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# ENVIRONMENTAL MANAGEMENT PROGRAMME

**FOR THE**

## PROPOSED FLOOD DAMAGE REPAIRS TO THE LANGENHOVEN SUBSTATION ON REMAINDER OF ERF 464, GEORGE, WESTERN CAPE.

APPLICATION IN TERMS OF THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998  
(ACT NO. 107 OF 1998), AS AMENDED, AND THE ENVIRONMENTAL IMPACT ASSESSMENT REGULATIONS, 2014

**PREPARED FOR:** George Municipality: Electrical  
Engineering Services  
PO Box 19  
George  
6530

**DATE:** 18 October 2025

**DEADP REF NO:** 16/3/3/1/D2/20/0009/26

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- Environmental Impact Assessments • Basic Assessments • Environmental Management Planning
  - Environmental Control & Monitoring • Water Use License Applications • Aquatic Assessments



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**Appendix 4 of the EIA Regulations 2014 (as amended 2017).**

This Environmental Management Programme has been drafted in accordance with Appendix 4 of the Environmental Impact Assessment Regulations 2014 (as amended 2017). The table below shows how the requirements of Appendix 4 have been included within this Environmental Management Programme.

Table 1: Appendix 4 of the EIA Regulations 2014 (as amended 2017).

(1) An EMPr must comply with section 24N of the Act and include— (a) details of— (i) the EAP who prepared the EMPr; and (ii) the expertise of that EAP to prepare an EMPr, including a curriculum vitae;	Appendix C- EAP CV
(b) a detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description;	Section 4 – Description of the Activity
(c) a map at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that should be avoided, including buffers;	Section 4 - Description of the Activity
(d) a description of the impact management outcomes, including management statements, identifying the impacts and risks that need to be avoided, managed and mitigated as identified through the environmental impact assessment process for all phases of the development including— (i) planning and design; (ii) pre-construction activities; (iii) construction activities; (iv) rehabilitation of the environment after construction and where applicable post closure; and (v) where relevant, operation activities;	Section 8 - Environmental Impact Management: Planning and Design Phase Section 9 - Environmental Impact Management: Pre-construction Phase Section 10 - Environmental Impact Management : Construction Phase Section 11 - Environmental Impact Management : Post Construction Rehabilitation Phase & Operational Phase
(f) a description of proposed impact management actions, identifying the manner in which the impact management outcomes contemplated in paragraph (d) will be achieved, and must, where applicable, include actions to — (i) avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation; (ii) comply with any prescribed environmental management standards or practices; (iii) comply with any applicable provisions of the Act regarding closure, where applicable; and (iv) comply with any provisions of the Act regarding financial provision for rehabilitation, where applicable;	Section 8 - Environmental Impact Management: Planning and Design Phase Section 9 - Environmental Impact Management: Pre-construction Phase Section 10 - Environmental Impact Management: Construction Phase Section 11 - Environmental Impact Management: Post Construction Rehabilitation Phase & Operational Phase
(g) the method of monitoring the implementation of the impact management actions contemplated in paragraph (f);	Section 14 - Roles and Responsibilities Section 16 - Monitoring, Record Keeping and Reporting
(h) the frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f);	Section 14 - Roles and Responsibilities Section 16 - Monitoring, Record Keeping and Reporting
(i) an indication of the persons who will be responsible for the implementation of the impact management actions;	Section 8 - Environmental Impact Management: Planning and Design Phase Section 9 - Environmental Impact Management: Pre-construction Phase Section 10 - Environmental Impact Management: Construction Phase Section 11 - Environmental Impact Management: Post Construction Rehabilitation Phase & Operational Phase Section 14 - Roles and Responsibilities
(j) the time periods within which the impact management actions contemplated in paragraph (f) must be implemented;	Section 8 - Environmental Impact Management: Planning and Design Phase

## Environmental Management Programme

	<p>Section 9 - Environmental Impact Management: Pre-construction Phase</p> <p>Section 10 - Environmental Impact Management: Construction Phase</p> <p>Section 11 - Environmental Impact Management: Post Construction Rehabilitation Phase &amp; Operational Phase</p>
(k) the mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f);	<p>Section 14 - Roles and Responsibilities</p> <p>Section 16 - Monitoring, Record Keeping and Reporting</p>
(l) a program for reporting on compliance, taking into account the requirements as prescribed by the Regulations;	<p>Section 8 - Environmental Impact Management: Planning and Design Phase</p> <p>Section 9 - Environmental Impact Management: Pre-construction Phase</p> <p>Section 10 - Environmental Impact Management: Construction Phase</p> <p>Section 11 - Environmental Impact Management: Post Construction Rehabilitation Phase &amp; Operational Phase</p> <p>Section 14 - Roles and Responsibilities</p> <p>Section 16 - Monitoring, Record Keeping and Reporting</p>
(m) an environmental awareness plan describing the manner in which— (i) the applicant intends to inform his or her employees of any environmental risk which may result from their work; and (ii) risks must be dealt with in order to avoid pollution or the degradation of the environment; and	Section 14 - Roles and Responsibilities
(n) any specific information that may be required by the competent authority.	N/A

## DOCUMENT DETAILS

<b>Project Ref. No:</b>	16/3/3/1/D2/20/0009/26
<b>Conditions of Use:</b>	<p>This report is the property of the sponsor, <i>Sharples Environmental Services cc (SES)</i>, who may make allowance to publish it, in whole provided that:</p> <ol style="list-style-type: none"><li>Approval for copy is obtained from SES.</li><li>SES is acknowledged in the publication.</li><li>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.</li><li>That approval is obtained from SES if this report is to be used for the purposes of sale, publicity or advertisement.</li></ol> <p>SES accepts no responsibility for failure to follow the recommended program.</p>

### DETAILS OF PERSONS WHO COMPILED THIS DOCUMENT:

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**Sharples Environmental Services cc (SES)** has been actively engaged since 1998 in the fields of environmental planning, assessment and management. Clients include private, corporate and public enterprises on a variety of differing land use applications ranging from large-scale residential estates and resorts to golf courses, municipal service infrastructure installations and the planning of major arterials. The consultants have over 40+ years of combined experience and operate in the Southern, Eastern and Western Cape regions.

#### MICHAEL BENNETT (**Managing Director, Report Writer**):

Michael studied at the University of Cape Town completing a Bachelor of Science degree majoring in Environmental and Geographic Science and Ocean and Atmospheric Science. Michael joined SES in 2014 and has extensive experience in assessments and monitoring and has worked on a variety of technical projects. See Appendix C for his curriculum vitae. Michael is registered with EAPASA as a certified Environmental Practitioner (EAPASA # 2021/3163).

#### Onela Mhobo (**Candidate EAP**):

Onela graduated from the University of South Africa completing her BSc honours degree in Environmental Management and also holds a BSc in Botany and Geography from the Nelson Mandela University. Onela is registered with EAPASA as a Candidate Environmental Practitioner (EAPASA # 2022/4522)

## 1. Introduction

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Sharples Environmental Services cc (SES) has been appointed by Urban Engineering on behalf of the George Municipality: Electrical Engineering Services (applicant), to complete the Environmental Management Programme (EMPr) as part of the Basic Assessment Process for the Proposed Flood Damage Repairs to the Langenhoven Substation on Remainder of Erf 464, George, Western Cape

The proposed upgrade triggered listed activities in terms of the Amended Environmental Impact Assessment Regulations of 2014 (GN No. R.324 - 327 of 7 April 2017). Environmental Authorisation is therefore required from the competent authority (Western Cape Department of Environmental Affairs & Development Planning) before construction can commence.

## 2. About this EMPr

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This document is intended to serve as a guideline to be used by *the George Municipality* (as the Implementing Agent) and any person/s acting on behalf of *George Municipality: Electrical Engineering Services* during the pre-construction, construction, post-construction, and rehabilitation phases of the proposed upgrade and development. This document provides measures that must (where practical and feasible) be implemented to ensure that any environmental degradation that may be associated with the development is avoided, or where such impacts cannot be avoided entirely, are minimised, and mitigated appropriately.

This EMPr has been prepared in accordance with the requirements of an EMPr as specified in the Amended Environmental Impact Assessment Regulations, 2014 (GN No. R. 326 of 7 April 2017), and with reference to the "Guidelines for Environmental Management Programmes" published by the Department of Environmental Affairs and Development Planning (2005).

It is important to note that the EMPr is not designed to manage the physical rehabilitation and protection of infrastructure *per se* but should rather be seen as a tool which can be used to manage the environmental impacts of the development.

The rehabilitation, mitigation, management, and monitoring measures prescribed in this EMPr must be seen as binding to *George Municipality: Electrical Engineering Services* and any person acting on its behalf, including but not limited to agents, employees, associates, guests, or any person rendering a service to the development site.

### 2.1 Important caveat to the report

In the past, some developments have had a devastating impact on the environment even though they have had Environmental Management Programmes in place, while other developments have had a low impact even though no management plans have been compiled.

The Implementing Agent and the attitude of the construction team play an integral role in determining the impact that the development will have on the environment. The ECO (see Chapter 15) needs to ensure that all role-players are "on board" with regard to the constraints that the EMPr places on the development and construction team. The end result relies on cooperation and mutual respect and understanding of all parties involved.

### **3. How to use this document**

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It is essential that this EMPr be carefully studied, understood, implemented, and adhered to as far as reasonably possible, throughout all phases of the proposed development. The *George Municipality Services* must retain a copy of this EMPr, and another copy of this EMPr must be kept on site at all times during the pre-construction, construction, and post-construction rehabilitation phases of the development.

This EMPr must be included in all contracts compiled for contractors and subcontractors employed by *George Municipality: Electrical Engineering Services* as this EMPr identifies and specifies the procedures to be followed by engineers and other contractors to ensure that the adverse impacts of construction activities are either avoided or reduced. *George Municipality Electrical Engineering Services* and any appointed contractors must make adequate financial provision to implement the environmental management measures specified in this document.

This EMPr must be seen as a working document, which may be amended from time to time as needed, in order to accommodate changing circumstances on site or in the surrounding environment, or in order to accommodate requests/ conditions issued by the competent authority, the Department of Environmental Affairs & Development Planning. Amendments to this EMPr must first be approved by the competent authority, in writing.

### **4. Background and Location of the activity**

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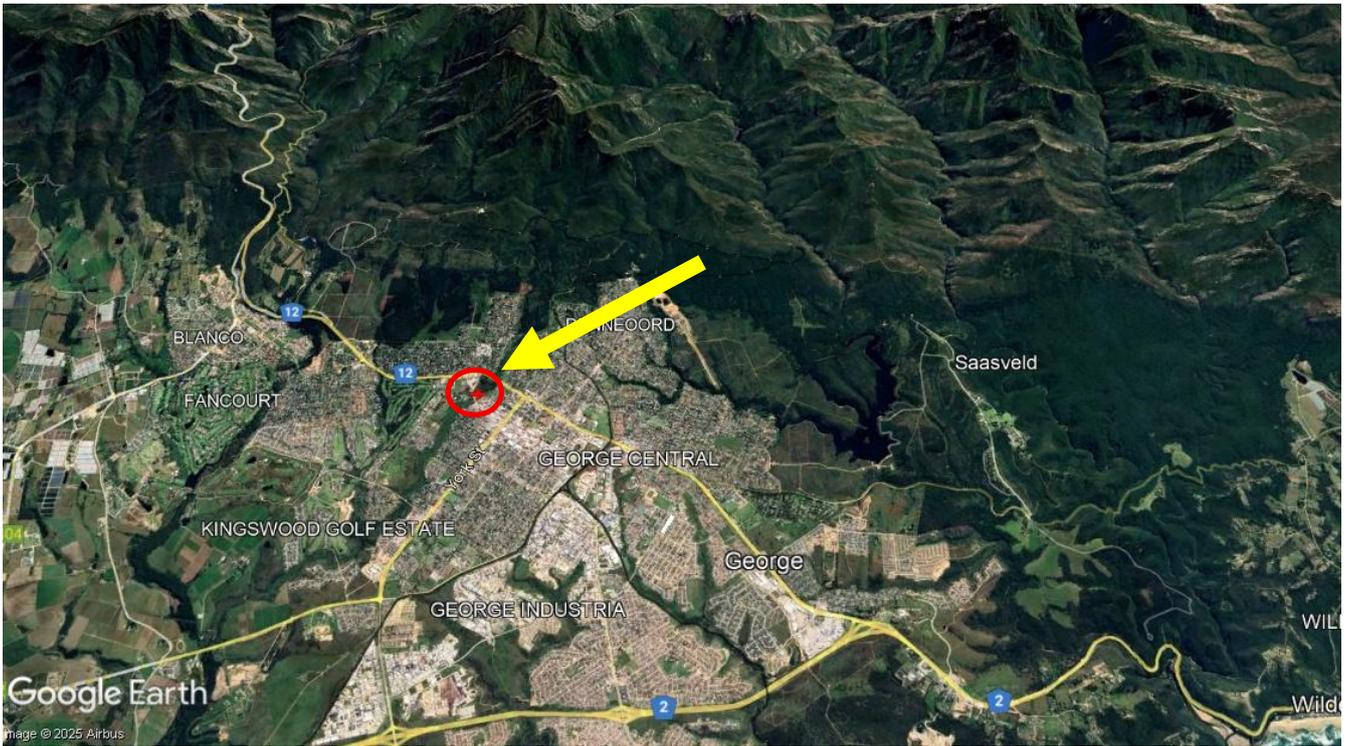
#### **4.1 Background and description**

The George Municipality experienced damage ranging from minor to extensive on infrastructure within the George Municipal Boundary during the November and December 2021 flood event.

This project proposes to repair damages caused by heavy rainfall and flood events and install protection measures to prevent future damages to the Langenhoven Substation and surrounding area. It is proposed to install gabion supporting structures to the south of the substation, construct an earth v-drain on the southern edge of the substation and a swale from the earth v-drain to the Camphersdrift river. Either a flared swale to spread the water out on the edge of the bush near the river and allow it to flow naturally over ground down to the river will be constructed or an outlet structure as close to the river as possible with energy dissipators will be constructed.

#### Scope of works

- Construct a gabion retaining structure (consisting of 2×1×1 m gabion baskets) on the northern side of the substation;
- Construct an earth V-drain along the southern edge of the substation; and
- Construct a trapezoidal grass swale with an outlet as close to the river as possible with energy dissipators to protect against erosion. Alternatively, construct a trapezoidal grass swale with a flared swale to spread the water out on the edge of the riverine scrub



**Figure 1: Approximate Locality of the site.**



Figure 2: Proposed Layout

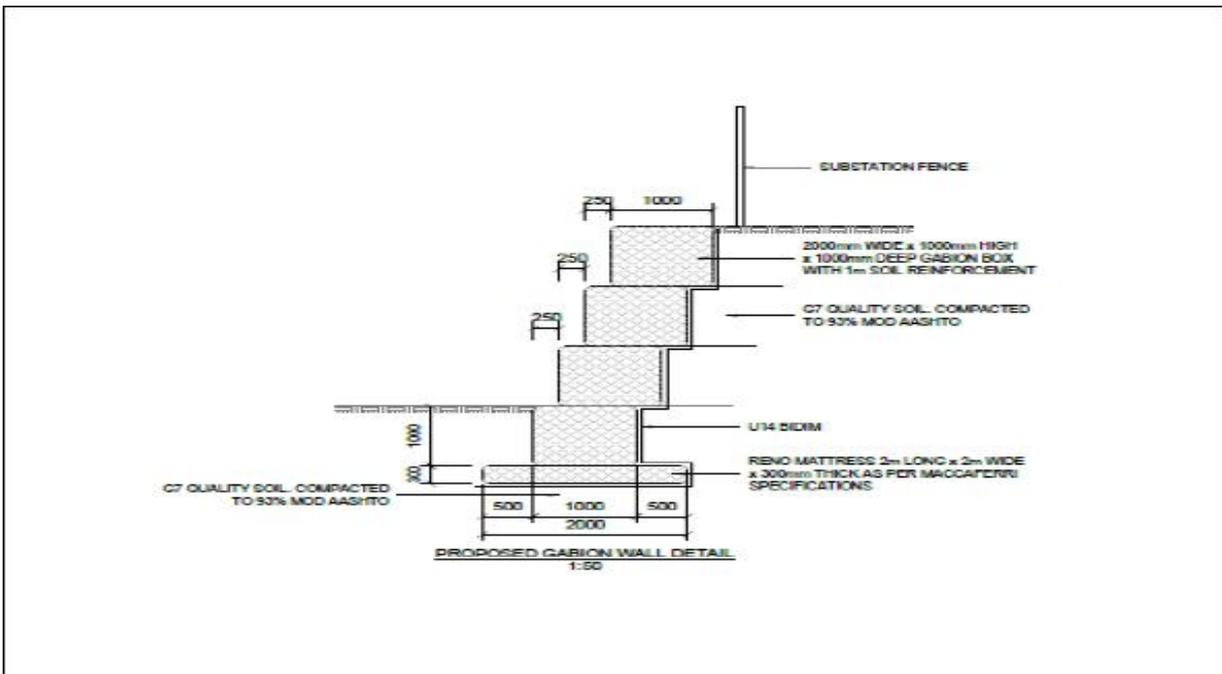


Figure 3: Sketch of the Gabion Retaining Structure.

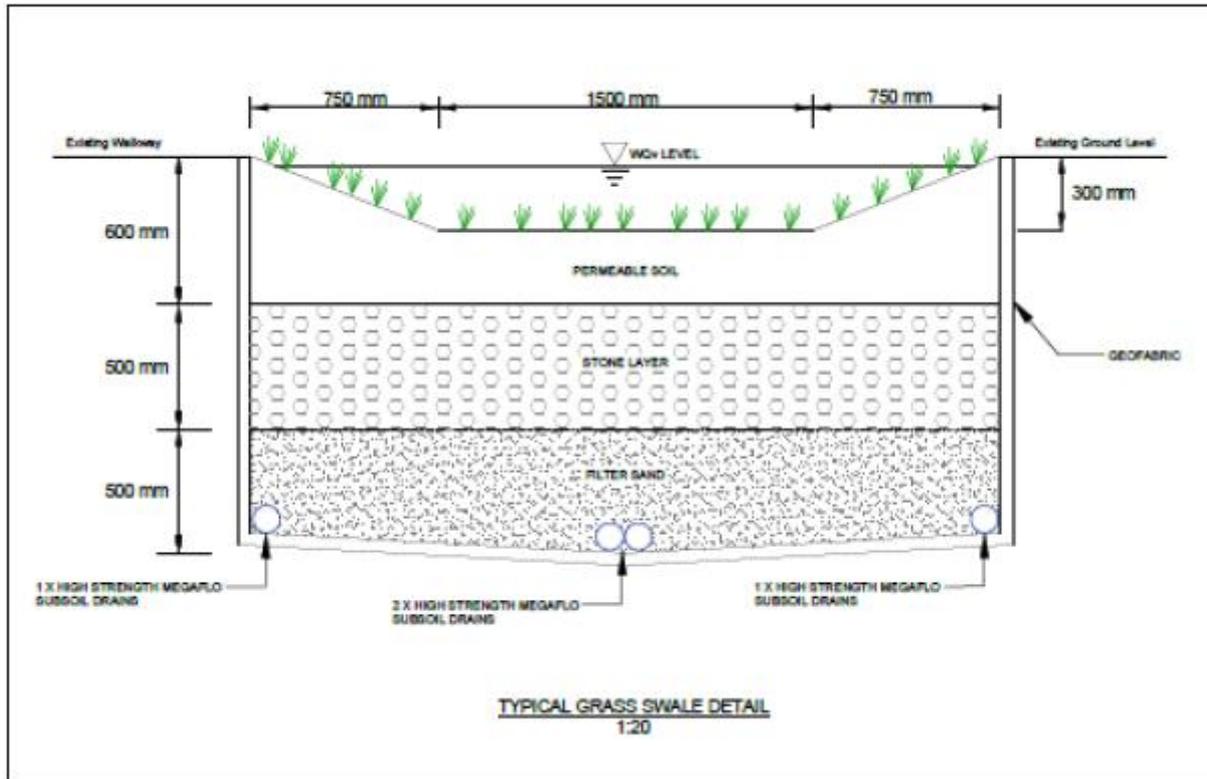


Figure 4: Sketch of a typical grass swale

## 5. Legal Framework

### 5.1 Environmental Impact Assessment Regulations (2017)

The following listed activities, in terms of the amended Environmental Impact Assessment Regulations, 2017 (GN No. R. 324 – 327) will be triggered by the proposed development:

Table 2: Listed activities in terms of the amended Environmental Impact Assessment Regulations (2017)

Listed Activity No(s):	Describe the relevant Basic Assessment Activity(ies) in writing as per Listing Notice 1 (GN No. R. 983)
12	<p><b>The development of—</b></p> <p>(i) dams or weirs, where the dam or weir, including infrastructure and water surface area, exceeds 100 square metres; or</p> <p><b>(ii) infrastructure or structures with a physical footprint of 100 square metres or more;</b> where such development occurs—</p> <p><b>(a) within a watercourse;</b></p> <p>(b) in front of a development setback; or</p> <p>(c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse; —</p> <p>excluding—</p> <p>(aa) the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour;</p> <p>(bb) where such development activities are related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies;</p> <p>(cc) activities listed in activity 14 in Listing Notice 2 of 2014 or activity 14 in Listing Notice 3 of 2014, in which case that activity applies;</p>

	<p>(dd) where such development occurs within an urban area;</p> <p>(ee) where such development occurs within existing roads, road reserves or railway line reserves; or</p> <p>(ff) the development of temporary infrastructure or structures where such infrastructure or structures will be removed within 6 weeks of the commencement of development and where indigenous vegetation will not be cleared.</p>
19	<p><b>The infilling or depositing of any material of more than 10 cubic meters into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic meters from a watercourse;</b></p> <p>but excluding where such infilling, depositing, dredging, excavation, removal or moving—</p> <p>(a) will occur behind a development setback;</p> <p>(b) is for maintenance purposes undertaken in accordance with a maintenance management plan;</p> <p>(c) falls within the ambit of activity 21 in this Notice, in which case that activity applies;</p> <p>(d) occurs within existing ports or harbours that will not increase the development footprint of the port or harbour; or</p> <p>(e) where such development is related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies.</p>
Listed Activity No(s):	Describe the relevant Basic Assessment Activity(ies) in writing as per Listing Notice 3 (GN No. R. 985)
12	<p><b>The clearance of an area of 300 square metres or more of indigenous vegetation</b> except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan.</p> <p><b>i. Western Cape</b></p> <p><b>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;</b></p> <p>ii. Within critical biodiversity areas identified in bioregional plans;</p> <p>iii. Within the littoral active zone or 100 metres inland from high water mark of the sea or an estuarine functional zone, whichever distance is the greater, excluding where such removal will occur behind the development setback line on erven in urban areas;</p> <p>iv. On land, where, at the time of the coming into effect of this Notice or thereafter such land was zoned open space, conservation or had an equivalent zoning; or</p> <p>v. On land designated for protection or conservation purposes in an Environmental Management Framework adopted in the prescribed manner, or a Spatial Development Framework adopted by the MEC or Minister.</p>
14	<p><b>The development of—</b></p> <p>(i) dams or weirs, where the dam or weir, including infrastructure and water surface area exceeds 10 square metres; or</p> <p>(ii) <b>infrastructure or structures with a physical footprint of 10 square metres or more;</b> where such development occurs—</p> <p>(a) within a watercourse;</p> <p>(b) in front of a development setback; or</p> <p>(c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse; excluding the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour.</p> <p><b>i. Western Cape</b></p> <p><b>i. Outside urban areas:</b></p> <p>(aa) A protected area identified in terms of NEMPAA, excluding conservancies;</p> <p>(bb) National Protected Area Expansion Strategy Focus areas;</p> <p>(cc) World Heritage Sites;</p> <p>(dd) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority; (ee) Sites or areas listed in terms of an international convention;</p>

	<p><b>(ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;</b>          (gg) Core areas in biosphere reserves; or          (hh) Areas on the estuary side of the development setback line or in an estuarine functional zone where no such setback line has been determined.</p>
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## 5.2 Other applicable legislation

George Municipality: Electrical Engineering Services is responsible for ensuring that all contractors, labourers and any other appointed person/entity acting on their behalf, remain compliant with the conditions of the received environmental authorisation and water-use authorisations, as well as the provisions of all other applicable legislation, including *inter alia*:

- National Environmental Management Act (NEMA) (Act No 107 of 1998, as amended);
- National Environmental Management Biodiversity Act (Act 10 of 2004);
- National Water Act (Act 36 of 1998)
- National Environmental Management: Waste Act (Act 59 of 2008);
- National Forest Act (Act No 84 of 1998);
- National Heritage Resources Act (Act No 25 of 1999);
- Occupational Health and Safety Act (Act 85 of 1993);

The above listed legislation have general applicability to most development applications, and it is George Municipality: Electrical Engineering Services responsibility to ensure that all contractors and employees are aware of their obligations in terms of these Acts. This EMPr does not detract from any other legal requirements.

## 6. Scope of this EMPr

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This EMPr describes the measures that must be implemented in order to avoid, minimise, manage and monitor the potential environmental impacts of the development, during all phases of the project life cycle, namely:

- Planning and Design Phase
- Pre-construction Phase
- Construction Phase
- Rehabilitation Phase

General environmental management measures that must be applied throughout the project lifecycle (as and where applicable) are described in Chapter 8. Additional management measures that must be implemented to address specific impacts that may arise during each phase are provided in **Chapters 9-12** of this EMPr.

## 7. General Environmental Management

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The following general management measures are intended to protect environmental resources from pollution and degradation during all phases of the project life cycle. These measures must be implemented as and where applicable, reasonable and practicable during the pre-construction, construction and post-construction and rehabilitation phases of the proposed development.

## 7.1 Site access and traffic management

The site is directly accessed from C.J. Langenhoven Road.

In general, all construction vehicles need to adhere to traffic laws. The speed of construction vehicles and other heavy vehicles must be strictly controlled to avoid dangerous conditions for other road users. As far as possible care must be taken to ensure that the local traffic flow pattern is not too significantly disrupted, and all vehicle operators therefore need to be educated in terms of “best-practice” operation to minimise unnecessary traffic congestion or dangers. Construction vehicles must therefore not unnecessarily obstruct the access point or traffic lanes used to access the site. Construction vehicles also need to consider the load carrying capacity of road surfaces and adhere to all other prescriptive regulations regarding the use of public roads by construction vehicles. Adequate signage that is both informative and cautionary to passing traffic (motorists and pedestrians) warning them of the construction activities. Signage would need to be clearly visible and need to include, among others, the following:

- Identifying working area as a construction site;
- Cautioning against relevant construction activities;
- Prohibiting access to construction site;
- Clearly specifying possible detour routes and / or delay periods;
- Possible indications of time frames attached to the construction activities, and;
- Listings of which contractors are working on the site.

Other mitigation measures include:

- ECO to do awareness training with the contractor and labourers before construction commences.
- Ensure appropriate behaviour of operators of construction vehicles.

## 7.2 Site demarcation

The following areas must be clearly demarcated on site during the pre-construction or construction phases of the development, as appropriate.

### Construction working area

Prior to the commencement of any construction activities, the outer boundary of the development area must be surveyed and pegged. The demarcation boundary must be tight around the site, typically allowing a working area of no more than 2.5m around the development footprint. This demarcation boundary is to ensure that construction activities are restricted to only that area strictly required for the proposed development, and to prevent unnecessary disturbance of soil surfaces and vegetation outside of the development footprint. Demarcation of the site within the river is not practical and as such markers can be placed on the edges of the working area in the river to highlight the limitations of site to the construction team.

### No-go areas

As the activities will be undertaken within the Camphersdrift river it is not practical to demarcate the entire extent of the working areas as that will entail installing demarcation within the river. It is therefore recommended that only the riparian area and riverbanks outside of the footprint and practical working area.

No-go areas must be off-limits to all construction workers, vehicles, and machinery during all phases of the development. No vegetation may be cleared from within the no-go areas, and no dumping of any material (waste, topsoil, subsoil etc.) may occur in these areas. Construction workers must be informed of the no-go areas, and if necessary appropriate signage and/or temporary fencing (e.g., droppers with danger tape) can be used to enforce the no-go areas.

### Demarcation of the site camp

The area chosen for the site camp and associated facilities must be the minimum area reasonably required to accommodate the site camp facilities, and which will involve the least disturbance to the environment. It is recommended that easily accessible, transformed areas are used for the site camp. Site selection must be done in consultation with the ECO.

## **7.3 Site camp and associated facilities**

The following general management measures pertaining to the set-up, operation and closure of a site camp must be applied where appropriate, reasonable and practicable:

### **7.3.1 Fencing & Security**

The site camp area must be secured to prevent any un-authorised individuals from entering the site camp and possibly getting injured or posing a safety and/or security risk. Adequate signage must be displayed, designating the site office / camp as a restricted area to non-personnel. If required, the site camp and associated areas may be fenced off along the demarcated boundaries of these areas, preferably with 2m high fence and shade netting or similar.

### **7.3.2 Fire Fighting Equipment**

No less than 2 fire extinguishers must be present in the site camp. The extinguishers must be in a working condition and within their service period. A fire extinguisher must always be present wherever any "hot works" (e.g., welding, grinding etc.) are taking place. It is recommended that all construction workers receive basic training in fire prevention and basic fire-fighting techniques and are informed of the emergency procedure to follow in the event of accidental fires. No open fires may be made on the construction site during any phase of the project. Construction workers may make small, contained fires (e.g., for warming or cooking purposes), within the site camp provided the small fire is encircled by a corrugated iron structure, drum or similar, to prevent wind-blown cinders from causing fires elsewhere. Such fires may not be left unattended and must be thoroughly extinguished after use. No smoking must be allowed on the construction site. In the case of accidental fires, the contractor must (if required) alert the Local Authority's Fire Department as soon as a fire starts prior to the fire becoming uncontrollable.

### **7.3.3 Waste Storage Area**

Sufficient bins for the temporary storage of construction related waste must be provided inside the site camp and/or at the working area and should be located in such a way that they will present as little visual impact to surrounding residents and road users as possible. Label each waste receptacle for waste separation, and ensure waste is contained either by use of lids or by ensuring waste receptacles are emptied prior to filling up, making them susceptible to wind dispersion. Sufficient signage and awareness should be created to ensure that these bins are properly used.

### **7.3.4 Hazardous Substances Storage Area**

Fuels, chemicals, lubricants and other hazardous substances must be stored in a demarcated, secured and clearly sign-posted area within the site camp away from the watercourses on site. Sufficient signage and awareness should be created to ensure that these bins are properly used. Ensure that when

substances are transferred, this is done on an impermeable and/or bunded surface, to contain any spillage. Spillage, should it occur, should be disposed of appropriately.

### **7.3.5 Potable Water**

An adequate supply of potable water must be provided to construction workers at the site camp. It is the Contractors duty to ensure that the labour has adequate access to potable water throughout construction phase, and to monitor weather conditions, to ensure that labour has enough drinking water on hotter days, or construction activity must cease, until conditions are safe to continue.

### **7.3.6 Ablution Facilities**

Chemical toilets should be maintained on the site camp for the duration of the construction phase and rehabilitation, on a level surface and secured from blowing over and located in such a way that the toilets will not cause any form of pollution. As per the SANS10400 requirement, one ablution facility for every 8 male workers and 2 ablution facilities for every 8 female workers will be provided.

The ablution facilities must not be linked to the river or dam system in any way. Toilets must be serviced regularly and kept in an orderly state. The contractor must ensure that no spillage occurs when the toilets are cleaned, serviced or moved. The toilet facilities should be emptied on a weekly basis, by an appropriately registered service provider. Proof of this weekly servicing must be obtained and filed in the Environmental File on site. Performing ablutions outside of the provided toilet facilities is strictly prohibited and the ECO would need to regularly inspect the state of the chemical toilets to ensure compliance.

### **7.3.7 Eating Area & Rest Area**

A dedicated area within which construction workers can rest and eat during breaks should be provided within the site camp. Seating and shade should be provided.

### **7.3.8 Vehicle & Equipment Maintenance Yard**

Where possible, construction vehicles and equipment that require repair must be removed from site and taken to a workshop for servicing. If emergency repairs and/or basic maintenance of construction vehicles or equipment are necessary on site, such repair work must be undertaken within the designated maintenance yard area away from any watercourses. Repairs must be conducted on an impermeable surface, and/or a tarpaulin and/or drip trays must be laid down prior to emergency repairs taking place, in order to prevent any fuel, oil, lubricant or other spillages from contaminating the surrounding environment.

### **7.3.9 House-keeping**

The site camp and related site camp facilities must be kept neat and orderly at all times, in order to prevent potential safety risks and to reduce the visual impact of the site during construction.

## **7.4 Vegetation clearing**

Where vegetation must be cleared the following measures must be implemented where applicable, reasonable and practical:

- Where feasible vegetation must simply be trimmed to facilitate access/ construction, rather than being completely cleared or removed.
- Vegetation clearing/trimming must be cleared by hand (i.e. brush cut) and stockpiled for use as mulch/ brush-packing during rehabilitation of the site. Any alien vegetation that is cleared must be disposed of in consultation with the ECO, unless the cleared alien vegetation does not contain seeds in which case it may be retained for use in site rehabilitation.
- No bulldozing must be undertaken for the purpose of vegetation clearing.

- Only the areas required to accommodate the construction activities and access to the construction site must be cleared/trimmed of vegetation.
- Vegetation outside of the construction footprint and beyond any No-Go areas must not be cleared.

### **7.5 Topsoil and subsoil management**

It is recommended that topsoil be removed from any area where physical disturbance of the surface will occur, including within the footprint of the development site (working area) and possibly within the site camp, ablution area, vehicle maintenance yard, refuelling area and temporary waste storage area. Topsoil removal and stockpiling must be undertaken only after consultation with the ECO.

- Removed topsoil and subsoil must be stockpiled for the duration of the active construction period and utilised for the final landscaping and rehabilitation of disturbed areas on site.
- The removed topsoil must be stockpiled in a berm, in a demarcated area as agreed with the ECO.
- Removed subsoil must be stockpiled separately from topsoil.
- The topsoil & subsoil storage area must be located on a level area outside of any surface drainage channels and at a location where it can be protected from disturbance during construction and where it will not interfere with construction activities.
- Where applicable topsoil and subsoil stockpiles must be adequately protected from being blown away or eroded by storm water. If necessary, shade cloth or other suitable measures must be used to stabilise and protect the stockpile from wind/water erosion. Topsoil stockpiles must not be covered with tarpaulin, as this may smother and decrease the virility of topsoil.
- Handling of topsoil must be minimised as much as possible, and the location of the topsoil berm must be chosen carefully to avoid needing to relocate the topsoil berm at a later date. The ECO must be consulted with regards to the placement of the stockpiles, to ensure that the selected location is in compliance with this EMP and EA (once granted).
- Ideally, topsoil is to be handled twice only, once to strip and stockpile, and once to replace, level, shape and scarify.
- If soil stockpiles will be stored for an extended period of time, the stockpiles must be kept clear of weeds and alien vegetation growth by regular weeding, (or application of herbicides if agreed with the ECO).
- Spoil material that will not be re-utilised on site may be removed from site and taken to an appropriate site for re-use or disposal.
- Note that the topsoil must be the final layer applied to a rehabilitated/ re-landscaped site, after subsoil/ spoil material has been placed and shaped on the site.

### **7.6 Integrated waste management approach**

It is recommended that an integrated waste management system is adopted on site. The system must be based on waste minimisation and must incorporate reduction, recycling, re-use and disposal where appropriate. Waste bins for the different categories of recyclable waste (i.e., paper, plastic, metal) must be provided on site. These bins must be emptied, and the waste must be taken to a registered recycling facility. The receipts from the facility must be kept on file and must be available on request. Images 1 and 2 show two such systems within a construction site.



**Image 1:** Recycling system implemented on a construction site. Skips provided for general waste, plastic, cardboard and metal.



**Image 2:** Recycling system implemented on a construction site. Lidded bins provided for general waste, plastic, cardboard, and metal.

The non-recyclable and non-reusable waste (e.g., builder's rubble, etc.) generated on site must be stored and disposed of at a landfill site licensed in terms of the applicable legislation.

### 7.7 Hazardous substances and fuels

If hazardous substances and fuels such as diesel, oil, lubricant, detergents etc. are to be stored on site for construction purposes, a designated area must be set aside for this within the site camp.

- All hazardous substances must be stored in the designated area within the site camp.
- The area selected for storage of hazardous fuels must be located on a level area, well outside of any water courses, water bodies or surface drainage channels.
- The designated area must be clearly demarcated and secured by use of fencing and/or cages, to prevent access by un-authorized persons and/or animals.
- Access to the hazardous material storage area must be restricted to authorised personnel only and must be treated as a no-go zone to unauthorised personnel.
- Appropriate hazard signage indicating the nature of the stored materials must be prominently displayed at the storage area.
- Those persons tasked with handling any hazardous substances must be equipped with the knowledge, equipment, and safety gear necessary to handle the substance/s safely.
- Material Safety Data Sheets (MSDSs) must be available on site for all hazardous chemicals and hazardous substances to be used on site. Where possible and available, MSDSs must additionally include information on ecological impacts and measures to minimise negative environmental impacts during accidental releases or escapes
- Storage vessels of hazardous substances must be situated in an impermeable bunded area large enough to accommodate at least 110% of the capacity of the tank in question. If plastic sheeting

is used to line the bunded area, care must be taken to ensure it is not punctured in any way during the course of the construction period.

- Fuel tanks must ideally be elevated so that leaks can easily be detected.
- No smoking may be permitted at or surrounding the area where fuels and hazardous substances are stored.
- Firefighting equipment must be located in close proximity to the storage area.

### **7.8 Cement and concrete batching**

Cement and concrete batching is permitted on site, but may only take place on designated impermeable, bunded surfaces, as agreed with the ECO.

- Cement/ concrete must not be mixed on bare ground.
- Cement/concrete must not be mixed within any drainage lines.
- The impermeable/ bunded area must be established in such a way that cement slurry, runoff and cement water will be contained and will not flow into the surrounding environment or contaminate the soil.
- Cement run-off and excess cement slurry must be collected in the designated impermeable area, allowed to dry and then disposed of at an appropriate facility. Alternately, the contaminated water can be collected in sealed tanks and transported to an appropriate disposal site for disposal.
- Empty cement bags are currently not recycled within the Garden Route and must be disposed of in the un-recyclables waste bins on site.

### **7.9 Erosion control and stormwater management**

Appropriate measures must be implemented to control the flow of storm water across the construction site, to prevent possible flooding, soil loss and dispersion of pollutants. All exposed earth surfaces must also be protected from wind and water erosion. Stripped areas must not remain uncovered for extended periods of time and must be provided with a suitable cover (vegetation, mulch, brush-packing) as soon as possible.

The scale and nature of the erosion and storm water control measures implemented on site must be appropriate to the conditions on site, and sufficient to achieve the desired outcomes (soil preservation, prevention of flooding, storm water control) to the satisfaction of the ECO and consulting engineer.

It may be necessary to implement small-scale erosion protection measures at the construction site, to prevent soil erosion. Such measures may include the use of shade netting, geo-fabric, brush-packing, logs and stakes or similar barriers in areas susceptible to erosion and along exposed slopes. The netting/fabric is placed directly across the path of flow of storm water. Poles and logs, staked in along the contours of a slope susceptible to erosion may also be used.

### **7.10 Construction near a watercourse**

Construction within the vicinity of the aquatic system needs to be conducted in a conscious manner. The Aquatic Assessment Report completed by Debbie Fordham of Upstream Consulting highlights the following mitigation measures to be adhered to during construction.

- A construction method statement must be compiled and available on site. Use the smallest possible working corridor. Outside the working corridor, all watercourses are to be considered no go areas.
- Do not infill any wetland habitat and keep the gabion wall within current disturbance footprint.
- Work as far as possible from the bank with limited work within the wetland.
- The construction boundary must be clearly demarcated.

- Vegetation removal must be avoided as far as possible. Any indigenous vegetation removed during construction must be stored in a wet area nearby for replacement following construction.
- Remove any alien plant species within the working corridor.
- Stockpiles must not be located within 15 metres of the riparian zone. The furthest threshold must be adhered to. Erosion control measures including silt fences, low soil berms and/or shutter boards must be put in place around the stockpiles to limit sediment runoff from stockpiles.
- Where possible, construction activities should be conducted during the drier months of the year to minimise the possibility of erosion, sedimentation and transport of suspended solids associated with disturbed areas and rainfall events. Planning for such a situation must be undertaken.
- Diversions/ dewatering areas must be temporary in nature and no permanent walls, berms or dams may be installed within a watercourse. Sandbags used in any diversion or for any other activity within a watercourse must be in a good condition, so that they do not burst and empty sediment into the watercourse. Upon completion of the construction at the site, the diversions shall be removed to restore natural flow patterns. Under no circumstance shall a new channel or drainage canals be excavated to divert water away from construction activities.
- Monitoring should be conducted by an independent ECO before commencement to confirm demarcations are in place and indigenous vegetation is relocated where possible nearby, and frequently during construction within the wetland to ensure no unnecessary disturbance occurs.

### **7.11 Excavations and Earthworks**

Any major earthworks with heavy machinery must be under constant supervision and operators are to be aware of all the environmental obligations, as there is always the potential to inflict damage to the sensitive areas. Any unnecessary or excessive heavy machinery movement must be kept to a minimum i.e., only what is absolutely necessary. Areas to be excavated must be clearly demarcated. It may be necessary to demarcate excavations or earthworks along busier haulage routes with orange barrier netting (or a similar product).

All excavated material must be stored on a flat surface away from any drainage line or area susceptible to erosion. The location must be decided upon in consultation with the ECO. Stored material must be protected from wind and water erosion, and this may entail covering the material with suitable shade cloth material or similar (if and when necessary). The shade cloth may need to be weighed down by logs (or similar material) in such a manner that any stream flow is directed away from the stockpile, reducing the risk of erosion.

### **7.12 Site closure and rehabilitation**

Upon completion of the construction phase, all disturbed areas, including the working area (disturbance corridor), temporary access roads, and all areas utilised for the site camp and associated site camp facilities will require rehabilitation as follows:

- On completion of the construction operations, the site camp area must be cleared of all site camp facilities, ablution facilities, fencing, signage, waste and surplus material.
- All areas within the working area and site camp that have become devoid of vegetation or where soils have been compacted due to construction activities must be scarified or ripped to improve filtration and reduce run-off.
- All demarcation fencing, including all droppers, wires, netting and barrier tape must be removed from site and taken to an appropriate site for re-use or disposal.
- Surfaces are to be checked for waste products from activities such as concreting or asphaltting and cleared in a manner approved by the ECO. Any soil contaminated with oil, fuel or other hazardous substance must be collected and disposed of as hazardous waste.
- All construction waste, litter and rubble is to be removed from the site and disposed of at an appropriate facility. Burying or burning of waste or rubble on site is prohibited.

- Topsoil that was removed and stockpiled before construction, must be replaced by spreading it evenly over the areas from which it was removed. This topsoil (and the seedbank it contains) will facilitate the re-vegetation of the site.
- Disturbed areas, especially areas where excavations have taken place, must be shaped as appropriate (original topography must be restored where possible), and covered with a layer of stockpiled topsoil as soon as possible.
- Any topsoil, subsoil or other excavated material that cannot be utilised during site rehabilitation must be removed from the site and disposed of at an appropriate disposal site.
- The disturbed, newly rehabilitated surfaces (particularly steeper slopes and areas recently covered with topsoil) must be protected from wind & water erosion using mulch, brush packing or other appropriate erosion protection measures. Brush-packing/ mulching is done by covering the exposed surface with organic plant material such as branches, plant cuttings and leafy material. Ideally the vegetation removed from site at the start of the construction must be utilised. Brush-packing/ mulching plays a valuable role in erosion control, while also promoting re-vegetation of the site by retaining moisture in the soil, introducing seeds and/or trapping wind-blown seeds and providing organic material (compost) to promote new plant growth.
- Final rehabilitation of the site must be done to the satisfaction of the ECO, and must adhere to all conditions/ requirements of the Environmental Authorisation.
- If the site camp was located on the footprint of an erf or road, the location of the site camp must then be rehabilitated in accordance with the site development plan.

## **8. Environmental Impact Management Planning and design phase**

No direct environmental impacts are associated with the planning and design phase. However, poor planning or inappropriate design decisions in this phase may result in environmental impacts arising during subsequent phases of the project.

Planning and design activities must therefore take into account the environmental constraints and opportunities identified during the Environmental Impact Assessment process, in order to avoid or minimise the potential future impacts of the development. Proper planning is also essential to ensure that adequate provision is made to implement the environmental requirements of this EMPr, and to ensure that the development remains compliant with the received Environmental Authorisation.

The environmental management objectives (goals) during this phase are to:

- Appoint an Environmental Control Officer.
- Environmental Control Officer to conduct an inspection prior to the commencement of construction activities on site

These environmental management outcomes, as well as the management actions that must be implemented in order to achieve the desired outcome and avoid/minimise potential impacts are discussed in more detail below.

### **OBJECTIVE 1: APPOINTMENT OF AN ENVIRONMENTAL CONTROL OFFICER**

<b><i>Impact Management Objective: To appoint a suitably qualified and experienced Environmental Control Officer.</i></b>		
Potential impact to avoid	Failure to appoint an ECO will result in non-compliance with the Environmental Authorisation and the requirements of the EMPr.	
Impact Management Outcome	The conditions of Environmental Authorisation and the requirements of the EMPr are implemented and monitored during all phases of the development, which will promote sound environmental management on site.	
<b>IMPACT MANAGEMENT ACTIONS</b>		
Mitigation measure	Responsible party	Time period
<ul style="list-style-type: none"> <li>• A suitably qualified and experienced Environmental Control Officer must be appointed before any activities commence on site.</li> <li>• The appointed ECO must adhere to the requirements stated in Chapter 15 and 17 of the EMPr and any other requirements specified in the Environmental Authorisation.</li> <li>• The appointed ECO must be advised of the construction start date, before any activities commence on site so that the ECO can perform a pre-commencement inspection and plan for environmental awareness training of construction workers.</li> </ul>	George Municipality: Electrical Engineering Services	During design phase

Performance Indicator	A qualified ECO is appointed prior to the commencement of any construction activities (including pre-construction set-up activities) on site.
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**OBJECTIVE 2: UPDATE ENVIRONMENTAL MANAGEMENT PROGRAMME**

The Environmental Authorisation issued for the development may require certain amendments to be applied to the EMPr. In addition, the final site layout and detailed design may also necessitate the amendment of the EMPr, in order to ensure that the development is accommodated in the EMPr.

<b><i>Impact Management Objective: To ensure the EMPr adheres to the requirements of the Environmental Authorisation and makes provision for the final detailed site layout.</i></b>		
Potential impact to avoid	<ul style="list-style-type: none"> <li>• Failure to update the EMPr in accordance with conditions specified in the EA may result in non-compliance with the EA.</li> <li>• Failure to update the EMPr to accommodate the final detailed site layout may result in non-compliance with the EA.</li> </ul>	
Impact Management Outcome	Good environmental management is promoted on site.	
<b>IMPACT MANAGEMENT ACTIONS</b>		
Mitigation measure	Responsible party	Time period
<ul style="list-style-type: none"> <li>• An independent Environmental Consultant must be appointed to amend the EMPr.</li> <li>• All amendments to the EMPr specified in the EA must be applied to the EMPr unless agreed otherwise in writing with the Competent Authority.</li> <li>• Amendments to the EMPr must be approved in writing by the Competent Authority.</li> <li>• Public participation may be required on the proposed EMPr amendments. The Competent Authority must be consulted for clarity on these requirements.</li> </ul>	<i>George Municipality: Electrical Engineering Services</i>	During design phase
Performance Indicator	An updated EMPr that adheres to the conditions of the EA and that reflects the requirements of the final detailed site layout is approved by the Competent Authority prior to commencing activities on site.	

## 9. Environmental Impact Management Pre-Construction Phase

Proper set-up during the pre-construction phase can set the foundation for good environmental management during the active construction phase to follow and can avoid potential impacts from arising at a later date.

The Impact Management Objectives for this phase of the project relate to:

- Demarcation of no-go areas and working areas.
- Establishment of site camp and associated site facilities.
- Pre-construction ECO visit.

### OBJECTIVE 1: IDENTIFY & DEMARCATe NO-GO AND WORKING AREAS

<b><i>Impact Management Objective: Identify and demarcate no-go areas, working areas and site facilities.</i></b>		
Potential impact to avoid	<ul style="list-style-type: none"> <li>• Insensitive location of working areas and site facilities may result in environmental impacts during construction phase.</li> <li>• Failure to accurately demarcate working areas may result in increased disturbance footprint.</li> <li>• Failure to demarcate no-go (open spaces) areas may result in disturbance to these areas during construction.</li> </ul>	
Impact Management Outcome	Future construction activities will be restricted to within the designated areas & environmentally sensitive areas (no-go areas) will be protected from disturbance.	
<b>IMPACT MANAGEMENT ACTIONS</b>		
Mitigation measure	Responsible party	Time period
<ul style="list-style-type: none"> <li>• The no-go areas must be identified.</li> <li>• Demarcation of working area and no-go areas must be done in accordance with Section 7.2 of this EMPr.</li> <li>• Site camp facilities must be situated as far away from the No-Go areas as possible.</li> </ul>	Engineer / Contractor	Pre-construction phase (prior to arrival of construction equipment, machinery, or workers on site)
Performance Indicator	No-go areas, working areas and areas for site camp facilities have been identified and appropriately demarcated to the satisfaction of the ECO, before construction activities commence on site.	

**OBJECTIVE 2: ESTABLISH ENVIRONMENTALLY SENSITIVE SITE CAMP & SITE FACILITIES**

<b><i>Impact Management Objective: To set up and equip the site camp and associated site facilities in a manner that will promote good environmental management.</i></b>		
Potential impact to avoid	<ul style="list-style-type: none"> <li>• Inappropriate siting of site camp facilities may result in impacts to sensitive resources (e.g. contaminated run-off from refuelling area may contaminate soil).</li> <li>• Failure to properly demarcate and set up site facilities may result in disorganised construction activities and unnecessary disturbance to the site.</li> <li>• Failure to provide the necessary site facilities and/or failure to equip these facilities with the necessary equipment/materials may impede good environmental management &amp; compromise ability to respond to emergencies.</li> </ul>	
Impact Management Outcome	Site camp facilities do not impact significantly on environment. The equipment required to implement the provisions of the EMPr are provided on site.	
<b>IMPACT MANAGEMENT ACTIONS</b>		
Mitigation measure	Responsible party	Time period
<ul style="list-style-type: none"> <li>• The site camp and site facilities described in Section 7 of this EMPr must be provided on site.</li> <li>• The site camp and associated site facilities must be set-up and managed in accordance with the general environmental management measures specified in Section 7 of this EMPr.</li> </ul>	Contractor	Pre-construction phase (prior to start of construction activities)
Performance Indicator	Appropriate, well organised and properly equipped site facilities are available on site prior to commencement of construction activities. The location and set up of the facilities does not impact on the natural resources.	

**OBJECTIVE 3: PRE-CONSTRUCTION ECO INSPECTION**

It is essential that the appointed ECO be advised of the intended construction start date before construction activities commence on site, so that the ECO can conduct an initial site inspection to assess the pre-commencement condition of the site. The ECO can also advise on the appropriate siting and demarcation of the site facilities, and the identification and demarcation of the no-go areas. The ECO may also conduct the first round of environmental awareness training at this stage, if the construction workers are present on site.

<b><i>Impact Management Objective: Environmental Control Officer to conduct an inspection prior to the commencement of construction activities on site.</i></b>		
Potential impact to avoid	<ul style="list-style-type: none"> <li>• Failure to appoint ECO or to notify ECO of commencement prior to commencement will result in non-compliance with the EA.</li> <li>• If a pre-commencement ECO inspection is not performed, the Applicant may be held liable for environmental degradation that took place prior to the Contractor commencing work on site.</li> </ul>	
Impact Management Outcome	<ul style="list-style-type: none"> <li>• Good environmental management is promoted and enforced by the ECO during the full pre-construction and construction phases.</li> <li>• Site facilities are appropriately located on site.</li> <li>• Construction workers receive environmental awareness training before commencing work on site.</li> </ul>	
<b>IMPACT MANAGEMENT ACTIONS</b>		
Mitigation measure	Responsible party	Time period
<ul style="list-style-type: none"> <li>• The appointed ECO must be advised of the construction start date, before any activities commence on site so that the ECO can perform a pre-commencement inspection and plan for environmental awareness training of construction workers.</li> </ul>	Contractor	Start of construction phase
Performance Indicator	A pre-commencement site inspection is conducted by the appointed ECO before construction activities commence on site.	

## 10. Environmental Impact Management Construction Phase

A number of potential environmental impacts may arise during the construction phase of the development. These impacts have been identified and assessed during the Environmental Impact Assessment process. Environmental Management outcomes and actions that will prevent the identified potential impacts from arising – or where avoidance is not possible, that will minimise and mitigate the impact – are provided in this section.

The environmental management actions and mitigation measures prescribed in this section must be implemented throughout the construction phase, and must be implemented in conjunction with the general management measures specified in Chapter 8 of this EMPr as well as any other conditions stated in the Environmental Authorisation. The Environmental Control Officer must monitor and enforce the implementation of the relevant environmental management measures and may provide guidance on the implementation of these environmental management measures as and when required.

### The environmental management objectives (goals) for the Construction phase are:

- To Limit Disturbance of aquatic habitat and biota
- To limit Changes to the hydrological regime
- Limit the Geomorphological changes
- To limit Changes to surface water quality
- To limit the impact on terrestrial biodiversity
- To limit loss of Flora and Potential SCC

The environmental management actions that must be implemented in order to achieve the desired outcomes and avoid/minimise potential impacts are discussed in more detail in the sections below.

### OBJECTIVE 1: Disturbance of aquatic habitat and biota

<b>Impact Management Objective: To Limit Disturbance of aquatic habitat biota</b>		
Potential impact to avoid	<ul style="list-style-type: none"> <li>• Clearance of vegetation, earthworks, and further invasive alien plant infestation.</li> <li>• Deterioration in freshwater ecosystem integrity, and a reduction in the supply of ecosystem services.</li> </ul>	
Impact Management Outcome	Disturbance of aquatic habitat biota is kept to a minimum	
<b>IMPACT MANAGEMENT ACTIONS</b>		
Mitigation measure	Responsible party	Time period
<ul style="list-style-type: none"> <li>• A construction method statement must be compiled and available on site. Use the smallest possible working corridor. Outside the working corridor, all watercourses are to be considered no go areas.</li> </ul>	Contractor	Construction phase

<ul style="list-style-type: none"> <li>• Do not infill any wetland habitat and keep the gabion wall within current disturbance footprint.</li> <li>• Work as far as possible from the bank with limited work within the wetland.</li> <li>• The construction boundary must be clearly demarcated.</li> <li>• Vegetation removal must be avoided as far as possible. Any indigenous vegetation removed during construction must be stored in a wet area nearby for replacement following construction.</li> <li>• Remove any alien plant species within the working corridor.</li> <li>• Stockpiles must not be located within 15 metres of the riparian zone. The furthest threshold must be adhered to. Erosion control measures including silt fences, low soil berms and/or shutter boards must be put in place around the stockpiles to limit sediment runoff from stockpiles.</li> <li>• Where possible, construction activities should be conducted during the drier months of the year to minimise the possibility of erosion, sedimentation and transport of suspended solids associated with disturbed areas and rainfall events. Planning for such a situation must be undertaken.</li> <li>• Diversions/ dewatering areas must be temporary in nature and no permanent walls, berms or dams may be installed within a watercourse. Sandbags used in any diversion or for any other activity within a watercourse must be in a good condition, so that they do not burst and empty sediment into the watercourse. Upon completion of the construction at the site, the diversions shall be removed to restore natural flow patterns. Under no circumstance shall a new channel or drainage canals be excavated to divert water away from construction activities.</li> <li>• Monitoring should be conducted by an independent ECO before commencement to confirm demarcations are in place and indigenous vegetation is relocated where possible nearby, and frequently during construction within the wetland to ensure no unnecessary disturbance occurs.</li> <li>• An Alien Invasive Species Management Plan has been compiled. All management, control, and eradication of alien invasive plant species must be undertaken in accordance with the approved Alien Invasive Species Management Plan (Appendix E).</li> </ul>		
Performance Indicator	Disturbance of aquatic habitat biota is kept to a minimum	

**OBJECTIVE 2: CHANGES TO THE HYDROLOGICAL REGIME**

<b><i>Impact Management Objective: To limit changes to surface water quality</i></b>		
Potential impact to avoid	<ul style="list-style-type: none"> <li>• Changes to surface water input patterns and retention</li> </ul>	
Impact Management Outcome	<ul style="list-style-type: none"> <li>• Changes to surface water input and retention are limited</li> </ul>	
<b>IMPACT MANAGEMENT ACTIONS</b>		
Mitigation measure	Responsible party	Time period
<ul style="list-style-type: none"> <li>• Diversions must be temporary in nature and no permanent walls, berms or dams may be installed within a watercourse.</li> <li>• The stormwater management infrastructure, such must be designed to ensure the runoff is not highly concentrated before entering the riparian area.</li> <li>• Effective stormwater management must include effective stabilisation (gabions and Reno mattresses) of exposed soil and drain outlets. Contingency plans must be in place for high rainfall events which may occur during construction.                             <ul style="list-style-type: none"> <li>○ Allow for grass to grow taller in swale – don't mow it.</li> <li>○ Direct it to stormwater outlet, (if possible).</li> </ul> </li> </ul>	Contractor	Construction phase
Performance Indicator	Changes to surface water input patterns and retention are limited	

**OBJECTIVE 3: GEOMORPHOLOGICAL CHANGES**

<b><i>Impact Management Objective: To limit geomorphological changes</i></b>		
Potential impact to avoid	<ul style="list-style-type: none"> <li>• Excavation in the wetland and in Camfersdrift River riparian area, and erosion at swale outlet in operation.</li> </ul>	
Impact Management Outcome	Impact on the wetland and Camphersdrift River Riparian area is limited.	
<b>IMPACT MANAGEMENT ACTIONS</b>		
Mitigation measure	Responsible party	Time period
<ul style="list-style-type: none"> <li>• Prevent unnecessary encroachment into the wetland.</li> <li>• Rehabilitate disturbed areas to pre-disturbance state.</li> <li>• Prevent and monitor erosion at swale outlet.</li> <li>• Do not drain the wetland.</li> <li>• Sedimentation must be minimised with appropriate measures.</li> </ul>	Contractor	Construction phase

<ul style="list-style-type: none"> <li>All stockpiles must be protected and located in flat areas where run-off will be minimised and sediment recoverable.</li> <li>Construction must have contingency plans for high rainfall events during construction.</li> </ul>		
Performance Indicator	Impact on the wetland and Camphersdrift River Riparian area is limited.	

**OBJECTIVE 4: CHANGES TO SURFACE WATER QUALITY**

<b><i>Impact Management Objective: To limit changes to surface water quality</i></b>		
Potential impact to avoid	During construction, earthworks will expose and mobilise earth materials, and a number of materials as well as hydrocarbons/ cement/ chemicals may end up in the surface water. This can result in possible deterioration in aquatic ecosystem integrity and species diversity.	
Impact Management Outcome	Changes to surface water quality are limited	
<b>IMPACT MANAGEMENT ACTIONS</b>		
Mitigation measure	Responsible party	Time period
<ul style="list-style-type: none"> <li>Spills or leaks from vehicles or machinery must be entirely avoided. Cement/concrete batching is to be located in an area of low environmental sensitivity away from the river channel and pre-approved by the ECO. No batching activities shall occur on unprotected ground. Adequate surface protection will be required. Concrete batching should be restricted to a level and bunded/sealed surface above the riverbanks.</li> <li>Contaminated water containing fuel, oil or other hazardous substances must never be released into the environment. It must be disposed of at a registered site.</li> <li>Sedimentation must be minimised with appropriate measures.</li> <li>Where possible, construction activities should be conducted during the drier months of the year.</li> <li>All post-construction building material and waste must be cleared in accordance with the EMPr. The solid domestic waste must be removed and disposed of offsite.</li> <li>Any use of herbicides in removing alien plant species is required to be investigated by the ECO before use, for the necessity, type proposed to be used, effectiveness and impacts of the product on aquatic biota.</li> <li>Construction must be immediately followed by rehabilitation.</li> </ul>	Contractor	Construction phase
Performance Indicator	Changes to surface water quality are limited	

**OBJECTIVE 5: TO LIMIT THE IMPACT ON TERRESTRIAL BIODIVERSITY**

<b>Impact Management Objective: To limit the disturbance of aquatic habitat and biota</b>		
Potential impact to avoid	<ul style="list-style-type: none"> <li>• Minor clearing (damage) of riverine scrub.</li> <li>• Temporary impact on the functionality of biodiversity network.</li> <li>• Increased opportunity for alien infestation.</li> <li>• Pollution of watercourse.</li> <li>• Increased alien infestation.</li> <li>• Erosion due to poor rehabilitation efforts or stormwater control.</li> </ul>	
Impact Management Outcome	Impact on terrestrial biodiversity is limited to what is only required to undertake the activities	
<b>IMPACT MANAGEMENT ACTIONS</b>		
Mitigation measure	Responsible party	Time period
<ul style="list-style-type: none"> <li>• Fence off the construction area where it encroaches on the Camfersdrift River. The watercourse and adjacent riparian zone outside the works area must not be disturbed in any way.</li> <li>• Rehabilitate the watercourse and riparian zone by removing all the invasive aliens within 30 m of the construction area. Planting of a few locally indigenous species suitable for the habitat may also be required. Remove all construction waste from the area once construction is completed.</li> <li>• Allow at least 24 months for the monitoring of rehabilitation success and alien infestation on the site post construction.</li> <li>• Monitor the area bordering on the new infrastructure for rehabilitation success and erosion. Where needed, rehabilitate/revegetate disturbed surfaces expediently. Erosion prevention measures may be needed on steep slopes, such as logs or netting, to slow down runoff and potential erosion. Mulching and seeding with indigenous fynbos seed may also be needed.</li> <li>• As a long-term maintenance requirement, keep the site and immediate surrounding area clear of invasive aliens, focussing on species such as black wattle, blackwood, inkberry, bugweed, spear thistle and Spanish reed. These species are category 1b and 2 invaders that require compulsory control as part of an invasive species control programme. Please note that it is a legal requirement for landowners to clear alien vegetation on their land.</li> </ul>	Contractor	Construction phase

Performance Indicator	Impact on terrestrial biodiversity is limited to what is only required to undertake the activities
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**OBJECTIVE 6: To limit loss of flora and SCC**

<b>Impact Management Objective: To limit loss of flora and SCC</b>		
	Loss of Indigenous flora and potential SCC	
Impact Management Outcome	Loss of indigenous flora and potential SCC is limited	
<b>IMPACT MANAGEMENT ACTIONS</b>		
Mitigation measure	Responsible party	Time period
<ul style="list-style-type: none"> <li>Fence off the construction area where it encroaches on the Camphersdrift River. The watercourse and adjacent riparian zone outside the works area must not be disturbed in any way.</li> <li>Rehabilitate the watercourse and riparian zone by removing all the invasive aliens within 30 m of the construction area. Planting of a few locally indigenous species suitable for the habitat may also be required. Remove all construction waste from the area once construction is completed.</li> <li>Allow at least 24 months for the monitoring of rehabilitation success and alien infestation on the site post construction.</li> </ul>	Contractor/ holder of EA	Post-Construction phase
Performance Indicator	Loss of indigenous flora and potential SCC is limited.	

**11. Environmental impact management post construction rehabilitation phase**

After all construction activities have ceased, the sites must be cleared of all construction related equipment, materials, facilities and waste. In addition all disturbed surfaces – including disturbed areas around the structures and all areas utilised for site facilities – must be stabilised, rehabilitated and provided with a suitable cover. All temporary access roads constructed must rehabilitated and access must be restricted from the public.

**The environmental management objective (goal) for this phase is to:**

- rehabilitate all areas disturbed by construction activities in an environmentally sensitive manner
- To limit the impact on terrestrial biodiversity
- To limit the loss of flora and SCC

**OBJECTIVE 1: SITE CLOSURE & REHABILITATION**

<b>Impact Management Objective: To rehabilitate all areas disturbed by construction activities in an environmentally sensitive manner.</b>		
Potential impact to avoid	<ul style="list-style-type: none"> <li>• Failure to remove all construction related waste and materials may result in environmental pollution.</li> <li>• Failure to remove all construction related equipment, machinery and site facilities may pose an impact to the natural environment.</li> <li>• Failure to stabilise disturbed surfaces may result in soil erosion and increased storm water run-off, which may limit successful revegetation of the site.</li> </ul>	
Impact Management Outcome	<ul style="list-style-type: none"> <li>• The site is neat and tidy, and all exposed surfaces are suitably covered/ stabilised.</li> <li>• There is no construction-related waste or pollution remaining on site.</li> </ul>	
<b>IMPACT MANAGEMENT ACTIONS</b>		
Mitigation measure	Responsible party	Time period
<ul style="list-style-type: none"> <li>• On completion of the construction operations, the site camp area must be cleared of all site camp facilities, ablution facilities, fencing, signage, waste and surplus material.</li> <li>• Surfaces are to be checked for waste products from activities such as concreting or asphaltting and cleared in a manner approved by the ECO.</li> <li>• Any contaminated soil must be collected and disposed of as hazardous waste.</li> <li>• All construction waste, litter and rubble are to be removed from the site and re-used elsewhere or recycled/disposed of at an appropriate facility.</li> <li>• Burying or burning of waste or rubble on site is prohibited.</li> <li>• All areas within the working area and site camp that have become devoid of vegetation or where soils have been compacted due to construction activities must be scarified or ripped.</li> <li>• Topsoil removed during the establishment of the site camp and the working area must be spread evenly over the entire site camp area and all other disturbed/ exposed areas after those areas have been ripped, scarified, shaped and contoured (as required).</li> <li>• Where necessary seeding and planting of vegetation can take place after the replacement of the topsoil. Hardy, drought tolerant, non-invasive plant species must be selected. If needed, a layer of mulch can be applied to the newly shaped/ landscaped and topsoiled areas. The mulch will serve to limit erosion and will promote the re-vegetation of the site by retaining moisture in the soil and providing organic material (compost) for new plant growth. Mulched material must be spread to a depth of ± 50mm – a thinner layer is likely to be ineffective in protecting the site, while thicker layers may suppress plant growth.</li> </ul>	Contractor	Post-Construction phase

<ul style="list-style-type: none"> <li>• All exposed soils and recently topsoiled areas are to be re-vegetated or stabilised to the satisfaction of the ECO, to protect these areas from wind and water erosion. No areas are to be left exposed to erosive forces. Erosion protection measures that can be applied include mulching (described above), the placement of geotextile, onion bags filled with wood chips, brush-packing or other similar measures.</li> <li>• Any topsoil, subsoil or other excavated material that cannot be utilised during site rehabilitation must be removed from the site and reused elsewhere on the property or disposed of at an appropriate disposal site.</li> <li>• Where necessary disturbed soils must be revegetated with the local indigenous vegetation such as that which occurs at the site or provided with other suitable cover.</li> <li>• It is recommended that follow-up alien clearing be conducted 6 months after construction is complete.</li> </ul>		
<p>Performance Indicator</p>	<ul style="list-style-type: none"> <li>• All construction-related materials, equipment, facilities, waste and contaminated soils have been removed from the site.</li> <li>• Compacted soils have been scarified/ ripped and stabilised.</li> <li>• All disturbed/exposed surfaces have been provided with a suitable covering and/or stabilised.</li> <li>• No alien vegetation is evident on site.</li> </ul>	

**OBJECTIVE 2: LIMIT IMPACT ON TERRESTRIAL BIODIVERSITY**

<b><i>Impact Management Objective: To limit the impact on terrestrial biodiversity</i></b>			
Potential impact to avoid	<ul style="list-style-type: none"> <li>• Increased opportunity for alien infestation.</li> <li>• Erosion due to poor rehabilitation efforts or stormwater control.</li> </ul>		
Impact Management Outcome	The disturbed areas are rehabilitated sufficiently and no alien vegetation establish in the recovering areas		
<b>IMPACT MANAGEMENT ACTIONS</b>			
Mitigation measure	Responsible party	Time period	
<ul style="list-style-type: none"> <li>• As a long-term maintenance requirement, keep the site and immediate surrounding area clear of invasive aliens, focussing on species such as black wattle, blackwood, inkberry, bugweed, spear thistle and Spanish reed. These species are category 1b and 2 invaders that require compulsory control as part of an invasive species control programme. Please note that it is a legal requirement for landowners to clear alien vegetation on their land. An alien Management has been compiled (Appendix E)</li> <li>• Monitor the area bordering on the new infrastructure for rehabilitation success and erosion. Where needed, rehabilitate/revegetate disturbed surfaces expediently. Erosion prevention</li> </ul>	Holder of EA	Post-Construction phase	

measures may be needed on steep slopes, such as logs or netting, to slow down runoff and potential erosion. Mulching and seeding with indigenous fynbos seed may also be needed.		
Performance Indicator	The disturbed areas are rehabilitated sufficiently and no alien vegetation establish in the recovering areas	

**OBJECTIVE 3: TO LIMIT LOSS OF FLORA AND SCC**

<b><i>Impact Management Objective: To limit loss of flora and SCC</i></b>			
	Establishment of alien vegetation on site and displacement of indigenous flora		
Impact Management Outcome	The disturbed areas are rehabilitated sufficiently and no alien vegetation establish in the recovering areas		
<b>IMPACT MANAGEMENT ACTIONS</b>			
Mitigation measure	Responsible party	Time period	
<ul style="list-style-type: none"> <li>Monitor the area bordering on the new infrastructure for rehabilitation success and erosion. Where needed, rehabilitate/revegetate disturbed surfaces expediently. Erosion prevention measures may be needed on steep slopes, such as logs or netting, to slow down runoff and potential erosion. Mulching and seeding with indigenous fynbos seed may also be needed.</li> <li>As a long-term maintenance requirement, keep the site and immediate surrounding area clear of invasive aliens, focussing on species such as black wattle, blackwood, inkberry, bugweed, spear thistle and Spanish reed. These species are category 1b and 2 invaders that require compulsory control as part of an invasive species control programme. Please note that it is a legal requirement for landowners to clear alien vegetation on their land. An Alien Invasive Species Management Plan has been compiled. All management, control, and eradication of alien invasive plant species must be undertaken in accordance with the approved Alien Invasive Species Management Plan (Appendix E).</li> </ul>	Contractor/ holder of EA	Post-Construction phase	
Performance Indicator	Disturbed areas a sufficiently rehabilitated and the infestation of alien vegetation is limited.		

## **12. Emergency Preparedness**

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### **12.1 Emergency response procedures**

The potential environmental risks that may arise as a result of construction activities must be identified, and appropriate emergency response procedures must be compiled for each emergency scenario. Potential environmental emergencies that require an emergency response include – but are not limited to – unplanned fires, sewage spills, spills of hazardous chemicals, snake bites etc.

- The construction contractor is responsible for ensuring that the requirements of the Occupational Health & Safety Act (OHSA) are adhered to during the construction phase. The Applicant is responsible for ensuring compliance with the OHSA during the undertaking of construction activities.

### **12.2 Emergency preparedness**

The following measures must be implemented, as appropriate, to ensure effective responses to emergencies:

- All workers on site during the construction and maintenance phase must be properly educated about possible emergency incidents that may arise, how to avoid such incidents and how to respond in the event of an incident. "Refresher" training sessions on emergency procedures must be held if needed.
- All workers must ideally be given basic fire-awareness training and advised on basic firefighting and safety techniques. Fire-fighting equipment must be available on-site during construction activities (see section 7.3).
- All workers must be trained on how to respond in the event of a spill of a hazardous substance (fuel, chemicals etc.), if hazardous substances are to be used on site.
- A spill kit for containing and/or neutralising spills of hazardous substances (e.g., hydrocarbons) must be available on site at all times, when hazardous substances are present.
- Any incidents of pollution or spillage of hazardous materials during construction must be reported to the ECO as soon as possible. The ECO must then (depending on the nature of the spill) notify the relevant authorities, if needed. A first aid kit must be available on site at all times.
- Emergency contact numbers (including the fire department, police and ambulance) must be prominently displayed on site at all times and regularly updated.
- All emergency incidents must be recorded in a site incident log. The cause of the incident, the measures taken in response to the incident and the efficacy of those measures must also be recorded. This information must be used to inform future emergency preparedness planning, and to avoid prevent similar incidents from arising again.

### 12.3 Control of emergency incidents

In the event of an emergency incident, Section 30 of the National Environmental Management Act, 1998, must be complied with.

**Any incidents must be reported to the relevant authorities and within the prescribed period.**

**Table 3: NEMA Section 30**

<p>30.(1) in this section</p> <p>(a) "incident" means an unexpected sudden occurrence, including a major emission, fire or explosion leading to serious danger to the public or potentially serious pollution of or detriment to the environment. Whether immediate or delayed.</p> <p>(b) "responsible person" includes any person who</p> <p>(i) is responsible for the incident</p> <p>(ii) owns any hazardous substance involved in the incident; or</p> <p>(iii) was in control of any hazardous substance involved in the incident at the time of the incident</p> <p>(c) "relevant authority" means</p> <p>(i) a municipality with jurisdiction over the area in which an incident occurs</p> <p>(ii) a provincial head of department or any other provincial official designated for that purpose by the MEC in a province in which an incident occurs;</p> <p>(iii) the Director-General</p> <p>(iv) any other Director-General of a national department</p> <p>(2) Where this section authorises a relevant authority to take any steps, such steps may only be taken by</p> <p>(a) the person referred to in subsection (1)(c)(iv) if no steps have been taken by any of the other persons listed in subsection (1)(c):</p> <p>(b) the person referred to in subsection (1)(c)(iii) if no steps have been taken by 20 any of the persons listed in subsection (1)(c)(i) and (c)(ii):</p> <p>(c) the person referred to in subsection (1)(c)(ii) if no steps have been taken by the person listed in subsection (1)(c)(i):</p> <p>Provided that any relevant authority may nevertheless take such steps if it is necessary to do so in the circumstances and no other person referred to in subsection (1)(c) has yet taken such steps.</p> <p>(3) The responsible person or, where the incident occurred in the course of that person's employment, his or her employer must forthwith after knowledge of the incident, report through the most effective means reasonably available.</p> <p>(a) the nature of the incident</p> <p>(b) any risks posed by the incident to public health, safety and property</p> <p>(c) the toxicity of substances or by-products released by the incident; and</p> <p>(d) any steps that should be taken in order to avoid or minimise the effects of the incident on public health and the environment to</p> <p>(i) the Director-General</p> <p>(ii) the South African Police Services and the relevant fire prevention service;</p> <p>(iii) the relevant provincial head of department or municipality; and</p> <p>(iv) all persons whose health may be affected by the incident</p> <p>(4) The responsible person or, where the incident occurred in the course of that person's employment, his or her employer, must, as soon as reasonably practicable after knowledge of the incident</p>
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(a) take all reasonable measures to contain and minimise the effects of the incident, including its effects on the environment and any risks posed by the incident to the health, safety and property of persons;

(b) undertake clean-up procedures:

(c) remedy the effects of the incident:

(d) assess the immediate and long-term effects of the incident on the environment and public health:

(5) The responsible person or, where the incident occurred in the course of that person's employment, his or her employer, must, within 14 days of the incident, report to the Director-General, provincial head of department and municipality such information as is available to enable an initial evaluation of the incident, including

(a) the nature of the incident

(b) the substances involved and an estimation of the quantity released and their possible acute effect on persons and the environment and data needed to assess these effects;

(c) initial measures taken to minimise impacts:

(d) causes of the incident, whether direct or indirect, including equipment, technology, system, or management failure; and

(e) measures taken and to be taken to avoid a recurrence of such incident.

(6) relevant authority may direct the responsible person to undertake specific measures within a specific time to fulfil his or her obligations under subsections (4) and (5): Provided that the relevant authority must, when considering any such measure or time period, have regard to the following:

(a) the principles set out in section 2

(b) the severity of any impact on the environment as a result of the incident and the costs of the measures being considered;

(c) any measures already taken or proposed by the person on whom measures are to be imposed, if applicable:

(d) the desirability of the state fulfilling its role as custodian holding the environment in public trust for the people

(e) any other relevant factors.

(7) A verbal directive must be confirmed in writing at the earliest opportunity. Which must be within seven days.

(8) Should

(a) the responsible person fail to comply, or inadequately comply with a directive under subsection (6):

(b) there be uncertainty as to who the responsible person is: or

(c) there be an immediate risk of serious danger to the public or potentially serious detriment to the environment

A relevant authority may take the measures it considers necessary to

(i) contain and minimise the effects of the incident:

(ii) undertake clean-up procedures: and

(iii) remedy the effects of the incident.

(9) A relevant authority may claim reimbursement of all reasonable costs incurred by it in terms of subsection (8) from every responsible person jointly and severally.

(10) A relevant authority which has taken steps under subsections (6) or (8) must, as soon as reasonably practicable, prepare comprehensive reports on the incident. Which reports must be made available through the most effective means reasonably available to

(a) the public:

(b) the Director-General

(c) the South African Police Services and the relevant fire prevention service;

(d) the relevant provincial head of department or municipality; and

(e) all persons who may be affected by the incident.

(11) A person who contravenes or fails to comply with subsection (3), (4), (5) or (6) is guilty of an offence and liable on conviction to a fine not exceeding R1 million or to imprisonment for a period not exceeding 1 year, or to both such a fine and such imprisonment.

### 13. Method statements

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The Competent Authority and/or the ECO may require the Applicant or Construction Contractor to submit Method Statements for one or more construction-related activity, or any aspect of the management of the site, before the activity is undertaken or during the performance of the activity if the activity is causing or may cause significant environmental damage or pose a health and safety risk.

Method Statements need not be complex and lengthy, but must clearly state **how**, **when** and **where** the activity concerned will be undertaken, and must specify **who** will be responsible for undertaking each component of that activity. Method Statements must be prepared by the Construction Contractor and submitted to the ECO for approval before undertaking the activity concerned.

The ECO and / or Competent Authority have the authority to request method statements for other activities, including but not limited to:

- Establishment of site camp and stockpile area.
- Cement/ concrete batching, disposal and emergency contingencies.
- Topsoil and sub-soil storage/ stockpiling.
- Storage of fuels and hazardous chemicals and emergency contingencies.
- Waste management system.
- Storm water management and control.
- Emergency preparedness plan / emergency response procedure (see Chapter 13).

The ECO has the authority to prevent activities from being undertaken until such time as a satisfactory Method Statement has been submitted to the ECO and approved by the ECO.

### 14. Roles and Responsibilities

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This EMPr, once approved by the competent authority (DEADP), should be seen as binding to the Applicant, and any person acting on the Applicant's behalf, including but not limited to agents, employees, associates, contractors and service providers.

The Applicant and all other persons who may be directly involved in the development are also bound by their general Duty of Care, as stated in Section 28 of the National Environmental Management Act, 1998:

**Duty of Care:**

*“Every person who causes, has caused, or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring, or, in so far as such harm cannot reasonably be avoided or stopped, to minimize and rectify such pollution or degradation of the*

#### **14.1 Duties and Responsibilities of the Applicant**

The Applicant is ultimately responsible for ensuring that the environmental management measures specified in this EMPr, as well as any other conditions specified by the competent authority, are implemented and adhered to during the construction phase of the proposed development.

The Applicant or party delegated by the applicant is responsible for monitoring during the construction phase. The Applicant must ensure that all appointed service providers, contractors and workers are capable of complying with all statutory requirements of this EMPr and the conditions of the Environmental Authorisation. The Applicant is responsible for ensuring that this EMPr and the conditions of the Environmental Authorisation are implemented and adhered to during construction activities undertaken by the Applicant.

The Applicant or appointed consultant is responsible for identifying emergency situations that may arise during operational activities undertaken by the Applicant and must formulate appropriate emergency response procedures for these emergency scenarios.

#### **14.2 Duties and Responsibilities of the Contractor**

The “Construction Contractor” is the entity responsible for undertaking the physical construction of the residential development. The construction contractor is responsible for ensuring that all environmental management measures specified in this EMPr and in the EA are implemented during the pre-construction, construction and post-construction rehabilitation phases, unless agreed otherwise with the Applicant. The contractor will be responsible for all costs incurred in the rehabilitation of the site and for ensuring effective environmental management during construction. The contractor must therefore make adequate financial provision for the implementation of all prescribed measures.

It is strongly recommended that the Construction Contractor appoint an Environmental Site Officer (ESO), who will act as the Contractor’s representative to monitor and enforce compliance with the conditions of this EMPr, throughout all phases of construction.

In addition to the above, the Construction Contractor is responsible for the following:

- Identify emergency situations that may arise as a result of construction activities and formulate appropriate emergency response procedures (see Chapter 13).
- Ensure that all construction workers, including sub-consultants and service providers, undergo environmental awareness training prior to commencing work on site, or as soon as possible thereafter (see Chapter 16).
- Compile the required method statements, which must be to the satisfaction of the ECO, before commencing with the activity to be governed by the method statement (Chapter 14).

- Respond to concerns or issues identified by the ECO, as relates to environmental management, and implement the appropriate management or remediation measures, at the Contractor's own expense (unless agreed otherwise)
- Should third parties be called to the site to perform clean up and rehabilitation procedures, the Construction Contractor will be responsible for all associated costs.

Note that failure to comply with the requirements and conditions of this EMPr and the Environmental Authorisation may result in fines or other penalties being levied against the Construction Contractor by the Competent Authority.

### **14.3 Duties and Responsibilities of the ECO**

The appointed Environmental Control Officer (ECO) is responsible for undertaking regular site visits to monitor and report on the implementation of the EMPr and adherence to the conditions of the Environmental Authorisation during the pre-construction, construction and post-construction rehabilitation phases. The ECO is not required to monitor the site during the operational phase of the development.

#### **Competency of the ECO**

The ECO must be independent of the Applicant, Engineer, Construction Contractor and their service providers. The appointed ECO must be suitably qualified and experienced, and must be able to demonstrate that he / she is of sufficient competency to undertake the required task. The ECO should preferably be a resident in close proximity to the development area to ensure quick response if required. The ECO must work in close co-operation with the Construction Contractor, resident engineer or ESO (where applicable) and all contractors in order to identify potential problems before they occur, and provide suitable guidance as to how the identified problems (environmental impacts) can be avoided.

#### **Duties of the ECO**

The duties of the ECO include, but are not limited to:

- Conduct a pre-construction site inspection to ascertain the pre-commencement condition of the site (i.e. the status quo) and determine whether faunal search-and-rescue is required;
- Conduct environmental awareness training (see Chapter 16);
- Undertake regular site visits to monitor compliance with all mitigation, monitoring and management measures contained in the EMPr and the Environmental Authorisation, during the pre-construction, construction and rehabilitation phases of the development (see section below regarding frequency of ECO visits).
- Evaluate the achievement of the performance indicators associated with each impact management outcome specified in this EMPr (Chapters 9-12)
- Liaise with site contractors, engineers and other members of the development team with regard to the requirements of the EMPr;
- Provide guidance as and when required regarding the implementation of the environmental management measures contained in the EMPr and EA, so as to assist the Applicant and contractor in remaining compliant with these measures;
- Assist in finding environmentally acceptable solutions to construction problems;
- Ensure that the working area, site camp facilities, access roads and no-go areas are properly demarcated;
- Ensure that proper topsoil management practices are adhered to on site;
- Ensure that proper waste management & pollution prevention strategies are practised on site;

- Examine method statements;
- Email contractors with potential non compliance notices in case of contravention of the EMPr;
- Ensure satisfactory rehabilitation of disturbed areas on site, after construction is complete;
- Keep detailed records of all site activities that may pertain to the environment, and produce compliance-monitoring reports (ECO Reports) for submission to the Applicant, and the Competent Authority at regular intervals during the construction phase;
- Submit a final post-construction inspection report, within 6 months of completion of the construction phase. The audit report must detail the rehabilitation measures undertaken, describe all major incidents or issues of non-compliance and any issues or aspects that require attention or follow-up.
- All ECO Reports and Inspection Reports must be submitted to the Applicant and Competent Authority.

### **Frequency of ECO visits**

The ECO must conduct weekly site visits during construction and rehabilitation Phase, to check compliance with the conditions of the EA, mitigation measures and recommendations of this EMPr. The ECO has the discretion to undertake additional visits if he / she feels this is justified due to the actions of the contractors, and to make *ad hoc* visits in order to ensure compliance.

The ECO must also undertake a final inspection (audit) 6 months of completion of construction activities. The purpose of this final inspection is to ensure that the rehabilitation measures applied at the conclusion of the construction phase have been sufficient to promote the successful rehabilitation of the site, and to identify any further issues that require attention or follow-up.

### **Authority of the ECO**

The ECO has the authority to recommend that the Engineer suspend all works (or part thereof) occurring on site, should any action being undertaken on site not comply with the environmental requirements, and where such actions pose a serious threat to any element of the surrounding environment.

The ECO has the authority to recommend measures to the Engineer, regarding measures that must be implemented on site in order to ensure compliance with the EMPr and Environmental Authorisation, and/or to prevent environmental degradation or pollution from occurring.

The ECO has the authority to issue verbal and written warnings to contractors. Should verbal and written instructions and/or warnings be ignored, the ECO has the authority to request the Engineer to issue pre-determined fines or other penalties.

## **15. Environmental Awareness Plan**

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Environmental Awareness Training must be conducted prior to the commencement of construction activities. It is the applicant's responsibility to familiarise himself/herself with the content and requirements of this EMPr. The applicant is also responsible to ensure that the contractor and all labourers working on site during the construction phase are familiar with the content of this EMPr.

The following actions must be taken to ensure that all relevant parties are aware of their environmental role and duties:

1. This EMPr must be kept on site at all times.

2. The provisions of this EMPr and the conditions of the Environmental Authorisation must be explained in detail to all staff during Awareness Training.
3. Training booklets will be handed out to all labourers and must be explained to them.
4. Weekly checks to be done by the Applicant's environmental representative (where available) who must be on site at all times.
5. The ECO to do frequent site visits, as recommended in Section 14.3 of the EMPr.
6. Monthly monitoring reports to be compiled by the ECO. These reports will be circulated to all parties involved (including the applicant, contractor and the competent authority).

The Construction Contractor must make allowance for all construction site staff, including all subcontractors that will be working at the site, to attend environmental awareness training sessions (undertaken by the ECO) before commencing any work on site. During this training, the ECO will explain the EMPr and the conditions contained therein. Attention will be given to the construction process and how the EMPr fits into this process. Other items relating to sound environmental management which must be discussed and explained during the environmental awareness training sessions include:

- The demarcated "No-Go" areas;
- General do's and don'ts of the site;
- Making of fires;
- Waste management, use of waste receptacles and littering;
- Use of the toilets provided;
- Use and control of construction materials and equipment etc.;
- Control, maintenance and refuelling of vehicles;
- Methods for cleaning up any spillage;
- Access and road safety;
- Emergency procedures (e.g. in case of fire, spillage etc.)
- General "best practice" principles, with regards to the protection of environmental resources.

Environmental awareness training and education must be ongoing throughout the construction phase and must be undertaken regularly if deemed necessary (especially if it becomes apparent that there are repeat contraventions of the conditions of the EMPr), or as new workers come to site. Translators must be utilised where needed. An Environmental Awareness Guideline has been compiled and is included in Appendix D of the EMPr.

## **16. Monitoring, Record Keeping and Reporting**

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### **16.1 Environmental Auditing**

In accordance with the requirements of the Amended Environmental Impact Assessment Regulations of 2014 (GN No. R.327 of 7 April 2017), the holder of the Environmental Authorisation (i.e. the Applicant) must, for the period that the Environmental Authorisation is valid, appoint a suitably qualified independent person to conduct an environmental audit to audit compliance with the conditions of the Environmental Authorisation and the EMPr.

The appointed auditor must undertake environmental audits within 6 months after the completion of the rehabilitation measures. Following each audit the environmental auditor must submit an audit report to the Competent Authority (in this instance the DEA&DP). The Auditor must be independent from the EAP and ECO.

- Environmental auditing and environmental audit reports must adhere to the requirements of the Environmental Impact Assessment Regulations, in particular Section 34 (*Auditing of*

*Compliance with Environmental Authorisation, Environmental Management Programme) and Appendix 7 (Objective and Content of Environmental Audit Report).*

- The audit report must provide verifiable findings on the level of compliance with the provisions/ conditions of the Environmental Authorisation and the EMPr, and must also comment on the ability of the measures contained in this EMPr to sufficiently avoid, manage and mitigate environmental impacts.
- Where the findings of the audit report indicate that the impact management measures stated in the EMPr are insufficient to adequately address environmental impacts, recommendations as to how the EMPr must be amended so as to address the identified shortcomings must be made and submitted to the competent authority together with the audit report.

## **16.2 Construction phase monitoring, reporting and record keeping.**

The appointed Environmental Control Officer (ECO) is responsible for monitoring the site at regular intervals during the construction phase, in order to ensure that the provisions of this EMPr and the Environmental Authorisation are adhered to and that sound environmental management is ensuing on site.

The ECO must compile a monthly ECO report detailing the ECO's observations on site, any instances of non-compliance and any issues or aspects that require attention, follow-up or remedial action. The ECO reports must be submitted to the Applicant, and to the Competent Authority as requested by the DEADP in the EA. The ECO inspection reports must include both photographic and written records.

### **ECO Inspections - Photographic Records**

The condition of the surrounding natural environment must be monitored regularly in order to ensure that construction and management activities are not impacting negatively on the condition of the landscape and any sensitive ecosystems. The most effective way to achieve this is by means of a detailed photographic record. In this way, a record of any shift in ecosystem condition can be maintained and potential impacts be detected at an early stage. It is thus recommended that fixed-point photo-monitoring sites could be set up, and photographs should be taken at these sites during each ECO inspection. Where necessary, the entire working area should be well documented and photographed.

### **ECO Inspections - Written Records**

The following record-keeping during the pre-construction, construction and rehabilitation phases of the development is recommended:

- The ECO should complete an ECO Checklist after each ECO site visit.
- The ECO must compile an ECO monitoring report and submit this to the Applicant, the Contractor and the Competent Authority (the latter only if required by the Competent Authority). The monthly reports must be a summary of the ECO inspections from the preceding month and must highlight the key concerns/ issues on site, instances of non-compliance with the EA and EMPr, all instructions issued to the contractor, actions taken and aspects that still require attention.
- All ECO reports and ECO instructions must be retained on file by the Applicant at least for the duration of the construction period (retaining reports for a period of at least 5 years is recommended, in the event that the Competent Authority should request information).

- A record (minutes) of construction site meetings, liaison site meetings between the ECO and resident engineer or contractor, monitoring reports, ECO instructions and ECO observations should be clearly documented and filed on a master file off-site for safe keeping.
- It is recommended that a site register (incident register) should be kept on site at the site office for the recording of any environmental incidents (e.g., fires, spills etc.), observations which are contrary to the stipulations within the EMPr and any other contravention deemed necessary for the attention of the resident engineer. Actions taken to remedy the incidents should also be recorded.
- A complaints register should be kept on site in which complaints by any member of the public should be logged.
- The ECO must compile a final post-construction audit report, within 6 months of completion of each construction phase. The audit report should detail the rehabilitation measures undertaken, describe all major incidents or issues of non-compliance and any issues or aspects that require attention or follow-up.

### **Construction Phase Record Keeping**

A copy of the approved EMPr, the Environmental Authorisation and any relevant construction method statements must be kept on site at all times during pre-construction, construction and rehabilitation activities. The ECO Reports must be retained by the Applicant for a period of at least 5 years and must be provided to the Competent Authority upon request. Additionally any groundwater or water quality results must be made available to all relevant authorities upon request.

### **16.3 Corrective Action Procedure**

Correction actions need to be followed in the event where there is non-compliance with a condition of the EA and any recommendation and mitigation measure as stipulated in this EMPr in order to rectify the non-compliance and to prevent reoccurrence.

The ECO will be responsible for reporting non-compliance with any condition of the EA and the recommendations and mitigation measures as included in this EMPr. The ECO will also be responsible for the compilation of non-compliance reports and identifying steps to correct the non-compliance.

The ECO must report all non-compliance issues to the contractor whose responsibility it is to correct. A timeframe for the completion of the corrective actions must be agreed to the ECO. Once the corrective actions have implemented the contractor must notify the ECO. The ECO must review the effectiveness of the corrective actions and if it is found to be inadequate, additional measures must be implemented. Only once the corrective actions have been completed to the satisfaction of the ECO will the matter be considered as closed.

In instances where there are repeated instances where the requirements and conditions of this EMPr and the Environmental Authorisation are contravened or not fully complied with, the Construction Contractor may be liable for financial penalties. Penalties shall be issued by the Engineer, in accordance with the Schedule of Fines contained in the table below. Penalties may be issued at the Engineer's discretion, and/or upon the request/ recommendation of the ECO or Competent Authority.

Depending on the nature of transgression, the Engineer and/or ECO may issue one or more warnings to the Contractor prior to the issuing of a fine. Warnings may be given in writing or orally, but oral warnings must be followed up with written confirmation of the warning within 48 hours of the oral warning. The Engineer has the discretion to issue a fine without first issuing a warning, if the severity of the transgression is judged by the Engineer and/or ECO and/or Competent Authority to warrant such action.

The Engineer must ensure that the levying of fines/penalties forms part of the contract between the Construction Contractor and the Engineer and is subject to the provisions of South African contract law.

## Environmental Management Programme

The table below specifies the transgressions for which the Construction Contractor may incur financial penalties, and the amount of the fines that may be levied. Levying of fines/ penalties is subject to alignment with South African Contractual Law. For repeat offences of the same/ similar transgression by the same party, the value of the fine shall be doubled for each subsequent repeat offence to a maximum value of **R50 000.00** per offence.

*Note: "Provisions", as stated in the table below, relates to the requirements specified in this EMPr and any requirements or conditions specified in the EA, as well as any other requirements governing the environmental management aspects of the development, which the Contractor is responsible for implementing.*

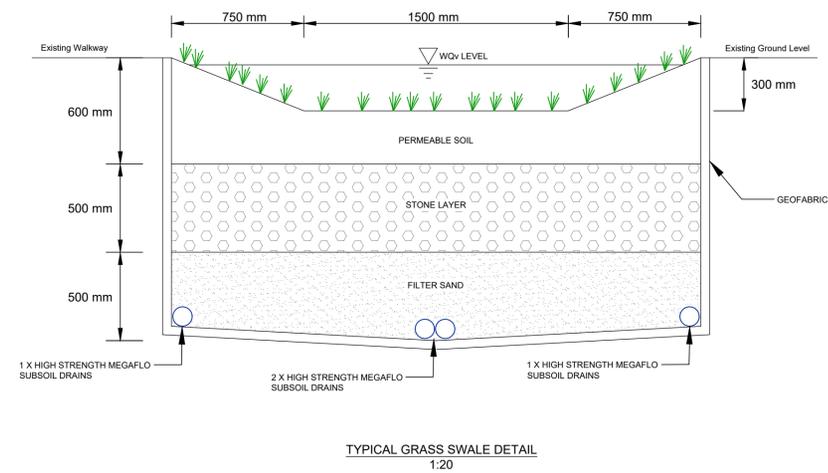
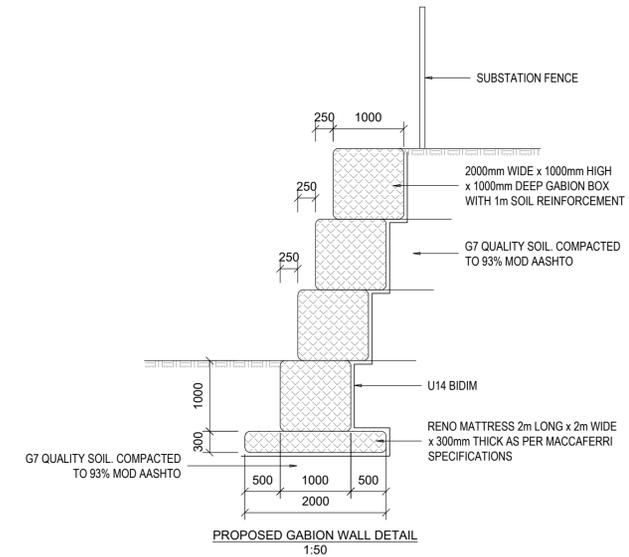
#	Finable Transgression	Min Fine	Max Fine
1	Failure to notify the ECO of the commencement of construction or pre-construction activities, prior to the commencement of such activities	R1 000	R2 000
2	Failure to comply with the provisions relating to the demarcation of the working area, site camp and associated facilities, and the maintenance of the demarcated boundaries.	R1 000	R5 000
3	Failure to comply with the provisions relating to the demarcation of all "no-go" areas, and the maintenance of the demarcated boundaries.	R2 000	R5 000
4	Failure to provide secured ablution facilities (1:30 ratio) on site.	R500	R15 000
5	Failure to comply with the provisions relating to the clearance of vegetation on site.	R2 000	R5 000
6	Clearance of indigenous vegetation (regardless of the density of alien vegetation present) outside of the demarcated boundaries of the working area and site camp.	R2 500	R15 000
7	Damage to indigenous vegetation in the surrounding areas within No-Go areas	R2 000	R10 000
8	Failure to apply herbicide to alien vegetation when required to do so.	R500	R2 000
9	Failure to adhere to designated access routes and/or the driving of vehicles through undeveloped vegetation outside of the demarcated working area or site camp.	R1 000	R5 000
10	Movement of vehicles and/or construction workers in no-go areas;	R1 000	R10 000
11	Empty cement bags found on site or surrounding vegetation. Open cement bags on site with cement blowing from the bag	R2 500	R15 000
12	Parking or storage of vehicles, machinery, tools and other materials or equipment related to the Contractors operations, within designated "no-go" areas.	R1 000	R10 000
13	Parking or storage of vehicles, machinery, tools and other materials or equipment related to the Contractors operations, outside of the areas demarcated for such parking/storage.	R500	R5 000
14	Failure to comply with the provisions relating to the management of topsoil and subsoil.	R1 000	R5 000
15	Excessive excavation of material in areas not depicted for such purpose / activity on the approved design plans.	R2 500	R10 000
16	Failure to comply with the provisions relating to waste management on site i.e. recycling of waste	R500	R5 000
17	Failure to comply with the provisions relating to the storage, use and management of hazardous substances and fuels on site and/or the spillage of hydrocarbons or hazardous substances on site.	R1 000	R10 000
18	Mixing cement or concrete on bare ground and/or failure to comply with any other provision regarding cement/ concrete batching	R1 000	R5 000

19	Failure to provide adequate fire-fighting equipment (in working order) on site at all times and/or failure to comply with the provisions relating to fire prevention and/or the occurrence of unattended or out of control fires.	R500	R5 000
20	Refuelling of vehicles, machinery or equipment outside of the designated refuelling area.	R500	R2 000
21	Maintenance of vehicles, machinery or equipment outside of the designated maintenance yard, except in emergencies	R500	R2 000
22	Failure to undertake refuelling or repairs over a drip tray or other impermeable bunded surface to collect spilled hydrocarbons (fuels, lubricants, oils etc.) and other hazardous substances; failure to provide drip trays under fuel burning equipment (including pumps and generators) where there is a risk of hydrocarbon leakage.	R500	R2 000
23	Storing / placing fuel containing equipment (i.e. bowsers and other fuel containers) within a drainage line.	R2 500	R10 000
24	Failure to produce a required method statement/s to the engineer's and ECO's satisfaction prior to undertaking the activity concerned and/or failure to adhere to an approved method statement	R1 000	R5 000
25	Waste found to be buried or burnt on site	R5 000	R15 000

## 17. CONCLUSION

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The recommendations and mitigation measures prescribed in this EMPr have been formulated with the intention of addressing potential pre-construction, construction and operational phase impacts on the environment. It is likely that if the conditions, requirements and recommendations of the above EMPr are implemented as described and the relevant stakeholders adhere to the various mitigation measures, then the project will be completed without unforeseen negative environmental impacts. Familiarity with the contents of this EMPr by the contractors and other individuals involved in the development project will assist in achieving "environmental best-practice", which ultimately ensures that the project arrives at a sustainable outcome.



- NOTES:**
- The drawing is the property Urban Engineering (Pty) Ltd and all designs are covered by copyright. The drawing and information hereon may not be used for any purpose other than that for what it was originally intended.
  - These drawings should be read together with the Architect's drawings, specifications and any discrepancies should be reported.
  - All dimensions and levels to be checked on site before fabrication. Any discrepancy or changes to the information on this drawing to be reported to the Engineer before fabrication.
  - The following standard specifications are applicable:
    - SANS 1200 C Site Clearance
    - SANS 1200 D Earthworks
    - SANS 1200 G Concrete
    - SANS 1200 H Structural Steelwork
  - All levels indicated on this plan are related to unfinished concrete.
  - All foundation excavations to be inspected and approved by the Engineer before casting of concrete.

- CONCRETE NOTES:**
- Concrete mixes:
    - All mass concrete - Class 20/19
    - Reinforced concrete strip footings - Class 25/19
    - Retaining wall and column footings - Class 25/19
    - Cavities of Retaining walls - Class 25/13
    - All other reinforced concrete - Class 30/19
  - All reinforcement to be supported on approved concrete spacers for cover:
    - Bases - 75mm bottom and 50mm sides
    - Retaining walls - Centred
    - Slabs - 40mm
    - Columns and beams - 40mm
  - No concrete may be cast without approval of the Engineer.
  - All concrete between expansion joints to be cast in one pour.
  - All reinforced concrete to be vibrated.
  - Place 250 Micron Polylin sheet between 2 layers of 3 ply method on nutec fibre cement sheet between concrete and brickwork as per detail shown.
  - No brick wall should be built on unsupported sections of the slab before removal of all formwork and props to slab and beams soffits.
  - Formwork and props to any reinforced concrete can only be removed on the Engineers instructions.
  - All concrete to be cured by an approved method for a minimum period of 7 days.

- BRICKWORK NOTES:**
- Use Class FBSE (14MPa) bricks and Class 2 mortar for all loadbearing brickwork indicated on this plan. Test on bricks and mortar to confirm the required strength should be submitted to the Engineer before building work commences.
  - All foundation walls exceeding 1m but less than 1.25m in height difference should be built as 350mm walls with brickforce every brick course.
  - Foundation walls exceeding 1.25m in height should be designed as retaining walls by the Engineer.
  - All brick loadbearing walls and walls supported by the reinforced concrete structure should be built as per building plans.

- STRUCTURAL STEEL NOTES:**
- All structural steel to EN10025-2-S355JR.
  - All structural steel to be hot dipped galvanized to ISO 1461-1999 only after fabrication. Clean galvanized surfaces with Plascon galvanized iron cleaner, apply 1 coat of Plascon Interseal 6710 HS Surface Tolerant Epoxy (125-150um dry thickness) and finishing coat of Plascon Interthane 990 (20-75um dry thickness). Colours as per Architect's specifications.
  - All bolts are to be hot-dipped galvanized to ISO 1461.
  - Damaged galvanized areas should be abraded with an 80 grit abrasive paper or stainless steel brush and all dust and debris should be removed. A zinc rich epoxy "Zinc fix" should then be applied over the damaged areas as per manufacturers instructions to a dry film thickness of minimum 100um.
  - All welding to be done by qualified welders. Minimum 6mm fillet welds with E70XX electrodes unless otherwise shown. No welding on site will be allowed, unless approved by Engineer. Weld surfaces to be continuous, clean and smoothly finished without pores or craters. No site welding allowed.

The reinforced concrete structure indicated on this drawing has been designed for the following additional loads apart from the own weight of the structure and walls as per Architect's building plans:

Floor finishes = 120kg/m<sup>2</sup>  
 Live load = 150kg/m<sup>2</sup>

REVISION	DATE	DESCRIPTION
0A	19/09/2025	FOR INFORMATION



Project  
**LANGENHOVEN STREET SUBSTATION**

Drawing Title  
**SITE LAYOUT**

**ISSUED FOR: INFORMATION**

Scale (Paper Size)	Date
AS SHOWN	19 SEPTEMBER 2025
Designed T de JAGER	Drawing Number 24-139-001
Drawn T de JAGER	Revision 0A
Checked -	

# CURRICULUM VITAE

## MICHAEL JON BENNETT

### PERSONAL

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

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**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*

- Environmental Monitoring

### TERTIARY EDUCATION

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**2010** University of Cape Town

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

## PROJECTS

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- 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                      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**                      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 Plattekloof 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, Klarstroom, 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, Kleinbrak 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                                      Clinkscales 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 filing 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** Knynsa 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** Knynsa 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** Knynsa 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 Blaauwtjies 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 Pacaltdorp 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



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# ENVIRONMENTAL AWARENESS TRAINING BOOKLET

- 
- Environmental Impact Assessments • Basic Assessments • Environmental Management Planning
  - Environmental Control & Monitoring • Public Participation • Broad scale Environmental Planning



## Environmental Monitor's Foreword

SES is here to ensure that everyone complies with the conditions of "Duty to Care". If these conditions are not complied with the project can be stopped and fines can be issued.

We hope that with your co-operation the project won't be stopped and fines won't be issued, and a successful project can be finished on time.

### Notes:

- Workers working on this project must undergo environmental training.
- The information contained in this document should be used during day-to-day activities.

## HOW IS THIS PROJECT IMPLEMENTING ENVIRONMENTAL MANAGEMENT?

This project is implementing Environmental Management on an ongoing basis throughout the duration of the project. The following aspects would be implemented to achieve the above stated:

- A dedicated Environmental Manager or Environmental Control Officer appointment to the project to implement and monitor Environmental Management.
- Regular environmental inspection on the site.
- Regular environmental training for workers
- Environmental audits on a regular basis.

## WASTE TREATMENT

### **Refuse:**

- Refuse waste includes: waste food, food containers, packaging materials, cans, bottles, newspapers and magazines.
- Day to day household waste should always be disposed of in the containers provided on site by the company.
- No dumping of waste anywhere other than in the bins provided.
- No burning of refuse.
- If there are not enough refuse containers on site, the ECO or supervisor needs to be informed.

### **Construction Waste:**

- Construction waste includes: concrete, steel, cement, rock, pre-coated chips, wood, plastic, empty bags and rubble.
- Construction waste must be discarded in skips located in strategic areas for removal.
- Construction waste must not be discarded in holes or burned on site.

- Small amounts of construction waste should be collected and not discarded into vegetation or down fill slopes.
- Material should only be spoiled if a rehabilitation plan has been designed for the area.

**Liquid waste:**

- Liquid waste includes: concrete, paint, thinners, diesel, hydraulic fluids, cooking oil, chemicals, other fuel and sewage.
- Use facilities provided for waste.
- The liquid waste should be recycled as far as possible.
- Use chemical toilets and ablution facilities.

**INFORM THE ENVIRONMENTAL CONTROL OFFICER (ECO) IMMEDIATELY OF ANY IMMEDIATE OR POTENTIAL ENVIRONMENTAL INCIDENT.**

SPECIFIC ENVIRONMENTAL ISSUES  
SPESIFIEKE OMGEWINGSKWESSIES  
IMIBA ETHILE YEZOBUME BEMEKO YENDALO

The basic Do's and Don'ts towards environmental awareness are as follows:

*Die basiese Moets en Moenies van omgewingsbesinning is as volg:*

Oondoqo bo mawukwenze no mawungakwenzi kwilinge lezobume be meko yendalo bume ngoluhlobo:

**Toilet Facilities:**  
***Toilet Fasiliteite:***  
**Izindlu Zangase:**

**DO:**

USE THE TOILET FACILITIES PROVIDED - REPORT FULL FACILITIES

***MOET:***

*GEBRUIK MAAK VAN TOILET FASILITEITE WAT VOORSIEN WORD  
– RAPPORTEER AS FASILITEITE VOL IS*

**OMAWUKWENZE:** SEBENZISA IZINDLU ZANGASESE  
EZIBONELELWEYO- NIKA INGXELO NGAMALUNGISELELO  
AGCWELEYO.

**DO NOT:**

USE THE BUSH

***MOENIE:***

*DIE BOS GEBRUIK NIE*

**OMAWUNGAKWENZI:** UKUSEBENZISA ITYHOLO.



**Vehicles operation and maintenance:**  
***Voertuig werking en onderhoud:***  
**Ulawulo nophatho lezithuthi:**

**DO:**

ENSURE THAT VEHICLES AND MACHINERY DO NOT LEAK FUEL OR OILS. REFUELLING, MAINTENANCE, SERVICING OR WASHING MUST BE DONE WITHIN THE DESIGNATED AREA IN THE CONSTRUCTION CAMP AREA ONLY.

***MOET:***

*VERSEKER DAT VOERTUIE EN MASJINERIE NIE OLIES OF BRANDSTOF LEK NIE. VOLMAAK, ONDERHOUD, DIENS OF SKOONMAAK VAN VOERTUIE MOET SLEGS IN AANGEWYSTE AREAS IN DIE KONSTRUKSIE KAMP GESKIED.*

**OMAWUKWENZE:** QINISEKISA IZITHUTHI NOMATSHINI ABAVUZI MAFUTHA OKANYE I OYILE, UKUGALELA, UKUPHATHA, UKULUNGISA OKANYE UKUHLAMBA KUFUNEKA KWENZIWE KUMMANDLA OTYUNJIWEYO KWINKAMPI YOLWAKHIWO KUPHELA NGOKUKHAWULEZILEYO.

**DO:**

REPORT ALL FUEL OR OIL SPILLS IMMEDIATELY & STOP THE SPILL CONTINUING.

***MOET:***

*RAPPORTEER ENIGE BRANDSTOF OF OLIE STORTE & VERHOED DAT DIE STORT AANHOU.*

**OMAWUKWENZE:** NIKA INGXELO NGE OLI NAMAFUTHA ACHITHEKILEYO, UZE UNQANDE UCHITHEKO LUNGAQHUBEKI.

**DO:**

PREVENT CONTAMINATION OR POLLUTION OF STREAMS AND WATER CHANNELS.

***MOET:***

*VERHOED DIE KONTAMINASIE EN BESOEDLING VAN STROME & WATERKANALE.*

**OMAWUKWENZE :** NQANDA USULELEKO OKANYE UNGCOLISEKO LWEMILAMBO NEMISELE YAMANZI.

**DO NOT:**

ALLOW WASTE, LITTER, OILS OR FOREIGN MATERIALS INTO THE STREAM

**MOENIE:**

*TOELAAT DAT AFVALPRODUKTE, GEMORS, OLIES OF VREEMDE MATERIALE IN STROME BELAND NIE.*

**OMAWUNGAKWENZI:** MUSA UKUVUMELA INCITHO, ULAHLO, IOYILE OKANYE EZINYE IZINTO EMILANJENI.



**Fire Control:**  
**Vuur Beheer:**  
**Ulawulo Lemililo:**

**DO:**

DISPOSE OF CIGARETTES AND MATCHES CAREFULLY. (Littering is an offence.)

**MOET:**

GOOI SIGARETTE & VUURHOUTJIES OP GEPASTE MANIER WEG WEG (rommelstrooi is 'n oortreding)

**OMAWUKWENZE:** LAHLA ISIGARETE NOOMATSHISI  
NGONONOPHELO (ukulahla lityala).

**DO:**

ENSURE A WORKING FIRE EXTINGUISHER IS IMMEDIATELY AT HAND IF ANY "HOT WORK" IS UNDERTAKEN e.g. welding, grinding, gas cutting etc.

**MOET:**

VERSEKER DAT 'N WERKENDE BRANDBLUSSER BYDERHAND IS INDIEN "WARM WERK" GEDOEN WORD bv. Sweiswerk.

**OMAWUKWENZE:** QINISEKISA ISICIMA-MLILO ESISEBENZAYO SISESANDLENI UKUBA KUKHO UMSEBENZI "OTSHISAYO" OWENZIWAYO, umz. ukuwelda, ugubo, ukuqhawula ugesi, njl.

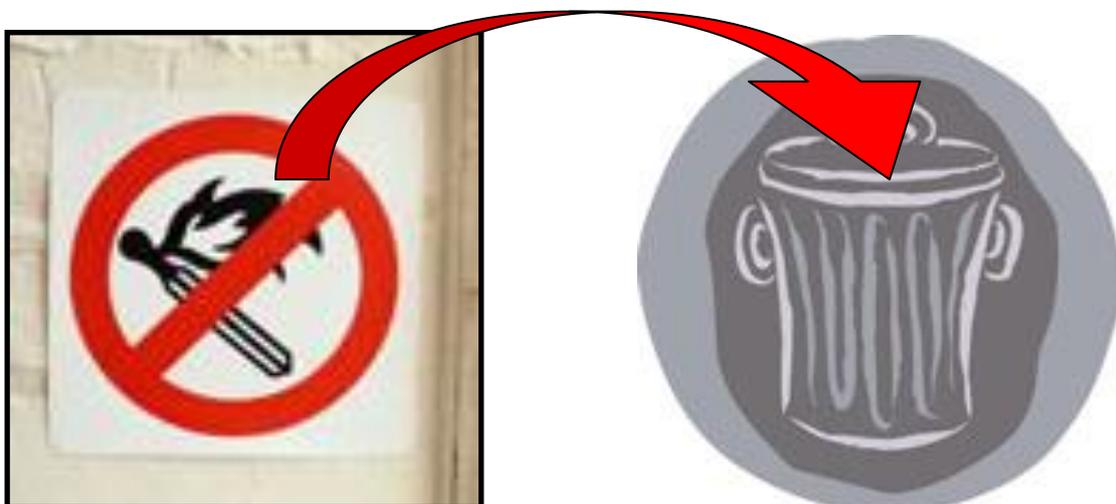
**DO NOT:**

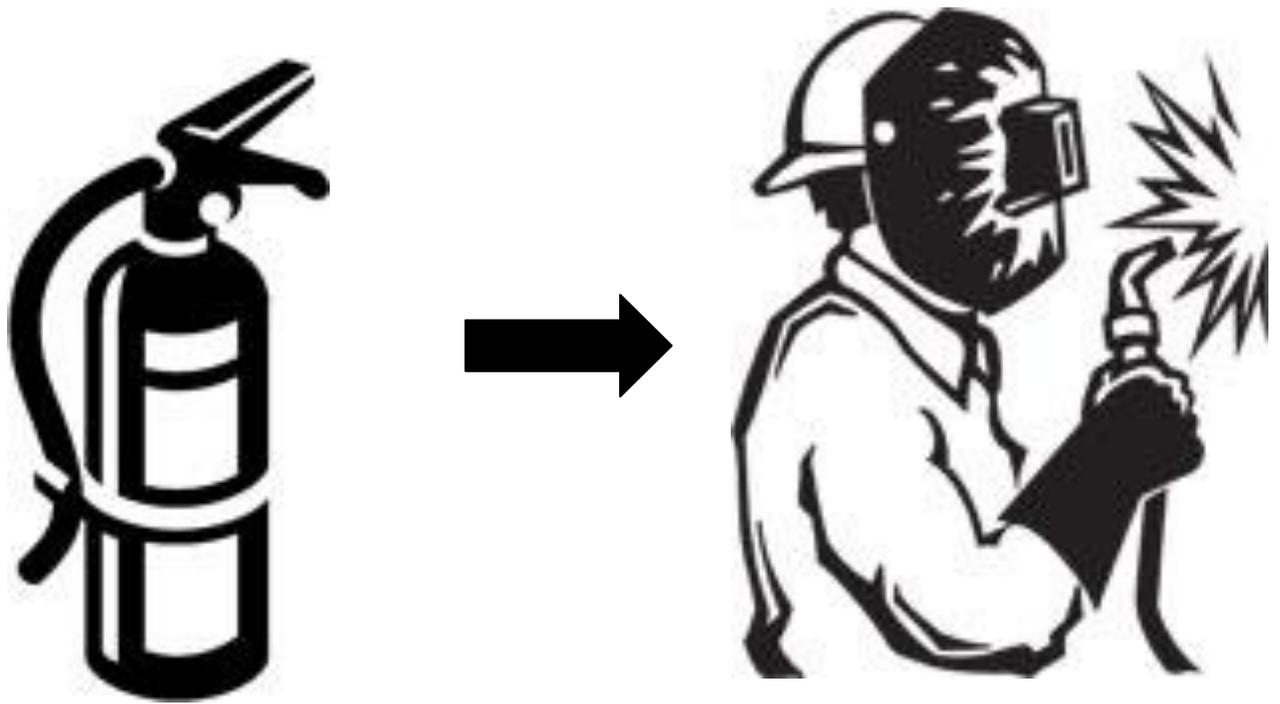
MAKE ANY FIRES

**MOENIE:**

ENIGE VURE MAAK OF ENIGEIETS VERBRAND NIE

**OMAWUNGAKWENZI:** UKWENZA IMILILO OKANYE UTSHISE NOKUBA YINTONI.





**Fencing and Restricted Areas:  
Omheining en Beperkte Areas:  
Ubiyelo Nemimandla Engavumelekanga:**

**DO:**

CONFINE WORK AND STORAGE OF EQUIPMENT TO WITHIN THE IMMEDIATE WORK AREA.

**MOET:**

*BEPERK ALLE WERK EN STOOR VAN GEREEDSKAP TOT IN DIE GEGEWE WERKAREA.*

**OMAWUKWENZE:**GCINA UMSEBENZI NEZIXHOBO ZOKUSEBENZA NGAKUMMANDLA OKUSETYENZELWA KUWO.

**DO NOT:**

ENTER ANY FENCED OFF OR MARKED AREA. SUCH AREAS HAVE BEEN MARKED WITH “NO-GO AREA” SIGNS AND SHOULD BE ADHERED TO.

**MOENIE:**

*ENIGE OMHEINDE OF GEMERKTE AREAS BINNEGAAN NIE. SULKE AREAS IS MET “NO-GO AREA” TEKENS GEMERK EN MOET GEHOORSAAM WORD.*

**OMAWUNGAKWENZI:** MUSA UKUNGENA KWI NDAWO EBIIWEYO OKANYE EPHAWULWEYO. IMIMANDLA ENJALO IPHAWULWE NGAMAGAMA ATHI “ **NO-GO AREA**”.



**NO-GO  
AREA**

**Safety:**  
**Veiligheid:**  
**Ukhuseleko:**

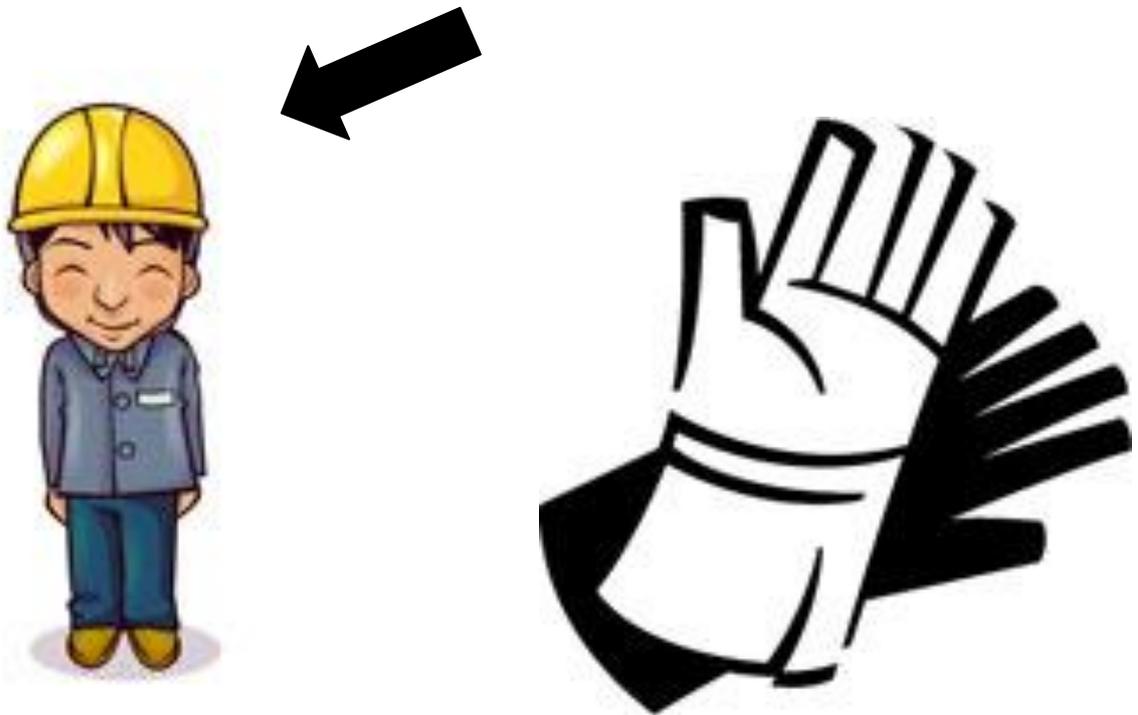
**DO:**

USE ALL SAFETY EQUIPMENT AND COMPLY WITH ALL SAFETY PROCEDURES.

**MOET:**

GEBRUIK ALLE VEILIGHEIDSGEREEDSKAP EN VOLDOEN AAN ALLE VEILIGHEIDS PROSEDURES.

**OMAWUKWENZE:** SEBENZISA ZONKE IZIXHOBO ZOKHUSELEKO, UZE UTHOBELE YONKE IMIGAQO YOKHUSELO.



**Driving and Dust:**  
***Bestuur en Stof:***  
**Uqhubo Nothuli:**

**DO:**

DRIVE ON DESIGNATED ROUTES ONLY.

***MOET:***

*NET OP AANGEWYSTE ROETES BESTUUR.*

**OMAWUKWENZE:** QHUBA KWIMIMANDLA EPHAWULWEYO  
KUPHELA.

**DO NOT:**

SPEED OR DRIVE RECKLESSLY

***MOENIE:***

*JAAG OF ROEKELOOS BESTUUR NIE.*

**OMAWUNGAKWENZI:** SUKUQHUBA NGESANTYA ESIPHEZULU  
OKANYE NGOKUNGAKHATHALI.

**DO NOT:**

ALLOW CEMENT TO BLOW AROUND.

***MOENIE;***

*TOELAAT DAT SEMENT WEGWAAI NIE.*

**OMAWUNGAKWENZI:** MUSUKUVUMELA ISAMENTE ISASAZWE.

**DO NOT:**

CAUSE EXCESSIVE DUST

***MOENIE:***

OORDREWE STOF VEROORSAAK NIE.



**Vegetation protection:  
*Plantegroei Beskerming:*  
Ukhuselo Lwezityalo:**

**DO NOT:**

DAMAGE OR REMOVE ANY VEGETATION WITHOUT DIRECT INSTRUCTION.

**MOENIE:**

*ENIGE PLANTEGROEI SONDER DIREKTE INSTRUKSIE BESKADIG OF VERWYDER NIE.*

**OMAWUNGAKWENZI:** MUSA UKUTSHABALALISA OKANYE USUSE NASIPHINA ISITYALO NGAPHANDLE KOMYALELO.



**Animals:**  
**Diere:**  
**Izilwanyana:**

**DO NOT:**

INJURE, CAPTURE/SNARE, FEED OR CHASE ANIMALS – this includes birds, frogs, snakes, lizards, tortoises, etc.

**MOENIE:**

ENIGE DIERE BESEER, VANG, VOER OF JAAG NIE – dit sluit in: voëls, paddas, slange akkedisse, skilpaaie ens.

**OMAWUNGAKWENZI:** MUSA UKWENZAKALISA, UKUBAMBA, UKONDLA OKANYE UKULEQA IZILWANYANA- okuquka iintaka, amasele, iinyoka, amacilikishe, izikolopati.

**DO:**

REPORT ANY INJURY OF AN ANIMAL.

**MOET:**

DIE BESERING VAN 'N DIER RAPPORTEER.

**OMAWUKWENZE:** XELA NASIPHI ISENZAKALO SESILWANYANA.



**Preventing Pollution:  
Voorkoming van Besoedeling:  
Ukhuselo Longcoliseko:**

**DO:**

CLEAR YOUR WORK AREAS OF LITTER AND BUILDING RUBBLE AT THE END OF EACH DAY – use the waste bins provided and ensure that litter will not blow away.

**MOET:**

*RUIM NA ELKE DAG DIE WERK AREA OP EN GOOI ENIGE ROMMEL WEG IN DIE GEGEWE HOUERS – maak seker dat rommel nie kan wegwaai nie.*

**OMAWUKWENZE:** COCA INDAWO OSEBENZA KUYO, IZINTO EZILAHLIWEYO NENKUNKUMA YOKWAKHA QHO EKUPHELENI KWEMINI-sebenzisa imigqomo yenkunkuma uze uqiniseke ukuba inkunkuma ayivuthuzwa ngumoya.

**DO NOT:**

ALLOW WASTE BINS TO OVERFLOW OR WASTE TO BLOW AROUND.

**MOENIE:**

*TOELAAT DAT ROMMELHOUERS OORVLOEI OF DAT ROMMEL ROND WAAI NIE.*

**OMAWUNGAKWENZI:** MUSA UKUVUMELA IMIGQOMO YENKUNKUMA IGCWALE KAKHULU OKANYE INKUNKUMA ISASAZEKE.

**DO NOT:**

LITTER OR LEAVE FOOD LAYING AROUND

**MOENIE:**

*ROMMEL OF KOS LAAT RONDLÊ NIE.*

**OMAWUNGAKWENZI:** MUSA UKUNGCOLISA OKANYE USHIYE UKUTYA KULELE INDAWO YONKE.

**DO NOT:**

BURY ANY LITTER OR WASTE IN THE GROUND.

**MOENIE:**

*ENIGE ROMMEL OF GEMORS IN DIE GROND BEGRAWE NIE.*

**OMAWUNGAKWENZI:** MUSA UKUNGCWABA INKUNKUMA EMHLABENI.





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# SITE SPECIFIC ALIEN AND INVASIVE SPECIES MANAGEMENT PROGRAMME

**FOR THE**

**FOR THE PROPOSED FLOOD DAMAGE REPAIRS TO THE  
LANGENHOVEN SUBSTATION ON THE REMAINDER OF ERF  
464 (NEAR THE GEORGE PROVINCIAL HOSPITAL), GEORGE**

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  
PO Box 19  
GEORGE  
6530

**DATE:** 02 March 2026

**DEA&DP REF.NO.:** 16/3/3/1/D2/20/0009/26



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

**Appendix B:** Botanical impact statement

**Appendix C:** DFFE Pesticide Policy

Section	<b>PROJECT DETAILS</b>
1	

<b>PROJECT DETAILS:</b>
-------------------------

Project Name:	PROPOSED FLOOD DAMAGE REPAIRS TO THE LANGENHOVEN SUBSTATION, GEORGE, WESTERN CAPE	
DEADP Reference Number:	16/3/3/1/D2/20/0009/26	
Erf Name and Portion Number:	<ul style="list-style-type: none"> <li>• Erf 464</li> </ul>	
SG Codes:	Erf RE/464	C02700020000046400000
Municipality:	George Municipality	
Province:	Western Cape	
Applicant:	George Municipality	
EAP:	Sharples Environmental Services cc EAP: Michael Jon Bennett (EAPASA: 2021/3163) Candidate EAP: Onela Mhobo (EAPASA: 2022/4522)	
Date:	02 March 2026	
Conditions of Use:	<p>This report is the intellectual property of Environmental Services cc (SES), who may make allowance to publish it, in whole provided that:</p> <ul style="list-style-type: none"> <li>a) Approval for copy is obtained from SES.</li> <li>b) SES is acknowledged in the publication.</li> <li>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.</li> <li>d) That approval is obtained from SES if this report is to be used for the purposes of sale, publicity or advertisement.</li> </ul> <p>SES accepts no responsibility for failure to follow the recommended program.</p>	

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

This Alien and Invasive Species Management Plan has been prepared for the Mossel Bay Municipality, for the Proposed Flood Damage Repairs to The Langenhoven Substation on the Remainder of Erf 464 (Near The George Provincial Hospital), George.

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.

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 minimises 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.

**Locality and Project Description:**

This project proposes to repair damages caused by heavy rainfall and flood events and install protection measures to prevent future damages to the Langenhoven Substation and surrounding areas.

It is proposed to install gabion supporting structures to the south of the substation, construct an earth v-drain on the southern edge of the substation and a swale from the earth v-drain to the Campfersdrift river. Either a flared swale to spread the water out on the edge of the bush near the river and allow it to flow naturally over ground down to the river will be constructed or an outlet structure as close to the river as possible with energy dissipators will be constructed.

**The extent and scope of the proposed repair work include:**

- Construct a gabion retaining structure (consisting of 2×1×1 m gabion baskets) on the northern side of the substation;
- Construct an earth V-drain along the southern edge of the substation; and
- Construct a trapezoidal grass swale with an outlet as close to the river as possible with energy dissipators to protect against erosion. Alternatively, construct a trapezoidal grass swale with a flared swale to spread the water out on the edge of the riverine scrub.



Figure 1: Locality of proposed flood damage repairs.

### Vegetation on Site:

Mark Berry was appointed to compile a Botanical 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 vegetation present on site:

- **Vegetation:**

The area around the substation is highly transformed/modified, comprising a flat grassy area leading to the Camfersdrift River, and an embankment/impoundment on the northern side of substation. Most of the indigenous species recorded are associated with the riparian habitat next to the Camfersdrift River. However, the latter is also modified by past development activities. No proper fynbos was encountered, only some riparian scrub associated with the river. The quality of the latter is also poor due to a high presence of pioneers and invasive species. The rest of the site, including the embankment, is covered by grasses and weeds. The botanical attributes of the site are presented in the figures below:



Figure 2: Grassy Area south of the substation and approximate route for the Trapezoidal grass swale



Figure 3: Riparian Scrub next to Camfersdrift River. The dominant shrub is *Cliffortia ordorata*



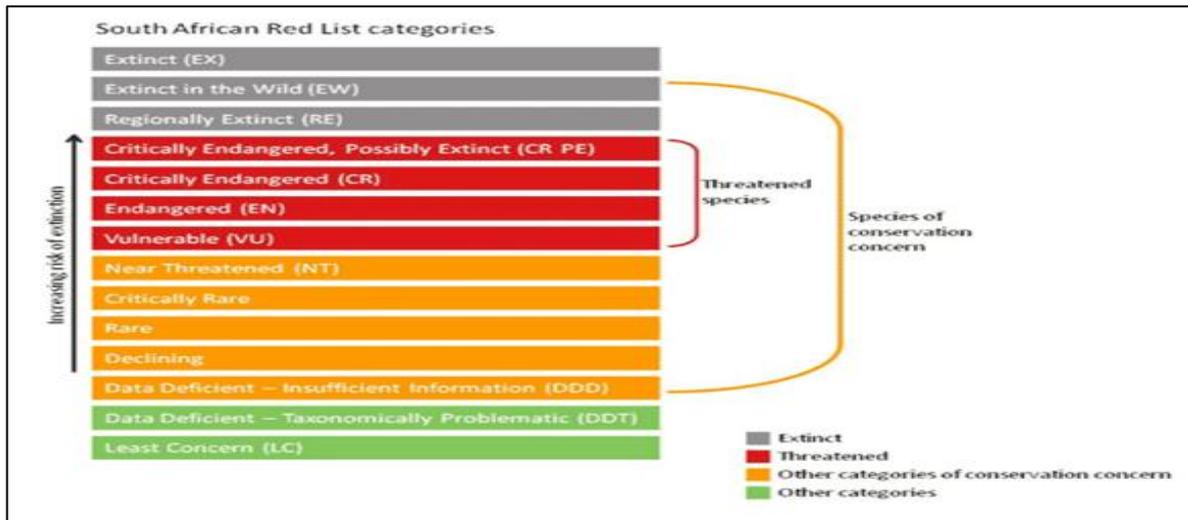
Figure 4: Embankment and impoundment on Northern Side of the Substation

- **Plant Species:**

The following indigenous shrub species were recorded on site, namely *Helichrysum petiolare*, *H. cymosum*, *H. foetidum*, *Pseudognaphalium undulatum*, *Senecio rigidus*, *Delairea odorata*, *Nidorella ivifolia*, *Crassula sarmentosa* (introduced), *Cliffortia odorata* (dominant) and *Gomphocarpus physocarpus*. Hemicryptophytes and geophytes recorded include *Cheilanthes viridis*, *Pteridium aquilinum*, *Isolepis prolifera*, *Cynodon dactylon*, *Commelina* sp, *Zantedeschia aethiopica* and *Wachendorfia thyrsiflora*. Nearly all of them are associated with the riparian scrub next to the Camfersdrift River. Floristic association with Garden Route Shale Fynbos is poor. Only *Helichrysum cymosum* and *Pteridium aquilinum* are considered to be important taxa in the latter, which is indicative of the transformed state of the site. Also, no Species of Conservation Concern (SCC) or protected tree species, such as kasuur or milkwood, were recorded. All the recorded species are widespread and common in the region.

Alien species recorded on site include *Acacia mearnsii* (black wattle, category 2), *A. melanoxylon* (blackwood, 2), *Phytolacca octandra* (inkberry, 1b), *Solanum mauritianum* (bugweed, 1b), *Cirsium vulgare* (spear thistle, 1b), *Erigeron cf sumatrensis* (fleabane), *Datura stramonium* (olieboom, 1b), *Physalis peruviana* (gooseberry), *Verbena bonariensis* (purple top, 1b), *Arundo donax* (Spanish reed, 1b) and *Paspalum urvillei* (giant paspalum). As indicated above, the majority are Category 1b and 2 invaders. In terms of the National Environmental Management: Biodiversity Act (NEMBA) (Act 10 of 2004) Alien and Invasive Species List (2016), category 1b invasive species require compulsory control as part of an invasive species control programme. Also, the harbouring of category 2 species, such as black wattle and blackwood, is prohibited without a permit. Black wattle, which is indicative of past disturbances, is considered a serious threat to the environment and very difficult to control.

**Table 1: South African Red List categories as prescribed by the International Union for Conservation of Nature (IUCN)**



**Critical Biodiversity Areas and Ecological Support Areas on Site:**

The site falls inside the George biodiversity network. Being located next to the Camfersdrift River, it includes aquatic and terrestrial critical biodiversity areas (CBA's), as well as a degraded critical biodiversity area (CBA2). These are all aligned with the Camfersdrift River and adjacent tracts of parkland, which act as an ecological corridor linking the Outeniqua Mountains with the coastline. Reasons for the importance of the mapped CBA's include the presence of ecological processes (FEPA river corridor) and water resource protection (Gwaing & South Eastern Coastal Belt). The closest protected area is the Van Kervel Local Authority Nature Reserve, located 1.4 km away to the northeast of the site. The Witfontein Nature Reserve is located ±3 km away to the north.)



Figure 5: CBA and ESA Map



Figure 6: Alien species recorded on site, with *Acacia melanoxydon* (top left), *A. mearnsii* (top right), *Cirsium vulgare* (bottom left) and *Solanum mauritianum* (bottom right).

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

Alien Species	Category
<i>Phytolacca octandra</i> (inkberry)	Category 1b
<i>Solanum mauritianum</i> (bugweed)	Category 1b
<i>Cirsium vulgare</i> (spear thistle)	Category 1b
<i>Erigeron cf sumatrensis</i> (fleabane)	Category 1b
<i>Datura stramonium</i> (olieboom)	Category 1b
<i>Acacia mearnsii</i> (Black Wattle)	Category 2
<i>Physalis peruviana</i> (gooseberry)	Category 1b
<i>Acacia melanoxydon</i>	Category 2
<i>Verbena bonariensis</i> (purple top)	Category 1b
<i>Verbena bonariensis</i> (Purple top)	Category 1b
<i>Arundo donax</i> (Spanish reed)	Category 1b
<i>Paspalum urvillei</i> (giant paspalum).	Category 1b

**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> <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 EMPr and must comply with DFFE requirements.		
<b>Management Actions:</b>		
1.	Integration into EMPr:	<ul style="list-style-type: none"> <li>This Alien Management Plan forms part of the approved EMPr.</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> </ul>

	<ul style="list-style-type: none"> <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 recognized 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.



<b>Phase</b>	<b>Activity</b>	<b>Timeframe</b>
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

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.

# CURRICULUM VITAE

## MICHAEL JON BENNETT

### PERSONAL

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

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**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*

- Environmental Monitoring

### TERTIARY EDUCATION

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**2010** University of Cape Town

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

## PROJECTS

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- 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                                      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**                      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 Plattekloof 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, Klarstroom, 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, Kleinbrak 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                      Clinkscales 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 filing 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** Knynsa 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** Knynsa 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** Knynsa Knysna Municipality
- Environmental Control Officer for upgrading of Knysna bulk water supply scheme: phase 1



- 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 Blaauwtjies 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

# Botanical Impact Assessment

## Proposed flood damage repairs to the Langenhoven Substation, George

25 July 2025



## Author details

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Area of Specialisation	Botanical surveys

Mark Berry is an independent botanical specialist with over 25 years of experience mainly in the Western Cape, but also in the adjacent provinces, Free State and KwaZulu-Natal. He is also experienced in undertaking/compiling Environmental Impact Assessments (EIA's), Environmental Management Programmes (EMPr's), Environmental Control Officer (ECO) duties, audits, land use surveys and due diligence investigations. CV is available upon request.

## Citation of report

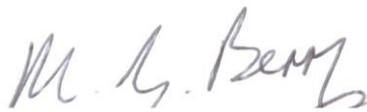
Berry, M.G. 2025. Botanical impact assessment: proposed flood damage repairs to the Langenhoven Substation, George. MB Botanical Surveys, Somerset West.

## Declaration of Independence

I Mark Gerald Berry, as the appointed Specialist hereby declare/affirm the correctness of the information provided or to be provided as part of the application, and that I:

- 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 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;
- 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
- am aware that a false declaration is an offence in terms of Regulation 48 of the EIA Regulations, 2014 (as amended).

Signature of the Specialist:



Name of Company:

MB Botanical Surveys

Date:

25 July 2025

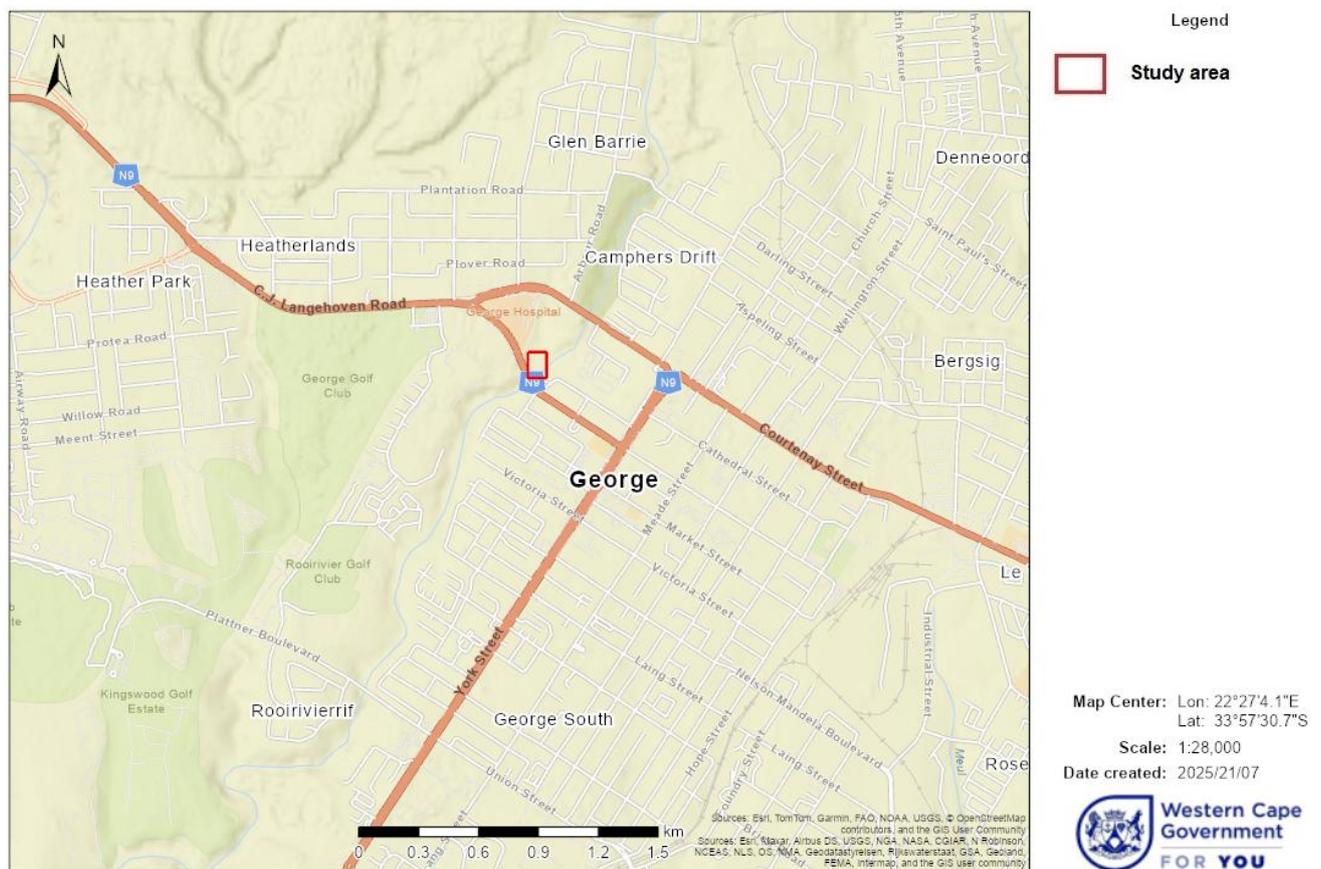
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# 1. Introduction

## Proposed development and area assessed

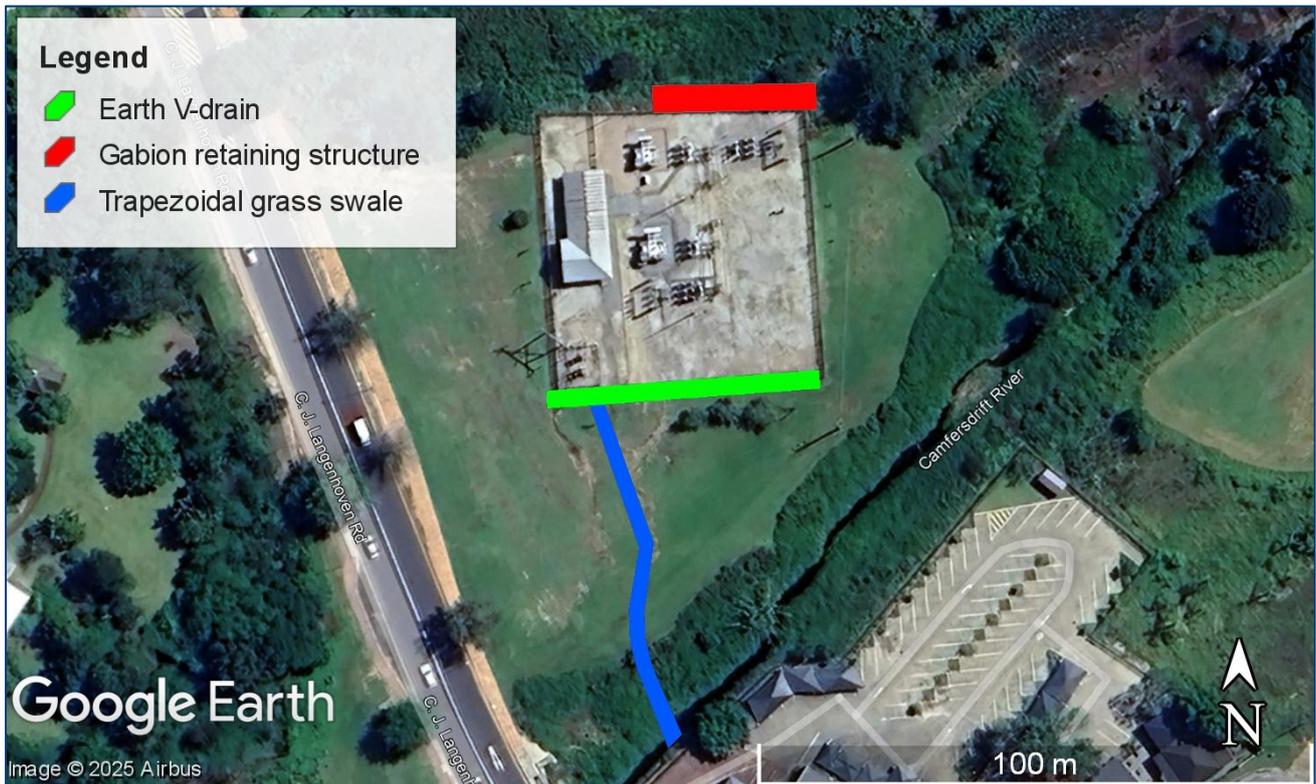
This report investigates the botanical impacts of proposed flood damage repairs to the Langenhoven substation in George. The site, which is situated next to the Camfersdrift River between George Central and Heatherlands, is located on Remainder of Erf 464 and Erf 20781 (**Figure 1-1**). It is covered by grasses/weeds, riverine habitat and an electrical substation. The aim of the study, which was requested by SES (EAP) on behalf of applicant (George Municipality), is to determine the botanical value of the affected area, the anticipated impact imposed by the project, and to recommend mitigation measures.



**Figure 1-1: Location of the site (outlined in red) inside George.**

The extent and scope of the proposed repair work include (**Figure 1-2**):

- Construct a gabion retaining structure (consisting of 2×1×1 m gabion baskets) on the northern side of the substation;
- Construct an earth V-drain along the southern edge of the substation; and
- Construct a trapezoidal grass swale with an outlet as close to the river as possible with energy dissipators to protect against erosion. Alternatively, construct a trapezoidal grass swale with a flared swale to spread the water out on the edge of the riverine scrub.



**Figure 1-2: Proposed project layout.**

According to the Screening Report, generated by the EAP (SES) on 27 March 2025 for the project, the site has been mapped as Low sensitive in the plant species theme, and Very High sensitive in the terrestrial biodiversity theme. The Very High sensitivity is ascribed to the possible presence of a threatened vegetation type and the encroachment of the site on the biodiversity network. As a result, MB Botanical Surveys was contracted to undertake a botanical assessment of the project area.

### Terms of Reference

The terms of reference agreed upon for this botanical study include:

- Adhere to the EAP's terms of reference for the study, including a *status quo* assessment, followed by either a Compliance Statement or a Botanical Impact Assessment Report, depending on the outcome of the *status quo* assessment;
- Identify and describe biodiversity patterns at a community and ecosystem level (main vegetation type, plant communities & threatened/vulnerable ecosystems), at species level (Species of Conservation Concern & protected species) and in terms of significant landscape features;
- Describe the sensitivity of the site and its immediate surroundings;
- Map or describe the presence of invasive alien plants;
- Review the relevant biodiversity plans compiled in terms of the National Environmental Management Biodiversity Act (Act 10 of 2004);

- Make recommendations with regards to the protection/management of biodiversity; and
- Adhere to the NEMA and CapeNature guidelines for biodiversity assessments.

### Limitations & Assumptions

The following limitations and assumptions apply to the study:

- Since fieldwork was carried out in winter, flowering plants that only flower at other times of the year (e.g. spring to summer), such as certain bulb species (notably from the Iridaceae & Orchidaceae families), may have been missed. However, the overall confidence in the completeness and accuracy of the botanical findings is considered to be good.

Notwithstanding the above limitation and the fact that the site is highly degraded or transformed, the specialist is of the opinion that the survey and findings are adequate to aid decision making. A follow-up botanical survey during spring or early summer is not considered necessary.

### Disclaimer & Use of this report

Any person using or referring to this report, do so at their own risk. The author will not accept liability for any loss or damage arising from this report or its content. This report reflects the professional judgment of its author. The information and recommendations presented are specific to the project and site at hand and do not extend to future developments or neighbouring sites. Use of this report is therefore restricted.

## 2. Site Sensitivity Verification

The Department of Environmental Affairs online Environmental Screening Tool indicates that the plant species theme is of Low sensitivity for the site (see the Screening Report, generated by the EAP on 27 March 2025). The Screening Report further indicates that the terrestrial biodiversity theme is of Very High sensitivity. This rating is ascribed to the possible presence of a terrestrial critical biodiversity area (CBA1), degraded terrestrial critical biodiversity area (CBA2), a degraded ecological support area (ESA2), SWSA (SW) Outeniqua and an endangered ecosystem (i.e. Garden Route Shale Fynbos).

In circumstances where the *status quo* assessment proves the contrary to the above (i.e. where the site is deemed to be of Low sensitivity in respect of both themes, the GN320 of 2020 requires that a Terrestrial Biodiversity Compliance Statement is submitted as set out by the National Environmental Management Act (NEMA) (Act No. 107 of 1998) Regulations of 2020. If the above is confirmed, then a biodiversity assessment will be required.

### 3. Methodology

The methodology used in this terrestrial biodiversity compliance assessment, including a desktop background assessment and one site visit, is outlined in the subsections below.

#### Desktop assessment

A brief review of online (e.g. Google Earth, iNaturalist.org & CapeFarmMapper) and desktop resources (available literature & reports) was undertaken to determine the nature of the site, the expected vegetation type(s), the presence of natural vegetation remnants and species of conservation concern (SCC), hydrological features, and the significance of the site in terms of biodiversity planning.

#### Site survey

A botanical survey of the site was undertaken on 18 July 2025 by the author. A qualitative assessment of the type and condition of affected vegetation on site, disturbances and presence of alien species, SCC and protected tree species was carried out. The path walked during the survey is shown in **Figure 3-1**. Plant species not identified in the field, were collected and/or photographed and identified at the office and Compton (Kirstenbosch) Herbarium. The 2018 South African Vegetation Map and the latest floristic taxonomic literature and reference books were used for the purpose of this specialist study. Any plants classified as rare or endangered in the Red List of South African Plants online database<sup>1</sup> are highlighted. The assessment follows the relevant national guidelines/protocols for biodiversity assessments as listed in the Government Gazette No. 43110 on 20 March 2020.

The following information was recorded during the site visit:

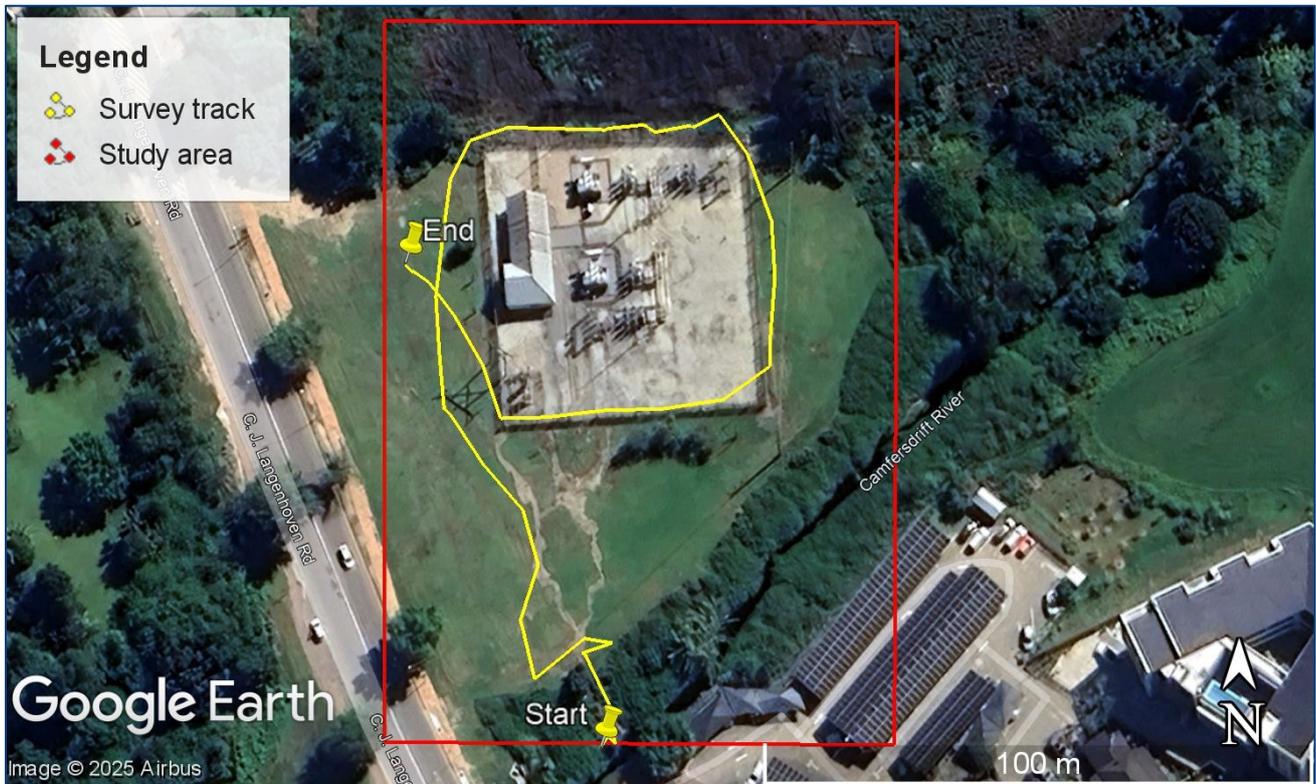
1. The condition of the vegetation. Is the vegetation either disturbed or degraded? A disturbed or degraded area could range from agricultural fields (fallow land), or areas previously disturbed by mining activities, to an area that has been severely eroded or degraded as a result of bad land management or alien infestation.
2. Species diversity (alpha diversity). This refers to the numbers of different indigenous plant species occurring on site.
3. Species of Conservation Concern (SCC), endemics, as well as protected tree species occurring on site. This would include near threatened, rare, vulnerable, endangered or critically endangered species. SCC and protected tree species were mapped using Easy GPS v2.5 software on an iPhone. Accuracy is given as  $\pm 4$  m.
4. Identification of the vegetation type(s) and communities (if discernible) on the site.

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<sup>1</sup> [Threatened Species Programme | SANBI Red List of South African Plants](#)

This would include trying to establish the known range of a vegetation type and whether or not it is vulnerable, endangered or critically endangered.

- Connectivity with (or isolation from) nearby natural vegetation.



**Figure 3-1: Satellite photo showing the survey track on site.**

### Data analysis

Site ecological importance (SEI) of the affected (receptor) area has been determined by applying the criteria described in the Species Environmental Assessment Guideline (SANBI, 2020). See **Annexure 1** for a description of the SEI methodology. The impact assessment methodology is described in **Annexure 2**.

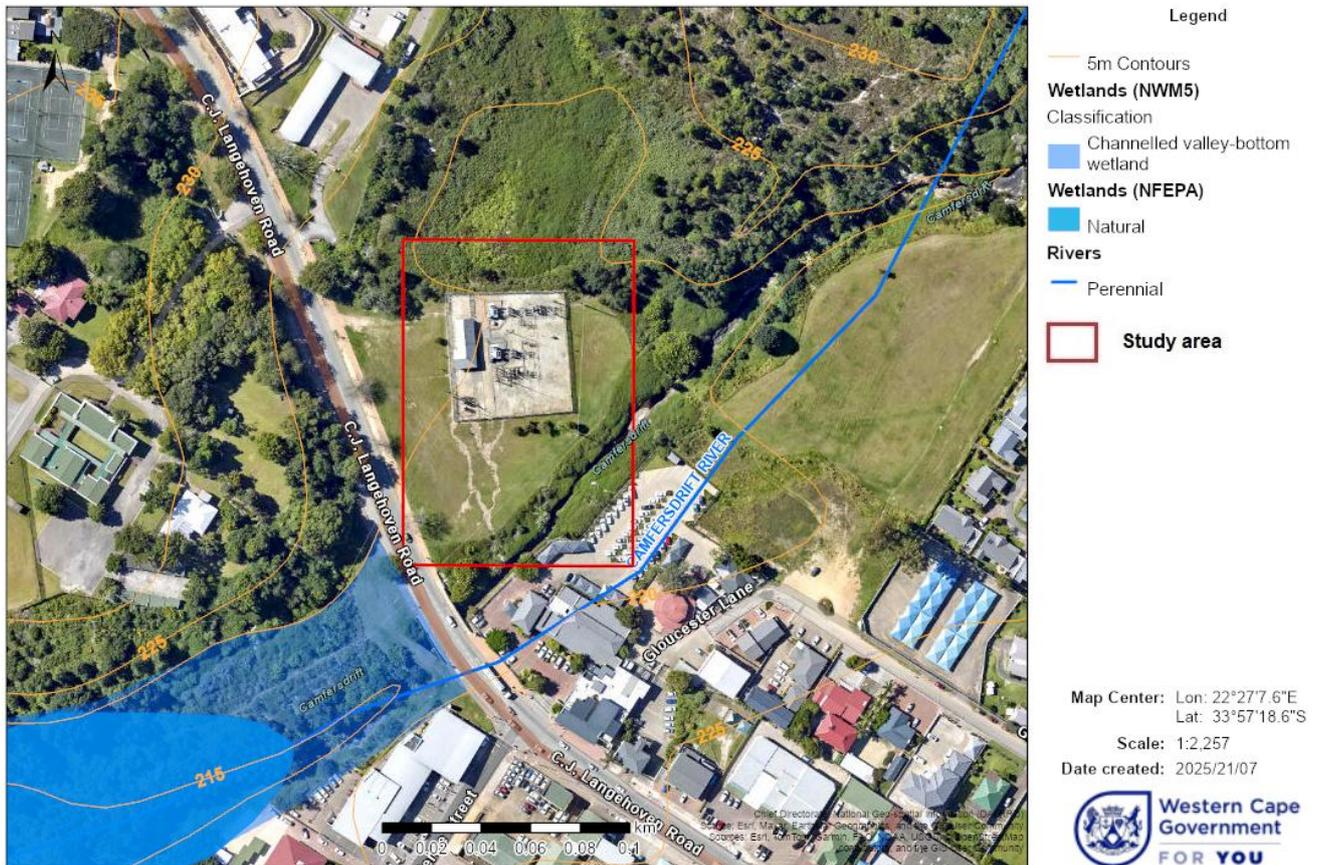
## 4. Literature Study

A desktop literature review was undertaken during the biodiversity assessment using both online resources and existing maps and reports. A summary of the most relevant information to this assessment is presented below. Some of the information was ground-truthed during the site survey.

### Location, topography & land use

The study site ( $\pm 220$  masl) is located next to the Camfersdrift River inside George. Apart from the deeply incised river channel, the terrain is relatively flat (**Figure 4-1**). The northern edge of the substation is located on top of an embankment. The site is surrounded by

open spaces, a residential area, a provincial hospital, commercial/business area and a school. Access to the site is gained from the bypassing C.J. Langenhoven Road. The Outeniqua Mountains form a dramatic backdrop 5 km away to the north. The site itself is covered by grasses/weeds, riverine habitat, an electrical substation and a few planted trees (**Figure 4-2**).



**Figure 4-1: Combined topography and hydrology map.**

## Hydrology

According to CapeFarmMapper, the only watercourse present on the site is the Camfersdrift River, which cuts across the south-eastern corner (**Figures 4-1 & 4-3**). The site survey also revealed a large impoundment on the northern side of the substation (**Figure 4-4**). Both the river and impoundment are highly modified. The riverine corridor downstream from C.J. Langenhoven Road has been mapped as a NWM5 channelled valley-bottom wetland, as well as a National Freshwater Ecosystem Priority Areas (NFEPA) wetland. The NFEPA project provides strategic spatial priorities for conserving South Africa's freshwater ecosystems and supports sustainable use of water resources. The above riverine corridor and impoundment (artificial) have been included in the Western Cape biodiversity network as aquatic (river) and terrestrial critical biodiversity areas (CBA's).



**Figure 4-2: View across the southern part of site towards commercial area east of the Camfersdrift River.**



**Figure 4-3: Camfersdrift River.**



**Figure 4-4: Impoundment on northern side of substation.**

### Climate

The mean annual rainfall for the site is 797 mm (as per Cape Farm Mapper climatic data for 1950 to 2000). The peak rainfall periods are the months of March (autumn) and October (spring), while the driest period is the winter months, i.e. bimodal rainfall regime. The study area lies in the transition zone between the winter and summer rainfall regions. Mean monthly maximum and minimum temperatures are 24.4°C and 6.6°C for January/February and July, respectively (as per Cape Farm Mapper data). The Köppen-Geiger climate classification for most of the George area is Cfb (temperate, no dry season, warm summer).

### Geology

According to the 3322 Oudtshoorn 1:250 000 geological map, the site is underlain by Kaaimans Group sediments (Saasveld Member), comprising andalusite schist, mica schist and hornfels. The Saasveld Member is about 600 m thick (Toerien, 1979). It is of Namibian age and are of the oldest sediments found in the region. It typically supports shale fynbos in these parts.

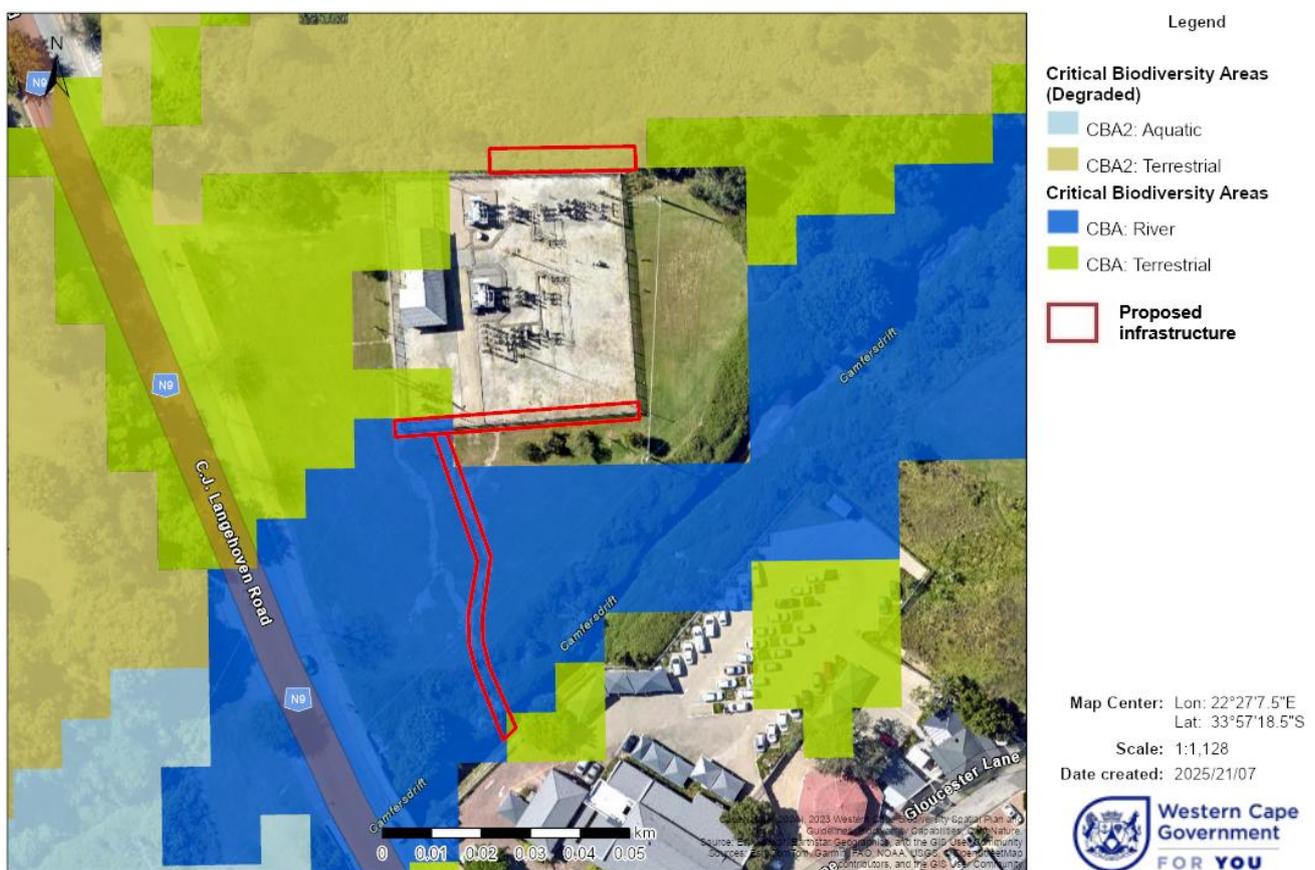
### Biodiversity Planning Context

Being located inside a highly transformed urban area, there is a notable presence of



purposes. Unfortunately, landscape fragmentation is disrupting this ‘maintenance’ requirement, often leading to localised species loss and bush encroachment or alien infestation (pers. obs.). The high rates of habitat loss place the unit at risk of collapse.

The site falls inside the George biodiversity network (**Figure 4-6**). Being located next to the Camfersdrift River, it includes aquatic and terrestrial critical biodiversity areas (CBA's), as well as a degraded critical biodiversity area (CBA2). These are all aligned with the Camfersdrift River and adjacent tracts of parkland, which act as an ecological corridor linking the Outeniqua Mountains with the coastline. Reasons for the importance of the mapped CBA's include the presence of ecological processes (FEPA river corridor) and water resource protection (Gwaing & South Eastern Coastal Belt). The closest protected area is the Van Kervel Local Authority Nature Reserve, located 1.4 km away to the northeast of the site. The Witfontein Nature Reserve is located  $\pm 3$  km away to the north.



**Figure 4-6: Extract of the Western Cape biodiversity network map.**

CBA's are defined as areas in a natural condition that are required to meet biodiversity targets, for species, ecosystems or ecological processes and infrastructure (Pool-Stanvliet, 2017). These sites are selected for meeting national targets for species, habitats and ecological processes (Pool-Stanvliet, 2017). Many of these areas support known occurrences of threatened plant species, and/or may be essential elements of designated ecological corridors. Loss of designated CBA's is therefore not recommended. ESA's, on the other hand, are supporting zones required to prevent the degradation of CBA's and Protected Areas. ESA's must be managed to minimize impact on ecological

processes and ecological infrastructure functioning, especially soil and water-related services, and to allow for faunal movement.

## 5. Results

In order to fulfil in the requirements of the terrestrial biodiversity and plant species protocols, this section describes the vegetation (terrestrial biodiversity) and plant species encountered in two subsections. In the plant species subsection specific reference is made to species of conservation concern (SCC) and protected tree species.

### Terrestrial biodiversity (vegetation)

The area around the substation is highly transformed/modified, comprising a flat grassy area leading to the Camfersdrift River, and an embankment/impoundment on the northern side of substation (**Figures 5-1 to 5-3**). Most of the indigenous species recorded are associated with the riparian habitat next to the Camfersdrift River. However, the latter is also modified by past development activities. No proper fynbos was encountered, only some riparian scrub associated with the river. The quality of the latter is also poor due to a high presence of pioneers and invasive species. The rest of the site, including the embankment, is covered by grasses and weeds. The botanical attributes of the site are presented in **Figure 5-4**.



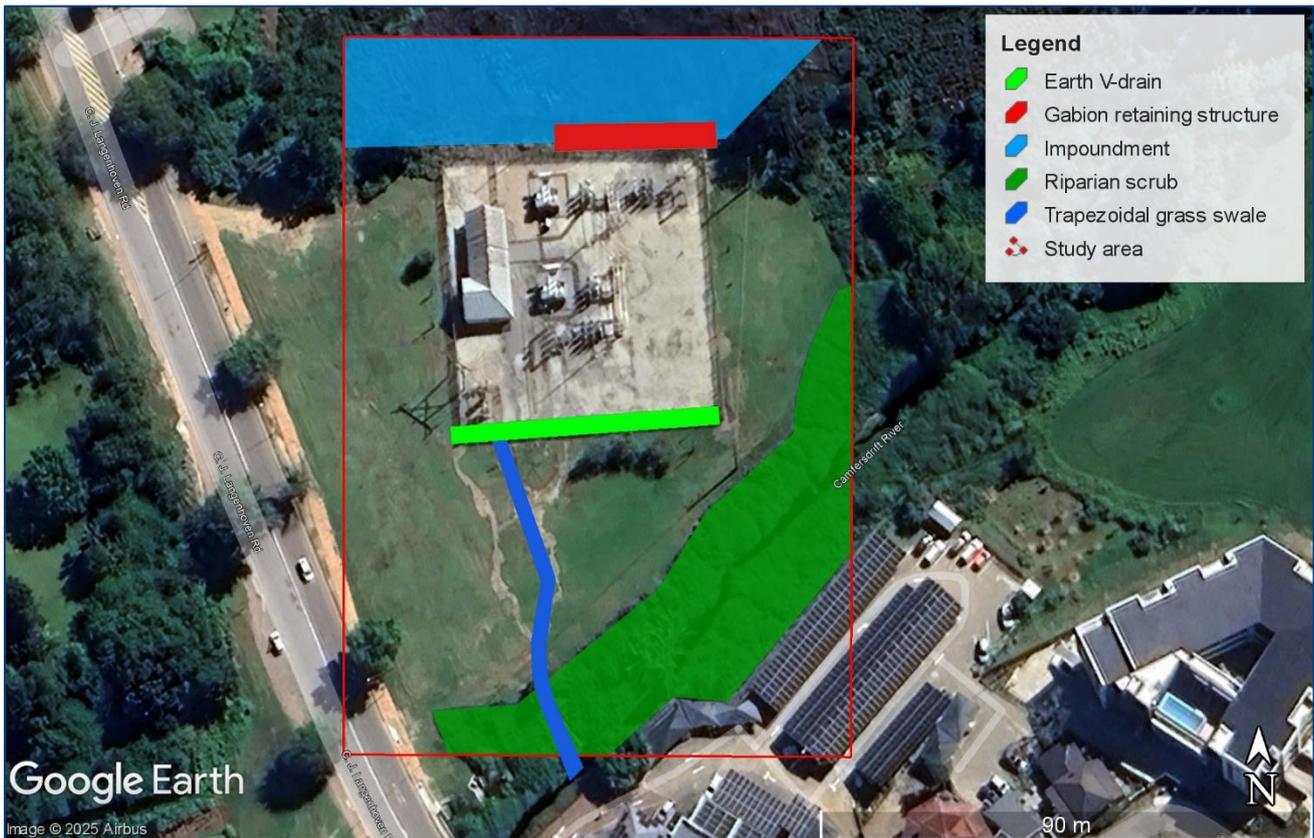
**Figure 5-1: Grassy area south of the substation and approximate route for the trapezoidal grass swale.**



**Figure 5-2: Riparian scrub next to the Camfersdrift River. The dominant shrub is *Cliffortia odorata*.**



**Figure 5-3: Embankment and impoundment on northern side of substation.**



**Figure 5-4: Botanical attributes of the site. The untoned areas are highly transformed.**

### Plant species

The following indigenous shrub species were recorded on site, namely *Helichrysum petiolare*, *H. cymosum*, *H. foetidum*, *Pseudognaphalium undulatum*, *Senecio rigidus*, *Delairea odorata*, *Nidorella ivifolia*, *Crassula sarmentosa* (introduced), *Cliffortia odorata* (dominant) and *Gomphocarpus physocarpus*. Hemicryptophytes and geophytes recorded include *Cheilanthes viridis*, *Pteridium aquilinum*, *Isolepis prolifera*, *Cynodon dactylon*, *Commelina* sp, *Zantedeschia aethiopica* and *Wachendorfia thyrsiflora*. Nearly all of them are associated with the riparian scrub next to the Camfersdrift River. Floristic association with Garden Route Shale Fynbos is poor. Only *Helichrysum cymosum* and *Pteridium aquilinum* are considered to be important taxa in the latter, which is indicative of the transformed state of the site. Also, no Species of Conservation Concern (SCC) or protected tree species, such as kasuur or milkwood, were recorded. All the recorded species are widespread and common in the region.

Alien species recorded on site include *Acacia mearnsii* (black wattle, category 2), *A. melanoxylon* (blackwood, 2), *Phytolacca octandra* (inkberry, 1b), *Solanum mauritianum* (bugweed, 1b), *Cirsium vulgare* (spear thistle, 1b), *Erigeron cf sumatrensis* (fleabane), *Datura stramonium* (olieboom, 1b), *Physalis peruviana* (gooseberry), *Verbena bonariensis* (purple top, 1b), *Arundo donax* (Spanish reed, 1b) and *Paspalum urvillei* (giant paspalum).

**Figure 5-5** shows a few of the alien species. As indicated above, the majority are Category 1b and 2 invaders. In terms of the National Environmental Management: Biodiversity Act

(NEMBA) (Act 10 of 2004) Alien and Invasive Species List (2016), category 1b invasive species require compulsory control as part of an invasive species control programme. Also, the harbouring of category 2 species, such as black wattle and blackwood, is prohibited without a permit. Black wattle, which is indicative of past disturbances, is considered a serious threat to the environment and very difficult to control.



**Figure 5-5: Alien species recorded on site, with *Acacia melanoxylon* (top left), *A. mearnsii* (top right), *Cirsium vulgare* (bottom left) and *Solanum mauritianum* (bottom right).**

### Site Ecological Importance

Due to the transformed/modified state of the site, a site ecological importance (SEI) map was not prepared. Even the riparian habitat will score a low SEI value as it should recover quickly following construction work. Please note that this assessment only considered the terrestrial biodiversity value of the affected habitats, not the aquatic or hydrological value.

## 6. Potential Impacts

### Terrestrial biodiversity (vegetation)

The site is highly transformed or degraded by past construction activities. There is also a

notable presence of invasive species. However, the Camfersdrift River and adjacent riparian zone on the southern side is worth protecting as a water resource. Two options are presented for the proposed outlet of the grass swale, namely an outlet inside the riparian zone or a flared swale to spread the water out on the edge of the riverine scrub. Due to the modified state of the riverbank, both options are acceptable, provided that neither will result in erosion or further degradation of the riverine habitat. The author cannot comment on which option is best suited in this regard. The affected vegetation is not of botanical interest but protects the riverbank from erosion. It may also have value as an ecological corridor for certain biota to move upstream or downstream, at least theoretically. The rest of the site, including the impoundment on northern side of substation, does not present any botanical constraints.

The project encroaches on the biodiversity (CBA) network. However, no permanent impact is expected on the network due to the nature of the project. One can expect a temporary impact on its functionality. The only mitigation measures for impacts in this regard would be to rehabilitate the affected area of the Camfersdrift River after construction, encourage the re-establishment of indigenous vegetation, and implement alien control. As an indirect impact, earthworks during the construction phase will provide ideal conditions for the establishment of invasive alien species. A high presence of aliens, such as black wattle, blackwood and bugweed, will exacerbate this impact. **Table 6-1** summarises the impact on terrestrial biodiversity.

**Table 6-1: Impact on terrestrial biodiversity.**

Phase	Construction Phase	Operational Phase
<b>Nature of impact(s)</b>	<ul style="list-style-type: none"> <li>- Minor clearing (damage) of riverine scrub.</li> <li>- Temporary impact on the functionality of biodiversity network.</li> <li>- Increased opportunity for alien infestation.</li> <li>- Pollution of watercourse.</li> </ul>	<ul style="list-style-type: none"> <li>- Increased alien infestation.</li> <li>- Erosion due to poor rehabilitation efforts or stormwater control.</li> </ul>
<b>Extent of impact</b>	Development footprint & immediate surroundings	Development footprint & immediate surroundings
<b>Duration</b>	Short to medium term	Long term
<b>Intensity</b>	Low	Low
<b>Probability of occurrence</b>	Medium	Medium
<b>Degree of reversibility</b>	Medium-high	High
<b>Irreplaceability of resource</b>	Medium	Medium-low
<b>Mitigatory potential</b>	High	High
<b>Significance before mitigation</b>	Low	Low
<b>Significance after mitigation</b>	Very low	Low

## Plant species

The impact on plant species, including potential SCC, is also expected to be of low significance. The species recorded are widespread and common in the region. No SCC were recorded, and none are expected to occur on site. Also, no protected tree species were detected. **Table 6-2** summarises the impact on plant species.

**Table 6-2: Impact of the project on flora & potential SCC.**

Phase	Construction Phase	Operational Phase
<b>Nature of impact(s)</b>	- Loss of indigenous flora & potential SCC	- Alien infestation & resulting displacement of indigenous flora
<b>Extent of impact</b>	Development footprint & immediate surroundings	Development footprint & immediate surroundings
<b>Duration</b>	Short to medium term	Long term
<b>Intensity</b>	Low	Low
<b>Probability of occurrence</b>	Medium	Medium
<b>Degree of reversibility</b>	Medium-high	High
<b>Irreplaceability of resource</b>	Medium	Medium-low
<b>Mitigatory potential</b>	High	High
<b>Significance before mitigation</b>	Low	Low
<b>Significance after mitigation</b>	Very low	Low

The **cumulative botanical impact** of the project is expected to be equivalent to the impact on terrestrial biodiversity and plant species described above, i.e. the continued erosion of Garden Route Shale Fynbos, the biodiversity network, as well as the loss of plant species. In this instance, the slight loss of biodiversity and resultant cumulative impact will be acceptable, due to the transformed or degraded state of the site. The affected riverine area on the southern side of site can be rehabilitated.

## 7. Recommended Mitigation Measures

The following mitigation measures are recommended to ensure that the impact on terrestrial biodiversity and plant species is minimised during the **construction phase**:

- Fence off the construction area where it encroaches on the Camfersdrift River. The watercourse and adjacent riparian zone outside the works area must not be disturbed in any way.
- Rehabilitate the watercourse and riparian zone by removing all the invasive aliens within 30 m of the construction area. Planting of a few locally indigenous species

suitable for the habitat may also be required. Remove all construction waste from the area once construction is completed.

- Allow at least 24 months for the monitoring of rehabilitation success and alien infestation on the site post construction.

Mitigation measures recommended for the **operational phase**:

- Monitor the area bordering on the new infrastructure for rehabilitation success and erosion. Where needed, rehabilitate/revegetate disturbed surfaces expediently. Erosion prevention measures may be needed on steep slopes, such as logs or netting, to slow down runoff and potential erosion. Mulching and seeding with indigenous fynbos seed may also be needed.
- As a long-term maintenance requirement, keep the site and immediate surrounding area clear of invasive aliens, focussing on species such as black wattle, blackwood, inkberry, bugweed, spear thistle and Spanish reed. These species are category 1b and 2 invaders that require compulsory control as part of an invasive species control programme. Please note that it is a legal requirement for landowners to clear alien vegetation on their land.

## 8. Conclusion & Recommendations

This report sets out the results from a desktop study, as well as a field survey conducted on 18 July 2025, to ascertain the terrestrial biodiversity and plant species constraints and possible impacts associated with proposed flood damage repairs to the Langenhoven substation in George. The site is situated next to the Camfersdrift River on Remainder of Erf 464 and Erf 20781.

The site is highly transformed or degraded by past construction activities. There is also a notable presence of invasive species. However, the Camfersdrift River and adjacent riparian zone on the southern side is worth protecting as a water resource. Two options are presented for the proposed outlet of the grass swale, namely an outlet inside the riparian zone or a flared swale on the edge of the riverine scrub. Due to the modified state of the riverbank, both options are acceptable, provided that neither will result in erosion or further degradation of the riverine habitat. No SCC were recorded, and none are expected to occur on site. Given the transformed or degraded state of the site, the impact on terrestrial biodiversity and plant species is of low significance.

It is therefore recommended that the proposed project be considered for approval, but subject to the proposed mitigation measures listed above.

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## Annexure 1: Impact Assessment Methodology

Each issue that is identified consists of components that on their own or in combination with each other give rise to potential impacts, either positive or negative, from the project onto the environment or from the environment onto the project. In the EIA the significance of the potential impacts is considered before and after identified mitigation is implemented, for direct, indirect, and cumulative impacts, in the short and long term.

A description of the nature of the impact, any specific legal requirements and the stage (construction/decommissioning or operation) were given. The following criteria will be used to evaluate the significance of each issue that was identified:

**Nature:** This is an appraisal of the type of effect the activity is likely to have on the affected environment. The description includes what is being affected and how. The nature of the impact will be classified as positive or negative, and direct or indirect.

❖ **Extent and location:** This indicates the spatial area that may be affected (**Table 1**).

**Table 1: Geographical extent of impact**

Rating	Extent	Description
1	Site	Impacted area is only at the site – the actual extent of the activity.
2	Local	Impacted area is limited to the site and its immediate surrounding area
3	Regional	Impacted area extends to the surrounding area, the immediate and the neighbouring properties.
4	Provincial	Impact considered of provincial importance
5	National	Impact considered of national importance – will affect entire country.

❖ **Duration:** This measures the lifetime of the impact (**Table 2**).

**Table 2: Duration of Impact**

Rating	Duration	Description
1	Short term	0–3 years, or length of construction period
2	Medium term	3–10 years
3	Long term	>10 years, or entire operational life of project.
4	Permanent – mitigated	Mitigation measures of natural process will reduce impact – impact will remain after operational life of project.
5	Permanent – No mitigation	No mitigation measures of natural process will reduce the impact after implementation – impact will remain after operational life of project.

❖ **Intensity/severity:** This is the degree to which the project affects or changes the environment; it includes a measure of the reversibility of impacts (**Table 3**).

**Table 3: Intensity of Impact**

Rating	Intensity	Description
1	Negligible	Change is slight, often not noticeable, natural functioning of environment not affected.
2	Low	Natural functioning of environment is minimally affected. Natural processes can be reversed to their original state.
3	Medium	Environment remarkably altered, still functions, if in modified way. Negative impacts cannot be fully reversed.
4	High	Natural functions and processes disturbed – potentially ceasing to function temporarily.
5	Very high	Natural functions and processes permanently cease, and valued, important, sensitive or vulnerable systems or communities are substantially affected. Negative impacts cannot be reversed.

- ❖ **Potential for irreplaceable loss of resources:** This is the degree to which the project will cause loss of resources that are irreplaceable (**Table 4**).

**Table 4: Potential for irreplaceable loss of resources.**

Rating	Potential for irreplaceable loss	Description
1	Low	No irreplaceable natural resources will be impacted.
3	Medium	Natural resources can be replaced, with effort.
5	High	There is no potential for replacing a particular vulnerable resource that will be impacted.

- ❖ **Probability:** This is the likelihood or the chances that the impact will occur (**Table 5**).

**Table 5: Probability of Impact**

Rating	Probability	Description
1	Improbable	Under normal conditions, no impacts expected.
2	Low	The probability of the impact to occur is low due to its design or historic experience.
3	Medium	There is a distinct probability of the impact occurring.
4	High	It is most likely that the impact will occur.
5	Definite	The impact will occur regardless of any prevention measures.

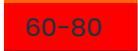
- ❖ **Confidence:** This is the level of knowledge or information available, the specialist had in his/her judgement (**Table 6**).

**Table 6: Confidence in level of knowledge or information**

Rating	Confidence	Description
	Low	Judgement based on intuition, not knowledge/information.
	Medium	Common sense and general knowledge inform decision.
	High	Scientific/proven information informs decision.

- ❖ **Consequence:** This is calculated as extent + duration + intensity + potential impact on irreplaceable resources.
- ❖ **Significance:** The significance will be rated by combining the consequence of the impact and the probability of occurrence (i.e. consequence x probability = significance). The maximum value which can be obtained is 100 significance points (**Table 7**).

**Table 7: Significance of issues (based on parameters)**

Rating	Significance	Description
 1-14	Very low	No action required.
 15-29	Low	Impacts are within the acceptable range.
 30-44	Medium-low	Impacts are within the acceptable range but should be mitigated to lower significance levels wherever possible.
 45-59	Medium-high	Impacts are important and require attention; mitigation is required to reduce the negative impacts to acceptable levels.
 60-80	High	Impacts are of great importance, mitigation is crucial.
 81-100	Very high	Impacts are unacceptable.

- ❖ **Cumulative Impacts:** This refers to the combined, incremental effects of the impact. The possible cumulative impacts will also be considered.

HERBICIDES FOR ALIEN PLANT CONTROL

HERBICIDES FOR ALIEN PLANT CONTROL					PPE			Medical Biomonitoring		Frequency and Duration		Environmental monitoring
Chemical group	MOA	Examples	Hazard Group	Hazard Criterion	Type	Pictogram	Classification	Blood	Urine	Blood	Urine	Environmental monitoring
1	Imidazolinones	Group 2: ALS: AHAS inhibitors	2	<p><b>Acute toxicity to mammals and birds</b>  <b>GHS07 WARNING</b></p>  <p>H319 (causes serious eye irritation)                      H335 (Respiratory irritant)                      H315 (causes skin 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 filters for respirators</p> <p>7.Apron/ Knapjack</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                      EN 140,                      EN149, EN 143:200</p> <p>R95, R99, R100</p>	N/A	<p>5cc fresh urine sample refrigerated. Tested using ELIZA dipstick test</p>	N/A	<p>1.All workers need to be tested before they start working.                      2.If the worker sprays 8 hours per day for 5 days per week, an additional test is needed every 2 years.                      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>  <b>GHS09 WARNING</b></p>								<p>Hazard criterion 7 and 8 are linked to environmental risks</p>

					 H412 (harmful to aquatic life with long lasting effects)							
2	Sulfonylureas	Group 2: ALS: AHAS inhibitors	Metsulfuron-methyl (Brush-off, Climax, Forester, Extreme, Nikanor)	7	Acute toxicity to aquatic organisms GHS09 WARNING  H400 (Very toxic to aquatic life)							
				2	Acute toxicity to mammals and birds GHS07 WARNING  H315 (causes skin irritation) H335 (Respiratory tract irritant) H319 (Causes serious eye irritation)	1. Chemically resistant nitrile gloves  2. Type 3 and Type 4 protective clothing   3. Safety boots  4. Face & Eye protection  5. Half-face respirators  6. Particulate air filters for respirators  7. Apron/ Knapjack  8. Long-sleeved shirts	EN 374:2016  EN 14605:2005  EN 345: 1993  EN ISO 20345  EN 166:2001 EN 140, EN149, EN 143:200  R95, R99, R100	N/A	5cc fresh urine sample refrigerated. Tested using ELIZA dipstick test	N/A	1. All workers need to be tested before they start working. 2. If the worker sprays 8 hours per day for 5 days per week, an additional test is needed every 2 years. 3. All workers need to be tested once they leave the programme	

Carboxylic acids	Group 4: Synthetic auxins	Picloram (Access, Browser, Scrubber)	2	<p>Acute toxicity to mammals and birds GHS07 WARNING</p>  <p>H302 (harmful if swallowed) H312 (harmful in contact with skin) H319 (Causes serious eye irritation) H332 (harmful if inhaled)</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 filters for respirators</p> <p>7.Apron/ Knapjack</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 EN 140, EN149, EN 143:200</p> <p>R95, R99, R100</p>		<p>5cc fresh urine sample refrigerated. Tested using ELIZA dipstick test</p>	<p>1.All workers need to be tested before they start working. 2.If the worker sprays 8 hours per day for 5 days per week, an additional test is needed every year. 3. All workers need to be tested once they leave they programme</p>			
			3	<p>Carcinogenicity GHS07 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. 2.If the worker sprays 8 hours per</p>				



					8. Long-sleeved shirts							
				7	Acute toxicity to aquatic organisms GHS09 WARNING  H400 (Very toxic to aquatic life)							
				8	Persistence in soil/water and soil absorption potential & bio magnification & bioaccumulation GHS09 WARNING  H410 (Very toxic to aquatic life with long lasting effects) H412 (harmful to aquatic life with long lasting effects)							
Phenoxy acids	Group 4: Synthetic auxins	Alkylchlorophenoxy (2,4D)	2	Acute toxicity to mammals and birds GHS07 WARNING  H302 (Harmful if swallowed) H317 ( May cause an allergic reaction) H318 (causes serious eye damage)	1.Chemically resistant nitrile gloves  2.Type 3 and Type 4 protective clothing    3.Safety boots  4.Face & Eye protection 	EN 374:2016  EN 14605:2005  EN 345: 1993  EN ISO 20345	5cc fresh urine sample refrigerated. Tested using ELIZA dipstick test	1.All workers need to be tested before they start working. 2.If the worker sprays 8 hours per day for 5 days per week, an additional test is needed every year. 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>	 	<p>EN 166:2001 EN 140, EN149, EN 143:200</p> <p>R95, R99, R100</p>				
			3	<p>Carcinogenicity GHS07 WARNING</p>  <p>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 filters for respirators</p> <p>7. Apron/ Knapjack</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 EN 140, EN149, EN 143:200</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. 2. If the worker sprays 8 hours per day for 5 days per week, an additional test needs to be done every 2 years.. 3. All workers need to be tested once they leave the programme</p>		

				5	<p>Developmental &amp; Reproductive toxicity GHS08 DANGER</p>  <p>H361 (Suspected of damaging fertility or the unborn child)</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>8. Long-sleeved shirts</p>	      	<p>EN ISO 20345</p> <p>EN 166:2001</p> <p>EN140 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. 2. If the worker sprays 8 hours per day for 5 days per week, an additional test needs to be done every 2 years.. 3. All workers need to be tested once they leave the programme</p>		
				8	<p>Persistence in soil/water and soil absorption potential &amp; bio magnification &amp; bioaccumulation GHS09 WARNING</p>							

					 H412 (Harmful to aquatic life with long lasting effects)							
			Pyridine compounds as butoxy ethyl esters (Garlon 4, Garlon max, Nuvogon, Triclon, Viroaxe, Triclomag, Turbador)	2	Acute toxicity to mammals and birds GHS07 WARNING  H302 (Harmful if swallowed) H317 ( May cause an allergic reaction) H319 (causes serious eye irritation) H373 (May cause damage to organs – heart, liver, kidneys)	1.Chemically resistant nitrile gloves 2.Type 3 and Type 4 protective clothing 3.Safety boots 4.Face & Eye protection 5.Half-face respirators 6.Particulate air filters for respirators 7.Apron/ Knapjack	     	EN 374:2016 EN 14605:2005 EN 345: 1993 EN ISO 20345 EN 166:2001 EN 140, EN149, EN 143:200 R95, R99, R100	5cc fresh urine sample refrigerated. Tested using ELIZA dipstick test	1.All workers need to be tested before they start working. 2.If the worker sprays 8 hours per day for 5 days per week, an additional test is needed every 2 years. 3. All workers need to be tested once they leave they programme		
				5	Developmental and Reproductive toxicity GHS08 DANGER  H360 (May damage fertility or the unborn child)	1.Chemically resistant nitrile gloves 2.Type 3 and Type 4 protective clothing	 	EN ISO 20345 EN 166:2001 EN140	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.If the worker sprays 8 hours per		

						 Type 5 protective clothing  3.Safety boots 4.Face & Eye protection  5.Half-face respirators 6.Particulate air filters for respirators  7.Apron/ Knapjack 8. Long-sleeved shirts 	EN 149  EN 143:2000  R95, R99, R100			day for 5 days per week, an additional test needs to be done every 5 years.. 3. All workers need to be tested once they leave the programme		
			8	Persistence in soil/water and soil absorption potential & bio magnification & bioaccumulation GHS09 WARNING  H411 (Toxic to aquatic life with long lasting effects)								
Quinoline carboxylic acid	Group 4: Synthetic auxins	Pyridine compounds such As Triclopyr as amine salts	2	Acute toxicity to mammals and birds GHS07 WARNING 	1.Chemically resistant nitrile gloves 	EN 374:2016		5cc fresh urine sample refrigerated. Tested		1.All workers need to be tested before they start working.		

		(Lumberjack, Timbrel)		 H302 (Harmful if swallowed) H317 ( May cause an allergic reaction) H318 (Causes serious eye damage) H315 (Causes skin irritation) H335 (may cause respiratory irritation) H336 (may cause drowsiness or dizziness) H360 (may damage fertility or the unborn child)	2.Type 3 and Type 4 protective clothing   3.Safety boots 4.Face & Eye protection  5.Half-face respirators  6.Particulate air filters for respirators  7.Apron/ Knapjack 	EN 14605:2005  EN 345: 1993  EN ISO 20345  EN 166:2001 EN 140, EN149, EN 143:200  R95, R99, R100	using ELIZA dipstick test	2.If the worker sprays 8 hours per day for 5 days per week, an additional test is needed every 2 years. 3. All workers need to be tested once they leave they programme		
			8	Persistence in soil/water and soil absorption potential & bio magnification & bioaccumulation GHS09 WARNING  H411 (Toxic to aquatic life with long lasting effects)						
Quinoline carboxylic acid	Group 4: Synthetic auxins	Pyridine compounds such as fluroxypyr (Tomahawk,	8	Persistence in soil/water and soil absorption potential & bio magnification & bioaccumulation						

			Starane, Voloxypr)		GHS09 WARNING  H411 (Toxic to aquatic life with long lasting effects)							
Quinoline carboxylic acid	Group 4: Synthetic auxins	Pyridine compounds such as Aminopyralid s ( Sendero)	2	Acute toxicity to mammals and birds GHS07 WARNING  H315 (Causes skin irritation) H318 (causes serious eye damage) H319 (Causes serious eye irritation) H335 (may cause respiratory irritation)	1.Chemically resistant nitrile gloves  2.Type 3 and Type 4 protective clothing    3.Safety boots  4.Face & Eye protection  5.Half-face respirators  6.Particulate air filters for respirators  7.Apron/ Knapjack 	EN 374:2016  EN 14605:2005  EN 345: 1993  EN ISO 20345  EN 166:2001 EN 140, EN149, EN 143:200  R95, R99, R100	5cc fresh urine sample refrigerated. Tested using ELIZA dipstick test	1.All workers need to be tested before they start working. 2.If the worker sprays 8 hours per day for 5 days per week, an additional test is needed every 2 years. 3. All workers need to be tested once they leave they programme				
			7	Acute toxicity to aquatic organisms GHS09 WARNING  H400 (Very toxic to aquatic life)								

				8	<p>Persistence in soil/water and soil absorption potential &amp; bio magnification &amp; bioaccumulation GHS09 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 as Fluroxypyr (Plenum, Gladiator)	2	<p>Acute toxicity to mammals and birds GHS07 WARNING</p>  <p>H302 (harmful if swallowed) H312 (harmful in contact with skin) H319 (Causes serious eye irritation) H332 (harmful if inhaled)</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 filters for respirators</p>  <p>7. Apron/ Knapjack</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 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.</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>				
			3	<p>Carcinogenicity GHS07 WARNING</p>	<p>1. Chemically resistant nitrile gloves</p>	<p>EN 374:2016</p>	20cc fresh blood sample.	1. All workers need to be				

					 H335 (May cause respiratory irritation)	2.Type 3 and Type 4 protective clothing  3.Safety boots 4.Face & Eye protection 5.Half-face respirators 6.Particulate air filters for respirators 7.Apron/ Knapjack	     	EN 14605:2005  EN 345: 1993  EN ISO 20345  EN 166:2001 EN 140, EN149, EN 143:200  R95, R99, R100	AChE tests done with Test-Mate model 400 device	tested before they start working. 2.If the worker sprays 8 hours per day for 5 days per week, an additional test needs to be done every 2 years.. 3. All workers need to be tested once they leave the programme		
			6	Endocrine Disrupting Chemicals (EDC) GHS08 DANGER  H370 (causes damage to organs – lungs)	1.Chemically resistant nitrile gloves 2.Type 3 and Type 4 protective clothing  Type 5 protective clothing 	  	EN ISO 20345  EN 166:2001  EN140 EN 149  EN 143:2000	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.If the worker sprays 8 hours per day for 5 days per week, an additional test needs to be done			

					<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>	  	R95, R99, R100			every 2 years.. 3. All workers need to be tested once they leave the programme		
			7	<p>Acute toxicity to aquatic organisms GHS09 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 GHS09 WARNING</p>  <p>H410 (Very toxic to aquatic life with long lasting effects) H412 (harmful to aquatic life with long lasting effects)</p>								

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 GHS07 WARNING</p>  <p>H302 (Harmful if swallowed) H317 ( May cause an allergic reaction) H319 (causes serious eye irritation) H373 (May cause damage to organs – heart, liver, kidneys)</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 filters for 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 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.</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 they programme</p>	
			5	<p>Developmental and Reproductive toxicity GHS08 DANGER</p>  <p>H360 (May damage fertility or the unborn child)</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>EN140 EN 149</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</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>EN 143:2000</p> <p>R95, R99, R100</p>				<p>week, an additional test needs to be done every 5 years..</p> <p>3. All workers need to be tested once they leave the programme</p>
			8	<p>Persistence in soil/water and soil absorption potential &amp; bio magnification &amp; bioaccumulation GHS09 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	2	<p>Acute toxicity to mammals and birds GHS07 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>				

			such Triclopyr as trimethylamine salt (Kaput gel)		<p>H302 (harmful if swallowed)  H312 (harmful in contact with skin)  H315 (causes skin irritation)  H317(May cause allergic skin reaction)  H319 (Causes serious eye irritation)  H332 (harmful if inhaled)  H335 (May cause respiratory irritation)  H336 (may cause drowsiness or dizziness)</p>	<p>protective clothing      3.Safety boots  4.Face &amp; Eye protection    5.Half-face respirators    6.Particulate air filters for respirators    7.Apron/ Knapjack  </p>	<p>EN 345: 1993  EN ISO 20345  EN 166:2001  EN 140, EN149, EN 143:200  R95, R99, R100</p>				
				3	<p>Carcinogenicity GHS07 WARNING    H335 (May cause respiratory irritation)</p>	<p>1.Chemically resistant nitrile gloves    2.Type 3 and Type 4 protective clothing      3.Safety boots  4.Face &amp; Eye protection    5.Half-face respirators  </p>	<p>EN 374:2016  EN 14605:2005  EN 345: 1993  EN ISO 20345  EN 166:2001</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.  2.If the worker sprays 8 hours per day for 5 days per week, an additional test needs to be done every 2 years..  3. All workers need to be</p>		

					6.Particulate air filters for respirators 7.Apron/ Knapjack	 	EN 140, EN149, EN 143:200  R95, R99, R100		tested once they leave the programme		
			5	Developmental and Reproductive toxicity GHS08 DANGER  H360 (May damage fertility or the unborn child)	1.Chemically resistant nitrile gloves 2.Type 3 and Type 4 protective clothing Type 5 protective clothing 3.Safety boots 4.Face & Eye protection 5.Half-face respirators 6.Particulate air filters for respirators 7.Apron/ Knapjack 8. Long-sleeved shirts	      	EN ISO 20345  EN 166:2001  EN140 EN 149  EN 143:2000  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. 2.If the worker sprays 8 hours per day for 5 days per week, an additional test needs to be done every 5 years.. 3. All workers need to be tested once they leave the programme		

				6	<p>Endocrine Disrupting Chemicals (EDC) 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> <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>EN ISO 20345</p> <p>EN 166:2001</p> <p>EN140 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. 2. If the worker sprays 8 hours per day for 5 days per week, an additional test needs to be done every 2 years.. 3. All workers need to be tested once they leave the programme</p>		
				7	<p>Acute toxicity to aquatic organisms GHS09 WARNING</p>							

					 H400 (Very toxic to aquatic life)							
				8	Persistence in soil/water and soil absorption potential & bio magnification & bioaccumulation GHS09 WARNING  H410 (Very toxic to aquatic life with long lasting effects) H411 (Toxic to aquatic life with long lasting effects) H412 (harmful to aquatic life with long lasting effects)							
Combinations	Group 4: Synthetic auxins	Pyridine compounds such as amine salt + Pyridine compounds such as Clopyralid (Confront, Astra)	2	Acute toxicity to mammals and birds GHS07 WARNING  H302 (Harmful if swallowed) H315 (Causes skin irritation) H317 ( May cause an allergic reaction) H318 (causes serious eye damage) H319 (causes serious eye irritation) H335 (May cause respiratory irritation) H373 (May cause damage to organs)	1.Chemically resistant nitrile gloves 2.Type 3 and Type 4 protective clothing 3.Safety boots 4.Face & Eye protection 5.Half-face respirators 6.Particulate air filters for respirators	    	EN 374:2016 EN 14605:2005 EN 345: 1993 EN ISO 20345 EN 166:2001 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. 2.If the worker sprays 8 hours per day for 5 days per week, an additional test is needed every 2 years. 3. All workers need to be tested once they leave they programme			

					- heart, liver, kidneys)	7.Apron/ Knapjack			R95, R99, R100				
			5	Developmental and Reproductive toxicity GHS08 DANGER  H360 (May damage fertility or the unborn child)	1.Chemically resistant nitrile gloves 2.Type 3 and Type 4 protective clothing  Type 5 protective clothing  3.Safety boots 4.Face & Eye protection 5.Half-face respirators 6.Particulate air filters for respirators 7.Apron/ Knapjack 8. Long-sleeved shirts	       	EN ISO 20345  EN 166:2001  EN140 EN 149  EN 143:2000  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. 2.If the worker sprays 8 hours per day for 5 days per week, an additional test needs to be done every 5 years.. 3. All workers need to be tested once they leave the programme				

				8	<p>Persistence in soil/water and soil absorption potential &amp; bio magnification &amp; bioaccumulation GHS09 WARNING</p>  <p>H411 (Toxic to aquatic life with long lasting effects)</p>							
Combinations	Group 4: Synthetic auxins	Pyridine compounds such as Triclopyr as triethyl ammonium + Aminopyralid (Confront super)	2	<p>Acute toxicity to mammals and birds GHS07 WARNING</p>  <p>H317 (May cause an allergic skin reaction) H318 (Causes serious eye damage) H319 (Causes serious eye irritation) H315 (Causes skin irritation) H335 (may cause respiratory irritation) 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>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 374:2016</p> <p>EN 14605:2005</p> <p>EN 345: 1993</p> <p>EN ISO 20345</p> <p>EN 166:2001 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. 2.If the worker sprays 8 hours per day for 5 days per week, an additional test is needed every 2 years. 3. All workers need to be tested once they leave they programme</p>				

				5	<p>Developmental and Reproductive toxicity GHS08 DANGER</p>  <p>H360 (may damage fertility or the unborn child)</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>8. Long-sleeved shirts</p>	      	<p>EN ISO 20345</p> <p>EN 166:2001</p> <p>EN140 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. 2. If the worker sprays 8 hours per day for 5 days per week, an additional test needs to be done every 5 years.. 3. All workers need to be tested once they leave the programme</p>			
				7	<p>Acute toxicity to aquatic organisms GHS09 WARNING</p> 								

					H400 (Very toxic to aquatic life)								
				8	<p>Persistence in soil/water and soil absorption potential &amp; bio magnification &amp; bioaccumulation GHS09 WARNING</p>  <p>H410 (Very toxic to aquatic life with long lasting effects) H11 (Toxic to aquatic life with long lasting effects)</p>								
Combinations	Group 4: Synthetic auxins	Pyridine compounds such as Triclopyr as Butoxy ethyl ester + Aminopyralid (Garlon Max)	2	<p>Acute toxicity to mammals and birds GHS07 WARNING</p>  <p>H302 (Harmful if swallowed) H315 (causes skin irritation) H317 ( May cause an allergic reaction) H318 (causes serious eye damage) H319 (causes serious eye irritation) H335 (may cause respiratory irritation) H336 (may cause drowsiness or dizziness) H373 (May cause damage to organs)</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 filters for respirators</p>  <p>7.Apron/ Knapjack</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 EN 140, EN149, EN 143:200</p>	5cc fresh urine sample refrigerated. Tested using ELIZA dipstick test	<p>1.All workers need to be tested before they start working. 2.If the worker sprays 8 hours per day for 5 days per week, an additional test is needed every 2 years. 3. All workers need to be tested once they leave they programme</p>					

					- heart, liver, kidneys)			R95, R99, R100					
				5	<p>Developmental and Reproductive toxicity GHS08 DANGER</p>  <p>H360 (May damage fertility or the unborn child)</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>8. Long-sleeved shirts</p>	      	<p>EN ISO 20345</p> <p>EN 166:2001</p> <p>EN140 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. 2. If the worker sprays 8 hours per day for 5 days per week, an additional test needs to be done every 5 years.. 3. All workers need to be tested once they leave the programme</p>			

				8	<p>Persistence in soil/water and soil absorption potential &amp; bio magnification &amp; bioaccumulation GHS09 WARNING</p>  <p>H410 (Very toxic to aquatic life with long lasting effects)</p>							
Uracils	Group 5: Photosynthetic inhibitors at Photosystem II, Site A.	Bromacil (Bushwacker)	2	<p>Acute toxicity to mammals and birds GHS07 WARNING</p>  <p>H302 (Harmful if swallowed) H315 (Causes skin irritation) H319 (Causes serious eye irritation) 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 filters for respirators</p> <p>7. Apron/ Knapjack</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 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.</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>			

				7	Acute toxicity to aquatic organisms GHS09 WARNING  H400 (Very toxic to aquatic life)							
				8	Persistence in soil/water and soil absorption potential & bio magnification & bioaccumulation GHS09 WARNING  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 GHS07 WARNING  H302 (Harmful if swallowed)	<ul style="list-style-type: none"> <li>1. Chemically resistant nitrile gloves</li> <li>2. Type 3 and Type 4 protective clothing</li> <li>3. Safety boots</li> <li>4. Face &amp; Eye protection</li> <li>5. Half-face respirators</li> <li>6. Particulate air filters for respirators</li> <li>7. Apron/ Knapjack</li> </ul>	     	<p>EN 374:2016</p> <p>EN 14605:2005</p> <p>EN 345: 1993</p> <p>EN ISO 20345</p> <p>EN 166:2001 EN 140, EN149, EN 143:200</p>	5cc fresh urine sample refrigerated. Tested using ELIZA dipstick test	<ul style="list-style-type: none"> <li>1. All workers need to be tested before they start working.</li> <li>2. If the worker sprays 8 hours per day for 5 days per week, an additional test is needed every 2 years.</li> <li>3. All workers need to be tested once they leave the programme</li> </ul>			

								R95, R99, R100				
				7	Acute toxicity to aquatic organisms GHS09 WARNING  H400 (Very toxic to aquatic life)							
				8	Persistence in soil/water and soil absorption potential & bio magnification & bioaccumulation GHS09 WARNING  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 GHS07 WARNING  H302 (Harmful if swallowed) H315 (Causes skin irritation) H319 (Causes serious eye irritation) H335 (may cause respiratory irritation)	1.Chemically resistant nitrile gloves 2.Type 3 and Type 4 protective clothing 3.Safety boots 4.Face & Eye protection 5.Half-face respirators		EN 374:2016 EN 14605:2005 EN 345: 1993 EN ISO 20345 EN 166:2001	5cc fresh urine sample refrigerated. Tested using ELIZA dipstick test	1.All workers need to be tested before they start working. 2.If the worker sprays 8 hours per day for 5 days per week, an additional test is needed every 2 years. 3. All workers need to be tested once they leave the programme			

					6.Particulate air filters for respirators 	EN 140, EN149, EN 143:200						
					7.Apron/ Knapjack 	R95, R99, R100						
				7	Acute toxicity to aquatic organisms GHS09 WARNING  H400 (Very toxic to aquatic life)							
				8	Persistence in soil/water and soil absorption potential & bio magnification & bioaccumulation GHS09 WARNING  H410 (Very toxic to aquatic life with long lasting effects)							
Glycines	Group 9: Inhibitors of EPSP synthesis.	Phosphonoglycines such as Glyphosate isopropylamine salts (Seismic, tangleweed) POE-T free	2	Acute toxicity to mammals and birds GHS07 WARNING  H318 (Causes serious eye damage)	1.Chemically resistant nitrile gloves  2.Type 3 and Type 4 protective clothing  3.Safety boots 	EN 374:2016  EN 14605:2005  EN 345: 1993  EN ISO 20345	5cc fresh urine sample refrigerated. Tested using ELIZA dipstick test	1.All workers need to be tested before they start working. 2.If the worker sprays 8 hours per day for 5 days per week, an additional test is needed every 2 years. 3. All workers need to be tested once				

						<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 166:2001 EN 140, EN149, EN 143:200</p> <p>R95, R99, R100</p>				they leave they programme
Glycines	Group 9: Inhibitors of EPSP synthesis.	Phosphonoglycines such as Glyphosate sodium salts (Kilo max)	2	<p>Acute toxicity to mammals and birds GHS07 WARNING </p> <p>H318 (Causes serious eye damage)</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 filters for respirators </p> <p>7.Apron/ Knapjack </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 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.</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 they programme</p>	

	Glycines	Group 9: Inhibitors of EPSP synthesis.	Phosphonoglycines such as glyphosate (all GBH's containing POE-T such as Roundup etc)	2	<p>Acute toxicity to mammals and birds GHS07 WARNING</p>  <p>H318 (Causes serious eye damage)</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 filters for respirators</p> <p>7. Apron/ Knapjack</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 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.</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>	
				3	<p>Carcinogenicity GHS07 WARNING</p>  <p>H335 (May cause respiratory irritation) 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>EN 374:2016</p> <p>EN 14605:2005</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</p>		

					<p>H315 (Causes skin irritation) H319 (causes serious eye irritation)</p> 	<p>3.Safety boots 4.Face &amp; Eye protection 5.Half-face respirators 6.Particulate air filters for respirators 7.Apron/ Knapjack</p>    	<p>EN 345: 1993 EN ISO 20345 EN 166:2001 EN 140, EN149, EN 143:200 R95, R99, R100</p>		<p>day for 5 days per week, an additional test needs to be done every 2 years.. 3. All workers need to be tested once they leave the programme</p>		
			8	<p>Persistence in soil/water and soil absorption potential &amp; bio magnification &amp; bioaccumulation GHS09 WARNING</p>  <p>H411 (Toxic to aquatic life with long lasting effects)</p>							
Organoarsenicals	Group 17: Unknown	Monosodium methylarsonate (MSMA)	2	<p>Acute toxicity to mammals and birds GHS07 WARNING</p>  <p>H302 (Harmful if swallowed) H315 (causes skin irritation) H319 (Causes serious eye irritation)</p> 	<p>1.Chemically resistant nitrile gloves 2.Type 3 and Type 4 protective clothing</p>   	<p>EN 374:2016 EN 14605:2005 EN 345: 1993</p>		<p>5cc fresh urine sample refrigerated. Tested using ELIZA dipstick test</p>	<p>1.All workers need to be tested before they start working. 2.If the worker sprays 8 hours per day for 5 days per week, an additional test is needed every 2 years.</p>		

					H332 (Harmful if inhaled)	<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 EN 140, EN149, EN 143:200</p> <p>R95, R99, R100</p>				3. All workers need to be tested once they leave they programme
			3	<p>Carcinogenicity GHS07 WARNING</p>  <p>H335 (May cause respiratory irritation) 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>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 374:2016</p> <p>EN 14605:2005</p> <p>EN 345: 1993</p> <p>EN ISO 20345</p> <p>EN 166:2001 EN 140, EN149, EN 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 programme</p>			

							R95, R99, R100					
				6	<p>Endocrine Disrupting Chemicals (EDC) GHS08 DANGER</p>  <p>H371 (may cause damage to organs (kidneys and liver)) H372 (causes damage to organs through prolonged effect (liver and kidneys))</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>8. Long-sleeved shirts</p>	      	<p>EN ISO 20345</p> <p>EN 166:2001</p> <p>EN140 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. 2.If the worker sprays 8 hours per day for 5 days per week, an additional test needs to be done every 2 years.. 3. All workers need to be tested once they leave the programme</p>		

Bipyridyliums	Group 22: Cell membrane disruptors	Diquat dibromide (Scuba, Midstream) & Paraquat (Gramoxone)	2	<p>Acute toxicity to mammals and birds</p> <p>GHS06 DANGER</p>  <p>H301( Toxic if swallowed) H311(Toxic in contact with skin) H330(Fatal if inhaled)</p> <p>GHS07 WARNING</p>  <p>H315(Causes skin irritation) H319(causes serious eye irritation) H335(May cause respiratory irritation) H372(Causes damage to organs)</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 filters for respirators</p> <p>7.Apron/ Knapjack</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 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.</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>		
			7	<p>Acute toxicity to aquatic organisms</p>  <p>H400 (Very toxic to aquatic life)</p>							

				8	Persistence in soil/water and soil absorption potential & bio magnification & bioaccumulation GHS09 WARNING  H411 (Toxic to aquatic life with long lasting effects)								
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**PESTICIDES FOR INVASIVE ANIMAL CONTROL**

	Chemical group	MOA	Examples	Hazard Group	Hazard Criterion	PPE			Medical Biomonitoring		Frequency and Duration		Environmental monitoring
						Type	Pictogram	Classification	Blood	Urine	Blood	Urine	
1	Rodenticides	Inhibits vitamin K, anti-coagulant	Difenacoum, Brodifacoum Coumatetralyl	2	Acute Toxicity to mammals and birds GHS06 DANGER  H300 (Fatal if swallowed) H310 (Fatal in contact with skin) GHS07 WARNING  H373 (Causes damage to organs through prolonged or repeated exposure – blood)	1.Chemically resistant nitrile gloves  2.Type 3 and Type 4 protective clothing  Type 5 protective clothing  3.Safety boots  4.Face & Eye protection  5.Half-face respirators 	EN ISO 20345  EN 166:2001  EN140 EN 149  EN 143:2001  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. 2.If the worker sprays 8 hours per day for 5 days per week, an additional test needs to be done every 2 years.. 3. All workers need to be tested once they leave the programme			

						<p>6.Particulate air filters for respirators</p> 					
					<p>7.Apron/ Knapjack</p>						
					<p>8. Long-sleeved shirts</p>						
			5	<p>Developmental and Reproductive toxicity GHS08 DANGER</p>  <p>H360D (May damage the unborn child)</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 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. 2.If the worker sprays 8 hours per day for 5 days per week, an additional test needs to be done every 2 years.. 3. All workers need to be tested once they leave the programme</p>			

						8. Long-sleeved shirts							
				6	<p>Endocrine Disrupting Chemicals (EDC) GHS08 DANGER</p>  <p>H372 (Causes damage to organs through prolonged or repeated exposure – blood)</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>8. Long-sleeved shirts</p>	     	<p>EN ISO 20345</p> <p>EN 166:2001</p> <p>EN140 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. 2. If the worker sprays 8 hours per day for 5 days per week, an additional test needs to be done every 2 years.. 3. All workers need to be tested once they leave the programme</p>			

				7	Acute toxicity to aquatic organisms  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 GHS09 WARNING  H410 (Very toxic to aquatic life with long lasting effects)							Ensure environmental monitoring is complied with such as ESRA protocols
		Cholecalciferol	2	Acute Toxicity to mammals and birds GHS06 DANGER  H301 (Toxic is swallowed) H311 (Toxic in contact with skin) H330 (fatal if inhaled)	1.Chemically resistant nitrile gloves  2.Type 3 and Type 4 protective clothing  Type 5 protective clothing  3.Safety boots  4.Face & Eye protection  5.Half-face respirators 	EN ISO 20345 EN 166:2001 EN140 EN 149 EN 143:2000 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. 2.If the worker sprays 8 hours per day for 5 days per week, an additional test needs to be done every 2 years.. 3. All workers need to be tested once they leave the programme				

					6.Particulate air filters for respirators 7.Apron/ Knapjack 8. Long-sleeved shirts						
			6	Endocrine Disrupting Chemicals (EDC) GHS08 DANGER  H372 (Causes damage to organs through prolonged or repeated exposure)	1.Chemically resistant nitrile gloves 2.Type 3 and Type 4 protective clothing  Type 5 protective clothing  3.Safety boots 4.Face & Eye protection 5.Half-face respirators 6.Particulate air filters for respirators 7.Apron/ Knapjack	     	EN ISO 20345 EN 166:2001 EN140 EN 149 EN 143:2000 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. 2.If the worker sprays 8 hours per day for 5 days per week, an additional test needs to be done every 2 years.. 3. All workers need to be tested once they leave the programme		

						8. Long-sleeved shirts							
2	Avicides	Sedative powder	alphachloralose	2	<p>Acute Toxicity to mammals and birds GHS06 DANGER</p>  <p>H301 (Toxic if swallowed)</p> <p>GHS07 WARNING</p>  <p>H332 (Harmful if inhaled) 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>8. Long-sleeved shirts</p>	<p>EN ISO 20345</p> <p>EN 166:2001</p> <p>EN140 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. 2. If the worker sprays 8 hours per day for 5 days per week, an additional test needs to be done every 2 years.. 3. All workers need to be tested once they leave the programme</p>				

				7	Acute toxicity to aquatic organisms  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 GHS09 WARNING  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 GHS06 DANGER  H301 (Toxic if swallowed) H311 (Toxic in contact with skin) GHS07 WARNING  H315 (Causes skin irritation) H317 (May cause an allergic skin reaction) H319 (Causes serious eye irritation) H332 (Harmful if inhaled)	1.Chemically resistant nitrile gloves  2.Type 3 and Type 4 protective clothing  Type 5 protective clothing  3.Safety boots  4.Face & Eye protection  5.Half-face respirators 	EN ISO 20345 EN 166:2001 EN140 EN 149 EN 143:2000 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. 2.If the worker sprays 8 hours per day for 5 days per week, an additional test needs to be done every 2 years.. 3. All workers need to be tested once they leave the programme			

					6.Particulate air filters for respirators 7.Apron/ Knapjack 8. Long-sleeved shirts							
				7	Acute toxicity to aquatic organisms  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 GHS09 WARNING  H410 (Very toxic to aquatic life with long lasting effects)							Ensure environmental monitoring is complied with such as ESRA protocols
3	Piscicides	Mitochondrial NADH: ubiquinone reductase inhibitor and toxin	Rotenone	2	Acute Toxicity to mammals and birds GHS06 DANGER  H301 (Toxic if swallowed) GHS07 WARNING  H315 (Causes skin irritation)	1.Chemically resistant nitrile gloves 2.Type 3 and Type 4 protective clothing  	 	EN ISO 20345 EN 166:2001 EN140 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. 2.If the worker sprays 8 hours per day for 5 days per week, an additional test needs to be done		

					<p>H319 (Causes serious eye irritation)  H335 (May cause respiratory irritation)</p>	<p>Type 5 protective clothing    3. Safety boots  4. Face &amp; Eye protection  5. Half-face respirators  6. Particulate air filters for respirators  7. Apron/ Knapjack  8. Long-sleeved shirts</p>	   	<p>EN 143:2000</p> <p>R95, R99, R100</p>			<p>every 2 years..  3. All workers need to be tested once they leave the programme</p>	
			7	<p>Acute toxicity to aquatic organisms    H400 (Very toxic to aquatic life)</p>								<p>Ensure environmental monitoring is complied with such as ESRA protocols</p>
			8	<p>Persistence in soil/water and soil absorption potential &amp; bio magnification &amp; bioaccumulation  GHS09 WARNING    H410 (Very toxic to aquatic life with long lasting effects)</p>								<p>Ensure environmental monitoring is complied with such as ESRA protocols</p>

