |

STRATEGY: ENVIRONMENTAL PROGRAMMES PESTICIDE POLICY, 2021

|  |  |  |   |                                                                                                                                                                 |                                           |                                                                                                                   |                                                                                                        |                                                                                                    |                                                                                                          |                       |  |                                                                                                                                                                   |                                                                         |
|--|--|--|---|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|-------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|-----------------------|--|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------|
|  |  |  |   |                                                                                                                                                                 | prolonged or repeated exposure – blood)   | <br>Type 5 protective clothing | <br>EN140<br>EN 149 | <br>EN 143:2000 | <br>R95, R99,<br>R100 | Mate model 400 device |  | sprays 8 hours per day for 5 days per week, an additional test needs to be done every 2 years..<br>3. All workers need to be tested once they leave the programme |                                                                         |
|  |  |  |   |                                                                                                                                                                 | 3.Safety boots                            |                                |                                                                                                        |                                                                                                    |                                                                                                          |                       |  |                                                                                                                                                                   |                                                                         |
|  |  |  |   |                                                                                                                                                                 | 4.Face & Eye protection                   |                                |                                                                                                        |                                                                                                    |                                                                                                          |                       |  |                                                                                                                                                                   |                                                                         |
|  |  |  |   |                                                                                                                                                                 | 5.Half-face respirators                   |                                |                                                                                                        |                                                                                                    |                                                                                                          |                       |  |                                                                                                                                                                   |                                                                         |
|  |  |  |   |                                                                                                                                                                 | 6.Particulate air filters for respirators |                                |                                                                                                        |                                                                                                    |                                                                                                          |                       |  |                                                                                                                                                                   |                                                                         |
|  |  |  |   |                                                                                                                                                                 | 7.Apron/ Knapjack                         |                                                                                                                   |                                                                                                        |                                                                                                    |                                                                                                          |                       |  |                                                                                                                                                                   |                                                                         |
|  |  |  |   |                                                                                                                                                                 | 8. Long-sleeved shirts                    |                                                                                                                   |                                                                                                        |                                                                                                    |                                                                                                          |                       |  |                                                                                                                                                                   |                                                                         |
|  |  |  | 7 | Acute toxicity to aquatic organisms<br><br>H400 (Very toxic to aquatic life) |                                           |                                                                                                                   |                                                                                                        |                                                                                                    |                                                                                                          |                       |  |                                                                                                                                                                   | Ensure environmental monitoring is complied with such as ESRA protocols |
|  |  |  | 8 | Persistence in soil/water and soil absorption                                                                                                                   |                                           |                                                                                                                   |                                                                                                        |                                                                                                    |                                                                                                          |                       |  |                                                                                                                                                                   | Ensure environmental monitoring is                                      |

STRATEGY: ENVIRONMENTAL PROGRAMMES PESTICIDE POLICY, 2021

|  |  |  |                 |   |                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                 |                                                                             |                                                                                                                                                                                                                                                 |  |  |                                      |
|--|--|--|-----------------|---|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--------------------------------------|
|  |  |  |                 |   | potential & bio magnification & bioaccumulation<br>GHS09<br>WARNING<br><br>H410 (Very toxic to aquatic life with long lasting effects)               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                 |                                                                             |                                                                                                                                                                                                                                                 |  |  | complied with such as ESRA protocols |
|  |  |  | Cholecalciferol | 2 | Acute Toxicity to mammals and birds<br>GHS06 DANGER<br><br>H301 (Toxic is swallowed)<br>H311 (Toxic in contact with skin)<br>H330 (fatal if inhaled) | 1.Chemically resistant nitrile gloves<br><br>2.Type 3 and Type 4 protective clothing<br><br>Type 5 protective clothing<br><br>3.Safety boots<br><br>4.Face & Eye protection<br><br>5.Half-face respirators<br><br>6.Particulate air filters for respirators<br><br>7.Apron/ Knapjack<br> | EN ISO 20345<br><br>EN 166:2001<br><br>EN140<br>EN 149<br><br>EN 143:2000<br><br>R95, R99, R100 | 20cc fresh blood sample.<br>AChE tests done with Test-Mate model 400 device | 1.All workers need to be tested before they start working.<br>2.If the worker sprays 8 hours per day for 5 days per week, an additional test needs to be done every 2 years..<br>3. All workers need to be tested once they leave the programme |  |  |                                      |



|  |  |  |  |   |                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                    |                                                                          |                                                                                                                                                                                                                                                 |  |  |  |
|--|--|--|--|---|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|
|  |  |  |  |   |                                                                                                                                                                                                                    | 8. Long-sleeved shirts                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                    |                                                                          |                                                                                                                                                                                                                                                 |  |  |  |
|  |  |  |  | 6 | Endocrine Disrupting Chemicals (EDC)<br>GHS08 DANGER<br><br>H372 (Causes damage to organs through prolonged or repeated exposure) | 1.Chemically resistant nitrile gloves<br><br>2.Type 3 and Type 4 protective clothing<br><br>Type 5 protective clothing<br><br>3.Safety boots<br><br>4.Face & Eye protection<br><br>5.Half-face respirators<br><br>6.Particulate air filters for respirators<br><br>7.Apron/ Knapjack | <br><br><br><br><br><br><br><br><br><br> | EN ISO 20345<br><br>EN 166:2001<br><br>EN140<br>EN 149<br><br>EN 143:2000<br><br>R95, R99,<br>R100 | 20cc fresh blood sample. AChE tests done with Test-Mate model 400 device | 1.All workers need to be tested before they start working.<br>2.If the worker sprays 8 hours per day for 5 days per week, an additional test needs to be done every 2 years..<br>3. All workers need to be tested once they leave the programme |  |  |  |

STRATEGY: ENVIRONMENTAL PROGRAMMES PESTICIDE POLICY, 2021

|   |          |                 |                 |   |                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                             |                                                                                 |                                                                                                                                                                                                                                                            |  |  |
|---|----------|-----------------|-----------------|---|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|
|   |          |                 |                 |   |                                                                                                                                                                                                                                                                                                                                                                     | 8. Long-sleeved shirts                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                             |                                                                                 |                                                                                                                                                                                                                                                            |  |  |
| 2 | Avicides | Sedative powder | alphachloralose | 2 | <p>Acute Toxicity to mammals and birds<br/>GHS06 DANGER</p>  <p>H301 (Toxic if swallowed)</p> <p>GHS07 WARNING</p>  <p>H332 (Harmful if inhaled)<br/>H336 (may cause drowsiness or dizziness)</p> | <p>1. Chemically resistant nitrile gloves</p> <p>2. Type 3 and Type 4 protective clothing</p>  <p>Type 5 protective clothing</p>  <p>3. Safety boots</p> <p>4. Face &amp; Eye protection</p> <p>5. Half-face respirators</p> <p>6. Particulate air filters for respirators</p> <p>7. Apron/ Knapjack</p> |       | <p>EN ISO 20345</p> <p>EN 166:2001</p> <p>EN140<br/>EN 149</p> <p>EN 143:2000</p> <p>R95, R99,<br/>R100</p> | <p>20cc fresh blood sample. AChE tests done with Test-Mate model 400 device</p> | <p>1. All workers need to be tested before they start working.<br/>2. If the worker sprays 8 hours per day for 5 days per week, an additional test needs to be done every 2 years..<br/>3. All workers need to be tested once they leave the programme</p> |  |  |

STRATEGY: ENVIRONMENTAL PROGRAMMES PESTICIDE POLICY, 2021

|  |  |                                                                |                     |   |                                                                                                                                                                                                                                                                       |                                                                                                                                                                               |                                                                                                                                                                                    |                                                        |                                                                          |  |                                                                                                                                         |  |                                                                         |
|--|--|----------------------------------------------------------------|---------------------|---|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|--------------------------------------------------------------------------|--|-----------------------------------------------------------------------------------------------------------------------------------------|--|-------------------------------------------------------------------------|
|  |  |                                                                |                     |   |                                                                                                                                                                                                                                                                       | 8. Long-sleeved shirts                                                                                                                                                        |                                                                                                                                                                                    |                                                        |                                                                          |  |                                                                                                                                         |  |                                                                         |
|  |  |                                                                |                     | 7 | Acute toxicity to aquatic organisms<br><br>H400 (Very toxic to aquatic life)                                                                                                         |                                                                                                                                                                               |                                                                                                                                                                                    |                                                        |                                                                          |  |                                                                                                                                         |  | Ensure environmental monitoring is complied with such as ESRA protocols |
|  |  |                                                                |                     | 8 | Persistence in soil/water and soil absorption potential & bio magnification & bioaccumulation<br>GHS09<br>WARNING<br><br>H410 (Very toxic to aquatic life with long lasting effects) |                                                                                                                                                                               |                                                                                                                                                                                    |                                                        |                                                                          |  |                                                                                                                                         |  | Ensure environmental monitoring is complied with such as ESRA protocols |
|  |  | Uptake orally resulting in hepatic necrosis and eventual death | DRC 1336/Starlicide | 2 | Acute Toxicity to mammals and birds<br>GHS06 DANGER<br><br>H301 (Toxic if swallowed)<br>H311 (Toxic in contact with skin)<br>GHS07<br>WARNING                                      | 1.Chemically resistant nitrile gloves<br><br>2.Type 3 and Type 4 protective clothing<br> | <br><br> | EN ISO 20345<br><br>EN 166:2001<br><br>EN140<br>EN 149 | 20cc fresh blood sample. AChE tests done with Test-Mate model 400 device |  | 1.All workers need to be tested before they start working.<br>2.If the worker sprays 8 hours per day for 5 days per week, an additional |  |                                                                         |

STRATEGY: ENVIRONMENTAL PROGRAMMES PESTICIDE POLICY, 2021

|  |  |  |   |                                                                                                                                                                 |                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                          |                                   |  |  |                                                                                                         |  |                                                                         |
|--|--|--|---|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|--|--|---------------------------------------------------------------------------------------------------------|--|-------------------------------------------------------------------------|
|  |  |  |   |                                                                                                                                                                 | <br>H315 (Causes skin irritation)<br>H317 (May cause an allergic skin reaction)<br>H319 (Causes serious eye irritation)<br>H332 (Harmful if inhaled) | Type 5 protective clothing<br><br>3.Safety boots<br>4.Face & Eye protection<br>5.Half-face respirators<br>6.Particulate air filters for respirators<br>7.Apron/ Knapjack<br>8. Long-sleeved shirts | <br><br><br> | EN 143:2000<br><br>R95, R99, R100 |  |  | test needs to be done every 2 years..<br>3. All workers need to be tested once they leave the programme |  |                                                                         |
|  |  |  | 7 | Acute toxicity to aquatic organisms<br><br>H400 (Very toxic to aquatic life) |                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                          |                                   |  |  |                                                                                                         |  | Ensure environmental monitoring is complied with such as ESRA protocols |
|  |  |  | 8 | Persistence in soil/water and soil absorption potential & bio magnification & bioaccumulation                                                                   |                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                          |                                   |  |  |                                                                                                         |  | Ensure environmental monitoring is complied with such as ESRA protocols |



|   |            |                                                              |          |   |                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                         |                                                                         |                                                                                                                             |                                                                          |                                                                                                                                                                                                                                                              |  |  |  |
|---|------------|--------------------------------------------------------------|----------|---|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|
|   |            |                                                              |          |   | <div>GHS09<br/>WARNING</div> <div></div> <div>H410 (Very toxic to aquatic life with long lasting effects)</div>                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                         |                                                                         |                                                                                                                             |                                                                          |                                                                                                                                                                                                                                                              |  |  |  |
| 3 | Piscicides | Mitochondrial NADH: ubiquinone reductase inhibitor and toxin | Rotenone | 2 | <div>Acute Toxicity to mammals and birds</div> <div>GHS06 DANGER</div> <div></div> <div>H301 (Toxic if swallowed)</div> <div>GHS07<br/>WARNING</div> <div></div> <div>H315 (Causes skin irritation)<br/>H319 (Causes serious eye irritation)<br/>H335 (May cause respiratory irritation)</div> | <div>1.Chemically resistant nitrile gloves</div> <div>2.Type 3 and Type 4 protective clothing</div> <div></div> <div>Type 5 protective clothing</div> <div></div> <div>3.Safety boots</div> <div>4.Face &amp; Eye protection</div> <div>5.Half-face respirators</div> <div>6.Particulate air filters for respirators</div> <div>7.Apron/ Knapjack</div> | <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> | <div>EN ISO 20345</div> <div>EN 166:2001</div> <div>EN140<br/>EN 149</div> <div>EN 143:2000</div> <div>R95, R99, R100</div> | 20cc fresh blood sample. AChE tests done with Test-Mate model 400 device | <div>1.All workers need to be tested before they start working.<br/>2.If the worker sprays 8 hours per day for 5 days per week, an additional test needs to be done every 2 years..<br/>3. All workers need to be tested once they leave the programme</div> |  |  |  |

STRATEGY: ENVIRONMENTAL PROGRAMMES PESTICIDE POLICY, 2021

|  |  |  |  |   |                                                                                                                                                                                                                                                                       |                        |  |  |  |  |  |  |                                                                         |
|--|--|--|--|---|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|--|--|--|--|--|--|-------------------------------------------------------------------------|
|  |  |  |  |   |                                                                                                                                                                                                                                                                       | 8. Long-sleeved shirts |  |  |  |  |  |  |                                                                         |
|  |  |  |  | 7 | Acute toxicity to aquatic organisms<br><br>H400 (Very toxic to aquatic life)                                                                                                         |                        |  |  |  |  |  |  | Ensure environmental monitoring is complied with such as ESRA protocols |
|  |  |  |  | 8 | Persistence in soil/water and soil absorption potential & bio magnification & bioaccumulation<br>GHS09<br>WARNING<br><br>H410 (Very toxic to aquatic life with long lasting effects) |                        |  |  |  |  |  |  | Ensure environmental monitoring is complied with such as ESRA protocols |