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

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

PRE-CONSTRUCTION, CONSTRUCTION AND POST-CONSTRUCTION PHASE

ENVIRONMENTAL MANAGEMENT PROGRAMME

FOR THE

PROPOSED CONSTRUCTION OF A MIXED-USE DEVELOPMENT ON ERF 998 AND PORTION 5 OF THE FARM ZANDHOOGTE NO. 139 (PORTION OF RE/139), TERGNIET, MOSSEL BAY LOCAL MUNICIPALITY, WESTERN CAPE

APPLICANT:	3MP Sales and Education Services
ENVIRONMENTAL CONSULTANT:	Sharples Environmental Services cc Michael Jon Bennett
DEA & DP PROJECT REFERENCE:	16/3/3/1/D6/35/0008/26
SES REFERENCE NUMBER:	EMP/MUD/TN/MB/WC/03/26
DATE:	March 2026

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Project Ref. No:	16/3/3/1/D6/35/0008/26
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DETAILS OF PERSONS WHO COMPILED THIS DOCUMENT:

Role:	Name:	E-Mail Address:	Qualifications:
Author:	Michael Jon Bennett	michael@sescc.net	• BSc: Environmental and Geographic Science & Ocean and Atmospheric Science
Candidate EAP	Onela Mhobo	onela@sescc.net	• BSc: Environmental Science • BSc Honours Environmental Management

Sharples Environmental Services cc Since 1998, SES has been actively engaged in the fields of environmental planning, assessment and management. We advise 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. Our consultants have over 20+ years of combined experience and we operate in the Southern, Eastern and Western Cape regions.

MICHAEL BENNETT (Environmental Assessment Practitioner, 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 G for his curriculum vitae. Michael is registered with EAPASA as a certified Environmental Practitioner (EAPASA # 2021/3163).

Onela Mhobo (Candidate Environmental Practitioner)
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. She is well versed in the technicalities associated with Monitoring and has worked on a variety of technical projects. Onela is registrered with EAPASA as

1. Introduction

Sharples Environmental Services cc (SES) was appointed by *3MP Sales and Education Services* (the proponent) to compile the Environmental Management Programme for the Proposed Mixed-Use Development on Erf 998 and a portion of Remainder of Farm 139 Zandhoogte, Tergniet, Mossel Bay Local Municipality, Western Cape.

2. About this EMPr

This document is intended to serve as a guideline to be used by *3MP Sales and Education Services* (as the Implementing Agent) and any person/s acting on *3MP Sales and Education Services* behalf, during the pre-construction, construction, post-construction rehabilitation and operational (maintenance) phases of the proposed development. This document provides measures that must 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 Environmental Impact Assessment Regulations, 2014 (as amended), 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 not only is the EMPr designed to manage the physical establishment of the development *per se*, but also 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 the *3MP Sales and Education 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 needs to ensure that all role-players are aware of the constraints that the EMPr places on the development and construction team and are prepared to be actively involved in enforcing these constraints. The end result relies on cooperation and mutual respect and understanding of all parties involved.

3. How to use this document

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. *3MP Sales and Education Services* must retain a copy of this EMPr, and an additional copy 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 *3MP Sales and Education 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 and maintenance activities are either avoided or reduced. 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 as and when 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 (DEADP). Amendments to this EMPr must first be approved by the competent authority, in writing, before being implemented.

4. Description of the Activity

3MP Sales and Education Services proposes to construct a mixed-use development which will comprise of the following:

Zoning	**Size (ha)**
Business Zone I (BZI)	2.604
Business Zone IV (BZIV)	0.268
Community Zone III (CZIII)	0.527
Mixed Zone II (MZII)	0.902
Open Space II (OSZII)	1.225
General Residential Zone II (GRZII)	0.697
General Residential Zone III (GRZIII)	0.653
Transport Zone II (TZII)	1.360
Mixed Use Zone II (MZII)	0.902
Split zone erf consisting of a portion Business Zone I (BZI) with a size of 1.0 hectare and a portion Open Space Zone II (OSZII) with a size of 1.0 hectare	2.00

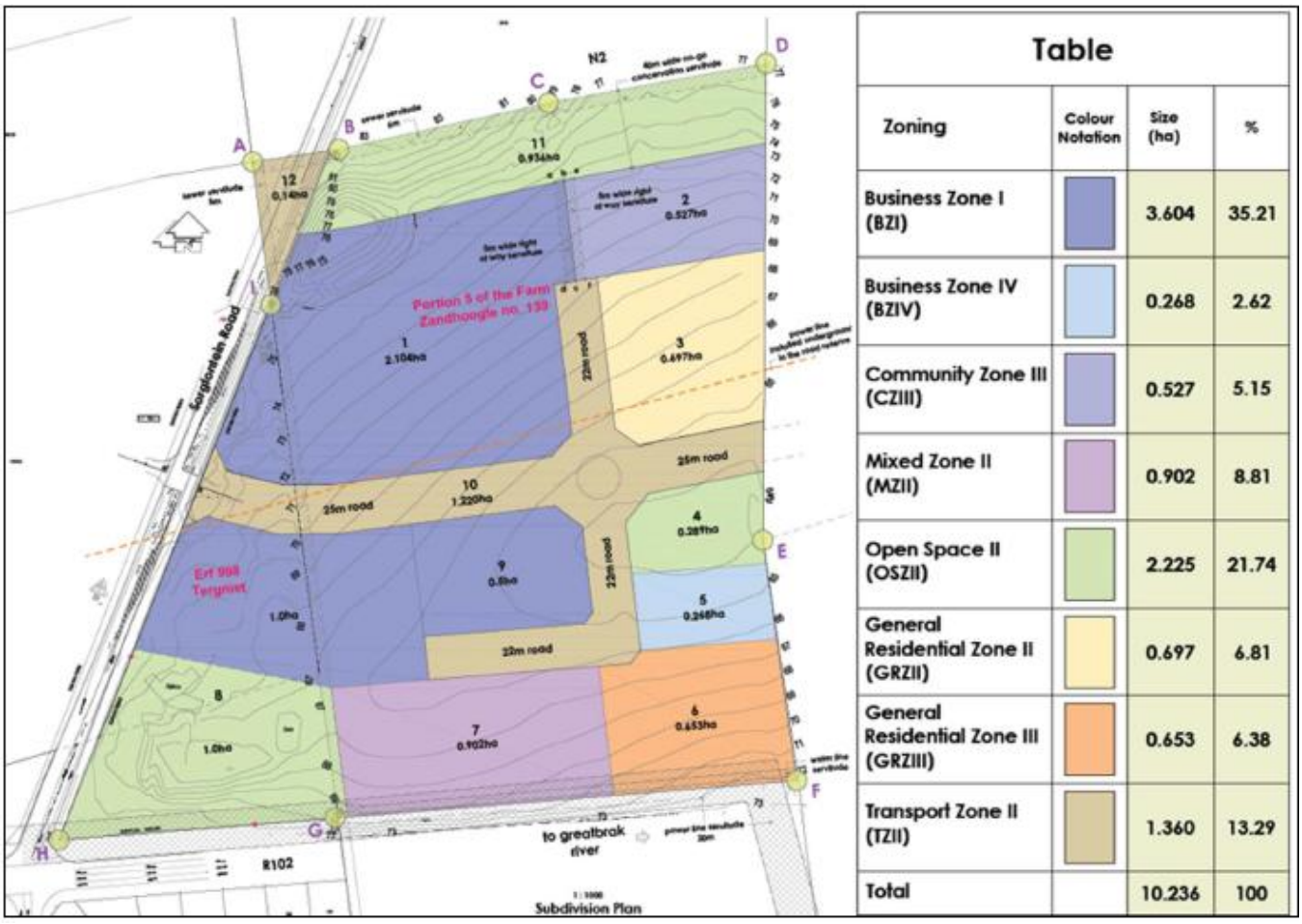


Table			
Zoning	Colour Notation	Size (ha)	%
Business Zone I (BZI)		3.604	35.21
Business Zone IV (BZIV)		0.268	2.62
Community Zone III (CZIII)		0.527	5.15
Mixed Zone II (MZII)		0.902	8.81
Open Space II (OSZII)		2.225	21.74
General Residential Zone II (GRZII)		0.697	6.81
General Residential Zone III (GRZIII)		0.653	6.38
Transport Zone II (TZII)		1.360	13.29
Total		10.236	100

Figure 1: Site Development Plan

The proposed developed will take place on erf 998 and portion 5 of the farm zandhoogte no. 139 (portion of re/139), Tergniet, Mossel Bay, Western Cape.

5. Legal Framework

5.1 The NEMA, Act No 107 of 1998, as Amended, and the EIA Regulations (2014)

The National Environmental Management Act (NEMA; No. 107 of 1998, as amended) gives effect to the Constitution of the Republic of South Africa by providing a framework for co-operative environmental governance and environmental principles that enable and facilitate decision-making on matters affecting the environment. NEMA requires that an environmental authorisation be issued by a competent authority (CA) before the commencement of an activity listed in Environmental Impact Assessment Regulations Listing Notices G.N. 324, 325, 326 & 327 published on the 7th April 2017.

Due to the fact that this development proposal is an activity listed in the EIA Regulations, a Basic Assessment Process is required and the respective reports must be submitted to the Department of Environmental Affairs and Development Planning (DEADP) before they issue 3MP Sales and Education Services with an Environmental Authorisation. The Environmental Authorisation has been attached as appendix 6.

Table 1: Listed Activities in terms of the NEMA Environmental Impact Assessment Regulations (2014), as amended, that are proposed to be triggered and therefore require an application for Environmental Authorisation to be submitted to the DEA & DP

Activity #	Listing notice 1. Description of Activity as per GN No. R 327
24	The development of a road— (i) for which an environmental authorisation was obtained for the route determination in terms of activity 5 in Government Notice 387 of 2006 or activity 18 in Government Notice 545 of 2010; or (ii) with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres; but excluding a road— (a) which is identified and included in activity 27 in Listing Notice 2 of 2014; (b) where the entire road falls within an urban area; or (c) which is 1 kilometre or shorter.
27	The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for— (i) the undertaking of a linear activity; or (ii) maintenance purposes undertaken in accordance with a maintenance management plan.
28	Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture, game farming, equestrian purposes or afforestation on or after 01 April 1998 and where such development: (i) will occur inside an urban area, where the total land to be developed is bigger than 5 hectares; or (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare; excluding where such land has already been developed for residential, mixed, retail, commercial, industrial or institutional purposes.
Activity #	**Listing notice 3. Description of Activity as per GN No. R 324**
4	The development of a road wider than 4 metres with a reserve less than 13,5 metres. i. Western Cape i. Areas zoned for use as public open space or equivalent zoning; ii. Areas outside urban areas; (aa) Areas containing indigenous vegetation; (bb) Areas on the estuary side of the development setback line or in an estuarine functional zone where no such setback line has been determined; or iii. Inside urban areas: (aa) Areas zoned for conservation use; or (bb) Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority.
12	The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan. i. Western Cape i. Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004; ii. Within critical biodiversity areas identified in bioregional plans;

	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; 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 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.
Activity #	**Listing notice 2. (GN No. R325): Scoping & Environmental Impact Reporting**
	N/A

5.2 Other applicable legislation

3MP Sales and Education 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 authorisations, as well as the provisions of all other applicable legislation and guidelines, 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 Environmental Management: Waste Act (Act 59 of 2008);
- National Water Act (Act 36 of 1998)
- 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);
- Subdivision of Agricultural Land (Act No. 70 of 1970)
- Guideline for emp's for state-subsidised housing: Considerations to be taken into account in preparation of EMPs for state-subsidised housing (February 2019)

The above listed legislation have general applicability to most development applications, and it is the responsibility of *3MP Sales and Education Services* 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.

The proposed development activity will take place through various phases. Each phase has specific impacts or issues unique to that phase of the development activity. These phases of the development are listed below and the impacts associated with each phase as identified through the environmental impact assessment process are identified and given a brief description. Brief management statements are provided, as well as a description of the desirable impact management outcomes.

6. Scope of this EMPr

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
- Post-Construction Rehabilitation
- Operational Phase

General environmental management measures that must be applied throughout the project lifecycle (as and where applicable) are described in Chapter 9 below. 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

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 should be implemented as and where applicable, reasonable and practicable during the pre-construction, construction and post-construction rehabilitation and operational (maintenance) phases of the proposed development.

Code of Conduct
The purpose of the Code of Conduct (CoC) is to minimise the impact of the activities associated with the construction phase on the environment. The rules and regulations prescribed in this CoC are intended to ensure that the impacts on the environment are not prejudiced by the construction activities. Failure to adhere to or any breach of this CoC will result in a fine being levied against the offending or defaulting party / individual.

Labourers during the construction phase should conserve the natural environment, endorsing the principles of sustainable use and minimum impact. They should also be sensitive to the impact of their operation on the environment within which they work and minimise any adverse impacts.

This EMPr forms an integral part of the activities during the construction phase and as such, is legally enforceable. In addition to the restrictions and controls provided for in this EMPr, the environmental controls comprise the following:

Engineers
- Unless otherwise stated by the holder, only a registered engineer must be appointed for the construction phase of the development.
- The engineer shall provide work or services of a quality and scope, and to a level, which are commensurate with accepted standards and practices.
- The engineer shall be impartial in decision-making, provision of advice and judgement.

Contractors and sub-contractors
- Unless otherwise determined, only appropriately registered contractors shall be appointed.
- It shall be the responsibility of the holder / engineer to ensure that the contractors abide by and comply with the rules and regulations of the Code of Conduct.
- Contractors shall at all times be responsible for their sub-contractors and employees whilst they are on the development property.

Rules and Regulations
It is of vital importance that engineers and contractors understand and acknowledge that they are working on an environmentally sensitive development and agree to conform to all environmental controls specified in this EMPr and any additional input by the ECO.

In addition to the EMPr, the environmental controls comprise the following:

- **Building Plan Controls**
    - A copy of the approved and signed building plans must be available on site during the construction phase of the development.
    - Variations of the building plans must be approved by the engineer / holder prior to being implemented.
    - Prior to commencing building, the contractor must remove all topsoil and store it in a berm of not more the 2m high, away from construction activities.

- **Site tidiness**
    - The contractor must keep the appearance of his building site neat and tidy at all times. Building rubble must be removed from site at regular intervals, and litter must be removed from the site on a daily basis. Refuse drums must be available on site which waste can be placed in. The drums must be emptied on a regular basis and the waste taken to a licenced local waste disposal facility.
- **Safety**
    - The contractor shall comply with the Health and Safety Act (Act No. 85 of 1993), as amended, together with such regulations promulgated thereunder.

7.1 Site access and traffic management

Access to the development is proposed directly from Sorgfontein Road (DR 1578).

All construction vehicles need to adhere to traffic laws and regulations. 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 should be taken to ensure that the local traffic flow pattern is not significantly disrupted and vehicle operators therefore need to be educated in terms of "best-practice" operation in order to minimise unnecessary traffic congestion or dangers. These practices include, but are not limited to, not unnecessarily obstructing the access point or traffic lanes used to access the site; considering the load carrying capacity of road surfaces and adhering to all other prescriptive regulations regarding the use of public roads by construction vehicles. Delivery trucks should be appropriately covered to deter the spilling of material along the route to the site.

Adequate signage that is both informative and cautionary to passing traffic (motorists and pedestrians) warning them of the construction activities should be implemented. Signage would need to be clearly visible and include, amongst 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:

- No construction to take place over or during the December holiday period without prior permission from the relevant authorities.
- ECO to do awareness training with the contractor and labourers and to highlight the traffic related risks before construction commences.
- Ensure appropriate behaviour of operators of construction vehicles.

7.1.1 Operational phase management measures

The necessary road markings, traffic signage, speed limits and early warning systems will need to be developed as per the requirements of the relevant roads-authority. Paved sidewalks should be provided in support of the development that will generate high numbers of public transport commuters.

7.2 Site demarcation

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

7.2.1 Construction working area

Prior to the commencement of any land-clearing or construction activities, the outer boundary of the development area must be surveyed and pegged. If practical, the demarcation boundary should typically allow a working area of no more than 2.5m around the development footprint unless otherwise agreed with the ECO. This demarcation boundary is to ensure that land clearing and 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.

If desired or deemed necessary by the ECO, the outer boundary of the working area can be enclosed with orange barrier netting fencing, shade netting, droppers & wire/ danger tape, or similar – as feasible and practical. The fencing should be retained and maintained for the duration of the construction period and should not be moved during construction unless agreed otherwise with the ECO.

7.2.2 No-go areas

The No-Go area for this proposal is Portion 11 of the Layout Plan (Figure 1). Prior to the commencement of any land-clearing or construction activities, all sensitive areas (as identified by the ECO), must be demarcated and must not be disturbed during the construction phase. No-go areas outside the approved development area 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 can be used to enforce the demarcation. Any interaction with no-go areas should be consulted between the contractor and ECO prior to any actions.

7.2.3 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 must be used for the site camp, at least 100m away from any no-go areas. 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 should 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. 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.

7.3.5 Potable Water

An adequate supply of potable water must be provided to construction workers at the site camp.

7.3.6 Ablution Facilities

Chemical toilets should be kept at the site camp, 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.

Chemical toilets should be kept at the site camp, on a level surface and secured from blowing over. The chemical toilets must be regularly emptied and the waste disposed of at an appropriate waste water disposal/ treatment site. The ablution facilities must not be linked to the river 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. 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 must 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 Indigenous vegetation clearing

Where indigenous vegetation must be cleared for the development the following measures must be implemented:

- 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. An Alien Invasive Species Management Plan has been compiled for the proposed development. All management, control, and eradication of alien invasive plant species must be undertaken in accordance with the approved Alien Invasive Species Management Plan **(Appendix D)**
- Only the areas required to accommodate the construction and access to the construction site must be cleared/trimmed of vegetation.
- After any clearing is completed, an appropriate cover crop should be planted where any weeds or exotic species are removed from disturbed areas timeously.
- Vegetation outside of the construction footprint and within any no-go areas must not be cleared.
- Clearing should take place in a phased approach, so that cleared areas are kept small and manageable.
- The indigenous forest which is located lower down in the valley should be protected and suitably buffered from the development by means of a fire belt, with the surrounding aliens 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.
- The topsoil berm may be a few meters wide but must ideally not be more than 2m high to allow light and air penetration.
- 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 outside the riparian zone, and at a location where it can be protected from disturbance and river flow/floods during construction and where it will not interfere with construction activities.
- 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.
- Ideally, topsoil is to be handled twice only, once to strip and stockpile, and once to replace, level, shape and scarify.
- Stockpiles must not be located within 50 metres of watercourses. The furthest threshold must be adhered to.
- 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).
- Soil 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.
- Topsoil removed from fynbos areas to be reused in rehabilitation areas, e.g. open space areas. Where possible, topsoil from fynbos areas, containing indigenous plant seeds, should be transferred immediately to rehabilitation areas rather than being stockpiled, as stockpiling kills important fungi, microbes, seeds and soil fauna. Topsoil stockpiles of this kind must not exceed 0.5 m in height and must not be compacted.
- 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. Weather and animal proof waste bins for the different categories of recyclable waste (i.e. paper, plastic, metal). These bins must be emptied and the waste taken to a registered recycling facility. The receipts from the facility must be kept on file and must be available on request. A Waste Management Plan is to be developed in order to formalise waste control methods and to provide a structure for waste management.

The non-recyclable and non-reusable waste (e.g. builder's rubble, etc.) generated on site must be stored in animal and weather proof bins and disposed of at a landfill site licensed in terms of the applicable legislation. The receipts from the facility must be kept on file and must be available on request.

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 in animal and weather proof bins/ storage units.
- The area selected for storage of hazardous fuels must be located on a level area, at least 100m from 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-authorised persons and/or animals.
- Soil contaminated by hazardous substances must be excavated and disposed of as hazardous waste.
- 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 shall be prominently displayed at the storage area.

- Spoil or waste material should not be dumped within 50 m of natural areas, it should be discarded at a licensed dump site.
- 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 vessel 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.
- All waste, hazardous as well as general, which result from the proposed activities must be disposed of appropriately at a licensed Waste Disposal Facility (WDF).
- 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.
- Drip trays must be utilised during decanting of hazardous substances and when refilling chemical/ fuel storage tanks.
- Refuelling of vehicles/ machinery may only take place at the site camp or vehicle maintenance yard. Where refuelling must occur, drip trays should be utilised to catch potential spills/ drips.
- Drip trays must be placed under generators (if used on site) water pumps and any other machinery on site that utilises fuel/ lubricant, or where there is risk of leakage/spillage.
- Firefighting equipment must be located in close proximity to the storage area.

In the event of a significant spill or leak of hazardous substances (petrol and diesel), such incident(s) must be reported to all relevant authorities, including the D: PCM, in accordance with Section 30 (5) of the National Environmental Management Act (NEMA) (Act 107 of 1998), pertaining to the control of emergency incidents.

7.8 Cement and concrete batching

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

- Cement/ concrete may not be mixed on bare ground.
- 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, the river/ riparian zone 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.
- Unused cement bags must be stored in such a way that they will be protected from rain.
- Washing of excess cement/concrete into the ground is not allowed. All excess concrete/ cement must be removed from site and disposed of at an appropriate location.
- Empty cement bags must be disposed of in the hazardous waste bins on site.

7.9 Erosion control and stormwater management

A detailed Stormwater Management Plan titled "Stormwater Management Plan – Consolidation, Rezoning and Subdivision of Erf 998 Tergniet and Portion 5 of Farm Zandhoogte No. 139, Mossel Bay"

(Report No. 22-160_SWMP, Revision 1, October 2025), prepared by Urban Engineering Consultants (Pty) Ltd, forms part of this EMPr and must be read in conjunction with this document. All stormwater management measures during the construction and operational phases must be implemented in accordance with the Stormwater Management Plan (Appendix E).

The Contractor and/or Developer shall ensure that stormwater control measures, including erosion prevention, attenuation, drainage structures, and water quality protection measures, are installed, maintained, and monitored as specified in the Stormwater Management Plan to prevent pollution, sedimentation, and downstream impacts.

The scale and nature of the erosion and stormwater 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, stormwater 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. These measures must be established to reflect the natural slope of the surface and located at the natural ground level and must be located within the development footprint and not encroach into the buffer areas. Such measures may include the use of shade netting, grease traps/oil separators, geo-fabric, brush-packing or similar barriers in areas susceptible to erosion and along exposed slopes. Stormwater managed by the development is to be discharged into porous channels / swales ('infiltration channels or basins') running near parallel or parallel to contours within and along the edge of the development. Areas must be rehabilitated and a suitable cover crop planted once specific phases of construction is completed.

7.10 Excavations and Earthworks

Any major earthworks with bulldozers and 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. Areas, which have already been excavated and entail fairly significant earthworks, must be similarly demarcated to avoid the spreading of construction activities into more sensitive areas.

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 in such a manner that any stream flow is directed away from the stockpile, reducing the risk of erosion.

In the event that any heritage resources (human remains, grave stones, stone tools, artefacts, old coins and pottery, fossil shell middens, rock art and engravings, remains of old built structures etc.) are encountered during construction, the finding should be protected from further disturbance (ideally left in situ) and the ECO and relevant Heritage Authority should be notified. The finding should be handled and/or removed from site as per instructions issued by the Heritage Authority or delegated heritage specialist.

7.11 Heritage Resources

Should any heritage resources, including evidence of graves and human burials, archaeological material and paleontological material be discovered during the execution of the activities, all works must be stopped immediately and Heritage Western Cape must be notified without delay.

Heritage Western Cape:

T: 021 483 5059
E: hwc.hwc@westerncape.gov.za

7.12 Site closure and rehabilitation

Upon completion of the construction phase, and after each maintenance event, all disturbed areas, including the working area (disturbance corridor), temporary access road, 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.
- Alien plants must be removed from the site as per NEMBA requirements. An Alien Invasive Species Management Plan has been compiled for the proposed development. All management, control, and eradication of alien invasive plant species must be undertaken in accordance with the approved Alien Invasive Species Management Plan (Appendix D .
- A suitable weed management strategy to be implemented in construction and operation phases to eradicate and control regeneration.
- 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 asphalting and cleared in a manner approved by the ECO. Any soil contaminated with hydrocarbons (oil, fuel, etc) or other hazardous substance must be collected and disposed of as hazardous waste to a licenced disposal facility.
- All construction waste is to be removed from the site and disposed of at an appropriate facility. Burying or burning of waste or rubble on site is strictly 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 landscaping and rehabilitation of the site must be done to the satisfaction of the ECO, and must adhere to all conditions/ requirements of the Environmental Authorisation.
- Erosion features that have developed due to construction within the aquatic habitat due to the project are required to be stabilised. This may also include the need to deactivate any erosion headcuts/rills/gullies that may have developed.

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 is compliant with an additional conditions which may be included in the Environmental Authorisation.

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

- Appoint an Environmental Control Officer.
- Complete the detailed design site layout plan.
- Update the EMPr (if necessary).

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

8.1 OBJECTIVE 1: APPOINTMENT OF AN ENVIRONMENTAL CONTROL OFFICER

***Impact Management Objective:* To appoint a suitably qualified and experienced Environmental Control Officer.**		
Potential impact to avoid	Failure to appoint an ECO will result in non-compliance with the requirements of the EMPr.	
Impact Management Outcome	The requirements of the EMPr are implemented and monitored during all phases of the development, which will promote sound environmental management on site.	
IMPACT MANAGEMENT ACTIONS		
Mitigation measure	Responsible party	Time period
• A suitably qualified and experienced Environmental Control Officer must be appointed before any activities commence on site. • The appointed ECO must adhere to the requirements stated in Chapter 15 and any other requirements specified in the Environmental Authorisation. • 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.	3MP Sales and Education 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.	

8.2 OBJECTIVE 2: DETAILED DESIGN AND SITE LAYOUT PLAN

Impact Management Objective: ***To compile a detailed design and site layout plan that adheres to the recommendations of the EIA Report and any additional conditions which may be included in the Environmental Authorisation.***			
Potential impact to avoid	Substantial deviation from the conceptual layout plan may result in: • Non-compliance with the Environmental Authorisation during construction. • Triggering of additional listed activities not authorised in the Environmental Authorisation. • An increase in the severity of the impacts identified and assessed in the EIA or may result in new impacts not previously assessed and not provided for in the EMPr, resulting in environmental degradation.		
Impact Management Outcome	Development is compliant with recommendations of the EIA and the EMPr.		
IMPACT MANAGEMENT ACTIONS			
Mitigation measure		Responsible party	Time period

• The final detailed design & layout must adhere to the conceptual layout assessed in the Environmental Impact Assessment (EIA) process.
• The final detailed design & layout must adhere to any conditions of the Environmental Authorisation (EA).
• If the final detailed design differs significantly from that assessed during the EIA, the revised layout must be assessed by an Environmental Consultant and the received EA must be amended by the Competent Authority before proceeding.
• Interested & Affected Parties may need to be provided with an opportunity to comment on any proposed amendment to the EA depending on the significance of the changes.
• It is recommended that the stormwater management plan be developed with appropriate ecological input and be developed based on Sustainable Drainage Systems (SUDS).
• All stormwater infrastructure, must be located within the development footprint and not encroach into the buffer areas.
• Stormwater infrastructure should be installed as per the Stormwater management layout (Annexure B of the SWMP (Appendix E));
• The following mitigation measures recommended by the Freshwater Specialist should be considered during detailed design:
  • It is important that stormwater generated on site should be managed according to Sustainable Drainage System (SuDS) principles. This requires that as much stormwater as possible should be attenuated within the development footprint.
  • Rainwater harvesting tanks be installed at all residences;
		3MP Sales and Education Services / Consulting Engineer	During design phase

• Use of swales and detention ponds to attenuate stormwater runoff, encourage infiltration and reduce the speed, energy and volumes at which stormwater is discharged from the site; • Use of permeable paving to encourage infiltration into the soil; and • Use of retention ponds and artificial wetlands to capture stormwater runoff and prevent its discharge from the site.		
Performance Indicator	Detailed designs and site layout plans that adhere to the conditions of the EA and EMPr are finalised prior to the commencement of construction.	

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.

9.1 OBJECTIVE 1: IDENTIFY & DEMARCATE NO-GO AND WORKING AREAS

Impact Management Objective: ***Identify and demarcate no-go areas, working areas and site facilities.***		
Potential impact to avoid	• No-Go areas include aquatic habitats and public open space to remain natural. • Insensitive location of working areas and site facilities may result in environmental impacts during the construction phase. • Failure to accurately demarcate working areas may result in an increased disturbance footprint. • Failure to demarcate no-go areas may result in disturbances to these areas during construction.	
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.	
IMPACT MANAGEMENT ACTIONS		
Mitigation measure	Responsible party	Time period
• The environmentally sensitive areas must be identified and be designated as no-go areas. • Demarcation of working area and no-go areas must be done in accordance with Section 8.2 of this EMPr. • Site camp facilities must be situated as far away from the No-Go areas as possible.	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 commences on site.	

9.2 OBJECTIVE 2: ESTABLISH ENVIRONMENTALLY SENSITIVE SITE CAMP & SITE FACILITES

Impact Management Objective: ***To set up and equip the site camp and associated site facilities in a manner that will promote good environmental management.***		
Potential impact to avoid	• Inappropriate siting of site camp facilities may result in impacts to sensitive resources • Failure to properly demarcate and set up site facilities may result in disorganised construction activities and unnecessary disturbance to the site. • Failure to provide the necessary site facilities and/or failure to equip these facilities with the necessary equipment/materials may impede good environmental management & compromise ability to respond to emergencies.	
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.	
IMPACT MANAGEMENT ACTIONS		
Mitigation measure	Responsible party	Time period
• The site camp and site facilities described in Section 8.3 of this EMPr must be provided on site. • The site camp and associated site facilities must be set-up and managed in accordance with the general environmental management measures specified in Chapter 8 of this EMPr. • The site camp must be strategically set up, away from freshwater resources, in a manner that will promote good environmental management during construction/ demolition, and to respond to potential emergencies (including fires, spillage of hazardous substances etc.) that may arise. • The No-Go boundary must be demarcated, and no disturbance may occur past this point during any stage. • The site camp, storage facilities, stockpiles, waste bins, and any other temporary structures on site should be located in such a way that they will present as little visual impact to surrounding residents and road users as possible. • Frequent stormwater outlets must be designed to prevent erosion at discharge points. • It is recommended that the stormwater management plan be developed with appropriate ecological input and be developed based on Sustainable Drainage Systems (SUDS).	Contractor / Developer	Pre-construction phase (prior to start of construction activities)

• The contractor shall plan his activities so that materials excavated from borrow pits and cuttings, in so far as possible, can be transported direct to and placed at the point where it is to be used. • Top soil and other top material such as boulders must be stored at a stockpile location agreed to by the ECO. Ensure the stock pile does not exceed the maximum height agreed upon.		
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.	

9.3 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, in order for the ECO to 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.

***Impact Management Objective:* Environmental Control Officer to conduct an inspection prior to the commencement of construction activities on site.**		
Potential impact to avoid	• Failure to appoint ECO or to notify ECO of commencement prior to commencement may result in non-compliance with the EA. • If a pre-commencement ECO inspection is not performed, the Construction Contractor may be held liable for environmental degradation that took place prior to the Contractor commencing work on site.	
Impact Management Outcome	• Good environmental management is promoted and enforced by the ECO during the full pre-construction and construction phases. • Site facilities are appropriately located on site. • Construction workers receive environmental awareness training before commencing work on site.	
IMPACT MANAGEMENT ACTIONS		
Mitigation measure	Responsible party	Time period
• 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.	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 objectives and actions that will prevent the identified potential impacts from arising – or where avoidance is not possible, that will minimise and mitigate the impacts – 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 which may be 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:

- Prevent environmental pollution and contamination of soil
- Limit disturbance of terrestrial ecosystems (fauna and flora)
- Noise impact management
- Dust impact management

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

10.1 OBJECTIVE 2: PREVENT POLLUTION AND SOIL

Impact Management Objective: ***To prevent environmental pollution and contamination of soil***		
Potential impact to avoid	• Fuel, oil, lubricant or other pollutants may leak from vehicles/ machinery and contaminate soil, surface water and/or ground water. • Spills of hazardous substances may contaminate environment. • Chemical toilets may leak. • Contaminated run-off from site or site camp facilities may pollute soil. • Waste (solid or liquid) from the construction site may be blown or washed into surrounding environment. • Contamination of soil or water may impact surrounding and downstream land/water users, biota and livestock.	
Impact Management Outcome	The environment (including soil, surface water and groundwater) is not contaminated.	
IMPACT MANAGEMENT ACTIONS		
Mitigation measure	Responsible party	Time period
• All erosion protection measures (e.g. Reno-mattresses) must be established to reflect the natural slope of the surface and located at the natural ground level.	Contractor	Construction phase

• Stormwater exit points must include a best management practice approach to trap any additional suspended solids and pollutants originating from the proposed development. Also include the placement of stormwater grates (or similar). **General Pollution Management:** • No pollution of surface water or ground water resources may occur due to any activity on the site. • All stormwater management measures during the construction and operational phases must be implemented in accordance with the approved Stormwater Management Plan (Appendix E) • No storm water runoff from any premises containing waste, or water containing waste emanating from construction activities may be discharged into the environment. Polluted stormwater must be contained on the site. • Stormwater managed by the development is to be discharged into porous channels / swales ('infiltration channels or basins') running near parallel or parallel to contours within and along the edge of the development • Frequent stormwater outlets must be designed to prevent erosion at discharge points. **General Waste Management:** • Dedicated waste bins or skips must be provided on site and kept in a demarcated area on an impermeable surface. • Separate waste bins/skips must be provided for recyclable waste, general waste and hazardous waste. Recovered builder's rubble & green waste may be stockpiled on the ground within the site camp, or in separate skips until removal. • Waste must be placed in the appropriate waste bins/skips/ stockpiles. • Hazardous waste bins must be kept on an impermeable bunded surface capable of holding at least 110% of the volume of the bins. • Skips/ bins must be provided with secure lids or covering that will prevent scavenging and windblown waste or dust. • Waste bins/skips must be regularly emptied and must not be allowed to overflow. • Construction workers must be instructed not to litter and to place all waste in the appropriate waste bins provided on site. • The Contractor must ensure that all workers on site are familiar with the correct waste disposal procedures to be followed. • Waste generated on site must be classified and managed in accordance with the National Environmental Management: Waste Act – Waste Classification and Management Regulations (GN No. R. 634 of August 2013).		

• Disposal of waste to landfill must be undertaken in accordance with the National Environmental Management: Waste Act – National Norms and Standard for the Assessment of Waste for Landfill Disposal (GN No. R. 635 of August 2013). • All waste, hazardous as well as general, resulting from the proposed activities must be disposed of appropriately at a licensed Waste Disposal Facility (WDF). **Pollution Management – hydrocarbons (oil, fuel etc.)** • Vehicles and machinery must be in good working order and must be regularly inspected for leaks. • If a vehicle or machinery is leaking pollutants it must, as soon as possible, be taken to an appropriate location for repair. The ECO has the authority to request that any vehicle or piece of equipment that is contaminating the environment be removed from the site until it has been satisfactorily repaired. • Repairs to vehicles/ machinery may take place on site, within a designated maintenance area at the site camp. Drip trays, tarpaulin or other impermeable layer must be laid down prior to undertaking repairs. • Refuelling of vehicles/ machinery may only take place at the site camp or vehicle maintenance yard. Where refuelling must occur, drip trays should be utilised to catch potential spills/ drips. • Drip trays must be utilised during decanting of hazardous substances and when refilling chemical/ fuel storage tanks. • Drip trays must be placed under generators (if used on site) water pumps and any other machinery on site that utilises fuel/ lubricant, or where there is risk of leakage/spillage. • Where feasible, fuel tanks should be elevated so that leaks are easily detected. • A spill kit to neutralise/treat spills of fuel/ oil/ lubricants must be available on site, and workers must be educated on how to utilise the spill kit. • Soil contaminated by hazardous substances must be excavated and disposed of as hazardous waste. • Spoil or waste material should not be dumped within 50 m of natural areas, it should be discareded at a licensed dump site. • The use of grease traps/oil separators to prevent pollutants from entering the environment from stormwater is recommended. **Pollution Management – Ablution facilities** • Chemical toilets must be kept at the site camp, on a level surface and secured from blowing over. • Toilets must be located well outside of any storm water drainage lines ,and may not be linked to the storm water drainage system in any way.		

• Chemical toilets must be regularly emptied and the waste disposed of at an appropriate waste water disposal/ treatment site. Care must be taken to prevent spillages when moving or servicing chemical toilets. **Pollution Management – Hazardous Substances** • Any hazardous substances (materials, fuels, other chemicals etc.) that may be required on site must be stored according to the manufacturers' product-storage requirements, which may include a covered, waterproof bunded housing structure. • Material Safety Data Sheets (MSDSs) shall be readily available on site for all chemicals and hazardous substances to be used on site. Where possible and available, MSDSs should additionally include information on ecological impacts and measures to minimise negative environmental impacts during accidental releases. • Hazardous chemicals and fuels should be stored on bunded, impermeable surfaces with sufficient capacity to hold at least 110% of the capacity of the storage tanks. **Cement Batching** • Cement batching must take place on an impermeable surface large enough to retain any slurry or cement water run-off. If necessary, plastic/ bidem lined detention ponds (or similar) should be constructed to catch the run-off from batching areas. Once the water content of the cement water/ slurry has evaporated the dried cement should be scraped out of the detention pond and disposed of at an appropriate disposal facility authorised to deal with such waste • Cement batching should take place on already transformed areas within the footprint of the facility. • Unused cement bags must be stored in such a way that they will be protected from rain. Empty cement bags must not be left lying on the ground and must be disposed of in the appropriate waste bin. • Washing of excess cement/concrete into the ground is not allowed. All excess concrete/ cement must be removed from site and disposed of at an appropriate location. • Construction works must preferably take place in drier months of the year when runoff from the construction site will be minimal, to limit potential dispersal of pollutants. •		
Performance Indicator	No pollution of the site or contaminated soils	

10.2 OBJECTIVE 4: LIMIT DISTURBANCE OF TERRESTRIAL ECOSYSTEMS (FAUNA AND FLORA)

<table>
<tr><td colspan="4"><u>Impact Management Objective:</u> To limit disturbance of terrestrial ecosystems (fauna and flora), the entire site will be transformed to an urban environment, the mitigation for this impact is therefore to maintain an ecological corridor on the norther boundary of the property</td></tr>
<tr><td>Potential impact to avoid</td><td colspan="3">• Destruction of habitat
• Direct mortality of fauna
• Vibration and noise
• Loss of an endangered ecosystem type
• Loss of ecosystem services
• Loss of ecosystem function, pattern and process
• Loss of distinct biodiversity features</td></tr>
<tr><td>Impact Management Outcome</td><td colspan="3">The terrestrial ecosystem of the ecological corridor is not significantly impacted on as a result of the construction activities.</td></tr>
<tr><td colspan="4">IMPACT MANAGEMENT ACTIONS</td></tr>
<tr><td colspan="2">Mitigation measure</td><td>Responsible party</td><td>Time period</td></tr>
<tr><td colspan="2">• An awareness program is to be run by the ECO in order to prevent the labour force from intentionally killing any faunal species
• No clearing outside of development and infrastructure footprint area to take place.
• An Environmental Control Officer will oversee compliance with all the prescribed environmental requirements and mitigation measures listed here and will be on site regularly.
• Construction workers must be sensitised to the fact that fauna (including mammals, snakes, birds, tortoises etc.) may be encountered on site, and they must exercise due caution to ensure that their actions/movements do not impact fauna.
• Any fauna encountered on site must be allowed to passively vacate the area. Active relocation of fauna like snakes must be a last resort, and must only be performed by a person skilled/ experienced enough to do so without endangering him/herself or the animal/bird.
• If animals are discovered on site during site preparation they are to be relocated or allowed to move off the area that is required to be disturbed without harm;
• Construction workers may not feed, hunt, trap, poison or shoot fauna on site or in the immediately surrounding areas.</td><td>Contractor</td><td>Construction phase</td></tr>
<tr><td>Performance Indicator</td><td colspan="3">• The terrestrial ecosystem of the ecological corridor is not significantly impacted on as a result of the construction activities.</td></tr>
</table>

10.3 OBJECTIVE 8: NOISE IMPACT MANAGEMENT

***Impact Management Objective:* To control avoidable noise impacts to the surrounding areas**		
Potential impact to avoid	Avoidable noise generated during the undertaking of construction activities, which may present a nuisance to surrounding community.	
Impact Management Outcome	Avoidable noise impacts are managed efficiently.	
IMPACT MANAGEMENT ACTIONS		
Mitigation measure	Responsible party	Time period
• A noise complaints register should be opened. • Excavations and earth-moving activities must be restricted to normal construction working hours (7:30 – 17:30) as far as possible. • Work on site must be well-planned and should proceed efficiently so as to limit the duration of the disturbance. • Vehicles and equipment must be kept in good working condition. If deemed necessary, machinery and equipment should be fitted with mufflers/ exhaust silencers. No unnecessary disturbances should be allowed to emanate from the construction site. • Due to the location of the proposed development site to residents, noise levels must be kept to a minimum at all times. If excessive noise is expected on the boundary of the residential erven bordering the site they must be informed in advance of when the high noise levels will occur and for how long they will occur. • Workers should be educated on how to control noise-generating activities that have the potential to become disturbances, particularly over an extended period of time. • Noise levels must comply with the relevant health & safety regulations and SANS codes and should be monitored by the Health & Safety Officer as necessary and appropriate. • Affected parties must be informed of the excessive noise factors. • The noise management and monitoring measures prescribed in the EMPr must be adhered to. • The appointed Environmental Control Officer (ECO) must undertake a site inspection once per week, for the duration of the construction phase, and to produce a short monthly ECO monitoring audit report, auditing on the compliance of the property developer with the conditions of the Environmental Authorisation and the approved EMP. The monthly Monitoring Report must be submitted to the Directorate (DEADP) each month.	Contractor	Construction phase
Performance Indicator	Noise levels on site remain within acceptable standards. No valid noise complaints are received.	

10.4 OBJECTIVE 10: DUST IMPACT MANAGEMENT

***Impact Management Objective:* To prevent the generation of significant dust.**			
Potential impact to avoid	• Dust and wind-blown sand may arise from site during earth-moving and other construction activities. • Dust may be generated from cement batching activities. • Dust may be generated from stockpiles of earth material. • Dust may smother surrounding vegetation, and may pose a nuisance to nearby land occupants or land users.		
Impact Management Outcome	The surrounding environment, land users, residents do not experience significant dust-related impacts.		
IMPACT MANAGEMENT ACTIONS			
Mitigation measure		Responsible party	Time period
• Land clearing and earthmoving activities should not be undertaken during strong winds, where possible. • Cleared areas should be provided with a suitable cover as soon as possible, and not left exposed for extended periods of time. • Stockpiles of topsoil, spoil material and other material that may generate dust must be protected from wind erosion (e.g. covered with netting, tarpaulin or other appropriate measures. Note that topsoil should not be covered with tarpaulin as this may kill the seedbank). • The location of stockpiles must take into account the prevailing wind direction and should be situated so as to have the least possible dust impact to surrounding residents, road-users and other land-users. • Speed limits must be enforced in all areas, including public roads and private property to limit the levels of dust pollution. • The speed limit should be set at 20-40km/h. • Dust must be suppressed on access roads and the construction site during dry periods by the regular application of non-potable water or a biodegradable soil stabilisation agent. Water used for this purpose must be used in quantities that will not result in the generation of excessive run off. • Dust suppression measures such as the wetting down of sand heaps as well as exposed areas around the site must be implemented especially on windy days. • The use of straw worked into the sandy areas may also help and the ECO must advise when this is necessary. • If dust appears to be a continuous problem the option of using shade cloth to cover open areas may be necessary or the erecting of shade netting above the fenced off are may need to be explored.		Contractor	Construction phase

• All vehicles transporting sand need to have tarpaulins covering their loads which will assist in any windblown sand occurring off the trucks. • Work on site must be well-planned and should proceed efficiently so as to minimise the handling of dust generating material. • Material loads should be properly covered during transportation. • Dust levels specified in the National Dust Control Regulations (GN 827 of November 2013) may not be exceeded. i.e. dust fall in residential areas may not exceed 600mg/m2/day, measured using reference method ASTM D1739; • A Complaints Register must be available at the site office for inspection by the ECO of dust complaints that may have been received.		
Performance Indicator	• Excessive dust does not arise from the site. • No dust complaints are received from any member of the public. • There is no evidence that vegetation surrounding the site is being smothered by dust.	

11. Environmental Impact Management: Post Construction Rehabilitation Phase & Operational 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 be rehabilitated and access must be restricted from the public.

The environmental management objectives (goals) for this phase are:

- Rehabilitate & stabilise disturbed areas, and ensure environmentally sensitive closure of the construction sites.
- Maintain ecological corridor free of alien vegetation.

11.1 OBJECTIVE 1: SITE CLOSURE & REHABILITION

***Impact Management Objective:* To rehabilitate all areas disturbed by construction activities in an environmentally sensitive manner.**		
Potential impact to avoid	• Failure to remove all construction related waste and materials may result in environmental pollution. • Failure to remove all construction related equipment, machinery and site facilities may pose an impact to the natural environment specifically the watercourses. • Failure to stabilise disturbed surfaces may result in soil erosion and increased storm water run-off, which may limit successful revegetation of the site.	
Impact Management Outcome	• The site is neat and tidy and all exposed surfaces are suitably covered/ stabilised. • There is no construction-related waste or pollution remaining on site.	
IMPACT MANAGEMENT ACTIONS		
Mitigation measure	Responsible party	Time period
• 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. • Surfaces are to be checked for waste products from activities such as concreting or asphalting and cleared in a manner approved by the ECO. • Any contaminated soil must be collected and disposed of as hazardous waste. • 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. • Burying or burning of waste or rubble on site is prohibited. • 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 should be scarified or ripped.	Contractor / 3MP Sales and Education Services	Rehabilitation phase

• 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). • 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. • Erosion features that have developed due to construction within the aquatic habitat due to the project are required to be stabilised. This may also include the need to deactivate any erosion headcuts/rills/gullies that may have developed. • 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. • 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. • Disturbed soils must be revegetated with the local indigenous vegetation such as that which occurs at the site ,or provided with other suitable cover. • Erosion features that have developed due to construction within the aquatic habitat due to the project are required to be stabilised. • The following mitigation measures proposed by the Freshwater Specialist should be implemented: o The area must be maintained through alien invasive plant species removal (which is the landowner's responsibility regardless of mitigation associated with this project) and the establishment of indigenous vegetation cover to filter run-off before it enters the freshwater habitat. An Alien Invasive Species Management Plan has been compiled for the proposed development. All management, control, and eradication of alien invasive plant species must be undertaken in accordance with the approved Alien Invasive Species Management Plan(Appendix D) o The solid domestic waste must be removed and disposed of offsite. All post-construction building material and waste must be cleared in accordance with the EMPr. o Removal of vegetation must only be when essential for the continuation of the project. Do not allow any disturbance to the adjoining natural vegetation cover or soils.		

o Erosion features that have developed due to construction within the aquatic habitat due to the project are required to be stabilised. This may also include the need to deactivate any erosion headcuts/rills/gullies that may have developed. o It is the contractor's responsibility to continuously monitor the area for newly established alien species during the contract and establishment period, which if present must be removed. Removal of these species shall be undertaken in a way which prevents any damage to the remaining indigenous species and inhibits the re-infestation of the cleaned areas. o Alien/ invasive species shall not be stockpiled, they should be removed from site and dumped at an approved site. o 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. o A monitoring programme shall be in place, not only to ensure compliance with the EMPr throughout the construction phase, but also to monitor any post-construction environmental issues and impacts such as increased surface runoff. The monitoring should be regular and additional visits must be taken when there is potential risk to watercourses. o The stormwater management infrastructure must be designed to ensure the runoff from the development is not highly concentrated before entering the buffer area. The volume and velocity of water must be reduced through discharging the surface flow at multiple locations surrounding the development, preventing erosion. o Any evidence of erosion from this stormwater system must be rehabilitated and the volume/velocity of the water reduced through further structures and/or energy dissipaters. These structures must be incorporated within the layout area. o The recommended use and maintenance of grease traps/oil separators to prevent pollutants from entering the environment from stormwater. o Appropriate waste water infrastructure must be designed to prevent any such water from entering the surrounding environment. o Maintenance of the freshwater habitat and buffer area must be implemented for it to remain effective. Apart from erosion control and alien invasive plant eradication, the encroachment of any further infrastructure or vehicles must be prevented.		

o Engage with the homeowners to explain the reasons why the buffer and the water resources are protected and what human activities are allowed. Encourage recreational activities within the buffer area that are not in conflict with water resource management. The community could be involved in the monitoring e.g. the packaging plant effluent.		
Performance Indicator	• All construction-related materials, equipment, facilities, waste and contaminated soils have been removed from the site. • Compacted soils have been scarified/ ripped and stabilised. • All disturbed/exposed surfaces have been provided with a suitable covering and/or stabilised. • No alien vegetation is evident on site.	

11.2 OBJECTIVE 2: MAINTAIN ECOLOGICAL CORRIDOR FREE OF ALIEN VEGETATION.

Impact Management Objective: ***Maintain ecological corridor free of alien vegetation.***		
Potential impact to avoid	• Spread of alien vegetation within the ecological corridor.	
Impact Management Outcome	• Alien vegetation is eradicated within the ecological corridor	
IMPACT MANAGEMENT ACTIONS		
Mitigation measure	Responsible party	Time period
• An Environmental Control Officer will oversee compliance with all the prescribed environmental requirements and mitigation measures listed here, and will be on site regularly. • Alien plants must be removed from the site as per NEMBA requirements. • A suitable weed management strategy to be implemented in construction and operation phases to eradicate and control regeneration. An alien management plan has been compiled(Appendix D)	Developer	Operational phase
Performance Indicator	• No alien vegetation is evident in the ecological corridor.	

12. Emergency Preparedness

12.1 Emergency response procedures

The potential environmental risks that may arise as a result of construction activities, or during the maintenance of the structures 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 identifying potential significant environmental risks that may arise as a result of pre-construction, construction and rehabilitation activities, and the contractor must formulate emergency response procedures for these potential incidents.
- The ECO, the contractor and the Holder are responsible for ensuring that all construction workers are aware of the emergency procedures, and are properly trained on how to identify and respond to an emergency incident during construction.
- An emergency procedure must clearly indicate who will take charge during an emergency, and the roles and responsibilities of workers and authorities during an emergency.
- 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 Holder is responsible for ensuring compliance with the OHSA during the undertaking of maintenance 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 operational 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 and maintenance activities (see section 8.3).
- 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. During the operational phase of the development, the Holder is responsible for notifying the relevant authorities of any pollution incidents that arise as a result of maintenance activities.
- 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.

13. Method statements

The Competent Authority and/or the ECO may require the Holder 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 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.
- Fire Control & Fire Emergency Plan.
- Emergency preparedness plan / emergency response procedure (see Chapter 14).
- Post-construction rehabilitation.

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

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

The Holder 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 environment"*

14.1 Duties and Responsibilities of the Holder

The Holder 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 and operational phase (maintenance activities) of the proposed development.

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

The Holder or appointed consultant is responsible for identifying emergency situations that may arise during operational and maintenance activities, 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 Holder. 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.
- 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.
- 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.
- 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 (maintenance) phase of the development.

14.3.1 Competency of the ECO

The ECO must be independent of the Holder, 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 must 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.

14.3.2 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);
- Conduct environmental awareness training;
- 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;
- Evaluate the achievement of the performance indicators associated with each impact management objective specified in this EMPr;
- 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 Holder and contractor in remaining compliant with these measures;
- Assist in finding environmentally acceptable solutions to construction problems;
- Ensure that the working areas, 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, where required;
- Recommend additional environmental protection measures, should this be necessary;
- Furnish contractors with verbal warnings in case of contravention of the EMPr;
- Recommend that the competent authority furnish errant contractors with predetermined fines, when verbal and / or written warnings are ignored;
- 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 Holder, 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 Holder and Competent Authority.

14.3.3 Frequency of ECO visits

The ECO must conduct two site visits every month during the initial site clearance and Civil services installations of the construction phase. Once the site footprint has been established and bulk earthworks are completed the ECO may reduce the frequency of visits to once per month.

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 after 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.

14.3.4 Authority of the ECO

The ECO has the authority to recommend to the authorities that they 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 issue instructions to the Construction Contractor and/or Holder, 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 Competent Authority to issue pre-determined fines or other penalties.

The ECO has the authority to report incidents of non-compliance to the Competent Authority at any time.

15. Environmental Awareness Plan

Environmental Awareness Training must be conducted prior to the commencement of construction activities. It is the holder's responsibility to familiarise himself/herself with the content and requirements of this EMPr. The holder 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 Holder's environmental representative who must be on site at all times.
5. The ECO to conduct frequent site visits.

6. Monthly monitoring reports to be compiled by the ECO. These reports will be circulated to all parties involved (including the holder, 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.

16. Monitoring, Record Keeping and Reporting

16.1 Environmental Auditing

In accordance with the requirements of the Environmental Impact Assessment Regulations, 2014 (as amended), the holder of the Environmental Authorisation 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 holder is responsible for appointing, managing and remunerating the appointed auditor. The auditor may not be the appointed Environmental Control Officer (ECO), or the EAP.

The appointed auditor must undertake regular environmental audits, at a recommended frequency of every 6 months. Following each audit the environmental auditor must submit an audit report to the Competent Authority (in this instance the DEA&DP).

- Environmental auditing and environmental audit reports must adhere to the requirements of the amended 2014 Environmental Impact Assessment Regulations, in particular Section 34 (*Auditing of Compliance with Environmental Authorisation, Environmental Management Programme*) and (*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 Holder and to the Competent Authority is so requested by that authority. The ECO inspection reports must include both photographic and written records.

16.2.1 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 must be taken at these sites during each ECO inspection. Where necessary, the entire working area must be well documented and photographed.

16.2.2 ECO Inspections - Written Records

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

- The ECO must complete an ECO Checklist after each ECO site visit.
- The ECO must compile an ECO monitoring report and submit this to the Holder, 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 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 must 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 must be clearly documented and filed on a master file off-site for safe keeping.
- It is recommended that a site register (incident register) 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 must also be recorded.

- A complaints register must be kept on site in which complaints by any member of the public must be logged.
- The ECO must compile a final post-construction audit report, within 6 months of completion of each 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.

16.2.3 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 Holder for a period of at least 5 years, and must be provided to the Competent Authority upon request. Attached as Appendix 6 find the Environmental Authorisation.

17. Penalties, Claims and Damages

The contractor will be responsible for all costs incurred in the rehabilitation of the site and for ensuring that all procedures required to rehabilitate the site are implemented. If third parties are called to the site to perform clean up and rehabilitation procedures, the contractor will be responsible for all costs. The competent authority may impose penalties on the Holder or any of the contractors if conditions contained in this EMPr are contravened. This would be based on an agreement or contract between the Holder and the contractor.

Penalties could be imposed In terms of Chapter 11 of the Western Cape Bill on Planning and Development as published in the Extraordinary Provincial Gazette No 5183, 3 October 1997, and would be applicable for any action which leads to damage to the natural environment. Please note that the payment of any fines in terms of the contract shall not absolve the offender from being liable from prosecution in terms of any law.

In cases where severe environmental damage occurs, the competent authority law enforcement division may take legal action against the responsible parties. The reasons for this could include, among others:

- Not implementing the conditions of the EMPr;
- Spillage that result in environmental damage;
- Incorrect handling and storage of construction materials and chemicals;
- Sensitive areas that are not clearly demarcated;
- Performing ablutions in areas other than facilities provided for such actions; and
- Occurrence of unattended and out of control fire.

With specific regard to the excavations through the forested area the following will apply. The contractor will be responsible to pay the following penalties should indigenous trees or vegetation which are in no go areas or being protected by barrier or danger tape be damaged by anyone under his/her employ.

The Contractor shall comply with the environmental specifications and requirements on an ongoing basis and any failure on his part to do so will entitle the ECO to issue the contractor with penalty / fine as described in the following section.

The following fine structure shall apply:

Any vehicles, plant, or thing related to the Contractors operations within the designated boundaries of a "no-go" area	**R 1,000.00**
Any vehicle being driven, and items of plant or materials being parked or store outside the demarcated boundaries of the site	**R 1,000.00**
Persons walking outside the demarcated boundaries of the site	**R 100.00**
Persistent and un-repaired oil leaks from machinery. The use of inappropriate methods of refuelling such as the use of a funnel rather than a pump	**R 1,000.00**
Littering of site by individuals	**R 250.00**
Deliberate lighting of illegal fires on site	**R 1,000.00**
The eating of meals on site outside the defined eating area. Individual not making use of the site ablution facilities	**R 250.00**
No on-site implementation of waste management system.	**R 1000.00**
Waste not collected and contained immediately.	**R 1000.00**
No recycling of waste.	**R 1000.00**
Burning, burying or disposing of waste other than as prescribed.	**R 1000.00**
Waste not disposed of at an approved landfill.	**R 1000.00**
Chemicals and / or waste spilled on ground.	**R 250.00**
Use of other areas for toilet purposes and / or disposal of chemicals / waste.	**R 250.00**
Stockpiling of soil in an unspecified area.	**R 2500.00**
Stockpiles not located and aligned so as to minimise impacts.	**R 2500.00**
Spilling of soil or construction material into water body or stream.	**R 1000.00**

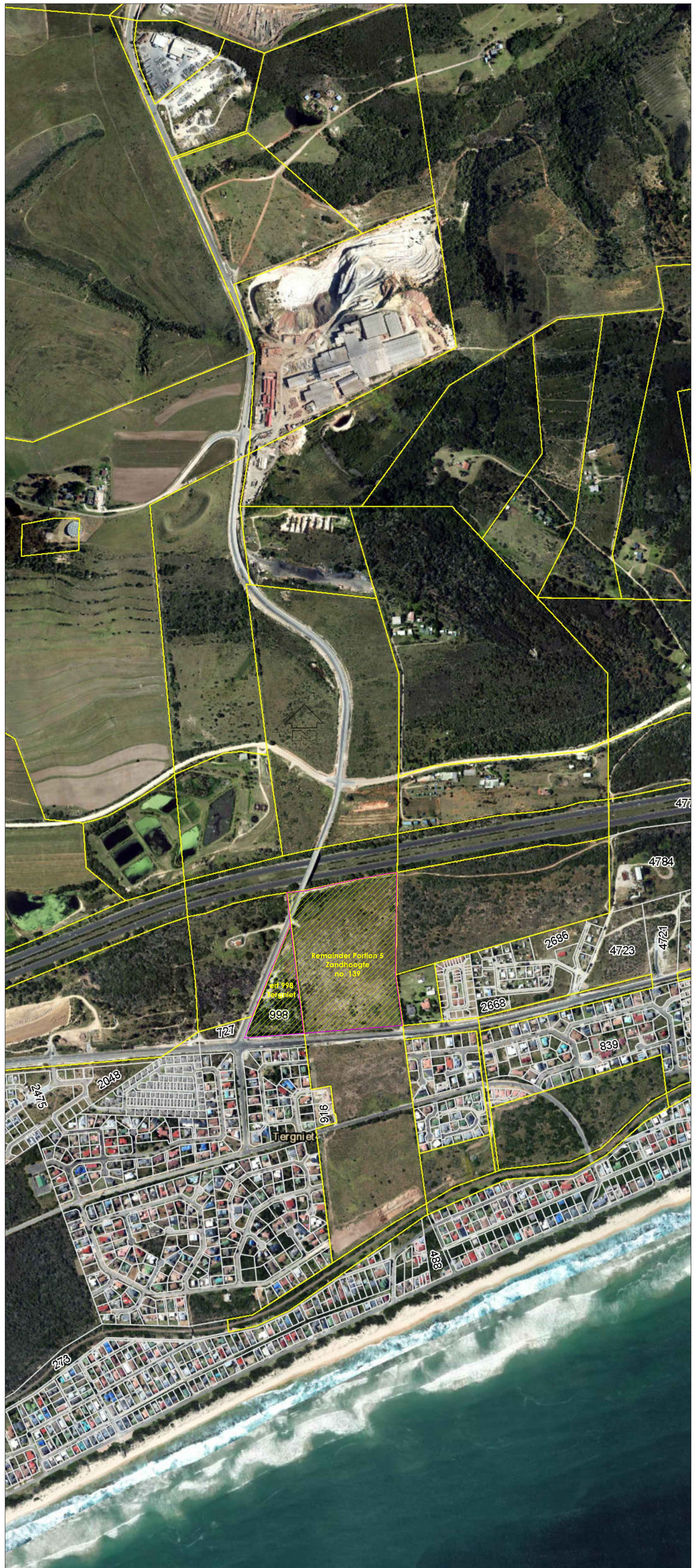
Table 2:Offences that may constitute a fine.

The above does not absolve the transgressor from being prosecuted in terms of the ***National Environmental Management Act (Act 107 of 1998)*** which may result in further penalties and other actions by State Departments.

18. Conclusion

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.



Locality Plan (n.t.s)

1 : 1000

Subdivision Plan

Consolidation of erf 998 and Remainder Portion 5 of the Farm Zandhoogte no. 139

Application for Consolidation, Rezoning and Subdivision

1. Application is made in terms of Article 15 (2)(e) of the Mossel Bay Municipality Zoning Scheme By-Law, 2021, to **consolidate Remainder Portion 5 of the Farm Zandhoogte no. 139** (2 portions marked as figures A, B,C,D,E,F, G & H and a,b & c), **8.3676ha** in size and **Erf 998, Tergniet** (figuur F, G & H), **1.8684ha** in size.

2. Application is made in terms of Article 15(2)(a) for **rezoning** of the consolidated erf from Argiculture Zone I (AZI) to a subdivisional area to allow the following:

* **2 Business Zone I (BZI)** erven with a total size of 2.604 ha,
* **1 Business Zone IV (BZIV)** erf with a size of 0.268 ha,
* **1 Community Zone III (CZIII)** erf with a size of 0.527 ha,
* **1 Mixed Use Zone II (MZII)** erf with a size of 0.902 ha,
* **2 Open Space Zone II (OSZII)** erf with a size of 1.225 ha,
* **1 General Residential Zone II (GRZII)** erf with a size of 0.697 ha,
* **1General Residential Zone III (GRZII)** erf with a size of 0.653ha,
* **2 Transport Zone II (TZII)** one erf with a size of 1.3360 ha and Remainder erf 998, Tergniet - size 0.0240ha
* **1 Split zone erf** consisting of a portion **Business Zone I (BZI)** with a size of 1.0ha and a portion **Open Space Zone II (OSZII)** with a size of 1.0ha,

3. Application is made in terms of Article 15 (2)(d) for the **subdivision** of the subdivisional area into the following erven:

* **portions 1 & 9:** Business Zone I (BZI) erven,
* **Remainder Portion 5:** Business Zone IV (BZIV) erf
* **portion 2:** Community Zone III (CZIII) erf
* **portion 7:** Mixed Use Zone II (MZII) erf
* **portion 4 & 11:** Open Space Zone II (OSZII) erf
* **portion 3:** General Residential Zone II (GRZII) erf
* **portion 6:** General Residential Zone III (GRZII) erf
* **portion 10 & 12:** Transport Zone II (TZII)
* **portion 8:** Split zone erf consisting of a portion Business Zone I (BZI) and a portion Open Space Zone II (OSZII)

4. Application is made in terms Section15(2)(d) of the Land Use Planning By-law for Mossel Bay Municipality, 2021 for the **cancellation of the following two servitudes**:

* the electrical transmission servitude running in an east/west direction over Erf 998 Tergniet and the Remainder of Portion 5 of the Farm Zandhoogte 139; and
* the 5-metre-wide sewer servitude located along the western boundary of the Remainder of Portion 5 of the Farm Zandhoogte 139.

5. Application is made in terms Section15(2)(d) of the Land Use Planning By-law for Mossel Bay Municipality, 2021 for the **registration of the following two servitudes**:

* a 5-metre-wide general right of way servitude along the eastern boundary of Portion 1 in favour of Portion 11; and
* a 5-metre-wide general right of way servitude along the western boundary of Portion 2 in favour of Portion 11.

6. Site survey:

6.1 Site survey done by WJ Marais (Reg no. S0691) Topographic and Engineer's Surveyor, 13 Cypress, Street, George.
6.2 Contour intervals: 1.0m

7. Servitudes:

7.1 Water line servitude - 5m wide northern side of the southern erf boundary (of the consolidated erf.
7.2 Sewer line servitude - 6m wide - south of the northern erf boundary (of the consolidated erf)
5.3 Sewer line servitute - 5m wide - eastern boundary of the line A, I and G.
7.4 Power line servitude - 20m wide - along the southern boundary - partly inside an partly outside the boundary line.
7.5 Power line (orange line) across the middle of the consolidated erf east to west - installed underground in the 25m road reserve.
7.6 A **40m wide no-go conservation buffer area** - portion 11.
7.7 A **5m wide right of way serwitude**, shown as **figure a,b, c& d**, to be registered over **portions 1** and a **5m wide right of way serwitude**, shown as **figure b, e, f & c**, to be registered over **portions 2** to give future access to portion 11.

Table

Zoning	Colour Notation	Size (ha)	%
Business Zone I (BZI)		3.604	35.21
Business Zone IV (BZIV)		0.268	2.62
Community Zone III (CZIII)		0.527	5.15
Mixed Zone II (MZII)		0.902	8.81
Open Space II (OSZII)		2.225	21.74
General Residential Zone II (GRZII)		0.697	6.81
General Residential Zone III (GRZIII)		0.653	6.38
Transport Zone II (TZII)		1.360	13.29
Total		10.236	100

Legend:

8	portion number
0.687ha	portion size (ha)

Amendments:

Date:	Description:
5-11-2022	* changes - erf sizes and road layout
25-01-2023	* power line serwituut - removed - change notes
20-11-2023	* changes - erf sizes and road reserves * add 10m wide conservation zone servitute * changes to all the tables and notes added
04-03-2024	* new layout - subdivision plan
30-03-2024	* changed to subdivision plan
8-04-2024	* changed to tabel - sizes portions 10and 12 *add wording - applications - points 4 and 5

Owner:		Signature:
		Design:
Design Centre and Associates:		Checked:
Reference no.:	2213	Scale: 1:1000 & n.t.s.
Date:	08 - 04 - 2024	Drawing no.: 2213-01 g
Stage:		

Client:
3M Sales and Education Services CC

Project Description:
Proposed Consolidation of erf 998, Tergniet and Remainder Portion 5 of the Farm Zandhoogte no. 139 Rezoning and Subdivision

Project name:
Dolfin Circle

Drawing Description:
Consolidation, Rezoning and Subdivision Plan
Locality Plan

Design Centre
creating meaningful work
Design Centre and Associates
Architecture, Interior Design, Town Planning & Landscape Design
p.o. box 7 molendrift 6537 - cell no.. 083 599 2882
Email: pieterdesigncentre@gmail.com

GEORGE
TEL: +27 (0) 44 873 4923 **FAX:**+27 (0) 44 874 5953
EMAIL: info@sescc.net **WEBSITE:** www.sescc.net
ADDRESS: 102 Merriman Street, George, 6530
PO BOX: 9087, George, 6530

CAPE TOWN
TEL: +27 (0) 21 554 5195 **FAX:**+27 (0) 86 575 2869
EMAIL: lauren@sescc.net **WEBSITE:** www.sescc.net
ADDRESS: Unit 71, Eden on the Bay, 5 Beach Estate Boulevard
Blouberg, Big Bay, 7441
PO BOX: 443, Milnerton, 7435

ENVIRONMENTAL AWARENESS TRAINING BOOKLET

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 Zangasese:

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 BESOEDELING VAN STROME & WATERKANALE.
OMAWUKWENZE : NQANDA USULELEKO OKANYE UNGCOLISEKO LWEMILAMBO NEMISELE YAMANZI.

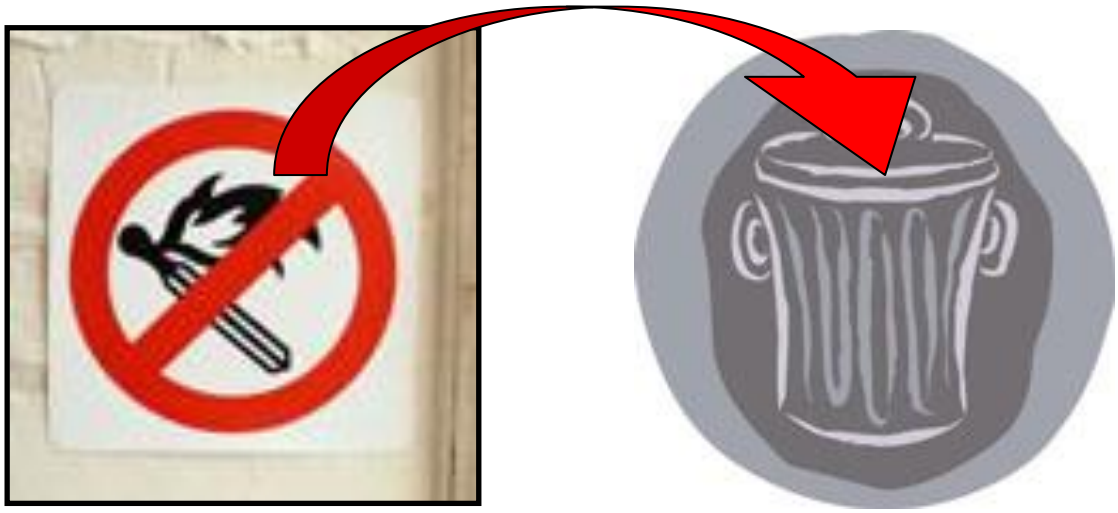
DO NOT:
ALLOW WASTE, LITTER, OILS OR FOREIGN MATERIALS INTO THE STREAM
MOENIE:
TOELAAT DAT AFVALPRODUKTE, GEMORS, OLIES OF VREEMDE MATERIALE IN STROME BELAND NIE.
OMAWUNGAKWENZI: MUSA UKUVUMELA INCITHO, ULAHLO, IOYILE OKANYE EZINYE IZINTO EMILANJENI.

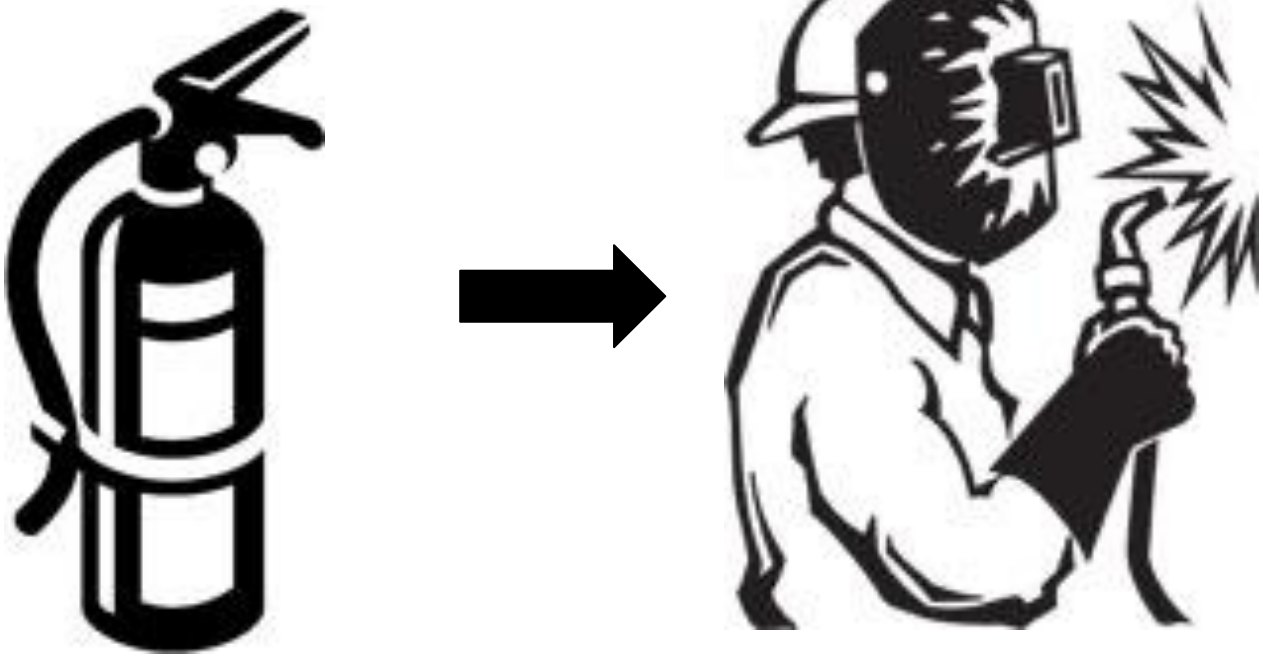
Fire Control:
Vuur Beheer:
Ulawulo Lemililo:

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 Nemimanndla 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 EBIYIWEYO 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.


SLOW


PPC

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.


GLASS
CARDBOARD
PAPER

CURRICULUM VITAE

MICHAEL JON BENNETT

PERSONAL

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

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

2010 University of Cape Town

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

PROJECTS

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, Klaarstroom, Prince Albert, Western Cape

2021 Mossel Bay Mossel Bay Municipality

- Basic Assessment Report for the proposed Dana Bay Emergency Access Road on Remainder of Portion 7 of the Farm 225, Dana Bay, Mossel Bay, Western Cape

2021 Willowmore LEZMIN 2087cc

- Basic Assessment Report for the proposed development of Portion 1 of the Farm Matjiesfontein No. 206, Baviaanskloof, Division Willowmore, Eastern Cape

2020 Sedgefield Knysna Municipality

- Basic Assessment Report for the proposed housing development on erven 3861, 3865, 3866, 3917, 3918 and 5010 in Sedgefield, Knysna, Western Cape

2020 Mossel Bay Paprenax Trading 6 cc

- Basic Assessment Report for the proposed establishment of a filling station and associated business infrastructure on a portion of erf 13996, Kwanonqaba, Mossel Bay, Western Cape

2020 Ladismith Department of Transport and Public Works

- Maintenance Management Plan for the periodic maintenance of Trunk Road 31, section 4, km 30.8 to km 76.06, Barrydale to Ladismith, Western Cape

2020 Knysna Knysna Municipality

- Maintenance Management Plan for the Maintenance of the potable water pipeline system on Erven 4197, RE/1352, RE/1351, RE/1146 and 1316 in Knysna, Western Cape

2020 Humansdorp Kouga Municipality

- Environmental Control Officer for the Phase 1A of New municipal 66kV double circuit overhead line between the Melkhout substation at Humansdorp and the main intake substation at Jefferys Bay, Eastern Cape

2020 Humansdorp Kouga Municipality

- Environmental Control Officer for the Construction of a new 22kv overhead powerline between Melkhout substation and Allison Street, Humansdorp, Eastern Cape

2020 Knysna Knysna Municipality

- Environmental Control Officer for the Charlesford raw water pumping scheme: Upgrade and refurbishment of pumpstation: Mechanical and electrical, Knysna, Western Cape

2020 Seweweekspoort, Department of Transport & Public Works

- Amendment of Environmental Authorisation (Part 2, Substantive amendment) for the flood damage repairs to road structures on MR309 in Seweweekspoort, Western Cape

2019 – 2021 Seweweekspoort, Department of Transport & Public Works

- Environmental Control Officer for the flood damage repairs to road structures on MR309 in Seweweekspoort, Western Cape

2019 George George Municpality

- Environmental Control Officer for the Raising of the Garden Route Dam Spillway on Portion 3/352, Remainder of 536 of Erf 221, Erf 3055 and Erf 3056, George, Western Cape

2019 Laingsburg Department of Agriculture

- Environmental Control Officer for the Construction Of Erosion Prevention Structures Within The One In Ten Year Flood Line Of The Buffels River, Laingsburg, Western Cape

2019 Williston Williston Municipality

- Environmental Control Officer for the Upgrading of bulk water network in Williston – Phase 3, Williston, Northern Cape

2019 George George Municipality

- Environmental Control Officer for the construction of new 66kV overhead line between Ballots Bay and Glanwood substations, George, Western Cape

2019 Oudtshoorn Department of Transport & Public Works

- Environmental Control Officer for the Periodic maintenance of Trunk Road 31, Section 6, km 23.3 to km 47.8 Calitzdorp to Oudtshoorn, Western Cape

2019 Kleinbrak Mossel Bay Municipality

- Environmental Control Officer for the Upgrading of Beyers Street, Klienbrak River, Western Cape

2019 George Outeniqua Eye Clinic Body Corporate

- Environmental Control Officer for the proposed expansion of parking area on erf 5950 and part of remainder erf 464, George, Western Cape

2019 Mossel Bay Hey Innovations

- Basic Assessment Report for the proposed establishment of a residential development on Erf 2839, Great Brak River, Western Cape

2019 Oudtshoorn Oudtshoorn Municipality

- Environmental Management Programme for the Blossoms Emergency Supply Scheme, Oudtshoorn, Western Cape

2019 Humansdorp Clinkscales 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 Environmetnal 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 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 Rheebok

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 Blaauwtjes Drift 110 in Oudtshoorn

2015 - 2016 Gouritz Department of Transport & Public Works

- Environmental Control Officer for the repair and maintenance of the Gouritz River Bridge bank protection along the R325 near Gouritzmond

2015 - 2016 Albertinia Garden Route Game Lodge (Pty) Ltd

- Environmental Control Officer for the five new units at the Garden Route Game Lodge

2015 - 2016 Mossel Bay Element Consulting Engineers

- Environmental Control Officer for the replacement of 22kV overhead powerline between Power Town and Hartenbos and between Hartenbos and the Hartenbos sewage substation

2014 - 2016 Plettenberg Bay Chauke Quanity 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

GEORGE
TEL: +27 (0) 44 873 4923 **FAX:** +27 (0) 44 874 5953
EMAIL: info@sescc.net **WEBSITE:** www.sescc.net
ADDRESS: 102 Merriman Street, George 6530
PO BOX: 9087, George , 6530

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

ALIEN AND ECOLOGICAL CORRIDOR MANAGEMENT PROGRAMME

FOR THE

REMAINDER OF PORTION 5 OF THE FARM ZANDHOOGTE 139, TERGNIET WESTERN CAPE PROVINCE.

PREPARED FOR: 3MP Sales and Education Services **DATE:** 3 March 2026

DEADP REF NO: 16/3/3/1/D6/35/0008/26

Submitted to: Stiaan Kotze

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DOCUMENT DETAILS

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DETAILS OF PERSONS WHO COMPILED THIS DOCUMENT:

Role:	Name:	E-Mail Address:	Qualifications:
Author:	Michael Bennett	michael@sescc.net	• B.Sc. Environmental and Geographical Sciences, Ocean and atmospheric Science (UCT) • EAPASA # 2021/3163
Candidate EAP	Onela Mhobo	onela@sescc.net	• BSc Environmental Science • Bsc Honours Environmental Management • EAPASA #2022/4522

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 **(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 Environmental Practitioner)**
Onela graduated from the University of South Africa completing her BSc honors degree in Environmental Management and also holds a BSc in Botany and Geography from the Nelson Mandela University. She is well versed in the technicalities associated with Monitoring.

1. Introduction

Sharples Environmental Services cc (SES) has been appointed *the MP3 SALES AND EDUCATION SERVICES,* to facilitate an Invasive Alien Plant Control Plan (ACP) in terms of the National Environmental Management: Biodiversity Act (NEM:BA, Act 10 of 2014) for the property.

2. About this Alien and Ecological Corridor Management Programme

A recommendation from the Terrestrial Biodiversity Assessment was to compile an Alien Invasive Plant Management Plan as part of the final Environmental Management Plan (EMPr). The objective of this plan is to include mitigation measures to prevent the infestation of Alien Invasive Plant Species (AIPS) in the project area and ensure that continuous monitoring and removal of AIPS is undertaken.

This report presents the site-specific Alien Invasive Plant Management Plan for the construction of a mixed- use development on ERF 998 and Portion 5 of the farm Zandhoogte No. 139 (Portion of RE.139), Tergniet, Mossel Bay , Western Cape(hereafter referred to as 'the project') and has been compiled in accordance with the National Environmental Management: Biodiversity Act 2004 (Act No. 10 of 2004): Alien and Invasive Species Regulations (2014 and subsequent 2020 amendments). The layout of the report is based on the Guidelines for Monitoring, Control and Eradication Plans (DEA, 2015).

3. Background and Location of the activity

3.1 Background and description

The property is situated on Erf 998, Tergniet, approximately 22 km's north-east of the Mossel Bay town.
It has the proposed project footprint around 10.6 hectares in size and situated between the town of Groot Brakrivier and coastal village, Tergniet. The site is bordered by the provincial road R102, the N2 National Highway and a municipal road, Old Mossel Bay Road (Figures 1 and 2). The R102, which immediately borders and runs parallel to the site's southern fenceline, is a major regional road connecting various coastal towns. Old Mossel Bay Road runs immediately adjacent and parallel to the site's eastern border and is one of the major access roads between Groot Brakrivier and Tergniet and connects the rural communities further inland to the town and coastal villages. The N2 runs adjacent and parallel to the site's northern border.

The site is located in a semi transformed strandveld environment in the southern Cape coastal region. The 2018 Vegetation Map of South Africa classifies the vegetation type found here as Hartenbos Dune Thicket. The latter is currently listed as Endangered1. It is described as "a mosaic of low (1-3 m) thicket, occurring in small bush clumps dominated by small trees and woody shrubs, in a mosaic of low (1-2 m) asteraceous fynbos. Thicket clumps are best developed in fire-protected dune slacks, and the fynbos shrubland occurs on upper dune slopes and crests". The northern-western part of the site harbours thick stands of alien and invasive plants.

Figure 1: Locality Map

Figure 2: Site to be managed.

This control plan will assist in the long-term managing of alien vegetation and subsequent re-growth on the property.

4. Legal Framework

The management of invasive alien plant species within the proposed development area is governed by the following key legislation and policy instruments:

- National Environmental Management: Biodiversity Act (Act 10 of 2004) (NEM:BA), in particular Section 76, which requires organs of state and landowners to control and eradicate listed invasive species.
- Alien and Invasive Species Regulations (2014, as amended), which prescribe control obligations based on species category.
- Conservation of Agricultural Resources Act (CARA) (Act 43 of 1983), where applicable to listed weed and invader species.
- The constitution of South Africa

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".

In South Africa, there are two main laws governing the control, eradication, purchasing and trading of Alien Invasive Plant (AIP) species, namely the Conservation of Agricultural Resources Act (CARA) (Act No. 43 of 1983) and the National Environmental Management: Biodiversity Act (NEM:BA) (Act No. 10 0f 2004). All landowners have a responsibility and legal liability to control AIPs on their land.

THE CONSERVATION OF AGRICULTURAL RESOURCES ACT (ACT NO. 43 OF 1983)

The Conservation of Agricultural Resources Act (CARA) (Act No. 43 of 1983) was promulgated in 1984 and amended in 1985 and again in 2001. The Act intends to provide for control over the utilization of the natural agricultural resources of the Republic, to promote the conservation of the soil, the water sources, and the vegetation, and the combating of weeds and invader plants. CARA includes a list of 198 species which are classified as weeds or invader plants according to three categories:

- Category 1: Invader plants must be removed & destroyed immediately. No trade in these plants.
- Category 2: Invader plants may be grown under controlled conditions in permitted zones. No trade in these plants.
- Category 3: Invader plants may no longer be propagated or sold. Existing plants do not need to be removed.

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 Alien and Invasive Species Lists (2020) published under the National Environmental Management: Biodiversity Act (NEM:BA) (Act No. 10 of 2004) includes a list of 383 plant species which are assigned to one of four categories:

- Category 1a: Invasive Species that must be combatted or eradicated. A person in control of land with a Category 1a Listed Invasive Species must:
    - Immediately take steps to combat or eradicate listed invasive species.
    - Allow authorised officials to inspect the property to monitor, assist with or implement the combatting or eradication of the listed invasive species.
    - If an Invasive Species Management Programme has been developed, a person must combat or eradicate the listed invasive species in accordance with such a programme.
- Category 1b: Invasive Species must be controlled.
    - If an Invasive Species Management Programme has been developed, a person must control the listed invasive species in accordance with such a programme.
    - A property owner must allow an authorised official to inspect a property to monitor, assist with or implement the control of listed invasive species or compliance with the Invasive Species Management Programme.
- 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

f) any other information which the Minister may require

- Category 2: Invasive Species require a permit to carry out a restricted activity within a specified area.
    - No person may carry out a restricted activity in respect of Category 2 Invasive Species without a permit.
    - A person in Control of a Category 2 Listed Invasive Species, or a 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 permit.
    - Any species listed as Category 2 that occurs outside of an area specified in a permit must be considered to be a Category 1b Listed Invasive Species and must be managed as such.
    - Any person or organ of state must ensure that Category 2 Listed Invasive 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: Category 3 listed invasive species are subject to certain exemptions in terms of section 70 (1)(a) of the NEMBA Act, which applies to the listing of alien invasive species.

- Any plant species identified as Category 3 Listed Invasive Species that occurs in riparian areas must be considered to be a Category 1b Listed Invasive Species and must be managed as such.

5. ECOLOGICAL CONTEXT AND IMPORTANCE OF THE SITE

Dr Visser was appointed to compile the terrestrial biodiversity report or 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 different habitat types within the study area:

Location	Habitat	Photo 1	Photo 2
A -34.06333, 22.18899 **B** 34.06439, 22.18978	This habitat comprises the larger part of the site and consists of deep sandy soil with remnant patches of vegetation, common grass species and a number of alien and invasive trees.		
C -34.06235, 22.1888 **D** -34.06176, 22.18984	This habitat encompasses a small section along the northern margin of the site and comprises thick an impenetrable stand of alien and invasive trees such as Port Jackson and Black Wattle. A small artificial dam is also located in the north-western part of the site (C).		

The Terrestrial Biodiversity Assessment Report confirms that although the northern margin of the site is mapped as a mix of terrestrial CBA 1 and CBA 2, the study area therefore fails to meet the criteria of these categories defined as:

CBA 1: "Areas in a natural condition that are required to meet biodiversity targets for species, ecosystems, or ecological processes and infrastructure."

CBA 2: "Areas in a degraded or secondary condition that are required to meet biodiversity targets, for species, ecosystems or ecological processes and infrastructure."

According to the Botanical Comment compiled by Mark Berry the following management of the area is recommended:

From a biodiversity network perspective, the northern side of the site encroaches on a terrestrial critical biodiversity area (CBA) and a degraded critical biodiversity area (CBA2). CBA's are defined as areas in a natural condition that are required to meet biodiversity targets, for species, ecosystems or ecological processes and infrastructure2. 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. The site forms part of an ecological link between the Groot Brak and Klein Brak Estuaries. However, the link may have been compromised by development approvals further away to the west between the R102 and the N2. There is also an unrehabilitated or active sand mine 500 m away to the west that also impacts on the link, The areas to the north and south of the site have been transform for agricultural and residential purposes. Other (probably lesser) links run along the railway line, the N2 road reserve and primary dune above the beach.

The most important management or maintenance task for the corridor would be to keep it clear of aliens. Ideally, all exotic species should be removed from the corridor. A simple alien clearing plan should suffice. It is important to note that the aliens must be cleared on an annual basis. To improve biodiversity inside the corridor, it is recommended that topsoil containing seeds of indigenous species and salvageable plants, such as *Carpobrotus spp and Aloe arborescens*, be collected from the development areas and deposited or planted inside the corridor.

Figure 3: Spatial locations of Critical Biodiversity Areas (CBAs) overlapping with the study area.

6. ALIEN INVASICE PLANTS WITHIN THE PROJECT AREA OF INFLUENCE

6.1 Identification of alien species

Table 1 below identifies the alien invasive plant species recorded in the Terrestrial Biodiversity Assessment Report (2024).

Table 1: Alien invasive plant species recorded on site

Scientific Name	**Common Name**	**NEM:BA** **Category**
Acacia mearnsii	Black Wattle	Category 2
Acacia saligna	Port Jackson	Category 1b
Acacia melanoxylon,	Australian blackwood	Category 2
Cestrum laevigatum	Ink Berry	Category 1b
psidium guajava	(Common guava)	Category 2
Schinus terebinthifolia	(Brazilian peppertree)	Category 1b

Table 2: Eradication methods

Species name	**Common name**	**Common methods**	**Source of control methodology**
Acacia mearnsii	Black Wattle	Sprouting tree Seedling • Hand pull • Foliar spray Young • Lopping / pruning with herbicide application • Removal with tree-popper Adult	Working for Water Programme. Strategic Plans and Operational Guidelines

		• Bark strip with herbicide application • Cut stump/frill with herbicide application	
Acacia saligna	Port Jackson	Seedling and coppice: hand-pull or foliar spray Young: lopping/pruning and herbicide application Adult: cut stump and herbicide application	DFFE "Best Practice Guidelines for the Control of Invasive Alien Plants WfW Contractor Operational Manuals
Acacia melanoxylon	blackwood	Sprouting tree **Seedling** • Hand pull • Foliar spray **Young** • Lopping / pruning with herbicide application **Adult** • Bark strip with herbicide application • Cut stump/frill with herbicide application	Working for Water Programme. Strategic Plans and Operational Guidelines
Cestrum laevigatum	Inkberry	Seedling Hand-pull Adult. Cut and spray	Working for Water Programme. Strategic Plans and Operational Guidelines
Schinus terebinthifoliu	Brazilian Pepper Tree	Cut Stump Foliar spray	Working for Water Programme. Strategic Plans and Operational Guidelines. DFFE.

		Basal bark application	

7. MANAGEMENT OBJECTIVES

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	• Conduct a site walk-through prior to vegetation clearing. • Identify and map all Category 1b species. • Record density and extent (GPS and photo record).
2. Control Methods	• Control methods must adhere to Section 7 of this Alien Management Plan. • 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.
3. Timing of Clearing	• Prioritise removal before seed set. • Avoid clearing during heavy rainfall periods to prevent soil erosion.
4. Disposal	All plant material must be: • Removed from site, or • Stacked and dried in a demarcated area (if safe), or • Disposed of at a registered waste facility where necessary. • No dumping in natural areas or watercourses.
5. Monitoring	• Clearing activities to be supervised by the ECO. • Monthly monitoring during construction. • Biannual monitoring post-construction (recommended for 3 years).
OBJECTIVE 2: PREVENT REGROWTH	
Regrowth is common due to seed banks and stump resprouting.	
Management Actions:	
1. Follow-Up Clearing:	• First follow-up within 6–8 weeks of initial clearing.

	• Subsequent follow-ups every 3–6 months during first year. • Thereafter annually for at least 3 years.
2. Stump Treatment:	• Immediate application of systemic herbicide to cut surfaces. • Ensure no untreated stumps remain.
3. Seed Bank Management	• Disturbed soil areas must be stabilised quickly. • Avoid unnecessary soil disturbance.
4. Record Keeping:	• Maintain register of cleared areas. • Record regrowth hotspots and treatment dates.
OBJECTIVE 3: PREVENT SPREAD TO ADJACENT NATURAL VEGETATION	
Special care must be taken to protect surrounding indigenous vegetation and aquatic buffers.	
Management Actions:	
1. Demarcation:	• Clearly demarcate approved development footprint. • No clearing outside approved areas.
2. Vehicle & Equipment Hygiene:	• Construction vehicles must arrive free of soil and plant material. • No storage of contaminated soil near natural vegetation
3. Stockpile Management:	• No stockpiling within 10–20 m of watercourses or buffers. • Prevent wind or water dispersal of seeds.
4. Stormwater Control	• Install erosion control measures. • Prevent runoff transporting invasive seeds.
5. Immediate Removal	• Any new alien growth in buffer areas must be removed immediately.
OBJECTIVE 4: RESTORE INDIGENOUS VEGETATION	
Rehabilitation reduces invasion risk and promotes ecological stability.	
Management Actions:	
1. Topsoil Management:	• Strip and stockpile topsoil separately. • Replace topsoil during rehabilitation phase.
2. Revegetation:	• Encourage natural regeneration where feasible. • Supplement with locally indigenous species if required. • Avoid planting invasive or ornamental species.
3. Erosion Control:	• Use brush packing where appropriate. • Install silt fencing and berms where necessary.
4. Rehabilitation Monitoring:	• Assess vegetation cover percentage. • Ensure no new alien dominance.
5. Success Criteria:	• No Category 1b regrowth. • Indigenous vegetation cover stabilised. • No active erosion.

OBJECTIVE 5: ENSURE COMPLIANCE WITH DFFE CONDITIONS	
The Alien Management Plan forms part of the EMPr and must comply with DFFE requirements.	
Management Actions:	
1. Integration into EMPr:	• This Alien Management Plan forms part of the approved EMPr. • Binding on the Applicant and all contractors.
2. ECO Monitoring:	• Monthly monitoring during construction. • Post-construction monitoring every 6 months for 3 years (recommended).
3. Reporting:	• Alien clearing activities to be included in ECO reports. • Non-compliance to be recorded and corrective action implemented immediately.
4. Training:	• Contractors and workers must receive environmental induction. • Awareness of listed invasive species and legal obligations.
5. Legal Compliance:	• Compliance with: o NEMBA (Act 10 of 2004) o Alien & Invasive Species Regulations o NEMA Duty of Care (Section 28)
6. Responsibility:	• The Applicant remains legally responsible for ongoing control of invasive species.

8. GENERIC ALIEN MANAGAMENT PLAN

The management approach will follow an adaptive control model comprising initial clearing, follow-up treatment, rehabilitation, and long-term monitoring.

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.

8.1 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.

8.2. 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.

8. 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.

8.3.1Mechanical 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 meters apart parallel to the contours to facilitate follow-up operations.

• Low density seedling regeneration must be hand pulled.

• Hand pulling around pockets of indigenous vegetation (1m swathe around clumps) is important so as to not damage indigenous vegetation pockets.

8.3.2 Chemical control

• Follow-up visitation no later than three months after initial operation.

• Follow-up control will be needed because soil stored seed may stay dormant in soil for up to 50 years.

• Follow-up control will involve a combination of hand pulling and foliar spraying.

• Seedlings, saplings and coppice can be foliar sprayed.

• Follow-up spray operation when sufficient regeneration has taken place.

• Blanket or foliar spray.

8.3.3 Tools

• Loppers, bow saws and chainsaws

• 12 –15 litre back pack spray units

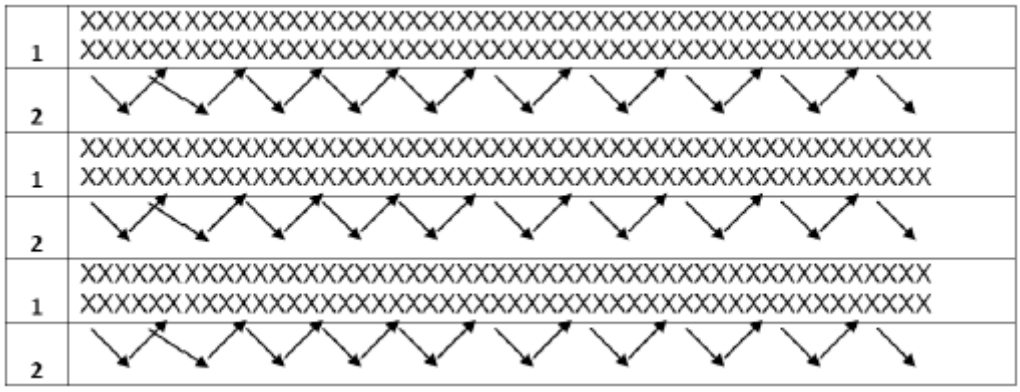
• Flat fan nozzles or solid cone and 1 bar constant flow valves.

8.3.4 Team composition

• 6 persons, each being equipped with a lopping shear, bow saw and herbicide applicator, must first sweep through the area in individual lanes 5 meters apart. These persons target all plants less than 8 cm in basal diameter, felling, stacking and applying herbicide. De-branching should only be used to facilitate stacking of larger branches.

• 2 chainsaw operators thereafter follow through these lanes felling all plants more than 8 cm in basal diameter. Two assistants are responsible for stacking and herbicide application.

• For the denser areas, methodology must follow the illustration below. All rows are five meters wide. Swathes labelled 1 must be cut first and the debris placed back into these swathes. Thereafter debris generated in swathes labelled 2, must be placed into swathes labelled 1.



8.3.5 Follow up

Once the source of the problem has been removed, namely the seed-bearing trees, it is important to follow up on any seedlings and saplings that may have grown in the interim. If this is not done the effort of the removal of the adult trees will have been wasted, as the alien vegetation problem will intensify.

9. Monitoring, Reporting and compliance

The landowner retains responsibility for invasive species control in terms of NEMBA. The appointed Environmental Control Officer (ECO) for the duration of the construction phase (and if appointment is extended to the operational phase) will monitor alien clearing during regular ECO site inspections. Progress can be measured against the alien clearing Any contravention must be reported to the Competent authority (DFFE: Biosecurity).

Phase	Activity	Timeframe	Responsibility
Construction Phase	Initial clearing	Construction duration - ongoing	Contractor (Implement) ECO (Audit)
Post Construction Rehabilitation Phase	Follow up clearing and rehabilitation	3 months post construction	Contractor (Implement) ECO (Audit)

Monitoring Phase	Annual monitoring	1-3 years post construction	Contractor

9. Responsibilities

Applicant – MP3 SALES AND EDUCATION SERVICES

Mp3 Sales and Education Services, 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

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

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

2010 University of Cape Town

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

PROJECTS

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, Klaarstroom, Prince Albert, Western Cape

2021 Mossel Bay Mossel Bay Municipality

- Basic Assessment Report for the proposed Dana Bay Emergency Access Road on Remainder of Portion 7 of the Farm 225, Dana Bay, Mossel Bay, Western Cape

2021 Willowmore LEZMIN 2087cc

- Basic Assessment Report for the proposed development of Portion 1 of the Farm Matjiesfontein No. 206, Baviaanskloof, Division Willowmore, Eastern Cape

2020 Sedgefield Knysna Municipality

- Basic Assessment Report for the proposed housing development on erven 3861, 3865, 3866, 3917, 3918 and 5010 in Sedgefield, Knysna, Western Cape

2020 Mossel Bay Paprenax Trading 6 cc

- Basic Assessment Report for the proposed establishment of a filling station and associated business infrastructure on a portion of erf 13996, Kwanonqaba, Mossel Bay, Western Cape

2020 Ladismith Department of Transport and Public Works

- Maintenance Management Plan for the periodic maintenance of Trunk Road 31, section 4, km 30.8 to km 76.06, Barrydale to Ladismith, Western Cape

2020 Knysna Knysna Municipality

- Maintenance Management Plan for the Maintenance of the potable water pipeline system on Erven 4197, RE/1352, RE/1351, RE/1146 and 1316 in Knysna, Western Cape

2020 Humansdorp Kouga Municipality

- Environmental Control Officer for the Phase 1A of New municipal 66kV double circuit overhead line between the Melkhout substation at Humansdorp and the main intake substation at Jefferys Bay, Eastern Cape

2020 Humansdorp Kouga Municipality

- Environmental Control Officer for the Construction of a new 22kv overhead powerline between Melkhout substation and Allison Street, Humansdorp, Eastern Cape

2020 Knysna Knysna Municipality

- Environmental Control Officer for the Charlesford raw water pumping scheme: Upgrade and refurbishment of pumpstation: Mechanical and electrical, Knysna, Western Cape

2020 Seweweekspoort, Department of Transport & Public Works

- Amendment of Environmental Authorisation (Part 2, Substantive amendment) for the flood damage repairs to road structures on MR309 in Seweweekspoort, Western Cape

2019 – 2021 Seweweekspoort, Department of Transport & Public Works

- Environmental Control Officer for the flood damage repairs to road structures on MR309 in Seweweekspoort, Western Cape

2019 George George Municpality

- Environmental Control Officer for the Raising of the Garden Route Dam Spillway on Portion 3/352, Remainder of 536 of Erf 221, Erf 3055 and Erf 3056, George, Western Cape

2019 Laingsburg Department of Agriculture

- Environmental Control Officer for the Construction Of Erosion Prevention Structures Within The One In Ten Year Flood Line Of The Buffels River, Laingsburg, Western Cape

2019 Williston Williston Municipality

- Environmental Control Officer for the Upgrading of bulk water network in Williston – Phase 3, Williston, Northern Cape

2019 George George Municipality

- Environmental Control Officer for the construction of new 66kV overhead line between Ballots Bay and Glanwood substations, George, Western Cape

2019 Oudtshoorn Department of Transport & Public Works

- Environmental Control Officer for the Periodic maintenance of Trunk Road 31, Section 6, km 23.3 to km 47.8 Calitzdorp to Oudtshoorn, Western Cape

2019 Kleinbrak Mossel Bay Municipality

- Environmental Control Officer for the Upgrading of Beyers Street, Klienbrak River, Western Cape

2019 George Outeniqua Eye Clinic Body Corporate

- Environmental Control Officer for the proposed expansion of parking area on erf 5950 and part of remainder erf 464, George, Western Cape

2019 Mossel Bay Hey Innovations

- Basic Assessment Report for the proposed establishment of a residential development on Erf 2839, Great Brak River, Western Cape

2019 Oudtshoorn Oudtshoorn Municipality

- Environmental Management Programme for the Blossoms Emergency Supply Scheme, Oudtshoorn, Western Cape

2019 Humansdorp Clinkscales 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 Environmetnal 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 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 Rheebok

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 Blaauwtjes Drift 110 in Oudtshoorn

2015 - 2016 Gouritz Department of Transport & Public Works

- Environmental Control Officer for the repair and maintenance of the Gouritz River Bridge bank protection along the R325 near Gouritzmond

2015 - 2016 Albertinia Garden Route Game Lodge (Pty) Ltd

- Environmental Control Officer for the five new units at the Garden Route Game Lodge

2015 - 2016 Mossel Bay Element Consulting Engineers

- Environmental Control Officer for the replacement of 22kV overhead powerline between Power Town and Hartenbos and between Hartenbos and the Hartenbos sewage substation

2014 - 2016 Plettenberg Bay Chauke Quanity 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

TERRESTRIAL FAUNAL AND AVIFAUNAL SPECIES COMPLIANCE STATEMENT REPORT FOR THE PROPOSED DEVELOPMENT ON ERF 998, TERGNIET AND PORTION 5 OF THE FARM ZANDHOOGTE NO. 139, MOSSEL BAY LOCAL MUNICIPALITY

February 2024

Prepared for:

Sharples Environmental Services cc (SES)

Prepared by:

Blue Skies Research

Dr Jacobus H. Visser

(PhD Zoology; Pr. Sci. Nat.)

Faunal Biodiversity Specialist

Cell: (083) 453 7916

e-mail: BlueSkiesResearch01@gmail.com

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Specialist details and expertise

Full Name: Jacobus Hendrik Visser

Professional registration: South African Council for Natural Scientific Professions**,** Professional Natural Scientist (Zoological Science) – Registration number: 128018

Address: 13 Dennelaan
Stilbaai
6674

Cell: (083) 453 7916

E-mail: BlueSkiesResearch01@gmail.com

Website: https://blueskiesresearch0.wixsite.com/blue-skies-research

Qualifications

- PhD (Zoology), University of Johannesburg (2015 - 2017)
- MSc (Zoology), Stellenbosch University (2011 - 2013)
- BSc Honours (Zoology) cum laude, Stellenbosch University (2010)
- BSc (Biodiversity and Ecology) cum laude, Stellenbosch University (2007 - 2009)

Expertise

- 28 years of in-the-field naturalist experience involving all faunal groups
- Zoologist with 17 years of professional experience
- 14 Peer-reviewed publications in high impact national and international scientific journals on the patterns and processes which drive and maintain faunal biodiversity, as well as on aspects of faunal biology and ecology
- Five IUCN Red List assessments

- Involved in the Southern African Bird Atlas Project 2 (SABAP2)
- Contributor on the National Biodiversity Assessment 2018: The status of South Africa's ecosystems and biodiversity. Synthesis Report. South African National Biodiversity Institute, an entity of the Department of Environment, Forestry and Fisheries, Pretoria.

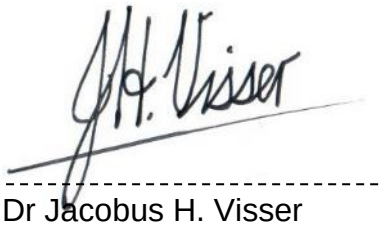
CELL: (083) 453 7916 E-MAIL: BlueSkiesResearch01@gmail.com
13 Dennelaan, Stilbaai, 6674

Declaration of independence by the independent person who compiled a specialist report or undertook a specialist process

I, Dr Jacobus Hendrik Visser, as the appointed independent specialist hereby declare that I:

• act/ed as the independent specialist in this application;
• regard the information contained in this report as it relates to my specialist input/study to be true and correct, and
• do not have and will not have any financial interest in the undertaking of the activity, other than remuneration for work performed in terms of the NEMA, the Environmental Impact Assessment Regulations and any specific environmental management Act;
• have no and will not have any vested interest in the proposed activity proceeding;
• have disclosed, to the applicant, EAP and competent authority, any material information that have or may have the potential to influence the decision of the competent authority or the objectivity of any report, plan or document required in terms of the NEMA, the Environmental Impact Assessment Regulations and any specific environmental management Act;
• am fully aware of and meet the responsibilities in terms of NEMA, the Environmental Impact Assessment Regulations and any specific environmental management Act, and that failure to comply with these requirements may constitute and result in disqualification;
• have ensured that information containing all relevant facts in respect of the specialist input/study was distributed or made available to interested and affected parties and the public and that participation by interested and affected parties was facilitated in such a manner that all interested and affected parties were provided with a reasonable opportunity to participate and to provide comments on the specialist input/study;
• have ensured that the comments of all interested and affected parties on the specialist input/study were considered, recorded and submitted to the competent authority in respect of the application;

• have ensured that the names of all interested and affected parties that participated in terms of the specialist input/study were recorded in the register of interested and affected parties who participated in the public participation process;
• have provided the competent authority with access to all information at my disposal regarding the application, whether such information is favourable to the applicant or not; and
• am aware that a false declaration is an offence.



08 February 2024

Dr Jacobus H. Visser
(PhD Zoology; Pr. Sci. Nat.)
SACNASP Registration Number: 128018

Date

Blue Skies Research

Dr Jacobus H. Visser
(PhD Zoology; Pr. Sci. Nat.)
Faunal Biodiversity Specialist

13 Dennelaan
Stilbaai
6674

08 February 2024

TERRESTRIAL FAUNAL AND AVIFAUNAL SPECIES COMPLIANCE STATEMENT REPORT FOR THE PROPOSED DEVELOPMENT ON ERF 998, TERGNIET AND PORTION 5 OF THE FARM ZANDHOOGTE NO. 139, MOSSEL BAY LOCAL MUNICIPALITY

1. Introduction

The applicant is proposing the construction of a business development on Erf 998, Tergniet and the Farm Zandhoogte No. 139, Western Cape (hereafter referred to as the “study area” or “site”). The study area is approximately 10.6 hectares in size, and three alternative layouts are being considered. These alternatives include the construction of roads (all alternatives), a service station (alternatives A and B), fast foods and takeaway area (alternative B), mixed use industrial zones (all alternatives), business zones (all alternatives), residential zones (all alternatives) and currently includes an existing nursery (see Section 11).

A combined botanical and faunal assessment report compiled by Chepri (Pty) Ltd has been provided for the project, but is missing certain information including an assessment of the alternatives and a clear indication of the way forward on the outcomes. To this end, it is required that the assessment of the various alternatives be completed, as well as an outcomes based management plan for the area (should this be recommended). Blue Skies Research was appointed by Sharples Environmental Services cc (SES) on behalf of the applicant to perform a terrestrial faunal and avifaunal assessment of the study area (see Sections 2 and 3), and preform an assessment of the various development alternatives. The current report represents a Compliance Statement for the proposed development alternatives, following a terrestrial faunal and avifaunal assessment of the site in accordance with

the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended, and the Environmental Impact Assessment (EIA) Regulations 2014 (Government Notice (GN) 984), as amended.

2. Terms of Reference

2.1. General legislature pertaining to this report

This terrestrial faunal and avifaunal assessment report is compiled in accordance with the following guidelines:

- *Department of Environmental Affairs and Development Planning (DEA&DP) Guidelines for Involving Biodiversity Specialists in the EIA Process* (Brownlie, 2005).
- *Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes, Government Notice No. 320* (Gazetted 20 March 2020).
- *Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Animal Species*, *Government Notice No. 1150* (Gazetted 30 October 2020).
- South African National Biodiversity Institute (SANBI). 2020. *Species Environmental Assessment Guideline. Guidelines for the implementation of the terrestrial fauna and terrestrial flora species protocols for environmental impact assessments in South Africa*. South African National Biodiversity Institute, Pretoria. Version 2.1 2021.

2.2 Other sources consulted

Other sources pertaining to this report are as follows:

- IUCN. 2021. The IUCN Red List of Threatened Species. Version 2021-3. https://www.iucnlist.org. Accessed on 25 January 2024.

- *National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004): Publication of lists of critically endangered, endangered, vulnerable and protected species, Government Notice No. 2007* (Gazetted 14 December 2007).

3. Reporting protocol

The DFFE Screening Tool Report generated for the proposed project footprint identifies the site as being of an overall "High" sensitivity under the "Relative Animal Species Sensitivity Theme". This follows from the projected and possible occurrence of two mammal, four avifaunal and three invertebrate Species of Conservation Concern (SCC) (Table 1). The current report therefore considers the presence or likely presence of these mammal, avifaunal and invertebrate SCC within the study area based on a field survey to detect their potential presence, as well as the availability of suitable habitat for these species (Section 9).

Table 1 List of Species of Conservation Concern (SCC) identified in the DFFE Screening Tool Report (https://screening.environment.gov.za/screeningtool/). For each, the listed sensitivity (possibility of occurrence within the study area), scientific name and common name is shown, along with its current IUCN status. Of these, two species were assigned codes, with its identity hidden for protection, as these are species that are prone to illegal harvesting.

Sensitivity	Species	Common name	IUCN status
High	*Circus ranivorus*	African Marsh-harrier	Least Concern
High	*Neotis denhami*	Denham's Bustard	Near-Threatened
High	*Bradypterus sylvaticus*	Knysna Warbler	Vulnerable
High	*Campethera notata*	Knysna Woodpecker	Near-Threatened
Medium	*Aloeides thyra orientis*	Red Russet	Endangered
Medium	*Chrysoritis brooksi tearei*	Brook's Opal	Endangered
Medium	*Sensitive Species 5*	Sensitive Species 5	Least Concern
Medium	*Sensitive Species 8*	Sensitive Species 8	Vulnerable
Medium	*Aneuryphymus montanus*	Yellow-winged Agile Grasshopper	Vulnerable

4. Overview of the study area

4.1 Geographic location

The study area encompasses Erf 998, Tergniet and the Farm Zandhoogte No. 139 with the proposed project footprint around 10.6 hectares in size and situated between the town of Groot Brakrivier and coastal village, Tergniet. The site is bordered by the provincial road R102, the N2 National Highway and a municipal road, Old Mossel Bay Road (Figures 1 and 2). The R102, which immediately borders and runs parallel to the site's southern fenceline, is a major regional road connecting various coastal towns. Old Mossel Bay Road runs immediately adjacent and parallel to the site's eastern border and is one of the major access roads between Groot Brakrivier and Tergniet and connects the rural communities further inland to the town and coastal villages. The N2 runs adjacent and parallel to the site's northern border.

The site's western fence line borders a residential property in the southernmost part and undeveloped land on the northern part. The landscape north of the site consists of a multitude of farming practices and diverse farm types including crop cultivation, livestock farming, horticulture, and specific practices such as vineyards and wineries. The landscape south of the site mainly consists of a densely developed residential area. A built-up area situated on the south-western corner of the site is fenced off from the undeveloped area and is currently used as a nursery and restaurant which include a parking lot, a building and footpaths.

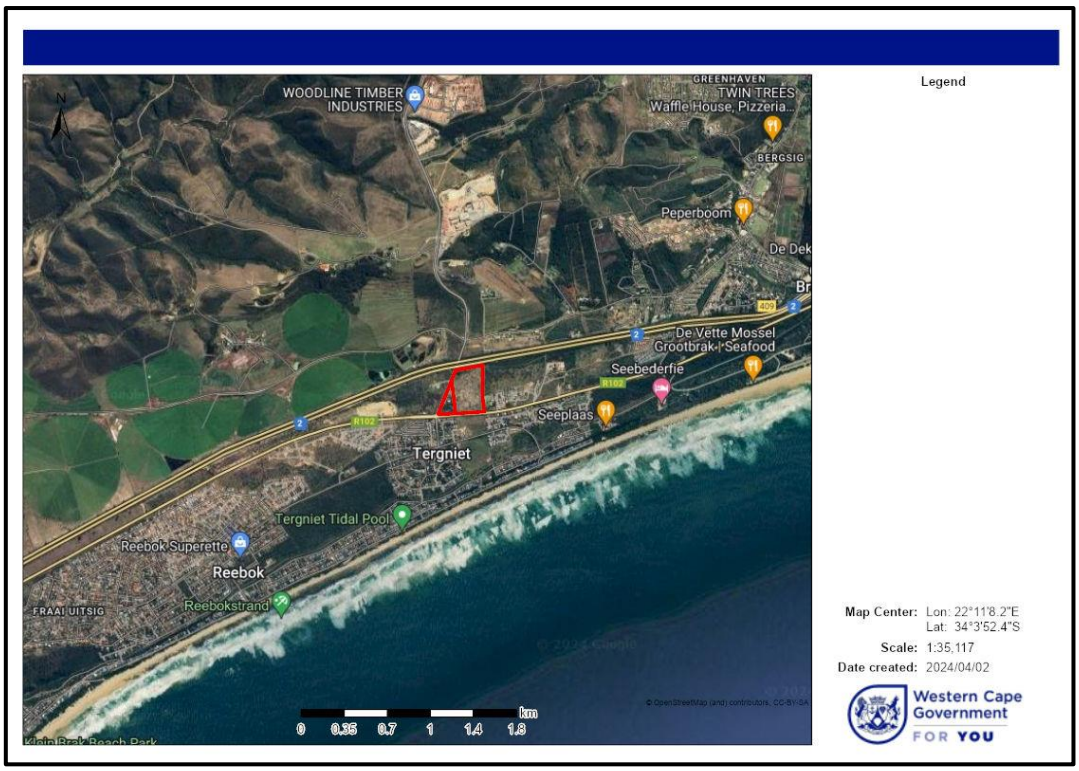


Figure 1 Spatial location of the study area relative to surrounding residential areas and main roads on a broad scale (Red polygon = Study area; map generated in Cape Farm Mapper version 3, Western Cape Department of Agriculture).

Figure 2 Spatial location of the study area relative to surrounding residential areas and main roads at a finer scale (Red polygon = Study area; map generated in Cape Farm Mapper version 3, Western Cape Department of Agriculture).

4.2 Topology

The larger northern part of the site slopes gently south-eastward, with the southern part sloping north-westward to create a slight depression in the southern section (Figure 3).

Figure 3 Topology of the study area showing 5 meter contour lines (Red polygon = Study area; map generated in Cape Farm Mapper version 3, Western Cape Department of Agriculture).

4.3 Vegetation

The Western Cape Biodiversity Spatial Plan (WCBSP), 2017 (Pool-Stanvliet et al. 2017) and the National Vegetation Map (Dayaram et al. 2019) identifies the

vegetation types in the larger northern part of the site as Groot Brak Dune Strandveld with a small southern section harbouring Canca Limestone Fynbos. Currently, these vegetation types are listed as “Endangered” ecosystem and “Least Threatened ecosystem types respectively (Figure 4) according to *The Revised National List of Ecosystems that are Threatened and in Need of Protection* (Government Notice No. 2747 of 18 November 2022). In the 2018 beta Vegetation Map, however, the vegetation on the entire site has been mapped as Hartenbos Dune Thicket (VegMap, 2018; Figure 5). Even so, only small remnants of natural vegetation remain on the site (Section 7).

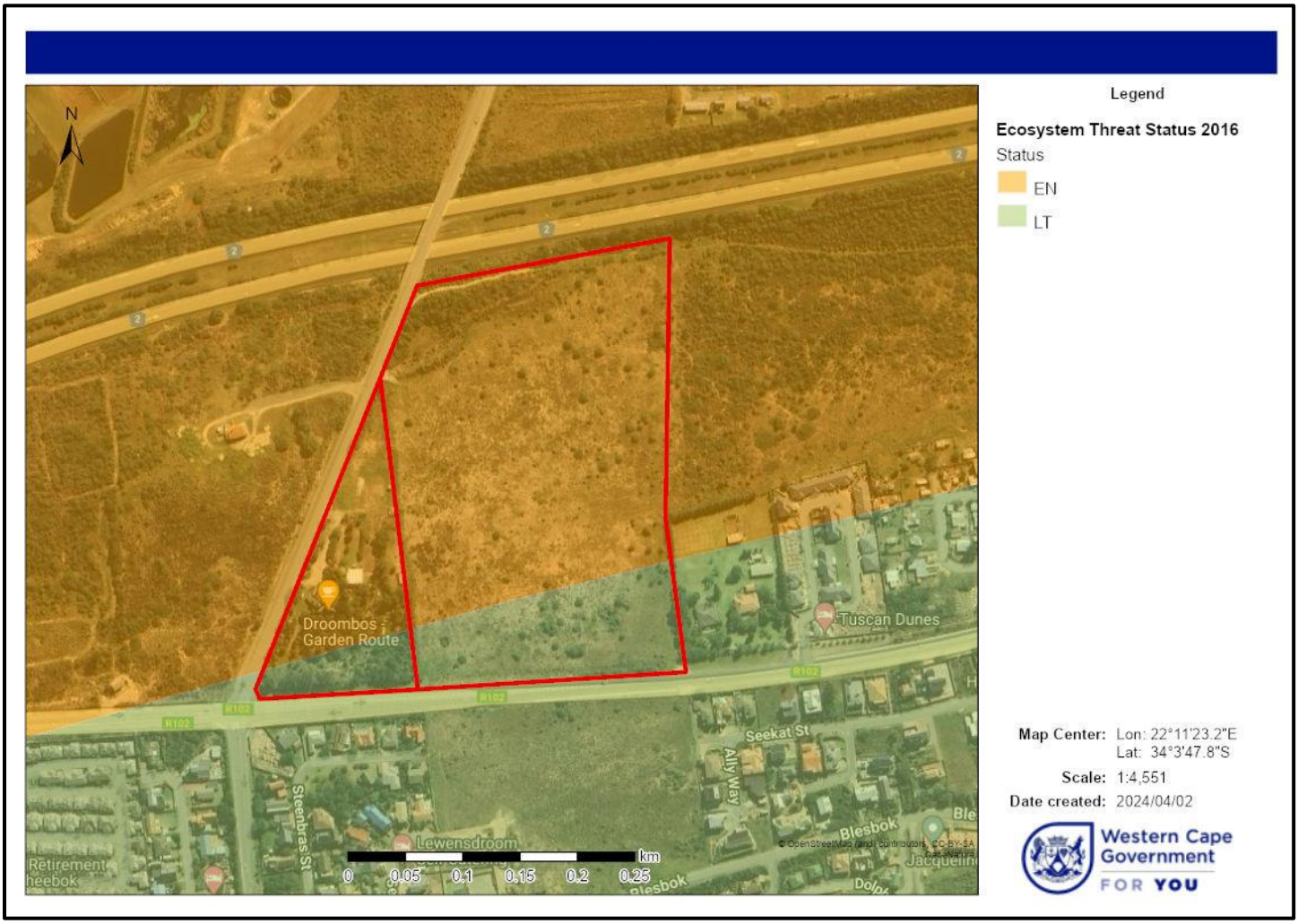


Figure 4 Spatial location of ecosystems and their threat statuses according to *The Revised National List of Ecosystems that are Threatened and in Need of Protection (Government Notice No. 2747 of 18 November 2022*, overlapping with the study area (Red polygon = Study area; information sourced from Cape Farm Mapper version 3, Western Cape Department of Agriculture).

Figure 5 Vegetation type across the study area (VEGMAP, SANBI 2018; Red polygon = Study area; map generated in Cape Farm Mapper version 3, Western Cape Department of Agriculture).

4.4 Land cover

Land cover within the study area comprises commercial annual crops rain-fed / dryland over the larger part with smallholdings (trees) in the south-western portion and a mosaic of low shrubland (fynbos) and dense forest & woodland along the northern margin (Land Cover 73-class, Department of Environmental Affairs, 2020; Figure 6). Overall, these designations of land cover were found to accurately reflect the habitat conditions on the site (Section 7).

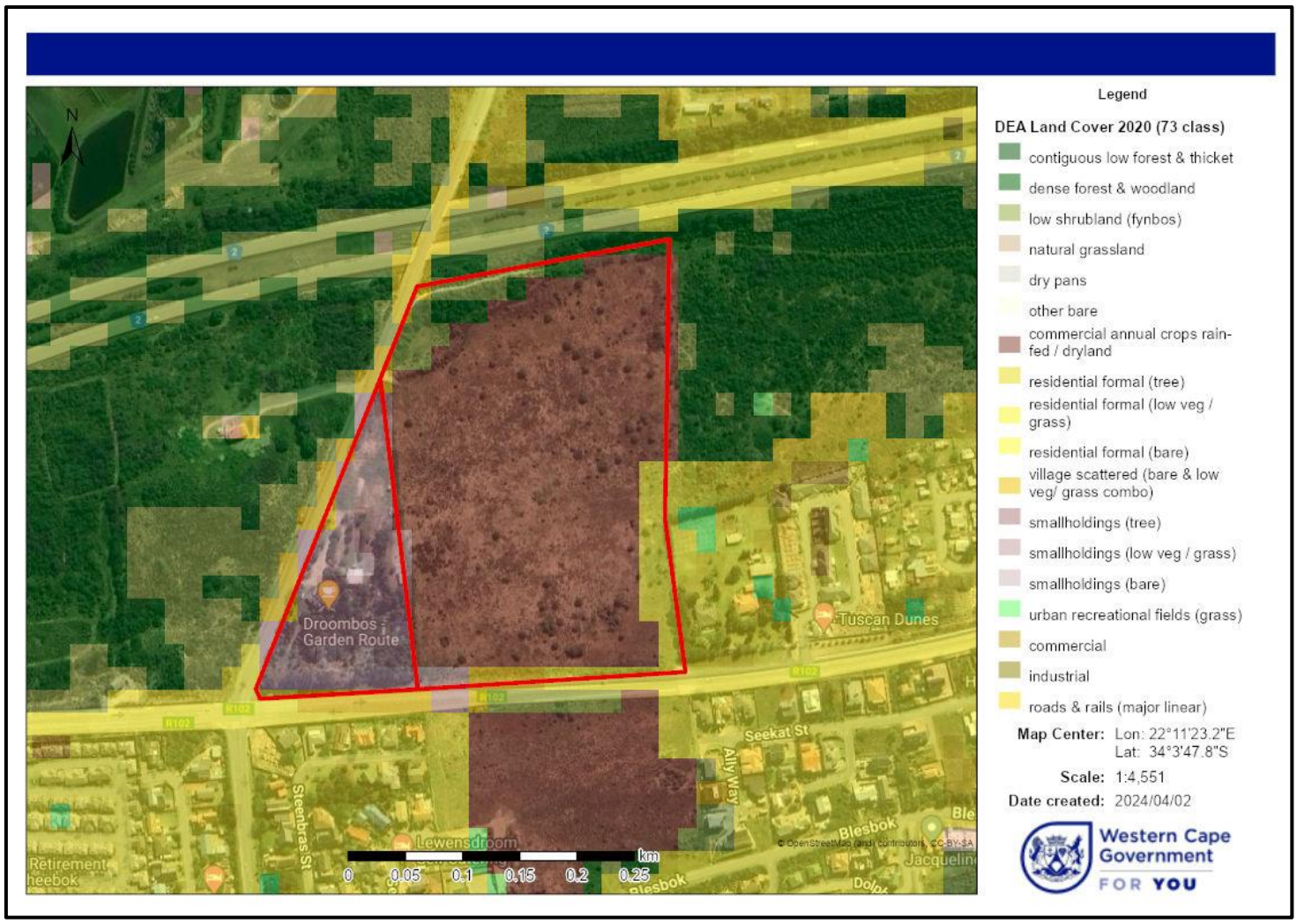


Figure 6 Land cover (Land Cover 73-class, Department of Environmental Affairs, 2020) within the study area (Red polygon = Study area; information sourced from Cape Farm Mapper version 3, Western Cape Department of Agriculture).

4.5 Critical Biodiversity Areas (CBAs)

Critical Biodiversity Areas (CBAs) are areas required to meet biodiversity targets for ecosystems, species and ecological processes, as identified in a systematic biodiversity plan (Purves and Holmes, 2015). Currently, the northern margin of the site is mapped as a mix of terrestrial CBA1 and CBA2 (Figure 7). The presence and integrity of these CBAs are discussed in Section 12.

Figure 7 Spatial locations of Critical Biodiversity Areas (CBAs) overlapping with the study area (Red polygon = Study area; information sourced from Cape Farm Mapper version 3, Western Cape Department of Agriculture).

5. Study methodology

5.1 Study aims

This study represents an assessment of the terrestrial faunal and avifaunal diversity and abundances, -habitat composition, ecosystem dynamics and potential occurrence of mammal, avifaunal and invertebrate (and other) SCC within the study area. As such, the aims of this investigation were to:

1.) Assess, define and create a spatial rendering of available faunal habitats across the study area based on information gathered during the field survey as well as through a desktop assessment using the latest satellite imagery,

2.) compile a faunal species list (including mammals, avifauna and grasshoppers) within the study area through field surveying so as to assess the possibility of occurrence any SCC which are present on the site, and

3.) generate spatial occurrence maps for the recovered faunal species within the study area to assess the spatial extent of areas supporting higher levels of diversity, and SCC subpopulations and habitats which may be of conservation concern.

5.2 Field survey

The study area was surveyed on foot over a single day on the 18th of January 2024, during the Summer season. Weather conditions during the surveying period were characterised by relatively warm daily temperatures, no cloud cover and moderate wind conditions (Figure 8).

Surveying included unconstrained point sampling through search meanders, as well active searching under rocks and debris. All tracks surveyed were recorded by GPS (Garmin eTrex® 10, Garmin International Inc, USA) and are represented in Figure 9. Terrestrial faunal species (mammals) were identified by direct visual observation, or by their tracks, burrows, remains or scat. Avifaunal species were identified by visual observation, using a 180x zoom lens, or by auditory means. Finally, grasshopper were identified and photographed from less than one meter away. All observations were recorded by GPS and the species or evidence of species' presence or activity were photographed using a digital camera (Canon PowerShot SX430 IS, Canon Inc, USA). A species list for all fauna recorded within the study area is given in Appendix A.

Given relatively optimal weather conditions, faunal and avifaunal species' activity was observed to be high over the surveying period, thereby resulting in 53 recorded

observations across the study area (Figure 10, Appendix A), relating to one observation per every 0.2 hectares of study area (the study area is 10.6 hectares in extent). During surveying, faunal habitats were broadly identified in the field, and thereafter delineated through a desktop assessment of the study area using satellite imagery (CapeFarmMapper Version 3, Western Cape Department of Agriculture).

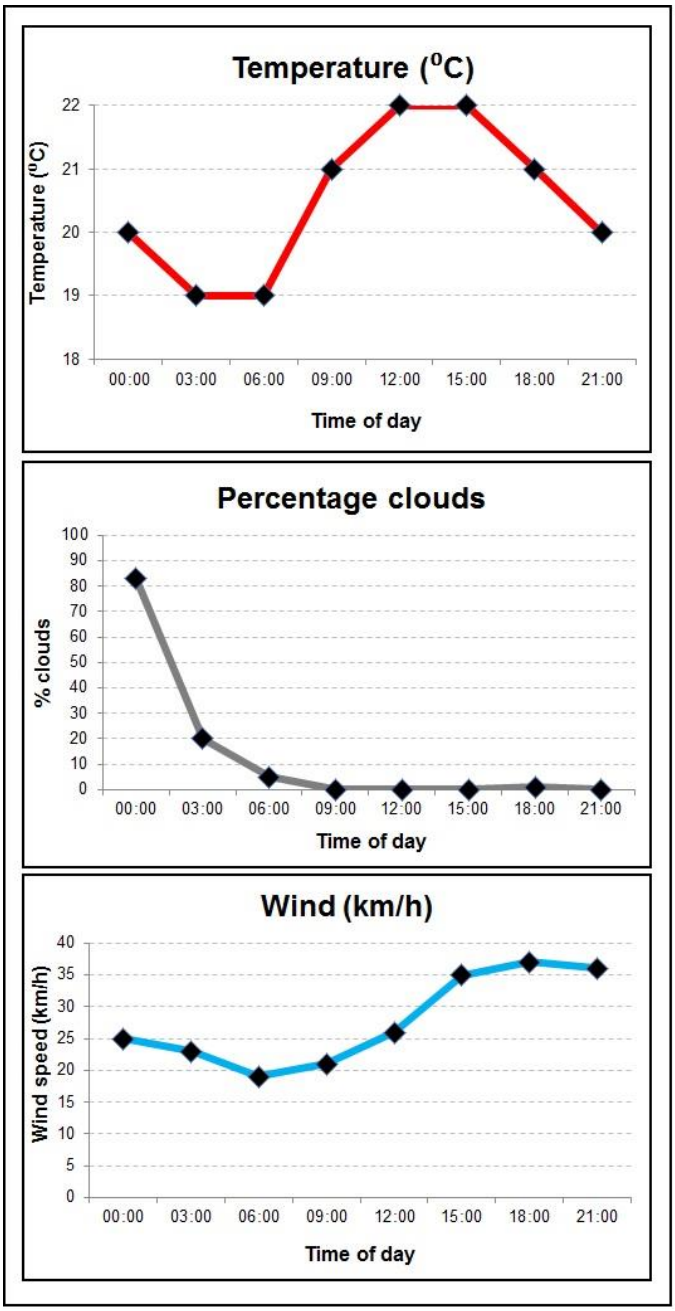


Figure 8 Weather conditions in the study area over the surveying period (18 January 2024). The time of day is indicated, along with the temperature (in °C), percentage cloud cover and wind speed (in km/h) (weather data sourced from https://www.worldweatheronline.com).

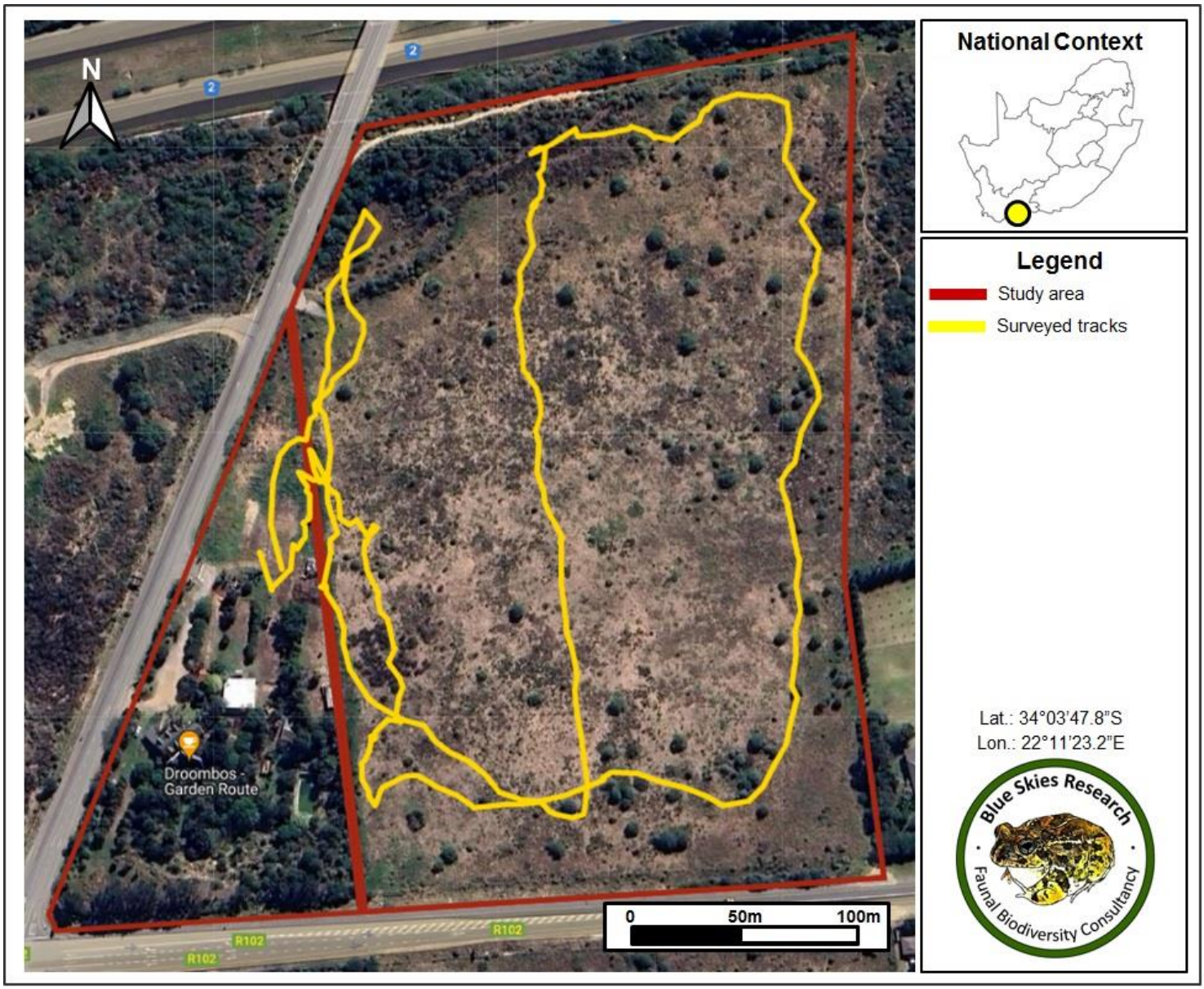


Figure 9 Spatial tracks recorded by GPS for all the search meanders across the study area over the surveying period.

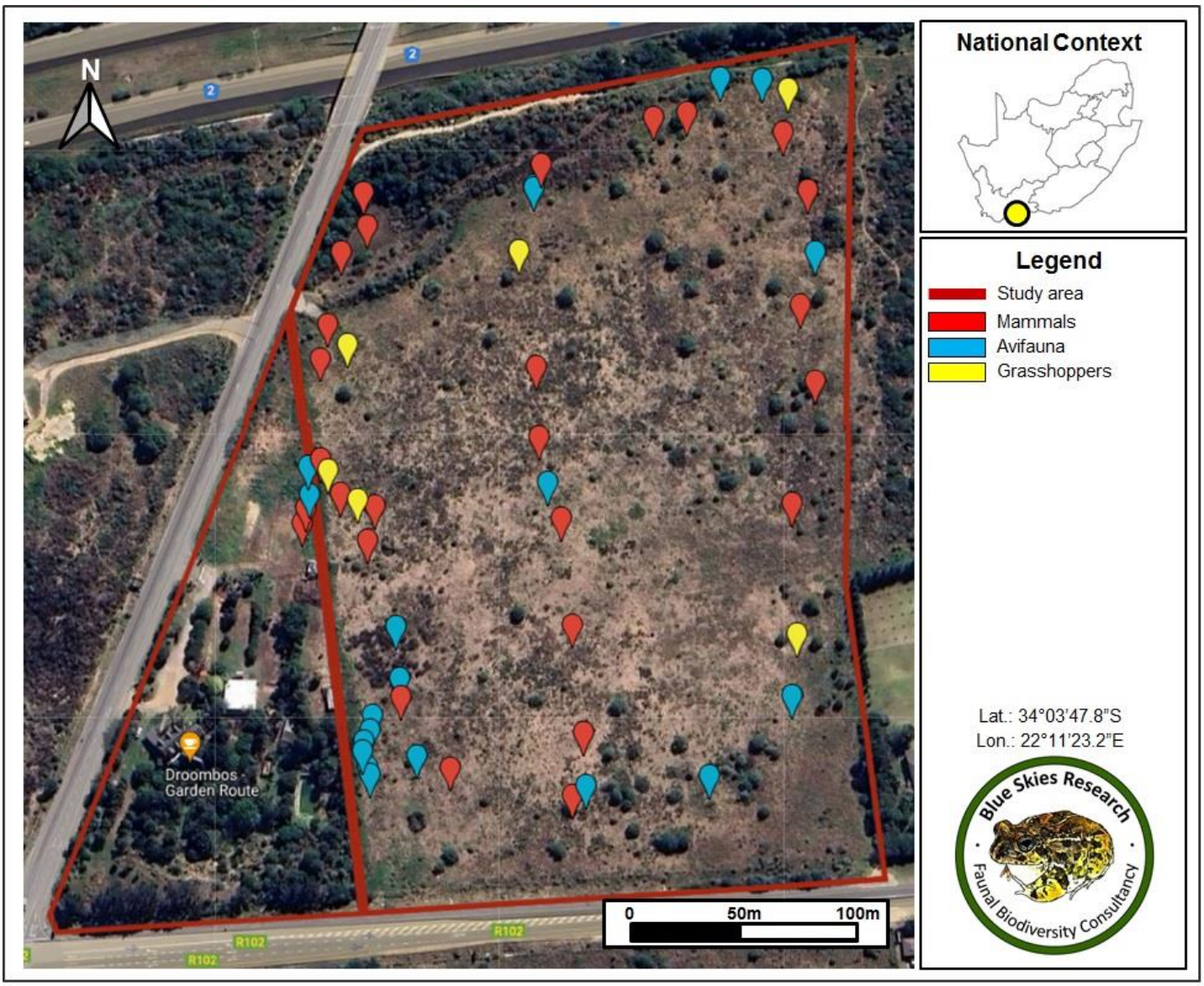


Figure 10 Spatial locations of all the faunal observations across the study area over the surveying period.

6. Assumptions and limitations

Weather conditions during the surveying period combined with an open and degraded habitat structure were relatively optimal for detecting a representative sample of the terrestrial faunal and avifaunal species diversity across the study area. Even so, it is possible that not all species could be observed (especially cryptic species). It is further possible that the surveying period did not correspond to the activity period or activity season of some species. The observed faunal composition of the study area therefore only partly reflects the species richness of, and faunal abundances within the study area (Appendix A).

7. Faunal habitat types within the study area

The study area is comprised of four broadly identified habitat features based on habitat composition and habitat integrity (Figure 11, Table 2). The natural vegetation on the site was transformed through radical clearing practices before 2004 (20 years ago) to a predominantly grassland phase and therefore exists in a highly degraded state with only remnant patches of recovering natural vegetation. The north-western corner of the site around the artificial dam is characterised by thicket and woody vegetation (trees) comprising a large number of alien and invasive species such as Port Jackson and Blackwattle. Finally, the south-western part of the site is characterised by a built-up area representing an existing nursery and restaurant which include a parking lot, a building and footpaths.

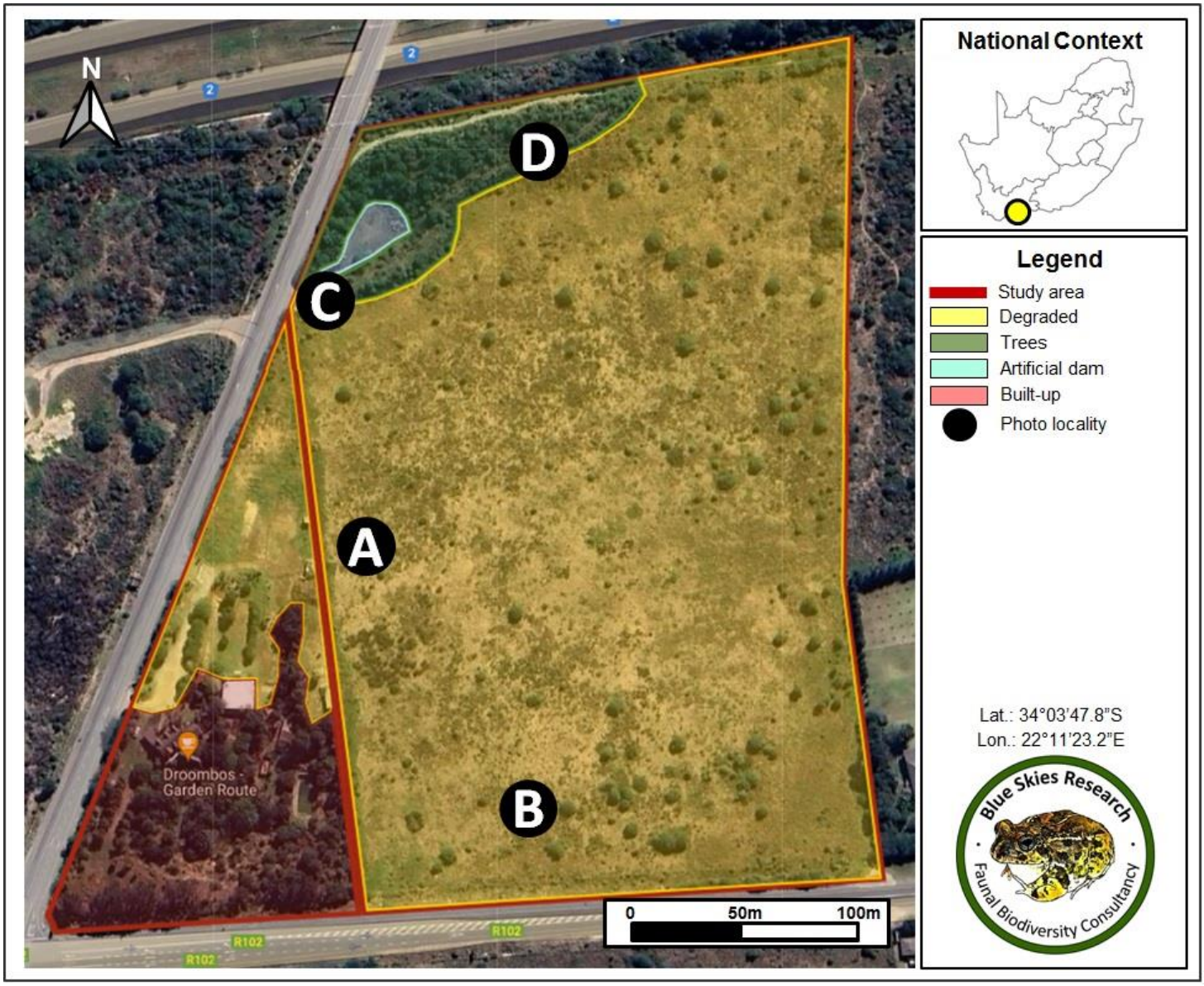


Figure 11 A broad indication of the spatial extent of habitat types overlapping the study area. Photo localities (A to D) correspond to the habitat photos in Table 2.

Table 2 Habitat locations, habitat descriptions and visual representations of the different habitat types within the study area. Location designations (A to D) correspond to the photo locations in Figure 11.

Location	Habitat description	Photo 1	Photo 2
A -34.06333, 22.18899 **B** -34.06439, 22.18978	**Degraded (open)** This habitat comprises the larger part of the site and consists of deep sandy soil with remnant patches of vegetation, common grass species and a number of alien and invasive trees.		

C -34.06235, 22.1888 **D** -34.06176, 22.18984	**Trees** This habitat encompasses a small section along the northern margin of the site and comprises thick an impenetrable stands of alien and invasive trees such as Port Jackson and Black Wattle. A small artificial dam is also located in the north-western part of the site (C).		

8. Faunal and avifaunal composition within the study area

8.1 Mammals

Evidence of six mammal species were recovered within the study area (Figures 12 and 13), all of which are currently classified as “Least concern” by the IUCN (Appendix A). Given the deep sandy substrate of the site, the most prominent species pertains to the burrowing Cape Dune Mole-rat (*Bathyergus suillus*). Other burrowing rodent species are also present, including the African Mole-rat (*Cryptomys hottentotus*), Cape Porcupine (*Hystrix africaeaustralis*) and Cape Gerbil (*Gerbilliscus afra*). The site harbours very few terrestrial mammal species, with the most abundant being the Four-striped Grass Mouse (*Rhabdomys pumilio*) and with single incidences of the Cape Grysbok (*Raphicerus melanotis*) also noted.

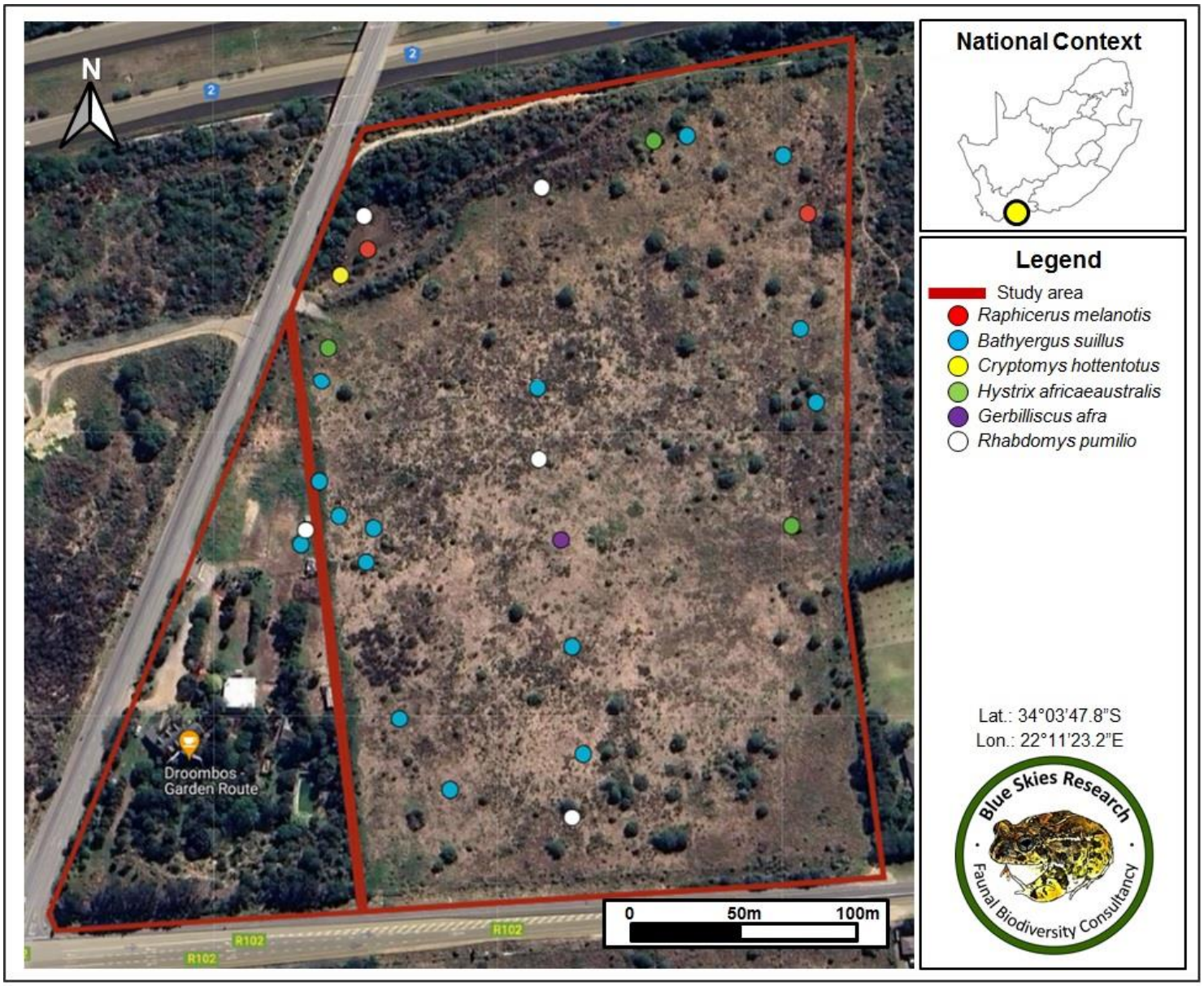


Figure 12 Spatial locations of the different mammal species recorded within the study area.

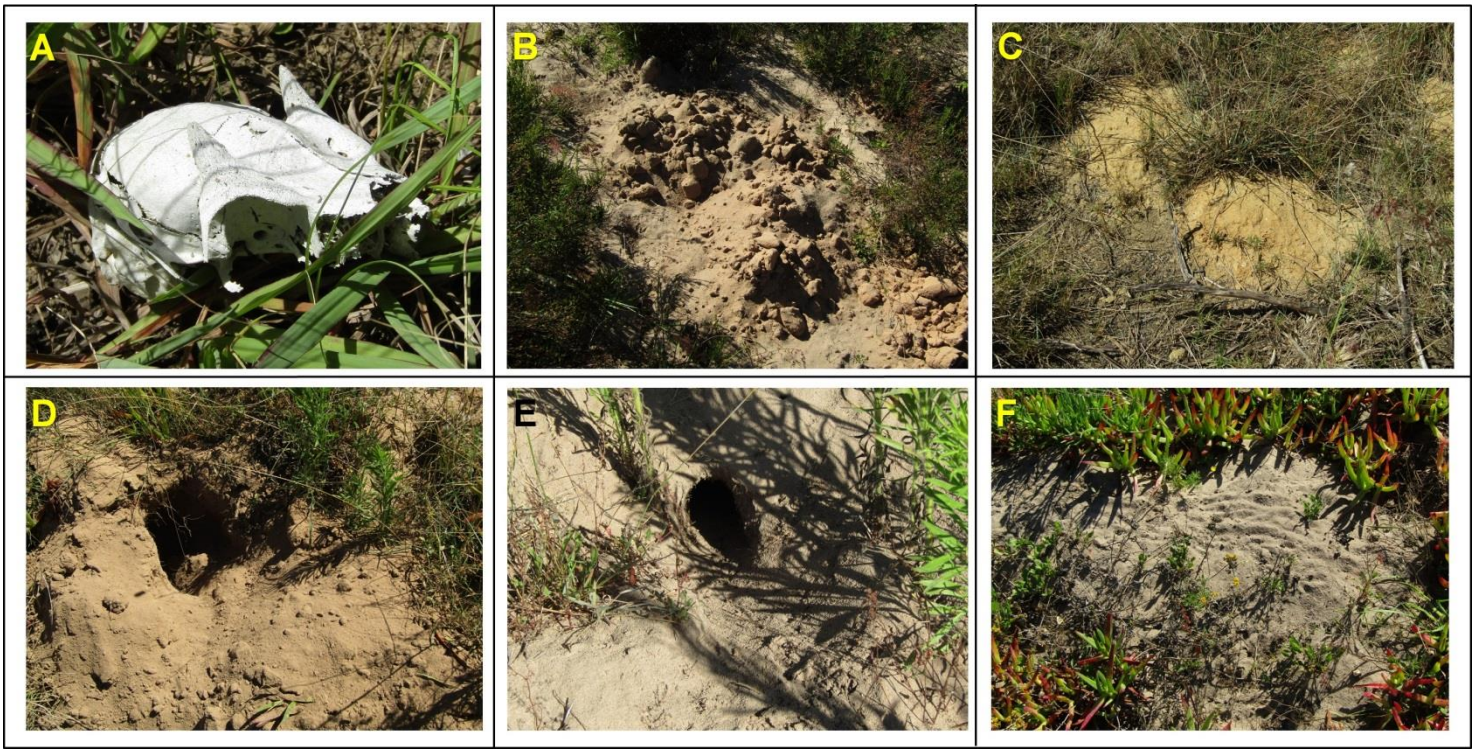


Figure 13 Photographic evidence of the different mammal species recorded in the study area. A) Remains of the Cape Gysbok (*Raphicerus melanotis*). B) Mounds of the Cape Dune Mole-rat (*Bathyergus suillus*). C) Mounds of the African Mole-rat (*Cryptomys hottentotus*). D) Feeding hole of the Cape Porcupine (*Hystrix africaeaustralis*). E) Burrow of the Cape Gerbil (*Gerbilliscus afra*). F) Tracks of the Four-striped Grass Mouse (*Rhabdomys pumilio*).

8.2 Avifauna

In total, only 19 bird species were recorded within the study area (Figures 14 and 15), all of which are currently classified as “Least concern” by the IUCN (Appendix B). All avifauna on the site constitute common species which are frequently encountered in an urban setting. Overall, avifaunal diversity on the site appears relatively impaired.

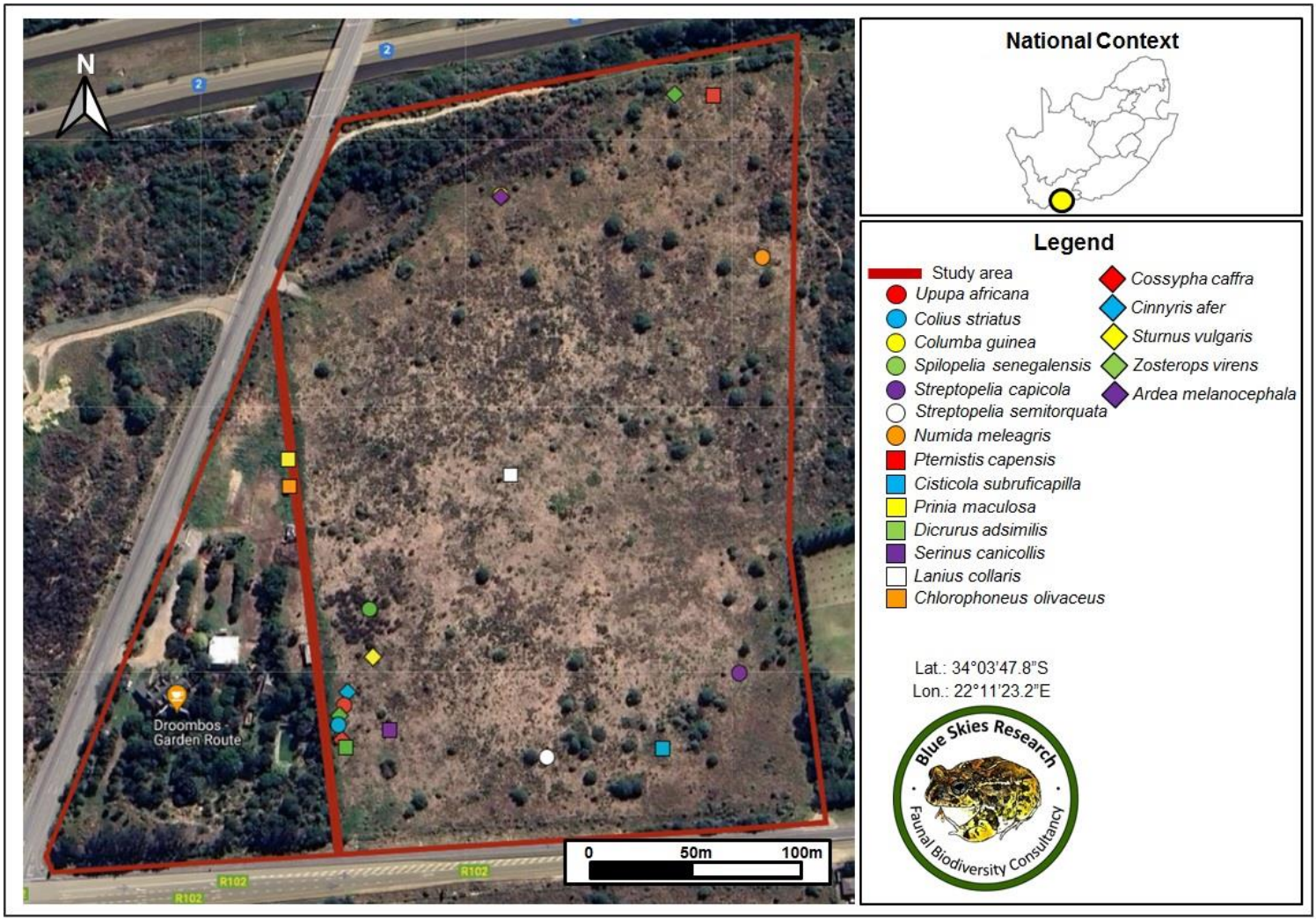


Figure 14 Spatial locations of the different avifaunal species recorded within the study area.

Figure 15 Photographic evidence of different avifaunal species recorded in the study area. A) Laughing Dove (*Spilopelia senegalensis*). B) Red-eyed Dove (*Streptopelia semitorquata*). C) Helmeted Guineafowl (*Numida meleagris*). D) Grey-backed Cisticola (*Cisticola subruficapilla*). E) Karoo Prinia (*Prinia maculosa*). F) Fork-tailed Drongo (*Dicrurus adsimilis*). G) Cape Canary (*Serinus canicollis*). H) Greater Double-collared Sunbird (*Cinnyris afer*). I) Common Starling (*Sturnus vulgaris*). J) Cape White-eye (*Zosterops virens*).

8.3 Grasshoppers

Three grasshopper species were recorded within the study area (Figures 16 and 17), all of which are currently not assessed by the IUCN (Appendix A). These three species pertain to the widespread Common Stick Grasshopper (*Acrida acuminata*), Common Digging Grasshopper (*Acrotylus insubricus*) and Band-winged Grasshopper (*Morphacris fasciata*).

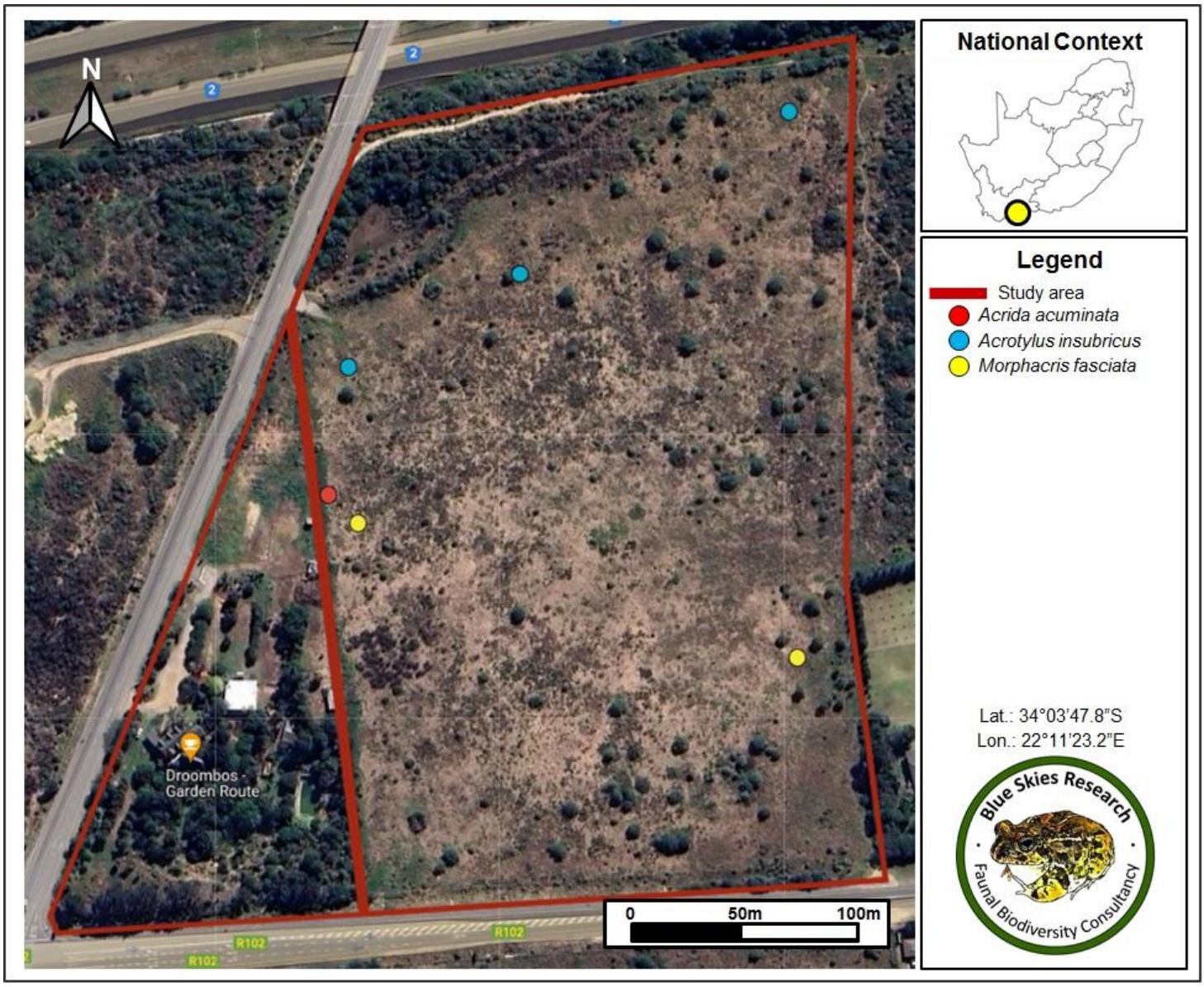


Figure 16 Spatial locations of the different grasshopper species recorded within the study area.

Figure 17 Photographic evidence of the different grasshopper species recorded in the study area. A) Common Stick Grasshopper (*Acrida acuminata*). B) Common Digging Grasshopper (*Acrotylus insubricus*). C) Band-winged Grasshopper (*Morphacris fasciata*).

8.4 Faunal and avifaunal diversity within the study area

Overall, terrestrial faunal and avifaunal diversity and abundances appears relatively low and is comprised of relatively common species of “Least Concern” (IUCN, 2021). This impaired faunal diversity is likely a result of the degraded an isolated nature of the site. For instance, the larger part of the site exists in a degraded and open state from radical clearing practices that took place before 2004 (20 years ago), with the north-western corner characterised by alien and invasive plant species and the south-western part comprising a built-up area. Furthermore, the site is situated next to busy roads (national highway, provincial and municipal roads from where daily noise and vibration is evident), a densely populated residential area to the south and south-east border, and developed agricultural farmlands to the north which isolates the site from surrounding natural areas in the landscape.

Taken together, there appears to be very few intact predator-prey dynamics on the site, with ecosystem dynamics appearing highly compromised. To this end, the study area does not appear to function as an important ecological link and faunal dispersal corridor in the study area landscape, rendering it of a lower sensitivity in a biodiversity and ecological context.

9. Species of Conservation Concern

The potential presence of nine (two mammal, four avifaunal and three invertebrate) SCC listed in the DFFE Screening Tool (Table 1) was considered. The probability of occurrence of each specific SCC within the study area landscape was assessed based on the following criteria:

Confirmed - The species was confirmed as present within the study area during the field survey.

High - The species was not confirmed as present within the study area during the field survey but has been recorded in the overlapped pentad (3400_2210) recently (less than 2 years ago) and in high number (>10 times) and is therefore likely to also occur in the study area, given suitable habitat characteristics.

Medium - The species was not confirmed as present within the study area during the field survey, but it has been recorded a number of times (<10 times) in the overlapped pentad (3400_2210) recently (less than 2 years ago). Suitable habitat for the species is also present in the study area.

Low - No suitable habitat for the species is present in the study area. Further, the species has been recorded a low number of times (<2 times) or more than five years ago in the overlapped pentad (3400_2210).

All of the SCC considered have a low likelihood of occurring on the site, given a lack of suitable habitat characteristics along with high levels of daily disturbances. The larger part of the site exists in a degraded and open state from radical historical clearing practices, with the north-western corner characterised by alien and invasive plant species and the south-western part comprising a built-up area. Furthermore, the site is situated next to busy roads (national highway, provincial and municipal roads), a densely populated residential area to the south and south-east border, and developed agricultural farmlands to the north. To this end, all considered SCC are highly unlikely to occur on the site.

Table 3 Probability of occurrence of specific SCC in the study area. For each species, the taxonomic Family, scientific name and common name is shown, along with its current classification under the IUCN Red List of Threatened Species (IUCN, 2021). In addition, the species' preferred habitat and the probability that the species occurs within the study area is given, along with a justification for listing this probability.

Order	Family	Species	Common name	Status	Habitat	Probability of occurrence in the study area	Justification of probability
Sensitive Species 8	Sensitive Species 8	*Sensitive Species 5*	*Sensitive Species 5*	-	-	Low	The presence of the species was not recorded during the field survey and it is highly unlikely that this species will occur in the study area given a lack of suitable thicket habitats.
Sensitive Species 8	Sensitive Species 8	*Sensitive Species 8*	*Sensitive Species 8*	-	-	Low	This species occurs only in protected areas and is therefore highly unlikely that the species will be present on the site.
Accipitriformes	Accipitridae	*Circus ranivorus*	African Marsh Harrier	Least Concern	The species breeds in wetlands, foraging primarily over reeds and lake margins (Harrison *et al*. 1997). Its diet consists largely of small mammals, particularly striped mouse *Rhabdomys pumilio* (Kemp and Dean, 1988).	Low	The species was not recorded in the study area landscape during the field survey. Furthermore, the species has only been recorded once in the study area landscape more than 10 years ago (April 2012). Coupled to this, the site does not harbour any of the reedbed habitats required by this species, and habitats on the site exist in an open and degraded state with a high level of daily disturbances. It is therefore highly unlikely that the species will be present on the site.
Otidiformes	Otididae	*Neotis denhami*	Denham's Bustard	Near-Threatened	The species inhabits grasslands, grassy *Acacia*-studded dunes, fairly dense shrubland, light woodland, farmland, crops, dried marsh and arid scrub plains, also grass-covered ironstone pans and burnt savanna woodland in Sierra Leone and high rainfall sour grassveld, planted pastures and cereal croplands in fynbos in South Africa (del Hoyo et al. 1996). It feeds on insects, small vertebrates and plant material (Collar, 1996).	Low	The species was not recorded in the study area landscape during the field survey. Even so, the species has been recorded a number of times (31 times) in the study area landscape, with the latest observation in October 2023. Even so, habitats on the site exist in an open and degraded state with a high level of daily disturbances. It is therefore highly unlikely that the species will be present on the site.
Passeriformes	Locustellidae	*Bradypterus sylvaticus*	Knysna Warbler	Vulnerable	The species occurs in thick, tangled vegetation along the banks of watercourses, or covering drainage lines in fynbos forest patches, or on the edges of afromontane forest. It breeds in dense understorey vegetation (Pryke et al. 2010).	Low	The species was not recorded in the study area landscape during the field survey, but has been recorded a number of times (87 times) in the study area landscape, with the latest observation in December 2023. Even so, habitats on the site exist in an open and degraded state with a high level of daily disturbances. It is therefore highly unlikely that the species will be present on the site.

Piciformes	Picidae	*Campethera notata*	Knysna Woodpecker	Near-Threatened	The species is confined to coastal areas of forest, woodland, dense bush, Euphorbia scrub, or open country with large trees.	Low	The species was not recorded in the study area landscape during the field survey, but has been recorded a number of times (seven times) in the study area landscape, with the latest observation in December 2021. Even so, habitats on the site exist in an open and degraded state with a high level of daily disturbances. It is therefore highly unlikely that the species will be present on the site.
Lepidoptera	Lycaenidae	*Aloeides thyra orientis*	Red Russet	Endangered	It occurs in a variety of habitats, including the sea-shore, sandy scrub-covered ground (e.g. coastal fynbos on flat sandy ground (either naturally occurring or from anthropogenic disturbances such as footpaths or unsurfaced track) between 40 m to 240 m above sea level) and at high altitudes in mountains. It also penetrates into parts of the Karoo. Larval host plants for *Aloeides thyra* are not differentiated between subspecies, and so the larval host plants for this taxon are assumed to include *Aspalathus acuminate*, *A. tulbaghensis*, *A. cymbiformis* and *A. laricifolia* (see e.g. Henning et al. 2009, Mecenero et al. 2013, Williams 2016).	Low	The species was not recorded in the study area landscape during the field survey. Furthermore, the site does not harbour any of the *Aspalathus* host plants preferred by the species, with habitats on the site existing in an open and degraded state with a high level of daily disturbances. It is therefore unlikely that the species will be present on the site.
Lepidoptera	Lycaenidae	*Chrysoritis brooksi tearei*	Brook's Opal	Endangered	Found on sandy, low hills, sparsely covered by shrubs. Reasons for decline are encroachment of alien plants, expansion of agricultural activities, and grazing by domestic livestock.	Low	The species was not recorded in the study area landscape during the field survey. Furthermore, although the site does harbour the site does harbour low hills sparsely covered by shrubs, habitats on the site existing in an open and degraded state with a high level of daily disturbances. It is therefore unlikely that the species will be present on the site.
Orthoptera	Acrididae	*Aneuryphymus montanus*	Yellow-winged Agile Grasshopper	Vulnerable	The species is associated with fynbos vegetation, where it has been collected "amongst partly burnt stands of evergreen Sclerophyll in rocky foothills" (Brown 1960). It prefers south-facing cool slopes (Kinvig 2005).	Low	The species was not confirmed as present on the site during the field survey. The site is furthermore devoid of any of the partly burnt stands of evergreen Sclerophyll in rocky foothills, or south-facing cool slopes preferred by the species. It is therefore highly unlikely that the species will be present on the site.

10. Evaluation of Site Ecological Importance (SEI)

10.1 Evaluating SEI for habitats in the study area

Evaluation of the Site Ecological Importance (SEI) for habitats in the study area was performed following the methods and criteria outlined in the Species Environmental Assessment Guideline (SANBI, 2020). Evaluation of SEI was performed for mammals, avifauna and invertebrates combined (given the low likelihood of SCC within any of these faunal groups being present on the site, Table 3). In short, SEI is a function of the Biodiversity Importance (BI) of the receptor (e.g., SCC, the vegetation/faunal community or habitat type present on the site) and its resilience to impacts (Receptor Resilience, RR) as follows: SEI = BI + RR. Biodiversity Importance (BI) is in turn a function of Conservation Importance (CI) and the Functional Integrity (FI) of the receptor as follows: BI = CI + FI.

To calculate the Conservation Importance (CI) and Functional Integrity (FI) of each habitat within the study area, the criteria outlined in Table 4 and Table 5 were respectively used.

According to the Species Environmental Assessment Guideline, Conservation Importance (CI) may defined as follows:

Conservation Importance (CI): "*The importance of a site for supporting biodiversity features of conservation concern present, e.g. populations of IUCN threatened and Near Threatened species (CR, EN, VU and NT), Rare species, range-restricted species, globally significant populations of congregatory species, and areas of threatened ecosystem types, through predominantly natural processes.*"

Table 4 Conservation importance (CI) criteria (table adapted from the Species Environmental Assessment Guideline, SANBI, 2020).

Conservation Importance (CI)	Fulfilling Criteria
Very high	Confirmed or highly likely occurrence of CR, EN, VU or Extremely Rare or Critically Rare species that have a global EOO of < 10 km^2. Any area of natural habitat of a CR ecosystem type or large area (> 0.1% of the total ecosystem type extent) of natural habitat of EN ecosystem type. Globally significant populations of congregatory species (> 10% of global population).
High	Confirmed or highly likely occurrence of CR, EN, VU species that have a global EOO of > 10 km^2. IUCN threatened species (CR, EN, VU) must be listed under any criterion other than A. If listed as threatened only under Criterion A, include if there are less than 10 locations or < 10 000 mature individuals remaining. Small area (> 0.01% but < 0.1% of the total ecosystem type extent) of natural habitat of EN ecosystem type or large area (> 0.1%) of natural habitat of VU ecosystem type. Presence of Rare species. Globally significant populations of congregatory species (> 1% but < 10% of global population).
Medium	Confirmed or highly likely occurrence of populations of NT species, threatened species (CR, EN, VU) listed under Criterion A only and which have more than 10 locations or more than 10 000 mature individuals. Any area of natural habitat of threatened ecosystem type with status of VU. Presence of range-restricted species. > 50% of receptor contains natural habitat with potential to support SCC.
Low	No confirmed or highly likely populations of SCC. No confirmed or highly likely populations of range-restricted species. < 50% of receptor contains natural habitat with limited potential to support SCC.
Very low	No confirmed and highly unlikely populations of SCC. No confirmed and highly unlikely populations of range-restricted species. No natural habitat remaining.

According to the guideline, Functional Integrity (FI) is defined as:

Functional integrity (FI): "*The receptors' current ability to maintain the structure and functions that define it, compared to its known or predicted state under ideal conditions. Simply stated, FI is: 'A measure of the ecological condition of the impact receptor as determined by its remaining intact and functional area, its connectivity to other natural areas and the degree of current persistent ecological impacts.*"

Table 5 Functional integrity (FI) criteria (table adapted from the Species Environmental Assessment Guideline, SANBI, 2020).

Functional Integrity (FI)	Fulfilling Criteria
Very high	Very large (> 100 ha) intact area for any conservation status of ecosystem type or > 5 ha for CR ecosystem types. High habitat connectivity serving as functional ecological corridors, limited road network between intact habitat patches. No or minimal current negative ecological impacts with no signs of major past disturbance (e.g. ploughing).
High	Large (> 20 ha but < 100 ha) intact area for any conservation status of ecosystem type or > 10 ha for EN ecosystem types. Good habitat connectivity with potentially functional ecological corridors and a regularly used road network between intact habitat patches. Only minor current negative ecological impacts (e.g. few livestock utilising area) with no signs of major past disturbance (e.g. ploughing) and good rehabilitation potential.
Medium	Medium (> 5 ha but < 20 ha) semi-intact area for any conservation status of ecosystem type or > 20 ha for VU ecosystem types. Only narrow corridors of good habitat connectivity or larger areas of poor habitat connectivity and a busy used road network between intact habitat patches. Mostly minor current negative ecological impacts with some major impacts (e.g. established population of alien and invasive flora) and a few signs of minor past disturbance. Moderate rehabilitation potential.
Low	Small (> 1 ha but < 5 ha) area. Almost no habitat connectivity but migrations still possible across some modified or degraded natural habitat and a very busy used road network surrounds the area. Low rehabilitation potential. Several minor and major current negative ecological impacts.
Very low	Very small (< 1 ha) area. No habitat connectivity except for flying species or flora with wind-dispersed seeds. Several major current negative ecological impacts.

Based on assessments of CI and FI for habitats within the study area, the Biodiversity Importance (BI) of each habitat was calculated using the matrix in Table 6 (based on the formula: BI = CI + FI). As Biodiversity Importance (BI) is a function of Conservation Importance (CI) and the Functional Integrity (FI) of a receptor, BI can be derived from a simple matrix of CI and FI as follows:

Table 6 Matrix for calculating Biodiversity Importance (BI) (table adapted from the Species Environmental Assessment Guideline, SANBI, 2020).

Biodiversity Importance (BI)		**Conservation Importance (CI)**				
		Very high	High	Medium	Low	Very low
Functional Integrity (FI)	Very high	Very high	Very high	High	Medium	Low
	High	Very high	High	Medium	Medium	Low
	Medium	High	Medium	Medium	Low	Very low
	Low	Medium	Medium	Low	Low	Very low
	Very low	Medium	Low	Very low	Very low	Very low

Finally, the Receptor Resilience for each habitat was evaluated following the criteria listed in Table 7. According to the Species Assessment Guidelines, Receptor resilience (RR) may defined as follows:

Receptor resilience (RR): "*The intrinsic capacity of the receptor to resist major damage from disturbance and/or to recover to its original state with limited or no human intervention.*"

Table 7 Receptor Resilience (RR) criteria (table adapted from the Species Environmental Assessment Guideline, SANBI, 2020).

Receptor Resilience (RR)	**Fulfilling Criteria**
Very high	Habitat that can recover rapidly (~ less than 5 years) to restore > 75%28 of the original species composition and functionality of the receptor functionality, or species that have a very high likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a very high likelihood of returning to a site once the disturbance or impact has been removed.
High	Habitat that can recover relatively quickly (~ 5–10 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a high likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a high likelihood of returning to a site once the disturbance or impact has been removed.
Medium	Will recover slowly (~ more than 10 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a moderate likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a moderate likelihood of returning to a site once the disturbance or impact has been removed.
Low	Habitat that is unlikely to be able to recover fully after a relatively long period: > 15 years required to restore ~ less than 50% of the original species composition and functionality of the receptor functionality, or species that have a low likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a low likelihood of returning to a site once the disturbance or impact has been removed.
Very low	Habitat that is unable to recover from major impacts, or species that are unlikely to remain at a site even when a disturbance or impact is occurring, or species that are unlikely to return to a site once the disturbance or impact has been removed.

Taken together, the Site Ecological Importance (SEI) was calculated for each habitat within the study area using the formula: SEI = BI + RR, and following the matrix outlined in Table 8. The interpretation of the development actions allowed for each SEI category are outlined in Table 9.

Table 9 Matrix for calculating Site Ecological Importance (SEI) (table adapted from the Species Environmental Assessment Guideline, SANBI, 2020).

Site Ecological Importance (SEI)		Biodiversity Importance (BI)				
		Very high	High	Medium	Low	Very low
Receptor Resilience (RR)	Very high	Very high	Very high	High	Medium	Low
	High	Very high	Very high	High	Medium	Very low
	Medium	Very high	High	Medium	Low	Very low
	Low	High	Medium	Low	Very low	Very low
	Very low	Medium	Low	Very low	Very low	Very low

Table 9 Guidelines for interpreting SEI in the context of the proposed development activities (table adapted from the Species Environmental Assessment Guideline, SANBI, 2020).

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

10.2 SEI for habitats in the study area

The SEI results for habitats within the study area are given in Table 10 with the spatial representation for each habitat and its concomitant SEI category portrayed in Figure 18. Because all habitats on the site do not constitute suitable habitat for any of the SCC considered, and further exist in a degraded and isolated state, these habitats are retrieved as having a "Very low" SEI, allowing for development activities of medium to high impact without restoration activities being required (Table 9). To this end, this renders the entire site as less sensitive from a faunal perspective.

Table 10 Evaluation of SEI within the study area. BI = Biodiversity Importance, RR = Receptor Resilience.

Habitat type	Conservation Importance	Functional Integrity	Receptor Resilience	Site Ecological Importance
Degraded (open)	**Very low** - No confirmed and a highly unlikely presence of populations of terrestrial faunal and avifaunal SCC.	**Low** - Several minor and major current negative ecological impacts (little remaining natural vegetation with a high level of daily disturbances and an isolated nature in the landscape).	**Very high** - Because this habitat exists in a degraded state, the faunal species diversity on the site already appears reduced, with only common species present. As such, this species diversity can recover relatively quickly (less than 5 years).	**Very low** - BI = Very low; RR = Very high
Trees	**Very low** - No confirmed and a highly unlikely presence of populations of terrestrial faunal and avifaunal SCC.	**Very low** - Several major current negative ecological impacts (a high incidence of alien and invasive vegetation).	**Very high** - Because this habitat consists of thick stands of alien and invasive vegetation, this habitat will recover to this state relatively quickly (less than 5 years).	**Very low** - BI = Very low; RR = Very high
Artificial dam	**Very low** - No confirmed and a highly unlikely presence of populations of terrestrial faunal and avifaunal SCC.	**Very low** - Several major current negative ecological impacts (a small artificial non-perennial dam).	**Very high** - Because this habitat is artificial, it an only recover to this artificial state.	**Very low** - BI = Very low; RR = Very high
Built-up	**Very low** - No confirmed and a highly unlikely presence of populations of terrestrial faunal and avifaunal SCC.	**Very low** - Several major current negative ecological impacts (established buildings and infrastructure).	**Very high** - This area comprises existing buildings and infrastructure and can only recover to this state.	**Very low** - BI = Very low; RR = Very high

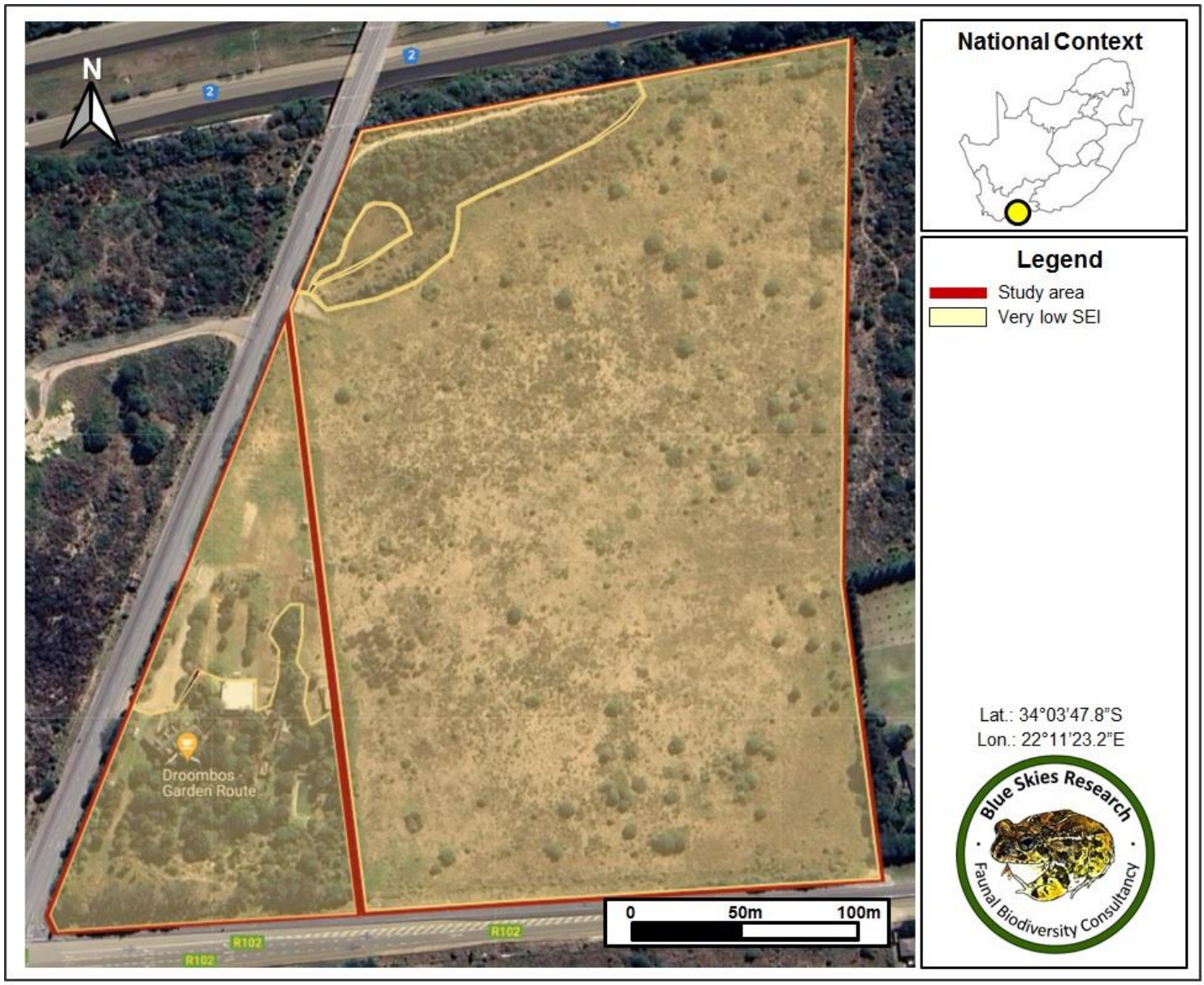


Figure 18 Spatial representation of the SEI for habitats within the study area.

11. Current impacts, project-related impacts and mitigation measures

11.1 Current impacts

Current impacts within the study area include the following:

- The study area has been subjected to radical past vegetation clearance, thereby degrading the habitat structure to a predominantly grassland phase.
- The northern-western part of the site harbours thick stands of alien and invasive vegetation.
- The study area is fenced over its entirety.
- The property is situated next to very busy roads (including a national highway, a provincial road and a municipal road) on its northern, western and southern borders, densely populated residential area next to its south and south-eastern border and developed agricultural farmlands to its north thereby isolating the site and limiting its functionality as a corridor for faunal movement.
- The south-western corner of the site comprises a fenced off area which is currently used as a nursery and restaurant which include a parking lot, a building and footpaths.
- A non-perennial man-made dam is situated on the north-western corner of the property.
- The site does not harbour suitable habitat for any of the faunal SCC considered.

Currently, these impacts appear severe to the point where the ecological integrity of the site has been compromised to such a degree that only a low number of common terrestrial faunal and avifaunal species are present.

11.2 Anticipated project impacts

Planned development activities for the proposed development footprint will include the clearing of vegetation, soil preparation, installation of roads and services and construction of building and infrastructure.

Impacts from these activities during the construction phase will include:

- Destruction of habitat,
- direct mortality of fauna, and
- vibration and noise (from machinery and people).

The placement of the proposed project footprint currently overlaps a relatively small area (10.6 hectares) of degraded habitat which harbours a low faunal diversity, is retrieved as having a “Very low” SEI and does not serve as an important ecological link in the broader landscape. To this end, impacts from the proposed development are expected to lead to the loss of only a relatively small area of degraded habitats and small subpopulations of burrowing species of “Least Concern” during the construction phase. From a broader conservation perspective, this loss of habitat and species is acceptable given that this should not compromise biodiversity targets on either a local, regional or national scale.

During the operational phase the entire study area will be developed for business and residential purposes. Impacts to the surrounding environment will therefore include:

- Possible pollution of the surrounding environment,
- predation by domestic pets (cats and dogs),
- collision of fauna with vehicles, and
- vibration and noise (from vehicles and people).

Considering the spatial location of the study area along with existing impacts (see Subsection 11.2), these impacts will not be a novel feature to the surrounding

receiving environment, and are not expected to drastically affect biodiversity and ecological patterns in the broader study area landscape.

11.3 Potential development layouts and proposed mitigation measures

The three development alternatives considered include the construction of roads (all alternatives), a service station (alternatives A and B), fast foods and takeaway area (alternative B), mixed use industrial zones (all alternatives), business zones (all alternatives), residential zones (all alternatives) and currently includes an existing nursery (Figures 19 to 21).

Considering the compromised biodiversity and ecological characteristics and ecosystem dynamics of the site, its isolated nature, the degraded state of habitats and their retrieval as having a “Very low” SEI, this renders the entire site is developable from a faunal perspective (Figure 22). To this end, any of the three development layouts may be considered for the study area without restoration activities being required.

It is, however, recommend that the newly developed area be fenced off so as to curb the potential predation by domestic pets and collision of fauna with vehicles. Furthermore, it is recommend that the development footprint be kept at the provided minimum to minimise disturbance of surrounding natural habitats. Furthermore, every effort should be made to save and relocate any mammal, reptile, amphibian, bird, or invertebrate that cannot flee of its own accord, encountered during site preparation (i.e., to avoid and minimise the direct mortality of faunal species). These animals should be relocated to a suitable habitat area immediately outside the project footprint, but under no circumstance to an area further away.

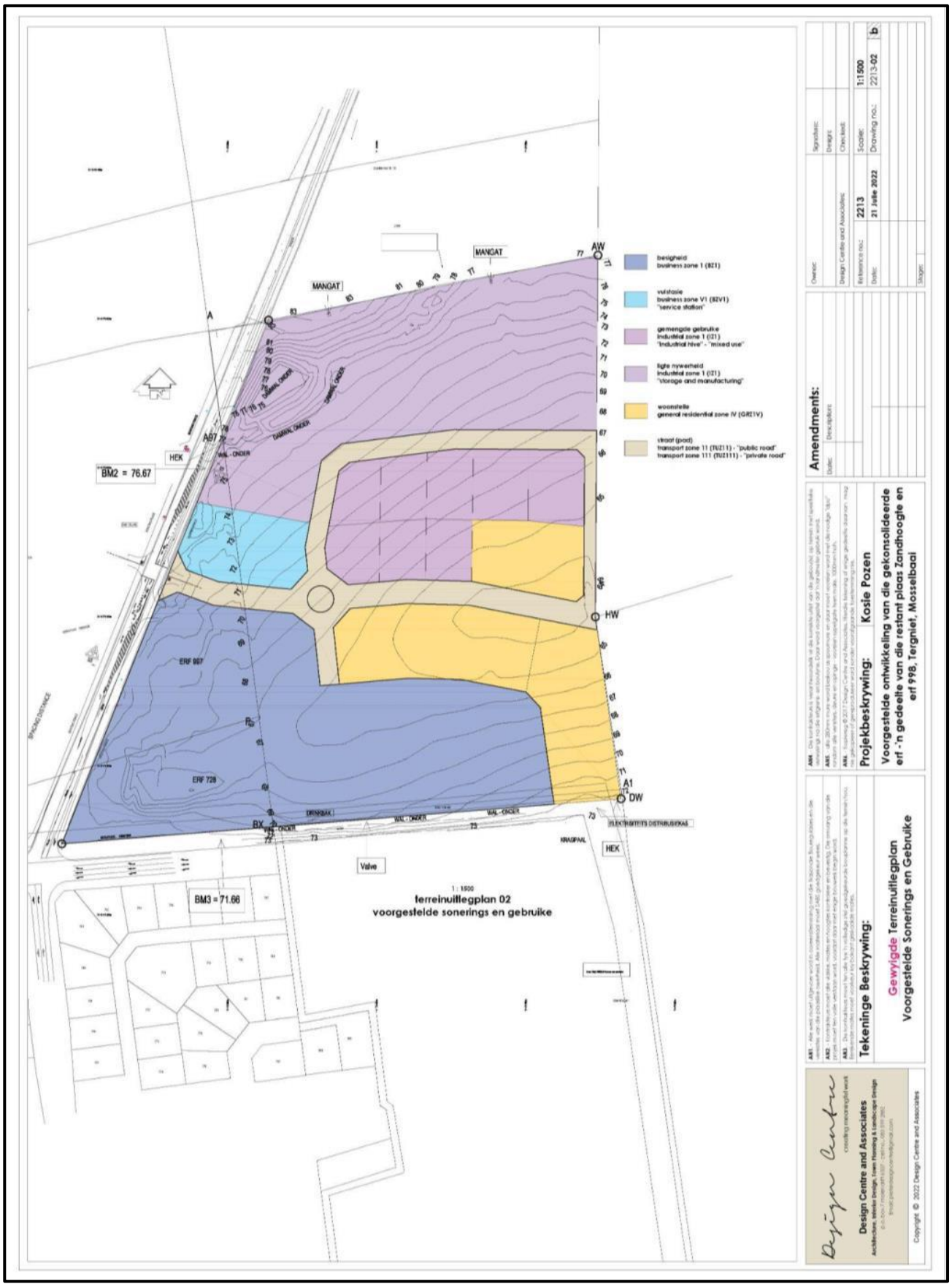


Figure 19 Proposed site development plan (SDP) for the study area under alternative A.

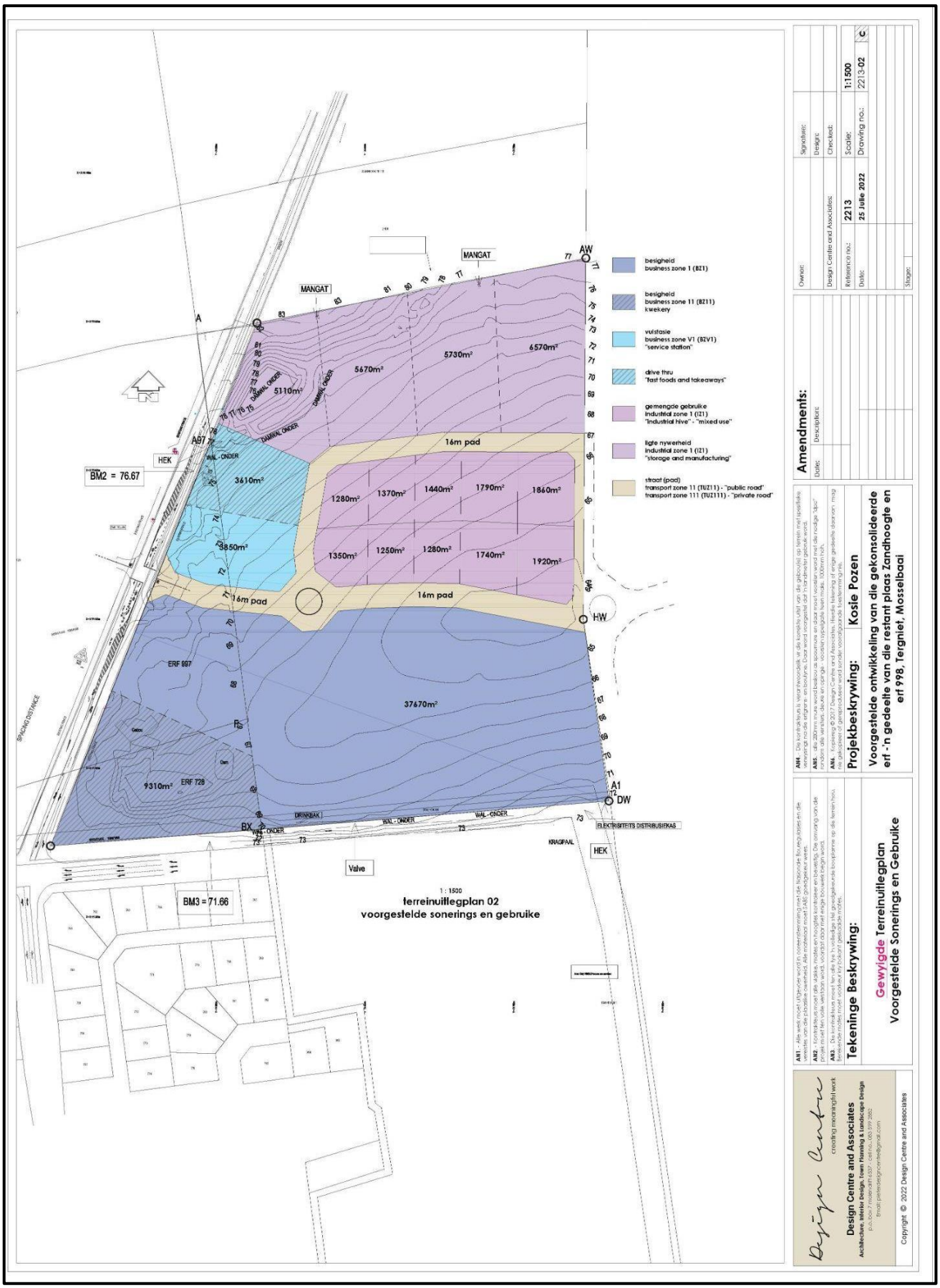


Figure 20 Proposed site development plan (SDP) for the study area under alternative B.

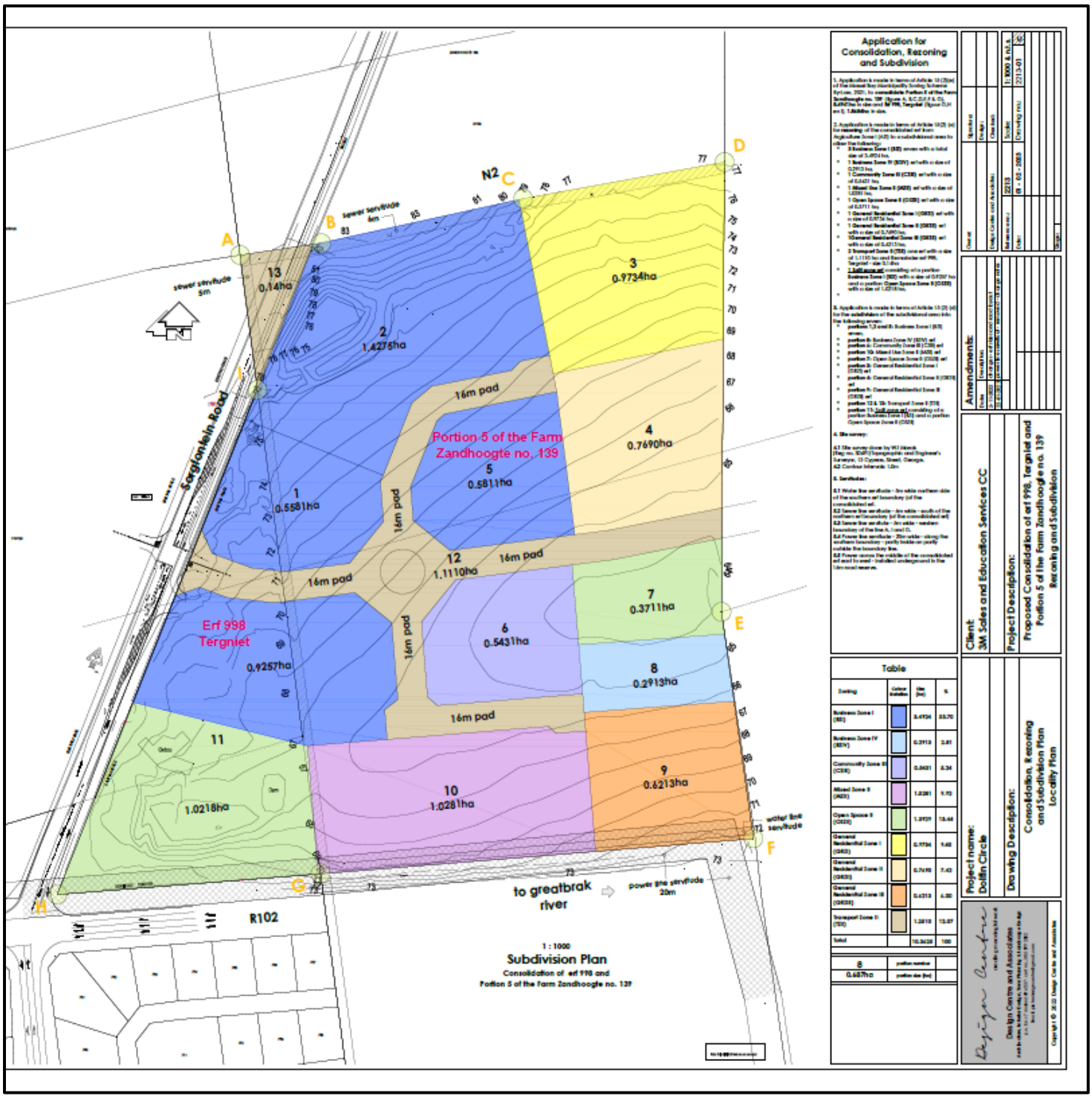


Figure 21 Proposed site development plan (SDP) for the study area under alternative C.

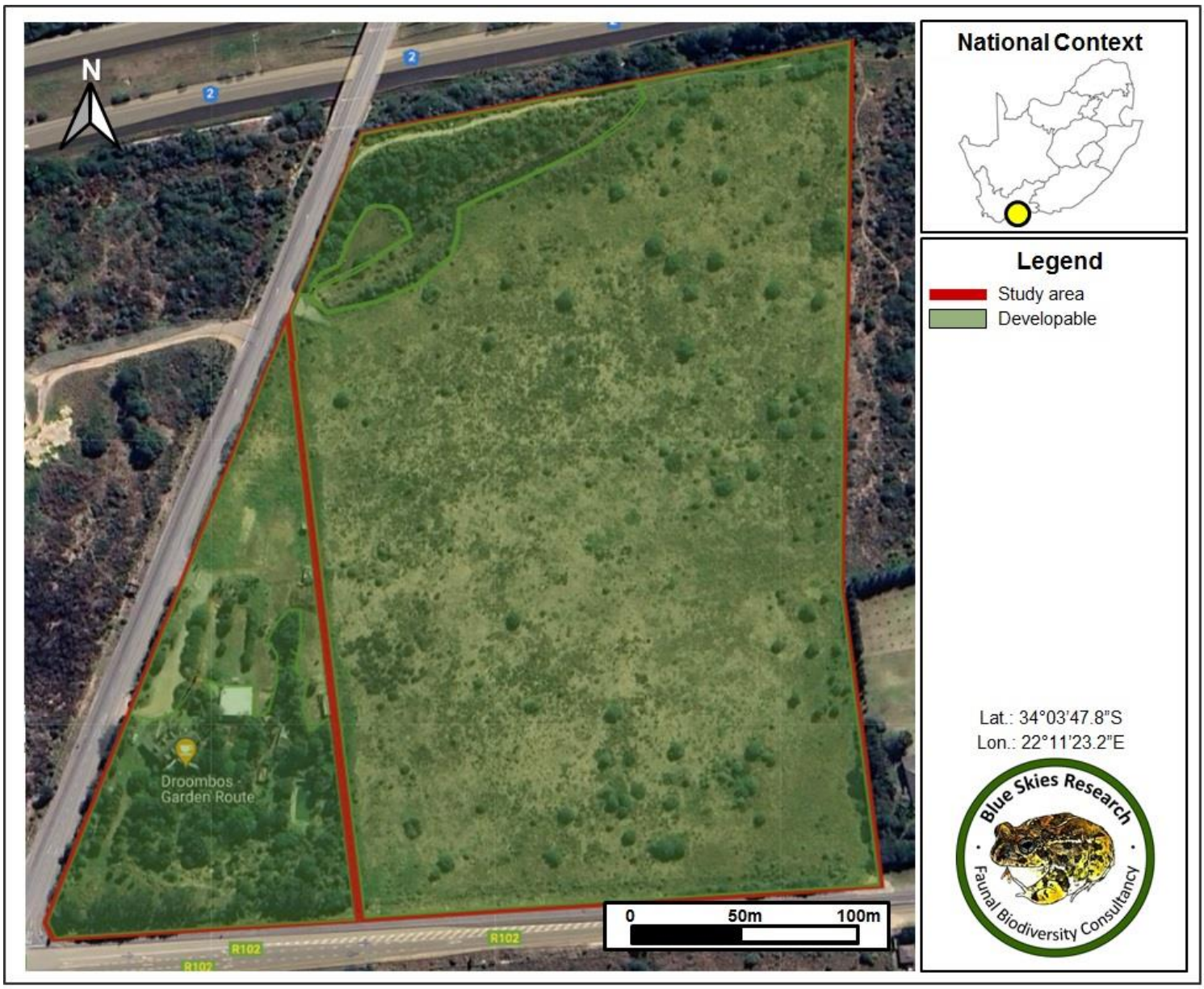


Figure 22 "Constraints and Opportunities" map of the study area showing the spatial overlap with areas which are suitable for potential development without considering mitigation.

12. Conclusion

12.1 Listed sensitivity in the DFFE Screening Tool Report

The results from this report confirm the site sensitivity of the proposed project footprint to be “Low” rather than “High” as identified in the DFFE Screening Tool Report (Section 3). This follows from degraded nature of the on-site habitat which offers little in the way of faunal habitats, does not provide a functional link in providing ecosystem services and which does not represent suitable habitat for any faunal or avifaunal SCC (Section 9).

12.2 Overlap with Critical Biodiversity Areas (CBAs)

Following the ground-truthing phase, the following conclusions may be drawn:

- The site harbours degraded habitats retrieved as having a “Very low” SEI.
- The site harbours an impaired terrestrial faunal and avifaunal diversity.
- The site displays compromised biodiversity and ecological characteristics and ecosystem dynamics.
- The site does not serve as an important or highly functional ecological corridor in the broader study area landscape.

Although the northern margin of the site is mapped as a mix of terrestrial CBA 1 and CBA 2, the study area therefore fails to meet the criteria of these categories defined as:

CBA 1: “*Areas in a natural condition that are required to meet biodiversity targets for species, ecosystems, or ecological processes and infrastructure.*”

and

CBA 2: "*Areas in a degraded or secondary condition that are required to meet biodiversity targets, for species, ecosystems or ecological processes and infrastructure.*"

Taken together, the study area is of little value in meeting biodiversity targets and offering ecosystem services or supporting ecological processes. To this end, this further indicates that the site is of a lower sensitivity, and is therefore developable from a faunal sensitivity perspective.

12.3 Conclusion

This report provides a representative faunal and avifaunal assessment of the study area considering facets of:

- Terrestrial faunal and avifaunal habitat composition (Section 7),
- terrestrial faunal and avifaunal components (Section 8),
- the presence of any terrestrial faunal and avifaunal SCC on the site (Section 9),
- the SEI of habitats within the study area, with associated acceptable development activities (Section 10), and
- a "Constraints and opportunities" map of the site (Section 11).

Taken together, the results of the report indicate the following:

- The study area is comprised of four broadly identified habitat features with the larger part existing in a highly degraded state, the north-western corner harbouring an artificial dam and a large number of alien and invasive trees and the south-western part representing a built-up area (Section 7).
- Terrestrial faunal and avifaunal diversity and abundances in the study area appear low which likely results from the degraded an isolated nature of the site. To this end, predator-prey dynamics and ecosystem dynamics appearing highly compromised, with the study area not forming an important ecological link and faunal dispersal corridor in the landscape (Section 8).

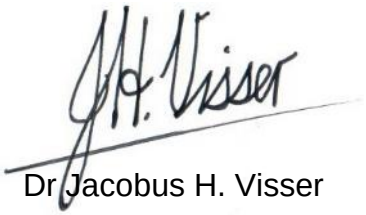
- Given a lack of suitable habitat characteristics along with high levels of daily disturbances, all considered SCC are highly unlikely to occur on the site (Section 9).
- All habitats on the site are retrieved as having a “Very low” SEI, allowing for development activities of medium to high impact without restoration activities being required (Section 10).
- Current impacts within the study area appear severe to the point where the ecological integrity of the site has been compromised to such a degree that only a low number of common terrestrial faunal and avifaunal species are present (Section 11).
- Impacts from the proposed development during the construction phase are expected to lead to the loss of only a relatively small area of degraded habitats and small subpopulations of burrowing species of “Least Concern”, with this loss being acceptable given that it should not compromise biodiversity targets on either a local, regional or national scale (Section 11).
- During the operational phase impacts to the surrounding environment will not be a novel feature to the surrounding receiving environment, and are not expected to drastically affect biodiversity and ecological patterns in the broader study area landscape (Section 11).
- Considering the compromised biodiversity and ecological characteristics and ecosystem dynamics of the site, its isolated nature, the degraded state of habitats and their retrieval as having a “Very low” SEI, this renders the entire site is developable from a faunal perspective, and any of the three development layouts may be considered for the study area without restoration activities being required (Section 11).
- The results from this report confirm the site sensitivity of the proposed project footprint to be “Low” rather than “High” as identified in the DFFE Screening Tool Report (Subsection 12.1).
- Following the ground-truthing phase, the study area fails to meet the criteria of the overlapped CBA 1 and CBA 2 categories further indicating that it is of a lower sensitivity, and is therefore developable from a faunal sensitivity perspective (Subsection 12.2).

Taken together therefore, the relatively limited spatial extent of the proposed project footprint along with the limited impact of its limited impact on the receiving environment is therefore acceptable from a faunal conservation perspective. Also considering the socio-economic benefits in the Western Cape, this development is therefore supported from a faunal biodiversity perspective.

13. Conditions to which this statement is subjected

The content of this report is based on the author's best scientific and professional knowledge as well as available information. Since environmental impact studies deal with dynamic natural systems, additional information may come to light at a later stage which is not listed in this report. As such, the conclusions and recommendations made in this report are done in good faith based on information gathered at the time of the investigation.

This report must not be altered or added to without the prior written consent of the author. This also refers to electronic copies of the report, which are supplied for the purposes of inclusion as part of other reports, including main reports. Similarly, any recommendations, statements or conclusions drawn from or based on this report must make reference to this report. If these form part of a main report relating to this investigation or report, this report must be included in its entirety as an appendix or separate section to the main report.



Dr Jacobus H. Visser
(PhD Zoology; Pr. Sci. Nat.)
SACNASP Registration Number: 128018

14. References

Barnes, K.N. 2000. *The Eskom Red Data Book of birds of South Africa, Lesotho and Swaziland*. BirdLife South Africa, Johannesburg.

BirdLife International. 2016. *Bradypterus sylvaticus*. The IUCN Red List of Threatened Species 2016: e.T22714480A94418244. https://dx.doi.org/10.2305/IUCN.UK.2016-3.RLTS.T22714480A94418244.en. Accessed on 25 January 2024.

BirdLife International. 2017. *Campethera notata*. The IUCN Red List of Threatened Species 2017: e.T22680910A118435157. https://dx.doi.org/10.2305/IUCN.UK.2017-3.RLTS.T22680910A118435157.en. Accessed on 25 January 2024.

BirdLife International. 2016. *Circus ranivorus*. The IUCN Red List of Threatened Species 2016: e.T22695352A93504602. https://dx.doi.org/10.2305/IUCN.UK.2016-3.RLTS.T22695352A93504602.en. Accessed on 25 January 2024.

BirdLife International. 2016. *Neotis denhami*. The IUCN Red List of Threatened Species 2016: e.T22691905A93327715. https://dx.doi.org/10.2305/IUCN.UK.2016-3.RLTS.T22691905A93327715.en. Accessed on 25 January 2024.

Brown, H.D. 1960. New Grasshoppers (Acridoidea) from the Great Karroo and the South Eastern . Journal of the Entomological Society of South Africa 23: 126-143.

Brown, L.H., Urban, E.K. and Newman, K. 1982. The Birds of Africa, Volume I. Academic Press, London.

Brownlie, S. 2005. Guideline for involving biodiversity specialists in EIA processes: Edition 1. CSIR Report No. ENV-S-C 2005-053 C. Provincial Government of the Western Cape: Department of Environmental Affairs and Development Planning.

Collar, N.J. 1996. Otididae (Bustards). In: del Hoyo, J.; Elliott, A.; Sargatal, J. (ed.), *Handbook of the birds of the world*, pp. 240-273. Lynx Edicions, Barcelona, Spain.

Edge, D. 2018a. *Aloeides pallida littoralis*. Southern African Lepidoptera Conservation Assessment (SALCA). Red List of South African Species. South African Biodiversity Institute. http://speciesstatus.sanbi.org/assessment/last-assessment/445/. 21 August 2023.

Edge, D. 2018b. *Aloeides thyra orientis*. Southern African Lepidoptera Conservation Assessment (SALCA). Red List of South African Species. South African Biodiversity Institute. http://speciesstatus.sanbi.org/assessment/last-assessment/445/. 21 August 2023.

Edge, D. 2018c. *Chrysoritis brooksi tearei*. Southern African Lepidoptera Conservation Assessment (SALCA). Red List of South African Species. South African Biodiversity Institute. http://speciesstatus.sanbi.org/assessment/last-assessment/445/. 21 August 2023.

Edge, D. 2018d. *Lepidochrysops littoralis*. Southern African Lepidoptera Conservation Assessment (SALCA). Red List of South African Species. South African Biodiversity Institute. http://speciesstatus.sanbi.org/assessment/last-assessment/445/. 21 August 2023.

Ferguson-Lees, J., Christie, D.A. 2001. *Raptors of the world*. Christopher Helm, London.

Flint, V.E., Boehme, R.L., Kostin, Y.V., Kuznetsov, A.A. 1984. A field guide to birds of the USSR. Princeton University Press, Princeton, New Jersey.

del Hoyo, J., Elliot, A., Sargatal, J. 1992. *Handbook of the Birds of the World, Vol. 1: Ostrich to Ducks*. Lynx Edicions, Barcelona, Spain.

del Hoyo, J., Elliott, A., Sargatal, J. 1996. *Handbook of the Birds of the World, vol. 3: Hoatzin to Auks*. Lynx Edicions, Barcelona, Spain.

Government Gazette No 34809, 9 December 2011. Department of Environmental Affairs, No. 1002 of 2011. List of Ecosystems that are Threatened and in Need of Protection.

Government Gazette No. 43110, 20 March 2020. Procedures for the assessment and minimum criteria for reporting on Identified Environmental Themes in terms of Sections 24(5)(a) and 44 of the National Environmental Management Act, 1998, when applying for Environmental Authorisation.

Government Gazette No. 43855, 30 October 2020. Procedures for the assessment and minimum criteria for reporting on Identified Environmental Themes in terms

of Sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, when applying for Environmental Authorisation.

Hochkirch, A., Bazelet, C., Danielczak, A. 2018. *Aneuryphymus montanus*. The IUCN Red List of Threatened Species 2018: e.T116114515A116116590. https://dx.doi.org/10.2305/IUCN.UK.2018-1.RLTS.T116114515A116116590.en. Accessed on 19 April 2023.

Hockey, P.A.R., Dean, W.R.J., Ryan, P.G. 2005. *Roberts birds of southern Africa*. Trustees of the John Voelcker Bird Book Fund, Cape Town, South Africa.

Hofmeyr, S.D., Symes, C.T., Underhill, L.G. 2014. Secretarybird *Sagittarius serpentarius* population trends and ecology: insights from South African citizen science data. PLoS ONE 9: e96772

Kemp, A., Dean, R. 1988. Diet of African Marsh Harriers from pellets. Gabar 3: 54-55.

Kinvig, R.G. 2005. Biotic indicators of grassland condition in Kwazulu-Natal, with management recommendations. School of Biological and Conservation Sciences, University of KwaZulu-Natal.

Kaiser, W. 2006. The characteristics of insect and small mammal communities as a reflection of the ecological value of grasslands. M.Sc. Thesis. University of the Free State.

Kinvig, R.G. 2005. Biotic indicators of grassland condition in Kwazulu-Natal, with management recommendations. School of Biological and Conservation Sciences, University of KwaZulu-Natal.

Mecenero, S., Ball, J.B., Edge, D.A., Hamer, M.L., Henning, G.A., Kruger, M., Pringle, E.L., Terblanche, R.F. & Williams, M.C. (eds). 2013. Conservation assessment of butterflies of South Africa, Lesothos and Swaziland: Red List and atlas. Saftronics (Pty) Ltd., Johannesburg & Animal Demography Unit, Cape Town.

Pryke, J.S., Samways, M.J., Hockey, P.A.R. 2010. Persistence of the threatened Knysna warbler *Bradypterus sylvaticus* in an urban landscape: do gardens substitute for fire? African Journal of Ecology 49(2): 199-208.

Urban, E.K., Fry, C.H., Keith, S. 1986. The Birds of Africa, Volume II. Academic Press, London.

Urban, E.K., Fry, C.H., Keith, S. 1997. *The birds of Africa vol. V*. Academic Press, London.

Williams, M.C. 2016. Butterflies and skippers of the Afrotropical Region., CD-ROM. Available from the author at mark.williams[at]up.ac.za., 2016.

Appendix A

Appendix A Species list of the faunal species recovered within the study area during the field survey. For each, the taxonomic Order, Family, species binomial name and species common name are shown, along with the current IUCN Red List classification of the species, and the number of records of the species during the surveying period.

Mammals					
Order	**Family**	**Species**	**Common name**	**IUCN status**	**Number of observations**
Cetartiodactyla	Bovidae	*Raphicerus melanotis*	Cape Grysbok	Least Concern	2
Rodentia	Bathyergidae	*Bathyergus suillus*	Cape Dune Mole-rat	Least Concern	15
		Cryptomys hottentotus	African Mole-rat	Least Concern	1
	Hystricidae	*Hystrix africaeaustralis*	Cape Porcupine	Least Concern	3
	Muridae	*Gerbilliscus afra*	Cape Gerbil	Least Concern	1
		Rhabdomys pumilio	Four-striped Grass Mouse	Least Concern	5
Avifauna					
Order	**Family**	**Species**	**Common name**	**Status**	**Number of observations**
Bucerotiformes	Upupidae	*Upupa africana*	African Hoopoe	Least Concern	1
Coliiformes	Coliidae	*Colius striatus*	Speckled Mousebird	Least Concern	1
Columbiformes	Columbidae	*Columba guinea*	Speckled Pigeon	Least Concern	1
		Spilopelia senegalensis	Laughing Dove	Least Concern	1
		Streptopelia capicola	Cape Turtle Dove	Least Concern	1
		Streptopelia semitorquata	Red-eyed Dove	Least Concern	1
Galliformes	Numididae	*Numida meleagris*	Helmeted Guineafowl	Least Concern	1
	Phasianidae	*Pternistis capensis*	Cape Spurfowl	Least Concern	1
Passeriformes	Cisticolidae	*Cisticola subruficapilla*	Grey-backed Cisticola	Least Concern	1
		Prinia maculosa	Karoo Prinia	Least Concern	1

	Dicruridae	*Dicrurus adsimilis*	Fork-tailed Drongo	Least Concern	1
	Fringillidae	*Serinus canicollis*	Cape Canary	Least Concern	1
	Laniidae	*Lanius collaris*	Southern Fiscal	Least Concern	1
	Malaconotidae	*Chlorophoneus olivaceus*	Olive Bushshrike	Least Concern	1
	Muscicapidae	*Cossypha caffra*	Cape Robin-Chat	Least Concern	1
	Nectariniidae	*Cinnyris afer*	Greater Double-collared Sunbird	Least Concern	1
	Sturnidae	*Sturnus vulgaris*	Common Starling	Least Concern	1
	Zosteropidae	*Zosterops virens*	Cape White-eye	Least Concern	2
Pelecaniformes	Ardeidae	*Ardea melanocephala*	Black-headed Heron	Least Concern	1
Grasshoppers					
Order	**Family**	**Species**	**Common name**	**IUCN status**	**Number of observations**
Orthoptera	Acrididae	*Acrida acuminata*	Common Stick Grasshopper	Not Assessed	1
		Acrotylus insubricus	Common Digging Grasshoppe	Not Assessed	3
		Morphacris fasciata	Band-winged Grasshopper	Not Assessed	2

Appendix B

Curriculum Vitae of Jacobus Hendrik Visser

Full Name: Jacobus Hendrik Visser

SACNASP Registration: Professional Natural Scientist (Zoological Science) – Registration number: 128018

Address: 13 Dennelaan
Stilbaai
6674

Cell: (083) 453 7916

E-mail: BlueSkiesResearch01@gmail.com

Website: https://blueskiesresearch0.wixsite.com/blue-skies-research

Qualifications

- PhD (Zoology), University of Johannesburg (2015 - 2017)
- MSc (Zoology), Stellenbosch University (2011 - 2013)
- BSc Honours (Zoology) cum laude, Stellenbosch University (2010)
- BSc (Biodiversity and Ecology) cum laude, Stellenbosch University (2007 - 2009)

Scientific publications

- **Visser J.H.** (2013). Gene-flow in the rock hyrax (*Procavia capensis*) at different spatial scales. MSc thesis, Stellenbosch University, Stellenbosch, South Africa. https://core.ac.uk/download/pdf/37420485.pdf
- **Visser J.H.** (2017). Evolution of the South African Bathyergidae: patterns and processes. PhD dissertation, University of Johannesburg, Johannesburg, South Africa.

- **Visser J.H.**, Bennett N.C., Jansen van Vuuren B. (2014). Local and regional scale genetic variation in the Cape dune mole-rat, *Bathyergus suillus*. PLos ONE 9(9):e107226. https://doi.org/10.1371/journal.pone.0107226
- **Visser J.H.**, Bennett N.C., Jansen van Vuuren B. (2017). Distributional range, ecology and mating system of the Cape mole-rat, *Georychus capensis* family Bathyergidae. Canadian Journal of Zoology 95 (10): 713-726. https://doi.org/10.1139/cjz-2017-0016
- **Visser J.H.**, Bennett N.C., Jansen van Vuuren B. (2018). Spatial genetic diversity in the Cape mole-rat, *Georychus capensis*: Extreme isolation of populations in a subterranean environment. PLoS ONE 13(3): e0194165. https://doi.org/10.1371/journal.pone.0194165
- **Visser J.H.**, Bennett N.C., Jansen van Vuuren B. (2019). Evolutionary and ecological patterns within the South African Bathyergidae: Implications for taxonomy. Molecular Phylogenetics and Evolution 130, 181-197. https://doi.org/10.1016/j.ympev.2018.10.017
- **Visser J.H.**, Bennett N.C., Jansen van Vuuren B. (2019). Phylogeny and biogeography of the African Bathyergidae: a review of patterns and processes. Journal of Biogeography PeerJ 7:e7730. https://doi.org/10.7717/peerj.7730
- **Visser J.H.**, Geerts S. (2020). Describing sexual dimorphism and fine scale spatial distributions in the Drab Thick-tail Scorpion, *Parabuthus planicauda*. African Zoology 55 (3): 250-256. https://doi.org/10.1080/15627020.2020.1796525
- **Visser J.H.**, Geerts S. (2021). Static allometry and sexual dimorphism in the Striped Lesser-thicktail Scorpion, *Uroplectes lineatus*. Arachnology 18 (7), 700–707. https://doi.org/10.13156/arac.2020.18.7.700
- **Visser J.H.**, Geerts S. (in review). Sexual dimorphism and static allometry in the burrowing scorpion, *Opistophthalmus pallipes*. African Zoology.
- **Visser J.H.**, Geerts S. (2021). Sexual dimorphism and static allometry in the South African scorpion *Opistophthalmus karrooensis*. Arachnology 18 (9), 1057-1063.
- **Visser J.H.**, Geerts S., Jansen van Vuuren B. (2021). Phylogeographic patterns in a semi-lithophilous burrowing scorpion from South Africa, *Opistophthalmus pallipes*. Zoological Science 38 (1): 36-44. https://doi.org/10.2108/zs200094

- **Visser J.H.**, Robinson T.J., Jansen van Vuuren B. (2020). Spatial genetic structure in the rock hyrax (*Procavia capensis*) across the Namaqualand and western Fynbos areas of South Africa - a mitochondrial and microsatellite perspective. Canadian Journal of Zoology 98 (8): 557-571. https://doi.org/10.1139/cjz-2019-0154
- Uhrová M., Mikula O., Bennett N.C., Van Daele P., Piálek L., Bryja J., **Visser J.H.**, Jansen van Vuuren B., Šumbera R. (2022). Species limits and phylogeographic structure in two genera of solitary African mole-rats *Georychus* and *Heliophobius*. Molecular Phylogenetics and Evolution 167 (2022) 107337

IUCN Red List Assessments

- Bennett N.C, Jarvis J.U.M., **Visser J.H.**, Maree, S. (2016). A conservation assessment of *Georychus capensis*. In: Child M.F., Roxburgh L., Do Linh San E., Raimondo D., Davies-Mostert H.T. (Eds). The Red List of Mammals of South Africa, Swaziland and Lesotho. South African National Biodiversity Institute and Endangered Wildlife Trust, South Africa. https://www.ewt.org.za/wp-content/uploads/2019/02/16.-Cape-Mole-rat-Georychus-capensis_LC.pdf
- Bennett N.C., **Visser J.H.**, Maree S., Jarvis J.U.M. (2016). A conservation assessment of *Bathyergus suillus*. In: Child M.F., Roxburgh L., Do Linh San E., Raimondo D., Davies-Mostert H.T. (Eds). The Red List of Mammals of South Africa, Swaziland and Lesotho. South African National Biodiversity Institute and Endangered Wildlife Trust, South Africa. https://www.ewt.org.za/wp-content/uploads/2019/02/6.-Cape-Dune-Mole-rat-Bathyergus-suillus__LC.pdf
- Maree S., Jarvis J.U.M., Bennett N.C., **Visser J.H.** (2017). *Bathyergus suillus*. The IUCN Red List of Threatened Species 2017:e.T2620A110017759. http://dx.doi.org/10.2305/IUCN.Uk.2017-2.RLTS.T2620A110017759.en.
- Maree S., **Visser J.H.**, Bennett N.C., Jarvis J.U.M. (2017). *Georychus capensis*. The IUCN Red List of Threatened Species 2017:e.T9077A110019425. http://dx.doi.org/10.2305/IUCN.Uk.2017-2.RLTS.T9077A110019425.en.
- **Visser J.H.**, Wimberger K. (2016). A conservation assessment of *Procavia capensis*. In: Child M.F., Roxburgh L., Do Linh San E., Raimondo D., Davies-Mostert H.T. (Eds). The Red List of Mammals of South Africa, Swaziland and

Lesotho. South African National Biodiversity Institute and Endangered Wildlife Trust, South Africa. https://www.ewt.org.za/wp-content/uploads/2019/02/3.-Rock-Hyrax-Procavia-capensis_LC.pdf

List of fauna reports

- **Visser, J.H.** Terrestrial Animal Species Compliance Statement Report For A Portion of Remainder of Farm 630, Rawsonville, Breede Valley Municipality. November 2021. Prepared for inClover Environmental Consulting.
- **Visser, J.H.** Terrestrial Faunal and Avifaunal Species Compliance Statement Report for a Portion of Brazil 329, Nama Khoi Municipality, Namakwa District. April 2022. Prepared for WNel Environmental Consulting Services.
- **Visser, J.H.** Terrestrial Faunal And Avifaunal Species Scoping Report for the Proposed Waste Management Facility at Portions 1 and 6 of Farm 32 Brakkefontein, City of Cape Town. April 2022. Prepared for SLR Consulting.
- **Visser, J.H.** Terrestrial Faunal And Avifaunal Species Impact Assessment Report for a Portion of Riet Valleij (Somerset Vale, Farm Portion RE/150), Estelm Boerdery, Swellendam Municipality, Overberg District. June 2022. Prepared for PHS Consulting.
- **Visser, J.H.** Site Sensitivity Verification Report for Remainder of Farm De Draay No 563, Overstrand Municipality. August 2022. Prepared for PHS Consulting.
- **Visser, J.H.** Terrestrial Faunal and Avifaunal Impact Assessment Report for Remainder of Farm Rooilandia No. 472, Breede Valley Municipality. October 2022. Prepared for McGregor Environmental Services.
- **Visser, J.H.** Terrestrial Faunal and Avifaunal Species Impact Assessment Report for Portion 3 of Farm 781, Theewaterskloof Local Municipality. December 2022. Prepared for PHS Consulting.
- **Visser, J.H.** Terrestrial Faunal Species Compliance Statement Report for Farm Portion 49, Hansmoeskraal Farm 202, George Local Municipality. April 2023. Prepared for Sharples Environmental Services cc (SES).
- **Visser, J.H.** Terrestrial Faunal and Avifaunal Species Compliance Statement Report for Farm 153 Vissershok (C1038: Upgrading of TR11/1), City of Cape

Town Municipality. May 2023. Prepared for Sharples Environmental Services cc (SES).

- **Visser, J.H.** Terrestrial Faunal and Avifaunal Species Impact Assessment Report for Farm Witteklip 69/123, Vredenburg, Saldanha Bay Municipality. June 2023. Prepared for Ecosense Environmental Consultants.
- **Visser, J.H.** Terrestrial Faunal and Avifaunal Species Impact Assessment Report for the Proposed Greenvalley Mixed-use Development on Portion 28, 31 and 32 of the Farm Wittedrift No. 306, and Associated Bulk Infrastructure, Plettenberg Bay, Bitou Municipality. June 2023. Prepared for Sharples Environmental Services cc (SES).
- **Visser, J.H.** Terrestrial Faunal and Avifaunal Species Compliance Statement Report for the Upgrade of the Schaapkop Sewer Rising Main on Remainder of Erf 464 and Erf 13486, George Local Municipality. July 2023. Prepared for Sharples Environmental Services cc (SES).
- **Visser, J.H.** Terrestrial Faunal and Avifaunal Species Impact Assessment Report for the Proposed Mixed-use Housing Development on Portions 7 and 8 of the Farm Kranshoek No. 432, Plettenberg Bay, Bitou Municipality. July 2023. Prepared for Sharples Environmental Services cc (SES).
- **Visser, J.H.** Terrestrial Faunal and Avifaunal Species Compliance Statement Report for the Proposed Sandmine on Portion 109 of the Farm Zwarte Jongers Fontein No. 489, Hessequa Municipality. August 2023. Prepared for Pro-Earth Consulting.
- **Visser, J.H.** Terrestrial Faunal and Avifaunal Species Impact Assessment Report for the Upgrading of Herold's Bay Sewer Pump Station and Associated Rising Main on Remainder of Farm Brakfontein 236, Portion 10 of Farm Brakfontein 236 and Erven RE/95 and 116, Herholds Bay, George Municipality. September 2023. Prepared for Sharples Environmental Services cc (SES).
- **Visser, J.H.** Terrestrial Faunal and Avifaunal Species Impact Assessment Report for the Proposed Flood Damage Repairs, Rehabilitation and Other Mitigation Measures in Van Riebeeck Gardens and Camphersdrift, George, George Municipality. September 2023. Prepared for Sharples Environmental Services cc (SES).

- **Visser, J.H.** Terrestrial Faunal and Avifaunal Species Compliance Statement Report for the Proposed Hartenbos Waste Water Treatment Works PV Solar Plant on Remainder of Portion 101 of the Farm Hartenbosch 217, Mossel Bay, Mossel Bay Municipality. September 2023. Prepared for Sharples Environmental Services cc (SES).
- **Visser, J.H.** Terrestrial Faunal and Avifaunal Species Site Sensitivity Verification Report for the Proposed Construction of Tourist Accommodation on Portions 10, 11 and 13 of the Farm Arieskraal A 456, Elgin. September 2023. Prepared for PHS Consulting.
- **Visser, J.H.** Terrestrial Faunal and Avifaunal Species Impact Assessment Report for the Proposed Multifunctional Agricultural Development on Remainder of Farm De Draay No 563, Overstrand Municipality. November 2023. Prepared for PHS Consulting.
- **Visser, J.H.** Terrestrial Faunal and Avifaunal Species Site Sensitivity Verification Report for Portion 7 of the Farm Witteklip No. 123, Saldanha Bay Municipality. November 2023. Prepared for Ecosense Environmental Consultants.
- **Visser, J.H.** Terrestrial Faunal and Avifaunal Species Compliance Statement Report for the Proposed Construction of Two Hard Water Reservoirs and Associated Infrastructure at the Koeberg Nuclear Power Station Located on the Farm Duynefontyn No. 1552, City of Cape Town Metropolitan Municipality. November 2023. Prepared for Sharples Environmental Services cc (SES).
- **Visser, J.H.** Terrestrial Faunal and Avifaunal Species Site Sensitivity Verification Report for Portion 7 of The Farm Hans Moes Kraal No. 202, George Local Municipality. December 2023. Prepared for Sharples Environmental Services cc (SES).

Other projects

- Southern African Bird Atlas Project 2 (SABAP2)
- Endemism, genetic variance and conservation priorities in the highlands of south-western Africa.
- Biodiversity and ecology of scorpions in the Cape Floristic Region.

- National Biodiversity Assessment 2018: The status of South Africa's ecosystems and biodiversity. Synthesis Report. South African National Biodiversity Institute, an entity of the Department of Environment, Forestry and Fisheries, Pretoria.

Conferences

- Presenter at the 2017 conference of the South African Wildlife Management Association (Presentation title: The influence of commercial game farming on maintaining genetic diversity in the sable antelope (*Hippotragus niger*) and roan antelope (*Hippotragus equinus*)
- Presenter at the 2017 conference of the Zoological Society of Southern Africa (Presentation title: Evolution of the South African Bathyergidae: Patterns and processes)
- Presenter at the 2010 conference of the Zoological Society of Southern Africa (Presentation title: Local and regional scale genetic variation in the Cape dune mole-rat, *Bathyergus suillus*

19 February 2026

TO WHOM IT MAY CONCERN

BOTANICAL COMMENT

Portion 5 of Farm Zandhoogte 139, Mossel Bay

The botanical comment below was requested by Sharples Environmental Services (SES), George. The undersigned was appointed as an independent botanical specialist to comment specifically on the ecological corridor (passage) proposed in a terrestrial biodiversity assessment report for the above properties. The latter report was prepared by Chepri Scientific Services in June 2023.

The applicant is currently investigating development opportunities on the above property, which is located between the R102 and the N2, north of Tergniet (**Figure 1**). The site is currently lying vacant (fallow). Erf 998, the triangular property directly west of the site, is also part of the larger site, but it is completely transformed and of no botanical interest.

Figure 1: Locality map.

Site survey

A brief botanical survey of the site was undertaken on 18 January 2024 by the undersigned, in the company of the faunal specialist Dr Jaco Visser. Special attention was given to the proposed ecological corridor on the northern side of the site, next to the N2. An additional assessment of the type and condition of vegetation on site, disturbances and presence of alien species and species of conservation concern (SCC) was carried out. Reference is also made to the 2018 South African Vegetation Map.

Biodiversity Planning Context

The site is located in a semi transformed strandveld environment in the southern Cape coastal region. The 2018 Vegetation Map of South Africa classifies the vegetation type found here as Hartenbos Dune Thicket. The latter is currently listed as Endangered[1]. It is described as "a mosaic of low (1-3 m) thicket, occurring in small bush clumps dominated by small trees and woody shrubs, in a mosaic of low (1-2 m) asteraceous fynbos. Thicket clumps are best developed in fire-protected dune slacks, and the fynbos shrubland occurs on upper dune slopes and crests".

Figure 2: Biodiversity network (CBA) map.

[1] Ecosystem Detail - Biodiversity BGIS (sanbi.org)

From a biodiversity network perspective, the northern side of the site encroaches on a terrestrial critical biodiversity area (CBA) and a degraded critical biodiversity area (CBA2) (see **Figure 2** above). 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[2]. 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. The site forms part of an ecological link between the Groot Brak and Klein Brak Estuaries. However, the link may have been compromised by development approvals further away to the west between the R102 and the N2! There is also an unrehabilitated or active sand mine 500 m away to the west that also impacts on the link, The areas to the north and south of the site have been transform for agricultural and residential purposes. Other (probably lesser) links run along the railway line, the N2 road reserve and primary dune above the beach.

Findings & recommendation

The site is situated in a shallow dune slack and the vegetation can be described as an open grassy (dune) thicket or strandveld type, typically associated with dune slacks (**Figures 3** to **5**). It comprises mainly grasses, restioids (*Thamnochortus insignis*) and a few scattered shrubs and trees, including *Osteospermum moniliferum, Helichrysum cymosum, H. patulum, H. odoratissimum, Chrysocoma ciliata, Senecio burchellii, Metalasia* sp, *Seriphium plumosum, Wiborgia obcordata, Carpobrotus edulis, Passerina corymbosa, Cliffortia cf linearifolia, Muraltia ericoides, Pelargonium capitatum, Leonotis ocymifolia, Crassula cf subulata* and *Selago corymbosa*. There are also a few dune thicket elements here and there, such as *Searsia glauca, S. crenata, S. pallens, Sideroxylon inerme, Pittosporum viridiflorum, Gymnosporia buxifolia, Grewia occidentalis, Diospyros dichrophylla* and *Aloe arborescens*. Both *Sideroxylon inerme* (milkwood) and *Pittosporum viridiflorum* (kasuur) are protected tree species under the National Forests Act (Act 84 of 1998). The farm dam in the north-western corner of site is surrounded by tall shrubs and trees, including several exotics such as *Schinus terebinthifolia* and *Psidium guajava* (**Figure 6**). One would not expect any notable species of conservation concern (SCC) to occur here, but the site certainly has some value as a part of the local biodiversity network.

The recommendation for an ecological corridor on the N2 side of the site is supported, which will provide a passage for fauna (pollinators & seed dispersal agents) to migrate across the site. This will theoretically maintain the ecological link between the natural vegetation on the western and eastern sides of the site. The N2 road reserve could serve as an extension to this corridor. The minimum width for such a corridor is difficult to determine, but probably depends on what is required from the corridor. In this instance

[2] Pool-Stanvliet, R., Duffell-Canham, A., Pence, G. & Smart, R. 2017. The Western Cape Biodiversity Spatial Plan Handbook. CapeNature, Stellenbosch.

there is probably no need to accommodate significant natural habitat, but more a need to maintain the functioning of the larger biodiversity network. I would suggest a minimum width of 40 m in order to minimise undesirable edge influences. A width of 40-50 m is considered suitable for small fauna, such as amphibian movement according to Cotter *et al*[3]. The biodiversity assessment report recommended a width of ±80 m for the corridor.

Figure 3: Botanical attributes of the site. The untoned area is degraded.

Site ecological importance (SEI) was determined by applying the criteria described in the Species Environmental Assessment Guideline (SANBI, 2020). The SEI considers the biodiversity importance of the affected area or habitat and its resilience to impacts. The habitat in this instance is described as degraded strandveld. SEI has been determined to be Medium for the site due to its size, the threat status of the vegetation type and limited connectivity that remains. This means that minimisation and restoration mitigation is recommended according to the Guideline.

Currently, motivation for the ecological corridor seems weak if development proposals further away to the west between the R102 and the N2 are going ahead. These will sadly further compromise the biodiversity link between the Groot Brak and Klein Brak Estuaries and other vegetation remnants in the area, such as the one in Reebok, 1 km southwest of the site. In a previous study for the municipality, I motivated for a connection between the latter and the biodiversity corridor between the R102 and the N2.

[3] Cotter, M., Berkhoff, K., Gibreel, T., Ghorbani, A., Golbon, R., Nuppenau, E.-A. & Sauerborn, J. 2014. Designing a sustainable land use scenario based on a combination of ecological assessments and economic optimization. Ecological Indicators, 36, 779– 787

Figure 4: Open grassy thicket in the centre of the site.

Figure 5: Patch of dekriet (*Thamnochortus insignis*).

Figure 6: Farm dam surrounded by tall shrubs and trees.

Management of the corridor

The most important management or maintenance task for the corridor would be to keep it clear of aliens. Ideally, all exotic species should be removed from the corridor. A simple alien clearing plan should suffice. It is important to note that the aliens must be cleared on an annual basis. To improve biodiversity inside the corridor, it is recommended that topsoil containing seeds of indigenous species and salvageable plants, such as *Carpobrotus* spp and *Aloe arborescens*, be collected from the development areas and deposited or planted inside the corridor.

The corridor should also not be fenced off on the sides facing away from the development. If fencing is needed for security reasons, a permeable fence should be erected that will allow small mammals through. Pedestrian traffic should be minimised. But if access needs to be provided for the residents, a path network should be established. The corridor should also be assessable for fire protection purposes.

Prepared by:

Mark Berry Pr Sci Nat (reg. no. 400073/98), PhD

HERBICIDES FOR ALIEN PLANT CONTROL

						PPE			Medical Biomonitoring		Frequency and Duration		
	Chemical group	**MOA**	**Examples**	**Hazard Group**	**Hazard Criterion**	**Type**	**Pictogram**	**Classification**	**Blood**	**Urine**	**Blood**	**Urine**	**Environmental monitoring**
1	Imidazolinones	Group 2: ALS: AHAS inhibitors	Imazapyr (Chopper, Hatchet, Arsenal)	2	**<u>Acute toxicity to mammals and birds</u>** **GHS07 WARNING**  H319 (causes serious eye irritation) H335 (Respiratory irritant) H315 (causes skin 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 they programme	
				8	**<u>Persistence in soil/water and soil absorption potential & bio magnification & bioaccumulation</u>** **GHS09 WARNING**								Hazard criterion 7 and 8 are linked to environmental risks

					 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 they programme	

	Carboxylic acids	Group 4: Synthetic auxins	Picloram (Access, Browser, Scrubber)	2	Acute toxicity to mammals and birds GHS07 WARNING  H302 (harmful if swallowed) H312 (harmful in contact with skin) H319 (Causes serious eye irritation) H332 (harmful if inhaled)	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		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 they programme	
				3	Carcinogenicity GHS07 WARNING  H335 (May cause respiratory irritation)	Same as above	Same as above	Same as above	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	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  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							
				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	Alkylchloropenoxy (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 they programme	

						5.Half-face respirators 6.Particulate air filters for respirators 7.Apron/ Knapjack	 	EN 166:2001 EN 140, EN149, EN 143:200 R95, R99, R100					
				3	Carcinogenicity GHS07 WARNING  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	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		

				5	Developmental & Reproductive toxicity GHS08 DANGER  H361 (Suspected of damaging 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 2 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								

					 H412 (Harmful to aquatic life with long lasting effects)								
			Pyridine compounds as butoxy ethyl esters (Garlon 4, Garlon max, Nuvogon, Triclon, Viroaxe, Triclomax, 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, Voloxypyr)		GHS09 WARNING  H411 (Toxic to aquatic life with long lasting effects)								
	Quinoline carboxylic acid	Group 4: Synthetic auxins	Pyridine compounds such as Aminopyralids (Sendero)	2	Acute toxicity to mammals and birds 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	Persistence in soil/water and soil absorption potential & bio magnification & bioaccumulation GHS09 WARNING  H411 (Toxic to aquatic life with long lasting effects)								
	Combinations	Group 4: Synthetic auxins	Quinoline carboxylic acid such as Picloram + Pyridine compound such as Fluroxypyr (Plenum, Gladiator)	2	Acute toxicity to mammals and birds GHS07 WARNING  H302 (harmful if swallowed) H312 (harmful in contact with skin) H319 (Causes serious eye irritation) H332 (harmful if inhaled)	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	
				3	Carcinogenicity GHS07 WARNING	1.Chemically resistant nitrile gloves		EN 374:2016	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		

						3.Safety boots 4.Face & Eye protection 5.Half-face respirators 6.Particulate air filters for respirators 7.Apron/ Knapjack 8. Long-sleeved shirts		R95, R99, R100			every 2 years.. 3. All workers need to be tested once they leave the programme		
				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)								

	Combinations	Group 4: Synthetic auxins	Pyridine compounds such as Fluroxypyr + Pyridine compounds such as Triclopyr as Pyridyloxy compound (Impala)	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 8. Long-sleeved shirt	     	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 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		

						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 143:2000 R95, R99, R100			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)								
	Combinations	Group 4: Synthetic auxins	Quinoline carboxylic acid such as Picloram + Pyridine compound	2	Acute toxicity to mammals and birds GHS07 WARNING 	1.Chemically resistant nitrile gloves 2.Type 3 and Type 4		EN 374:2016 EN 14605:2005					

			such Triclopyr as trimethylamine salt (Kaput gel)		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)	protective clothing  3.Safety boots  4.Face & Eye protection  5.Half-face respirators  6.Particulate air filters for respirators 7.Apron/ Knapjack 	 EN 345: 1993 EN ISO 20345 EN 166:2001 EN 140, EN149, EN 143:200 R95, R99, R100					
				3	Carcinogenicity GHS07 WARNING  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	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		

						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	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  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 2 years.. 3. All workers need to be tested once they leave the programme		
				7	Acute toxicity to aquatic organisms GHS09 WARNING								

					 H400 (Very toxic to aquatic life)								
					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 Triclopyr as amine salt + Pyridine compounds such as Clopyralid (Confront, Astra)	8 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	Persistence in soil/water and soil absorption potential & bio magnification & bioaccumulation GHS09 WARNING  H411 (Toxic to aquatic life with long lasting effects)								
	Combinations	Group 4: Synthetic auxins	Pyridine compounds such as Triclopyr as triethyl ammonium + Aminopyralid (Confront super)	2	Acute toxicity to mammals and birds GHS07 WARNING  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)	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  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		
				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) H11 (Toxic to aquatic life with long lasting effects)								
	Combinations	Group 4: Synthetic auxins	Pyridine compounds such as Triclopyr as Butoxy ethyl ester + Aminopyralid (Garlon Max)	2	Acute toxicity to mammals and birds 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) H336 (may cause drowsiness or dizziness) 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 7.Apron/ Knapjack		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)			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	Persistence in soil/water and soil absorption potential & bio magnification & bioaccumulation GHS09 WARNING  H410 (Very toxic to aquatic life with long lasting effects)								
	Uracils	Group 5: Photosynthetic inhibitors at Photosystem II, Site A.	Bromacil (Bushwacker)	2	Acute toxicity to mammals and birds 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 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	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)	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		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	

								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 they programme	

						6.Particulate air filters for respirators 7.Apron/ Knapjack	 	EN 140, EN149, EN 143:200 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, tumpleweed) 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	

						4.Face & Eye protection 5.Half-face respirators 6.Particulate air filters for respirators 7.Apron/ Knapjack	  	EN 166:2001 EN 140, EN149, EN 143:200 R95, R99, R100				they leave they programme	
	Glycines	Group 9: Inhibitors of EPSP synthesis.	Phosphonoglycines such as Glyphosate sodium salts (Kilo max)	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 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	

	Glycines	Group 9: Inhibitors of EPSP synthesis.	Phosphonoglycines such as glyphosate (all GBH's containing POE-T such as Roundup etc)	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 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	
				3	Carcinogenicity GHS07 WARNING  H335 (May cause respiratory irritation) H336 (may cause drowsiness or dizziness)	1.Chemically resistant nitrile gloves 2.Type 3 and Type 4 protective clothing 	 	EN 374:2016 EN 14605:2005	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		

					H315 (Causes skin irritation) H319 (causes serious eye irritation)	 3.Safety boots 4.Face & Eye protection 5.Half-face respirators 6.Particulate air filters for respirators 7.Apron/ Knapjack	   	EN 345: 1993 EN ISO 20345 EN 166:2001 EN 140, EN149, EN 143:200 R95, R99, R100			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	Persistence in soil/water and soil absorption potential & bio magnification & bioaccumulation GHS09 WARNING  H411 (Toxic to aquatic life with long lasting effects)								
	Organoarsenicals	Group 17: Unknown	Monosodium methylarsonate (MSMA)	2	Acute toxicity to mammals and birds GHS07 WARNING  H302 (Harmful if swallowed) H315 (causes skin irritation) H319 (Causes serious eye irritation)	1.Chemically resistant nitrile gloves 2.Type 3 and Type 4 protective clothing 	 	EN 374:2016 EN 14605:2005 EN 345: 1993		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.	

					H332 (Harmful if inhaled)	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 EN 140, EN149, EN 143:200 R95, R99, R100				3. All workers need to be tested once they leave they programme	
				3	Carcinogenicity GHS07 WARNING  H335 (May cause respiratory irritation) H336 (May cause drowsiness or dizziness)	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	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		

								R95, R99, R100					
				6	Endocrine Disrupting Chemicals (EDC) GHS08 DANGER  H371 (may cause damage to organs (kidneys and liver) H372 (causes damage to organs through prolonged effect (liver and kidneys)	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 2 years.. 3. All workers need to be tested once they leave the programme		

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

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

PESTICIDES FOR INVASIVE ANIMAL CONTROL

						PPE			Medical Biomonitoring		Frequency and Duration		
	Chemical group	**MOA**	**Examples**	**Hazard Group**	**Hazard Criterion**	**Type**	**Pictogram**	**Classification**	**Blood**	**Urine**	**Blood**	**Urine**	**Environmental monitoring**
1	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 143:2000 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							
				5	Developmental and Reproductive toxicity GHS08 DANGER  H360D (May damage 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	     	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							
				6	Endocrine Disrupting Chemicals (EDC) GHS08 DANGER  H372 (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 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 2 years.. 3. All workers need to be tested once they leave the programme		

				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	Acute Toxicity to mammals and birds GHS06 DANGER  H301 (Toxic if swallowed) GHS07 WARNING  H332 (Harmful if inhaled) H336 (may cause drowsiness or dizziness)	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 2 years.. 3. All workers need to be tested once they leave the programme		

				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		

					H319 (Causes serious eye irritation) H335 (May cause respiratory irritation)	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 143:2000 R95, R99, R100			every 2 years.. 3. All workers need to be tested once they leave the programme		
				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

URBAN ENGINEERING CONSULTANTS
CONSULTING CIVIL AND STRUCTURAL ENGINEERS

STORMWATER MANAGEMENT PLAN - CONSOLIDATION, REZONING AND SUBDIVISION OF ERF 998 TERGNIET AND PTN 5 OTF ZANDHOOGTE NO. 139, MOSSEL BAY

Report Number 22-160_SW

Date: October 2025 Revision (1)

QUALITY ASSURANCE DATA

Report Title:	STORMWATER MANAGEMENT PLAN - CONSOLIDATION, REZONING AND SUBDIVISION OF ERF 998 TERGNIET AND PTN 5 OTF ZANDHOOGTE NO. 139, MOSSEL BAY
Client:	3MP Sales and Education Services CC
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15 October 2025	1	Douw Louwrens	Pieter Brown	Design Centre and Associates	Email	.pdf
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			Kosie Pozyn	3MP Sales and Education Services Cc	Email	.pdf
			Michael Jon Bennett	Sharples Environmental Services	Email	.pdf

Prepared by:

Douw Louwrens (B.Eng)
on behalf of Urban Engineering (Pty) Ltd

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1 INTRODUCTION

Urban Engineering (Pty) Ltd was appointed by 3MP Sales and Education Services Cc to undertake a stormwater management plan pertaining to the proposed consolidation, rezoning and subdivision of Erf 998, Tergniet and PTN 5 of Farm Zandhoogte No. 139 Mossel Bay, Western Cape. The project is referred to as the Dolfin Circle Development.

1.1 PROJECT BENEFIT AND CONTEXT

The client has identified the need / opportunity for the creation of a mixed-use development consisting of both residential and business zones in the Tergniet / Groot Brak River area. To meet this demand, 3MP Sales and Education Services Cc is proposing the Dolfin Circle Development, which consists of the consolidation, rezoning and subdivision of Erf 998, Tergniet and PTN 5 of Farm Zandhoogte No. 139 Mossel Bay.

1.2 OBJECTIVES OF THIS REPORT

This report aims to provide a strategy for the management of stormwater for the proposed development. The objectives of these strategies are, inter alia to:

- Retain the peak stormwater flow to pre-development levels.
- Reduce the in-stream litter load.
- Protect the biodiversity within the catchment.
- Provide methods for removing, reducing, or retarding runoff flows, and preventing targeted stormwater runoff pollutants and contaminants from reaching receiving waters

It is important to note that this strategy document provides a range of principles and initial concepts based on site inspections as well as consultation with the relevant stakeholders. While conventional stormwater design has historically been a rather linear process (i.e. you design a piped network), this approach has had a significant impact on the environment through the erosion of natural channels, siltation of water bodies and pollution resulting in environmental degradation. An alternative approach to the conventional stormwater design system will be introduced, namely, Sustainable Urban Drainage Systems (SUDS).

1.3 STORMWATER MANAGEMENT PRINCIPLES

The underlying principle regarding Stormwater Management is that the peak runoff from the post-development site should not exceed that of the pre-developed site for the full range of storm periods (1:2 to 1:50). Mitigation measures must therefore be incorporated into the Site Development Plan to reduce and/or attenuate the post development flows to pre-development rates.

Although run-off calculations are performed with great care, it is still possible that the capacity of a system could be exceeded because of non-hydrological reasons. A limit to the elimination of probabilities must be incorporated as costs could become unrealistically high in comparison with the benefit of lower risks.

The relationship between function, risk, original cost and maintenance cost plays a major role in determining the design flood frequency, it is assumed in general that the flood frequencies as discussed in ***Table 1-1*** below should be provided for under normal circumstances.

Land Use	Design Storm Return Period (Major storm events)
Residential	50 years
Institutional (e.g.) schools	50 years
General Commercial and Industrial	50 years
High Value Central Business Districts	50 - 100 years
Land Use	**Design Storm Return Period (Minor storm events)**
Residential	1 - 5 years
Institutional (e.g.) schools	2 - 5 years
General Commercial and Industrial	5 years
High Value Central Business Districts	5 - 10 years

Table 1-1 - Typical stormwater analysis requirements based on land uses

1.4 SUSTAINABLE URBAN DRAINAGE SYSTEM (SUDS)

A conventional stormwater system manages the stormwater by collecting the runoff and channelling it into the nearest stormwater watercourse. The SUDS approach aims to mimic natural hydrological cycles, prevents the erosion of natural channels, siltation of water bodies, pollution and reducing environmental degradation.

SUDS embraces several options that are arranged in treatment trains, which helps to improve the efficiency and the resiliency of the system. There are three stages in the treatment train, each having slightly different combinations of SUDS options to control the stormwater:

1. "**Source Controls**" manage stormwater runoff as close to its source as possible, typically on site. Typical SUDS options include green roofs, rainwater harvesting, permeable pavements and soak-aways.
2. "**Local Controls**" manage stormwater runoff in the local area, typically within the road reserves. Typical SUDS options include bio-retention areas, filter strips, infiltration trenches, sand filters and swales.
3. "**Regional Controls**" manage the combined stormwater runoff from several developments. Typical SUDS options include constructed wetlands, detention and retention ponds.

2 LOCALITY

The future area of the combined erven will be approximately 10.3ha. The site is situated between National Road 2 (N2) and MR344. DR1578 defines the property's Western boundary and provides the only access onto the site. The site centre has approximate WGS 84 coordinates of 34° 3'49.05"S and 22°11'22.03"E. A basic locality plan has been included as ***Figure 2.1***.

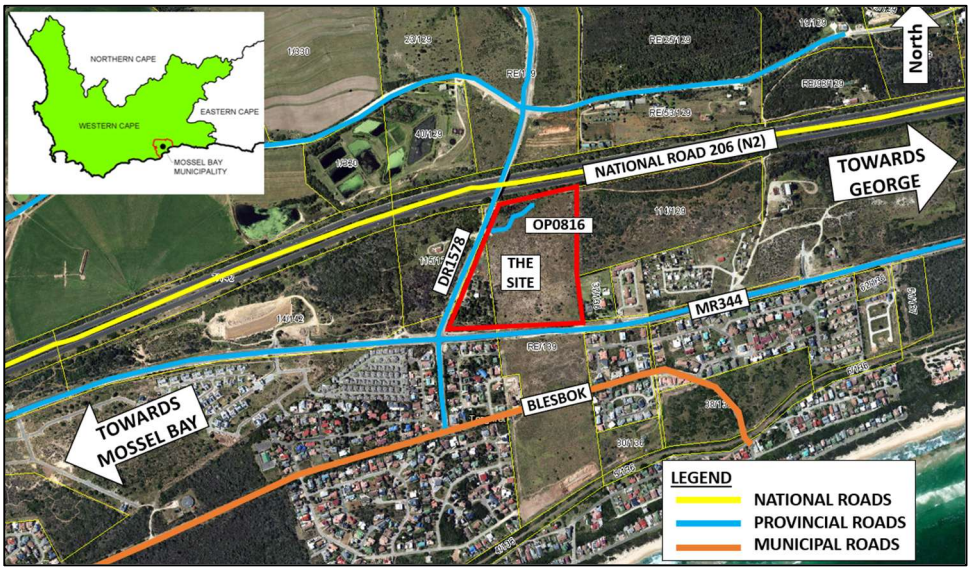


Figure 2-1 - Basic Locality Plan

3 STATUS QUO

The site consists of two erven with a frontal dimension of 370m and a width of 290m. There are currently structures on Erf 998, access onto both Erven from DR1578 (Sorgfontein Road), and a secondary access to the portion of RE/1578 from the MR344. The vegetation of the site is dry grasslands with some small shrubs.

Figure 3-1 - Status Quo Photo

The site is currently zoned Agriculture Zone I as indicated in the extract of Mossel Bay Municipality's GIS database.

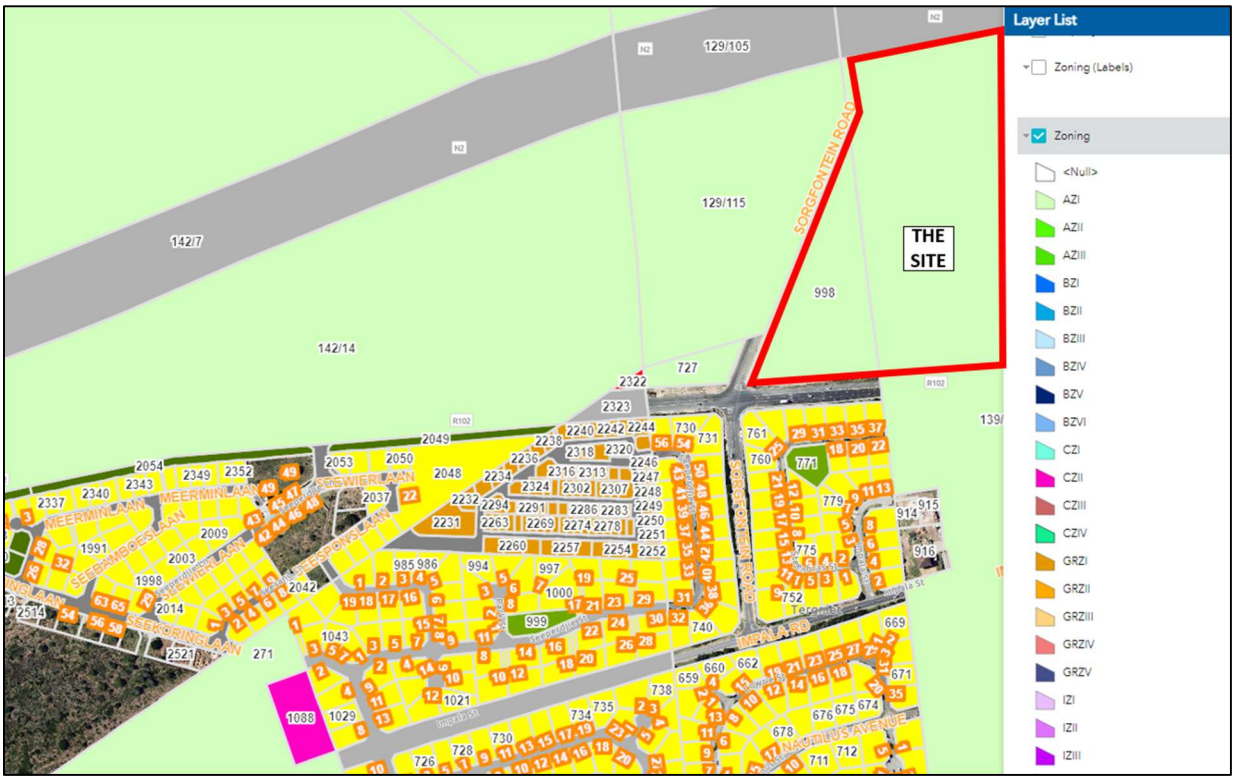


Figure 3-2 - Current Site Zoning

The 2018 Mossel Bay SDF prepared by CNdV planners identifies the site for future "Urban Expansion" potential (refer to Figure 3-3)

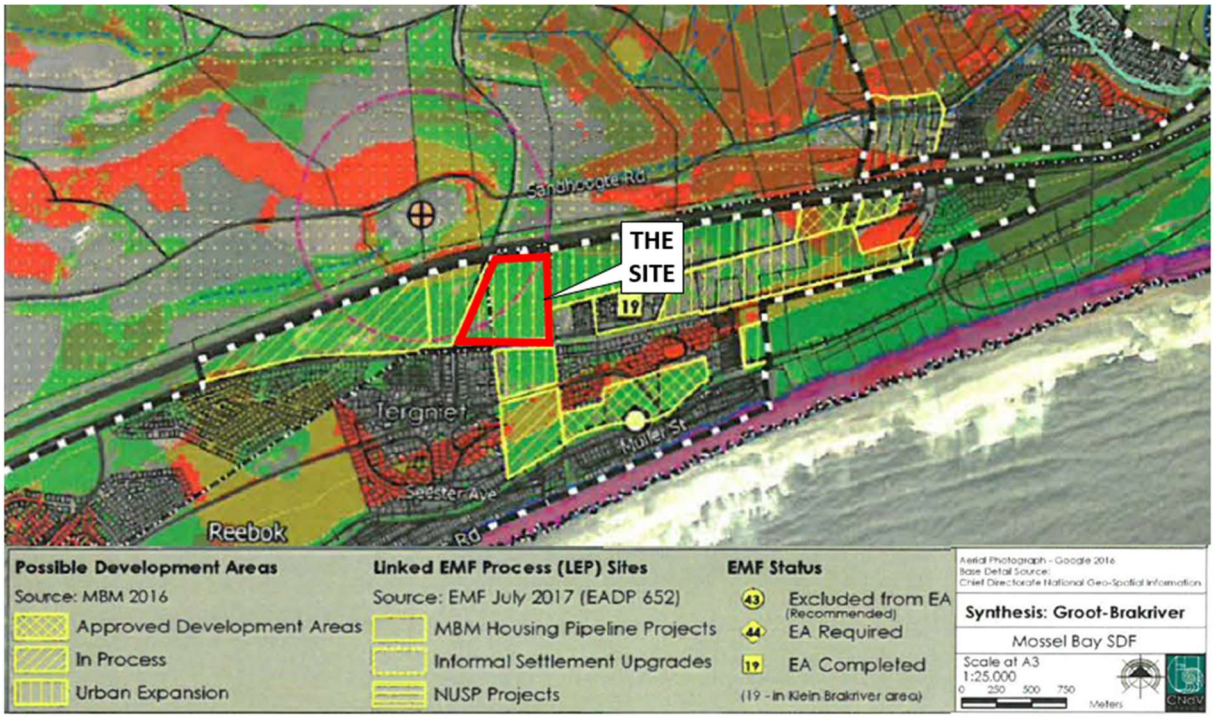


Figure 3-3 – Extract of Local Spatial Development Framework

4 PROPOSED DEVELOPMENT PARTICULARS

It is the intention of the landowner to develop the site into a new residential and commercial node. The main site access will remain on DR1578 but will be moved to the most optimum position along the DR1578.

The proposed development will consist of the following:

LAND USE DESCRIPTION	ABREVIATION	SIZE (ha)
Business Zone I	BZI	3.604
Business Zone IV	BZIV	0.268
Community Zone III	CZIII	0.527
Mixed Zone II	MZII	0.902
Open Space II	OSZII	2.225
General Residential Zone II	GRZII	0.697
General Residential Zone III	GRZIII	0.653
Transport Zone II	TZII	1.360
TOTAL		**10.236**

A subdivision plan was prepared by Pieter Brown of *Design Centre and Associates* and has been attached as **ANNEXURE B** to this report. For ease of reference, an extract of the SDP has been included as ***Figure 4-1*** below.

Table

Zoning	Colour Notation	Size (ha)	%
Business Zone I (BZI)		3.604	35.21
Business Zone IV (BZIV)		0.268	2.62
Community Zone III (CZIII)		0.527	5.15
Mixed Zone II (MZII)		0.902	8.81
Open Space II (OSZII)		2.225	21.74
General Residential Zone II (GRZII)		0.697	6.81
General Residential Zone III (GRZIII)		0.653	6.38
Transport Zone II (TZII)		1.360	13.29
Total		10.236	100

Figure 4-1 - Proposed Site Development Plan

5 GEOTECHNICAL INVESTIGATION

No geotechnical investigation was carried out for the site, but the soil can be described as having a strong contrast in texture, a marked clay accumulation, strongly structured and a non-reddish in colour. In addition, one or more of vertic, melanic and plinthic soils may be present.

The geology can be described as variegated (reddish-brown and greenish) silty mudstone and sandstone, subordinate grey shale and sandstone.

The erodibility of the soil can be described as high with an erodibility factor of 0.61.

Less than 15% of clay is found on site at a depth between 450mm and 750mm.

For this report, the soil conditions are accepted to be as follows:

Soil Description : Soils with a strong texture contrast
Soil Type : CA
Conductivity : 10.9 mm/hr
Suction Head : 110.1 mm

Source: https://gis.elsenburg.com/apps/cfm/

6 STORMWATER RETICULATION

6.1 CALCULATIONS

Hydrological calculations were conducted with the PCSWMM computer program for the various Return Interval (RI) storm events. A 24-hour South Africa Type 1 SCS storm, peaking at 12 hours was used in the analysis.

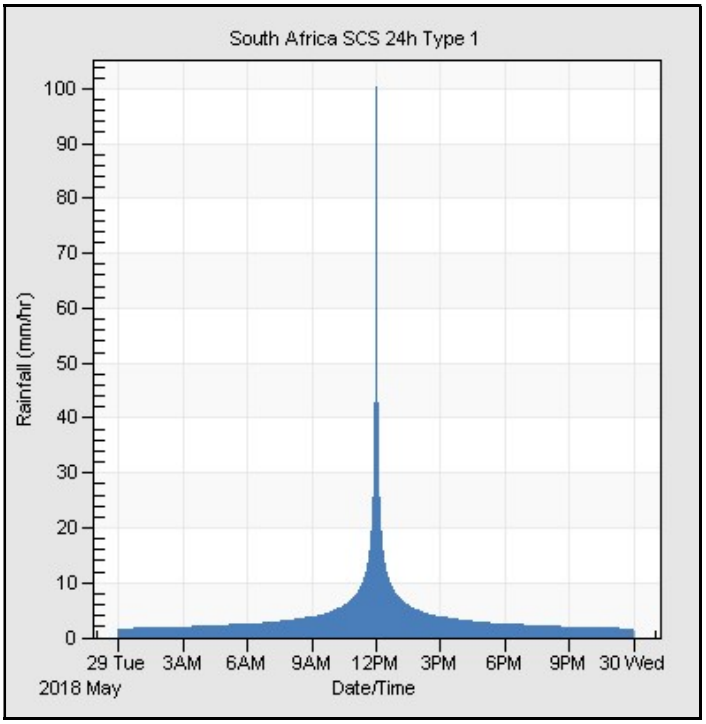


Figure 6-1 - SCS Type 1 Storm

6.2 HYDROLOGY

Tergniet is situated in the winter rainfall region of the Western Cape and no extreme rainfall intensities occur. A representative Mean Annual Precipitation (MAP) of 467mm has been obtained from the accompanying software of the *Design Rainfall and Flood Estimation in South Africa (JC Smithers and RE Schiltze)* report.

A summary of the rainfall station- and related storm rainfall data is given in ***Table 6-1*** and ***Table 6-2*** respectively.

Station name	SAWS Station No.	Latitude	Longitude	MAP (mm)	Altitude (m)	Distance from catchment centroid (km)	Length of records (years)
Sandhoogte (PUR)	0012303_W	34° 03'	22° 11'	576	76	1.8	72
Great Brak River	0012393_W	34° 03'	22° 13'	473	110	4.0	86
Mosselbaai (MAG)	0012220_W	34° 10'	22° 08'	437	94	12.1	39
Cape St Blaize (VRT	0012251_W	34° 11'	22° 09'	380	30	13.1	98
			Accepted	**467**			

Table 6-1 – Rainfall station data

	Rainfall Depth (mm)					
Rainfall return period	**1 in 2 year**	**1 in 5 year**	**1 in 10 year**	**1 in 20 year**	**1 in 50 year**	**1 in 100 year**
Sandhoogte (PUR)	46.8	68.7	85.5	103.4	129.6	151.7
Great Brak River	51.5	75.7	94.1	113.8	142.7	167.1
Mosselbaai (MAG)	51.8	76.1	94.6	114.4	143.4	167.9
Cape St Blaize (VRT	32.1	47.1	58.6	70.9	88.8	104.0
Accepted	**45.6**	**66.9**	**83.2**	**100.6**	**126.1**	**147.7**

Table 6-2 - Storm rainfall data

6.3 PRE-DEVELOPMENT RUNOFF

The National Road (N2) along the northern boundary of the proposed development acts as a cut-off drain for any runoff from the north, the DR1578 (Sorgfontein Road) acts as a cut-off drain for stormwater from the west of the proposed development, and the MR344 acts as a cut-off drain for stormwater from the south of the proposed development. There are an existing headwall structure and culvert that conveys stormwater from the north of the MR344, discharging via a headwall structure to the south.

The site consists of a catchment area of 102 360 m². A low point is situated close to the eastern border of the site, approximately 140 m to the north of MR344. The northern portion of the site drains in a southeastern direction towards the low point with an average gradient of approximately 6,6%. The southern portion drains in north-northeastern direction towards the low point with an average gradient of approximately 4%. ***Table 6-3*** summarizes the site characteristics in terms of the pre-development scenario. Based on the available information the site is currently only approximately 1,8 % impervious.

Scenario	Total site area (m²)	Impervious area (m²)	Impervious %
Pre-development	102 360	1885	1,8

Table 6-3 – Pre-development site characteristics

The development area was modelled with the PCSWMM program to determine stormwater runoff for the pre-development scenario for each of the storm events. Stormwater will accumulate at the low point on the eastern border of the site and drain further east overland from here. The peak pre-development flow and total runoff volume from the catchment area during the various storm events are indicated in ***Table 6-4***.

Recurrence Interval storm event	Pre-development runoff (m³/s)	Runoff volume (m³)
1:2	0.006	82
1:5	0.082	324
1:10	0.193	695
1:20	0.344	1 210
1:50	0.617	2 120
1:100	0.890	3 000

Table 6-4 – Pre-development stormwater runoff

6.4 POST-DEVELOPMENT RUNOFF

The available information includes a consolidation, rezoning and subdivision plan. The plan indicates the number of proposed land portions, size and land uses of each. Detailed Site Development Plans for each portion are not available at this stage. Pieter Brown of *Design Centre and Associates* however prepared a summary of the envisaged building footprints, parking areas, internal roads and loading zones which were used to determine the impervious areas for each portion. A summary of the envisaged areas for each portion is indicated in ***Table 6-5***.

No.	Total Area (m²)	Land Use	Roof Area (m²)	Parking and roads (m²)	Loading Zone (m²)	Yards (m²)	Storage (m²)	Outdoor Plant Tunnels (m²)	Open Space (m²)	Imp. %	Perv. %
1	21040	Business	7500	10125	1150				2265	89,2%	10,8%
2	5270	Community	400	810		50			4010	23,9%	76,1%
3	6970	Gen. Res.	2400	1295		360			2915	58,2%	41,8%
4	2890	Open Space							2890	0,0%	100,0%
5	2680	Business	600	1070					1010	62,3%	37,7%
6	6530	Gen. Res.	2610	2202					1718	73,7%	26,3%
7	9020	Mixed Zone	3500	3150	500		500		1370	84,8%	15,2%
8	10000	Open Space							10000	0,0%	100,0%
9a	10000	Business	1000		3000			6000		40,0%	60,0%
9b	5000	Business	1000	1200	400				2400	52,0%	48,0%
10	13600	Transport		7612					5988	56,0%	44,0%
11	9360	Open Space							9360	0,0%	100,0%
Total	**102360**		**19010**	**27464**	**5050**	**410**	**500**	**6000**	**43926**	**57,1%**	**42,9%**

Table 6-5 – Post-development site characteristics

Using the above characteristics, the development area was modelled with PCSWMM software to determine runoff for the post-development scenario for each of the storm events. It is anticipated that the development portions and roads will roughly follow the existing topographical characteristics of the current site, and the peak flow was measured at the low point on the eastern border of the property to be comparable to the pre-development scenario. The peak post-development flows and total runoff volumes from the site for the various storm events are indicated in ***Table 6-6***. Stormwater runoff from the site will increase considerably because of the development.

Recurrence interval storm event	Post-development runoff (m^3/s)	Runoff volume (m^3)
1:2	0.567	2440
1:5	0.916	3760
1:10	1.212	4830
1:20	1.562	6010
1:50	2.079	7800
1:100	2.483	9350

Table 6-6 – Post-development stormwater runoff

6.5 WATER QUALITY CONTROL

6.5.1 WATER QUALITY VOLUME (WQv)

Hydrologic studies indicate that most rainfall events producing stormwater runoff are small and occur frequently. These storms contribute substantially to the total annual pollutant load. By capturing, retaining, or treating these smaller, frequent events - along with part of the runoff from larger storms - it is possible to significantly reduce water quality impacts in developed areas.

The water quality volume (WQv) is specified to size best management practices (BMPs) to reduce / eliminate or treat these small storms up to a maximum runoff depth and the "first flush" of all larger storm events. This maximum depth is generally accepted to be the runoff generated from the ½ year 24-hour storm event. This volume is considered the point of optimisation between pollutant removal ability and cost-effectiveness. Capturing and treating a larger percentage of the annual stormwater runoff would provide only a small increase in additional pollutant removal but would considerably increase the required size (and cost) of the best management practices.

Required water quality volumes and proposed measures for each developable portion were investigated. To determine the treatment capacity required for the different facilities, the method proposed in the Georgia Stormwater Management Manual, which is based on Darcy's Law was used:

$$WQv = RD \times Rv \times A$$

WQv = *Water Quality Volume (m^3)*
Rv = *Volumetric Runoff Coefficient*
= *0.05 + (0.009 x I)*
A = *Site Area (m^2)*
RD = *Rainfall depth for ½-year RI (m)*
I = *Percent Impervious Cover (%)*

The above calculation was carried out for each of the development portions and the results are summarized in ***Table 6-7*** below.

Portion	Zoning	I (%)	Rv	A (m^2)	RD (m)	WQv (m^3)
1	Business	89,2%	0,85	21040	0,033	587,4
2	Community Zone	23,9%	0,27	5270	0,033	45,7
3	General Residential	58,2%	0,57	6970	0,033	130,8
5	Business	62,3%	0,61	2680	0,033	53,6
6	General Residential	73,7%	0,71	6530	0,033	152,4
7	Mixed Zone	84,8%	0,81	9020	0,033	240,1
9a	Business	40,0%	0,41	10000	0,033	134,2
9b	Business	52,0%	0,52	5000	0,033	84,8

Table 6-7 – Required WQv per development portion

6.5.2 WATER QUALITY CONTROL MEASURES

Due to detailed site development plans for each land use portion not available, exact details regarding layouts, positions, elevations and inlet and outlet structures of quality control measures cannot be prescribed at this time. Several viable measures are however explored in the following sections which include enhanced swales, permeable paving and bioretention ponds.

6.5.2.1 ENHANCED SWALES

Enhanced swales (also called bioswales, vegetated channels, or water quality swales) are engineered open channels designed to convey runoff while also capturing and treating the water quality volume (WQv) from a drainage area. Unlike standard swales, they include design features that improve pollutant removal. They are typically constructed with gentle slopes to slow flows, reduce erosion, and allow sediments to settle. Check dams or berms placed across the swale further encourage settling and infiltration.

Enhanced swales are suitable for various developments but are most effective in low- to medium-density residential or institutional areas with limited impervious cover, as well as along roads and highways. Common applications include large-lot housing, small impervious sites such as rooftops and parking areas, and rural road corridors.

Enhanced swales have the following pollutant removal capabilities:

Total Suspended Solids	=	80%
Total Phosphorous	=	50%
Total Nitrogen	=	50%
Metals	=	40%

Figure 6-2 provides a typical cross-section of an enhanced swale.

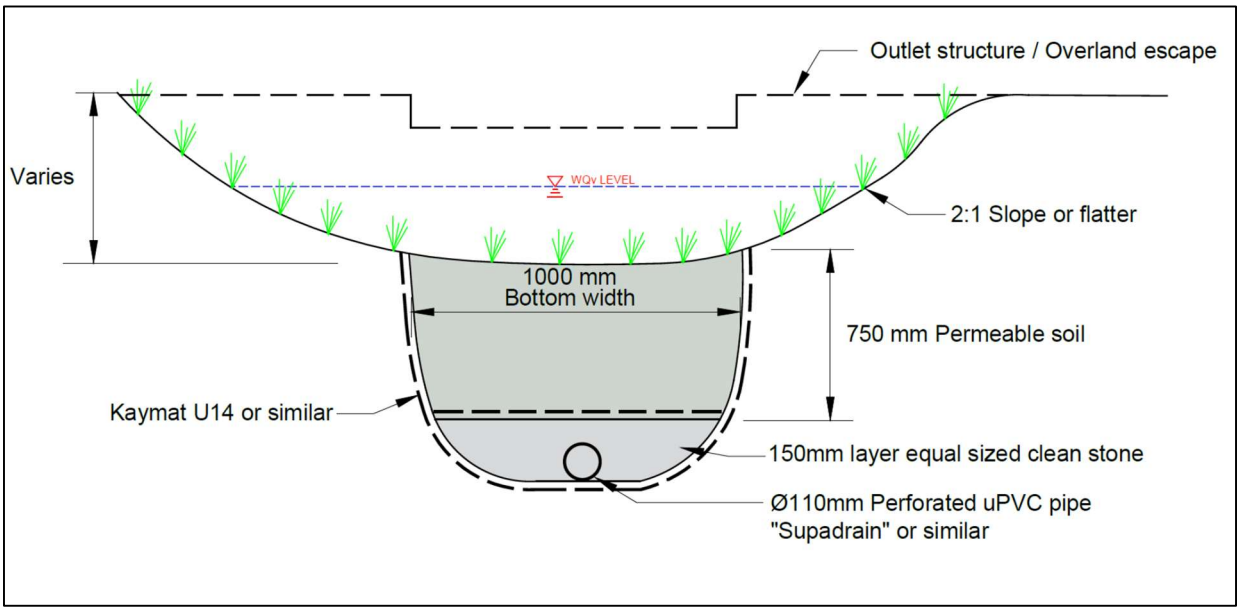


Figure 6-2 – Cross-section of an enhanced swale

6.5.2.2 PERMEABLE PAVING

Modular permeable paver systems are load-bearing pavement units with evenly spaced voids filled with pervious materials such as gravel. This design allows stormwater to infiltrate through the surface, reducing runoff volume, improving water quality, and supporting groundwater recharge. By replacing conventional paving, they also decrease a site's impervious area.

These systems are typically installed over a stone aggregate base that serves as both structural support and a temporary storage layer. Runoff passes through the paver surface into the gravel base, where it gradually infiltrates into the subsoil. To function effectively, subgrade soils must have sufficient infiltration capacity to drain the captured runoff within 48–72 hours. Careful construction practices are essential to prevent compaction of the underlying soils and preserve infiltration performance.

Modular permeable paver systems are typically used in low-traffic areas with low to no tree coverage such as:

- Parking lots
- Overflow parking areas
- Residential driveways
- Residential street parking lanes
- Recreational trails
- Golf cart and pedestrian paths
- Emergency vehicle and fire access lanes

A key limitation of modular permeable paver systems is their higher cost and construction complexity compared to traditional pavements. They demand precise workmanship to perform effectively, and rehabilitation can be difficult and expensive if the surface becomes clogged. For this reason, both construction and long-term maintenance requirements and costs must be carefully considered when selecting this option.

Permeable paver systems have the following pollutant removal capabilities:

Total Suspended Solids	=	80%
Total Phosphorous	=	50%
Total Nitrogen	=	50%
Metals	=	60%

Figure 6-3 provides a typical cross-section of a permeable paver system.

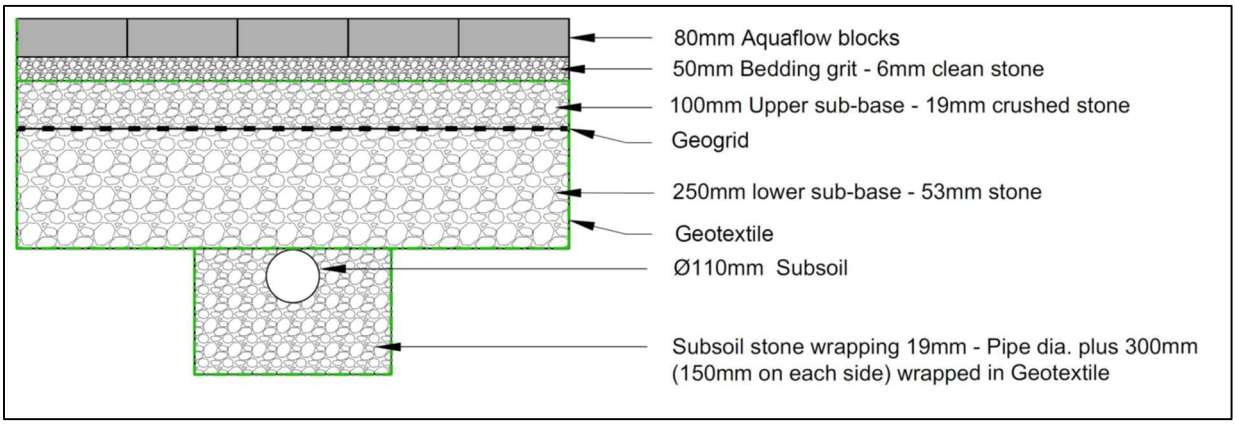


Figure 6-3 – Cross-section of a permeable paver system

6.5.2.3 BIORETENTION PONDS

Bioretention ponds are engineered stormwater facilities that capture and treat the water quality volume (WQv) within shallow landscaped basins using soil and vegetation.

Runoff enters a treatment zone typically made up of a ponding area, mulch or organic layer, engineered soil, and vegetation. Where soils are permeable, water infiltrates into the ground; where infiltration is poor, treated runoff is collected by an underdrain and discharged to the drainage system.

Unlike simple rain gardens, bioretention areas are fully engineered to handle larger drainage areas and often include underdrains to ensure reliable performance. ***Figure 6-4*** shows a typical bio-retention pond in a limited space environment.

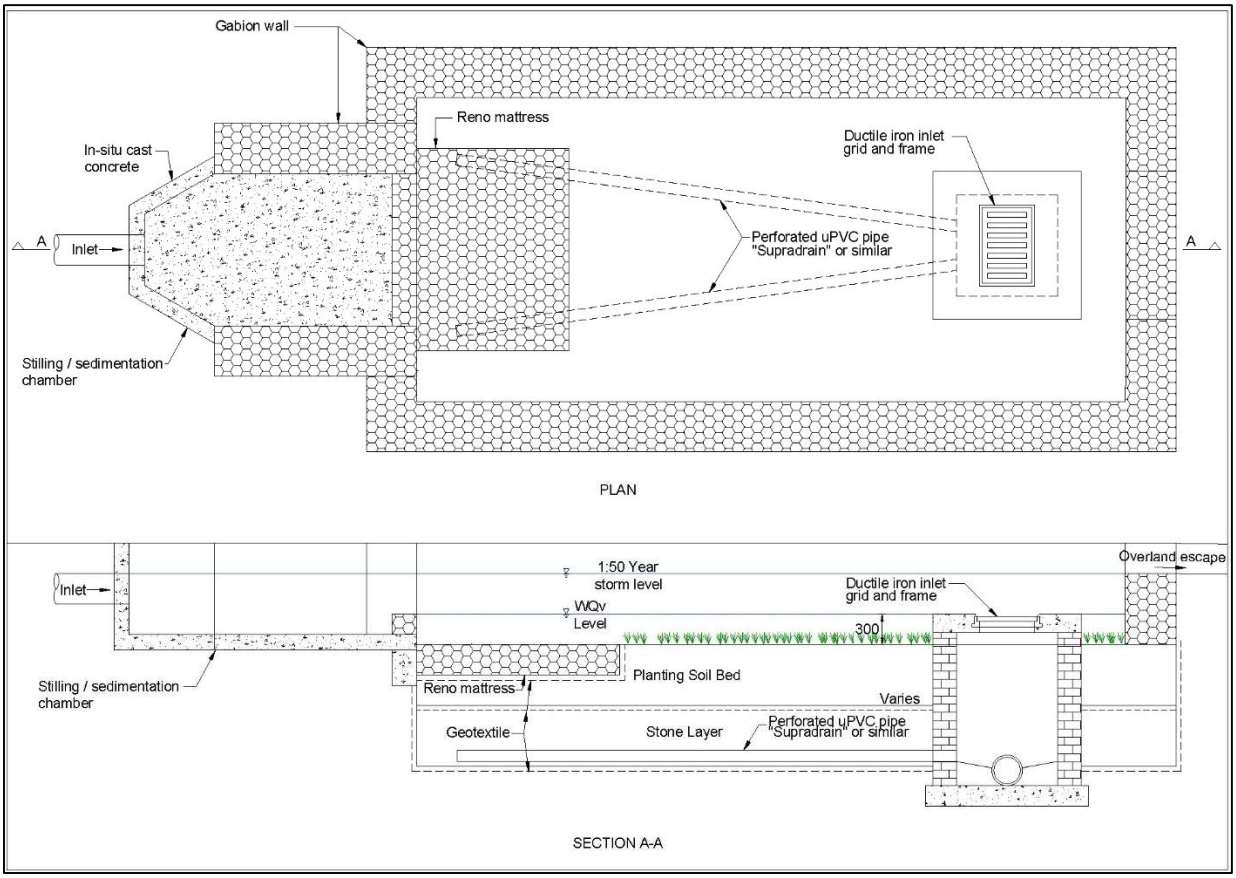


Figure 6-4 – Bioretention pond

Bio-retention facilities have the following pollutant removal capabilities:

Total Suspended Solids	=	85%
Total Phosphorous	=	80%
Total Nitrogen	=	60%
Metals	=	95%
Pathogens	=	90%

To quantify the effect of water quality control measures, especially the impact thereof on the total runoff from the site, bio-retention areas were identified to be included in a modelled scenario. Alternative measures such as enhanced swales and permeable paving can be further investigated when detailed Site Development Plans become available. These measures can then be used to supplement the proposed bioretention ponds and reduce their required size.

For the bioretention ponds to be modelled, they first had to be sized. The following formula as indicated in the Georgia Stormwater Management Manual was used to determine the surface of ponding area for bio-retention facilities for each of the land portions based on the WQv as described in *Paragraph 6.5.1*:

Af	=	*(WQv x df) / [k x (hf + df) x tf]*

Af = Surface Area of Ponding Area (m²)
WQv = Water Quality Volume – total volume to be captured (m³)
df = Media depth (m)
k = Coefficient of permeability of planting media (m/day)
hf = Average height of water above planting bed (m)
Tf = Design planting media drain time – 1 day max.

With:

df = 0.8 m
k = 0.3 m/day
hf = 0.3 m
tf = 1 day

The above calculation was carried out for the individual development portions of the site and the results summarised in ***Table 6-8***.

Portion	Zoning	Req. WQv (m³)	df (m)	k (m/d)	hf (m)	tf (days)	Af req. (m²)
1	Business	587,4	0,8	0,3	0,3	1	1424,0
2	Community Zone	45,7	0,8	0,3	0,3	1	110,9
3	General Residential	130,8	0,8	0,3	0,3	1	317,2
5	Business	53,6	0,8	0,3	0,3	1	129,9
6	General Residential	152,4	0,8	0,3	0,3	1	369,5
7	Mixed Zone	240,1	0,8	0,3	0,3	1	582,0
9a	Business	134,2	0,8	0,3	0,3	1	325,3
9b	Business	84,8	0,8	0,3	0,3	1	205,5

Table 6-8 – Required surface area of ponding area

The required surface of ponding areas for each portion of the site is shown to scale in ***Annexure B*** attached.

6.6 WATER QUANTITY CONTROL

The measures described in the previous Paragraph 6.6.2 were modelled in PCSWMM to determine the impact on the resulting rate of runoff from the site. The results are indicated in ***Table 6-9*** below.

Recurrence interval storm event	Pre-development runoff (m³/s)	Post-development runoff (m³/s)	Post-development runoff with water quality measures (m³/s)
1:2	0.006	0.567	0.073
1:5	0.082	0.916	0.300
1:10	0.193	1.212	0.737
1:20	0.344	1.562	1.032
1:50	0.617	2.079	1.379
1:100	0.890	2.483	1.635

Table 6-9 – Runoffs for pre- and post-development scenarios

From ***Table 6-9*** the proposed water quality control measures alone will not suffice to attenuate and reduce stormwater runoff from the developed site to that of the pre-developed state, especially for larger storm events. A detention pond near the low point of the site on Portion 4 was therefore investigated.

PCSWWM's 'Storage Calculator' was used to obtain estimates of the storage volume required to attenuate the post-development peak flows, which include the water quality measures, to pre-development flow rates. It is important to note that the 'Storage Calculator' computes the volume of storage required to reduce peak flow to a user-defined maximum design flow. This user-defined figure is based on the peak post-development scenario flow for the 1:50 RI Storm Event after inclusion of the water quality control measures.

Figure 6-5 provides an overview of how the storage tool works. The estimated discharge hydrograph is plotted in blue, and the storage volume required is taken to be the area between the post-development and estimated hydrograph (shaded in light blue).

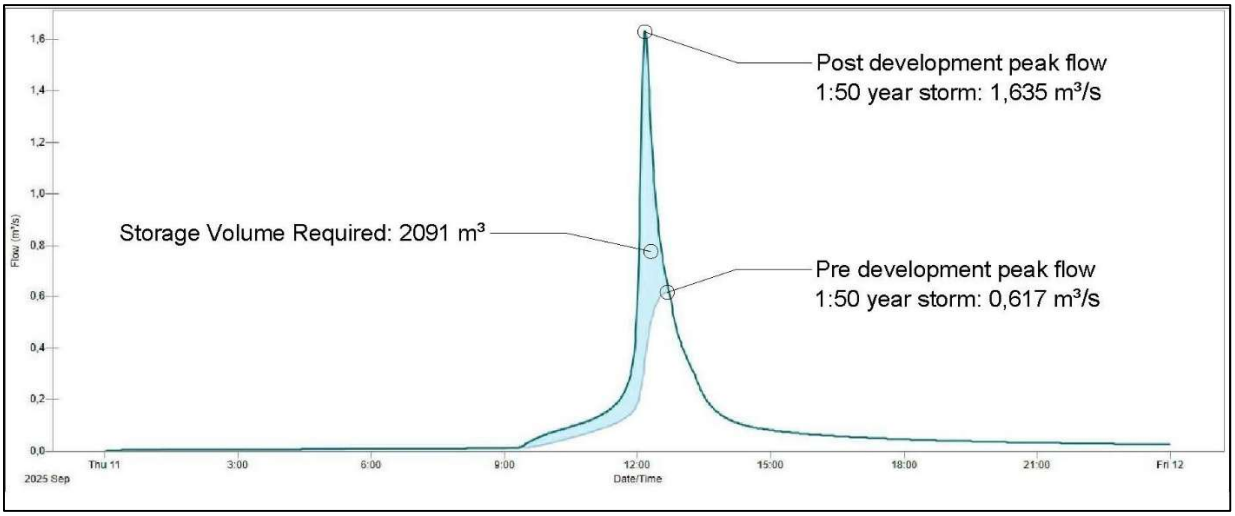


Figure 6-5 – Storage volume required

Based on the required volume and the available surface area available on Portion 4 of the development, the proposed detention pond should have the following characteristics:

Maximum depth : 1,25 m
Surface area : 2264 m²
Outlet : 225 mm Ø pipe and a 375 mm Ø pipe, vertically placed;
: 1500mm x 300mm rectangular overflow weir.

With the abovementioned characteristics, the pond will function as follows for each of the storm events:

Recurrence interval storm event	Peak outflow (m³/s)	Max. water depth of pond (m)	Min. freeboard (m)
1:2	0,005	0,060	1,19
1:5	0,105	0,290	0,96
1:10	0,196	0,540	0,71
1:20	0,365	0,730	0,52
1:50	0,607	0,920	0,33
1:100	0,852	1,030	0,22

Table 6-10 – Detention pond results

For reference, with the inclusion of the bioretention ponds as water quality controls described in *Paragraph 6.5.2.3* and the detention pond as described above, peak flow runoff from the site will be reduced to that of the pre-developed state as indicated in ***Table 6-11***:

Recurrence interval storm event	Pre-development runoff (m³/s)	Post-development runoff (m³/s)	Post-development runoff with water quality measures (m³/s)	Post-development runoff with water quality and quantity measures (m³/s)
1:2	0.006	0.567	0.073	0,005
1:5	0.082	0.916	0.300	0,105
1:10	0.193	1.212	0.737	0,196
1:20	0.344	1.562	1.032	0,365
1:50	0.617	2.079	1.379	0,607
1:100	0.890	2.483	1.635	0,852

Table 6-11 – Comparison of runoff scenarios

7 CONCLUSIONS

From the stormwater management plan for the proposed consolidation, rezoning and subdivision of Erf 998 Tergniet and Portion 5 of the Farm Zandhoogte No. 139 Mossel Bay the following can be concluded:

- That on-site water quality control measures including enhanced swales, permeable paving and bio-retention ponds be implemented to provide adequate treatment of stomwater runoff for the ½ year 24-hour storm event;

- That the proposed water quality control measures alone will not suffice to attenuate and reduce stormwater runoff from the developed site to that of the pre-developed state, especially for larger storm events. A detention pond near the low point of the site on Portion 4 is therefore proposed.

8 REFERENCES

1) Guidelines for Human Settlement Planning and Design, *Department of Housing*, 2000 CSIR

2) The Neighborhood Planning and Design Guide, *Department of Human Settlements*, 2019

3) Georgia Stormwater Management Manual, *Atlanta Regional Commission*, 2016

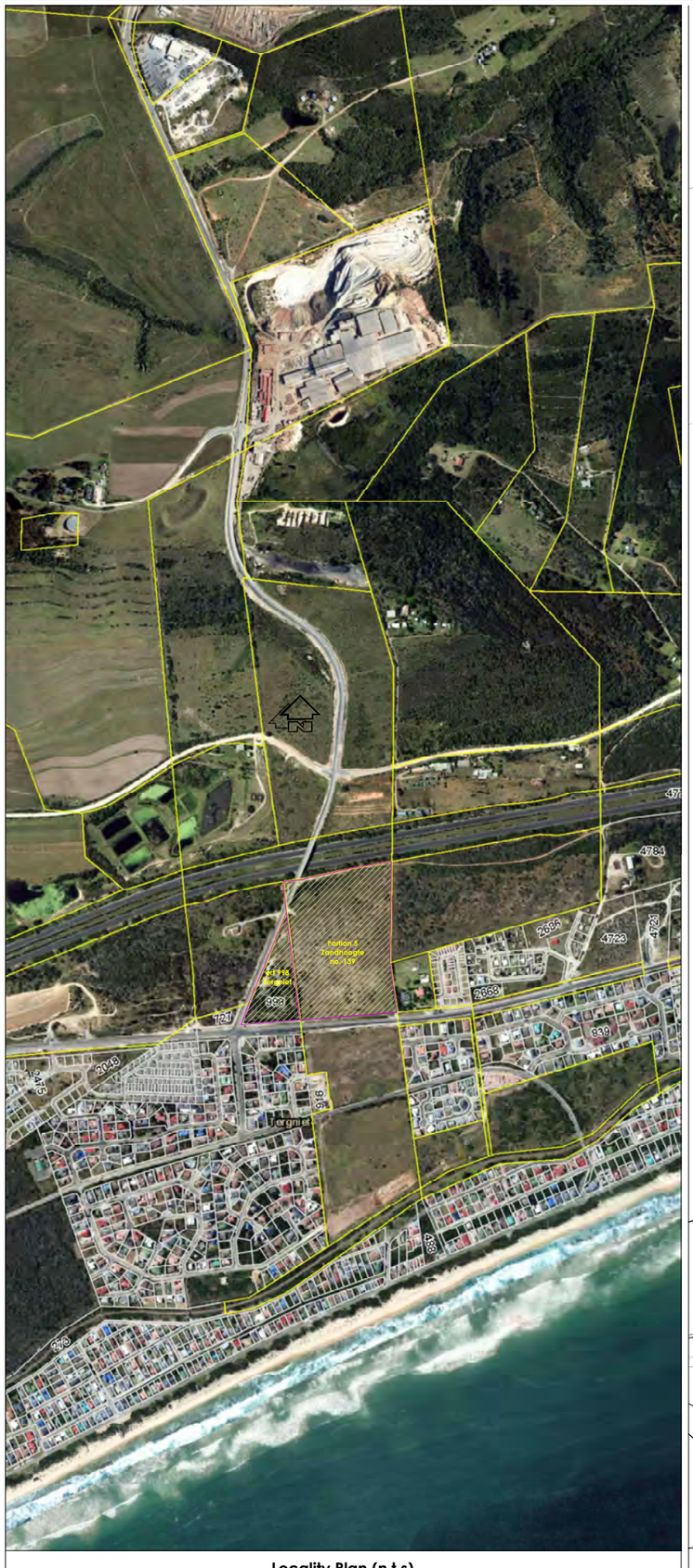
4) Drainage Manual 5th Edition, *The South African National Roads Agency Limited*, 2006

5) Guidelines for Urban Stormwater Management UTG 4, *Committee of Urban Transport Authorities*, 1999.

6) City of Cape Town Management of Urban Stormwater Impacts Policy – Version 1.1, 2009.

ANNEXURE A

SITE DEVELOPMENT PLAN



Locality Plan (n.t.s)

1 : 1000

Subdivision Plan

Consolidation of erf 998 and
Portion 5 of the Farm Zandhoogte no. 139

Application for Consolidation, Rezoning and Subdivision

1. Application is made in terms of Article 15 (2)(e) of the Mossel Bay Municipality Zoning Scheme By-Law, 2021, to **consolidate Portion 5 of the Farm Zandhoogte no. 139** (figure A, B,C,D,E,F & G), **8.3676ha** in size and **Erf 998, Tergniet** (figur G,H en I), **1.8684ha** in size.

2. Application is made in terms of Article 15(2) (a) for **rezoning** of the consolidated erf from Argiculture Zone I (AZI) to a subdivisional area to allow the following:

- **3 Business Zone I (BZI)** erven with a total size of 2.604 ha.
- **1 Business Zone IV (BZIV)** erf with a size of 0.268 ha.
- **1 Community Zone III (CZIII)** erf with a size of 0.527 ha.
- **1 Mixed Use Zone II (MZII)** erf with a size of 0.902 ha.
- **2 Open Space Zone II (OSZII)** erf with a size of 1.225 ha.
- **1 General Residential Zone II (GRZII)** erf with a size of 0.697 ha.
- **1General Residential Zone III (GRZII)** erf with a size of 0.653ha.
- **2 Transport Zone II (TZII)** one erf with a size of 1.220 ha and Remainder erf 998, Tergniet - size 0.140ha
- **1 Split zone erf** consisting of a portion **Business Zone I (BZI)** with a size of 1.0ha and a portion **Open Space Zone II (OSZII)** with a size of 1.0ha.

3. Application is made in terms of Article 15 (2) (d) for the **subdivision** of the subdivisional area into the following erven:

- **portions 1 & 9:** Business Zone I (BZI) erven.
- **portion 5:** Business Zone IV (BZIV) erf
- **portion 2:** Community Zone III (CZIII) erf
- **portion 7:** Mixed Use Zone II (MZII) erf
- **portion 4 & 11:** Open Space Zone II (OSZII) erf
- **portion 3:** General Residential Zone II (GRZII) erf
- **portion 6:** General Residential Zone III (GRZII) erf
- **portion 10 & 12:** Transport Zone II (TZII)
- **portion 8:** Split zone erf consisting of a portion Business Zone I (BZI) and a portion Open Space Zone II (OSZII)

4. Site survey:

4.1 Site survey done by WJ Marais (Reg no. S0691) Topographic and Engineer's Surveyor, 13 Cypress, Street, George.
4.2 Contour intervals: 1.0m

5. Servitudes:

5.1 Water line servitude - 5m wide northern side of the southern erf boundary (of the consolidated erf.
5.2 Sewer line servitude - 6m wide - south of the northern erf boundary (of the consolidated erf)
5.3 Sewer line servitute - 5m wide - eastern boundary of the line A, I and G.
5.4 Power line servitude - 20m wide - along the southern boundary - partly inside an partly outside the boundary line.
5.5 Power line (orange line) across the middle of the consolidated erf east to west - installed underground in the 25m road reserve.
5.6 A **40m wide no-go conservation buffer area** - portion 11.
5.7 A **5m wide right of way serwitude**, shown as **figure a,b, c& d**, to be registered over **portions 1** and a **5m wide right of way serwitude**, shown as **figure b, e, f & c**, to be registered over **portions 2** to give future access to portion 11.

Table

Zoning	Colour Notation	Size (ha)	%
Business Zone I (BZI)		3.604	35.21
Business Zone IV (BZIV)		0.268	2.62
Community Zone III (CZIII)		0.527	5.15
Mixed Zone II (MZII)		0.902	8.81
Open Space II (OSZII)		2.225	21.74
General Residential Zone II (GRZII)		0.697	6.81
General Residential Zone III (GRZIII)		0.653	6.38
Transport Zone II (TZII)		1.360	13.29
Total		10.236	100

8	portion number
0.687ha	portion size (ha)

Amendments:

Date:	Description:
5-11-2022	* changes - erf sizes and road layout
25-01-2023	* power line servitute - removed - change notes
26-11-2023	* changes - erf sizes and road reserve * changes - 5m wide right of way servitute * changes to all the tables and notes added
04-03-2024	* new layout + subdivision plan
30-03-2024	* changed to subdivision plan

Owner:
Signature:
Design:
Design Centre and Associates: Checked:
Reference no.: 2213 Scale: 1:1000 & n.t.s.
Date: 30 - 03 - 2024 Drawing no.: 2213-01
Stage:

Client: 3M Sales and Education Services CC

Project Description: Proposed Consolidation of erf 998, Tergniet and Portion 5 of the Farm Zandhoogte no. 139 Rezoning and Subdivision

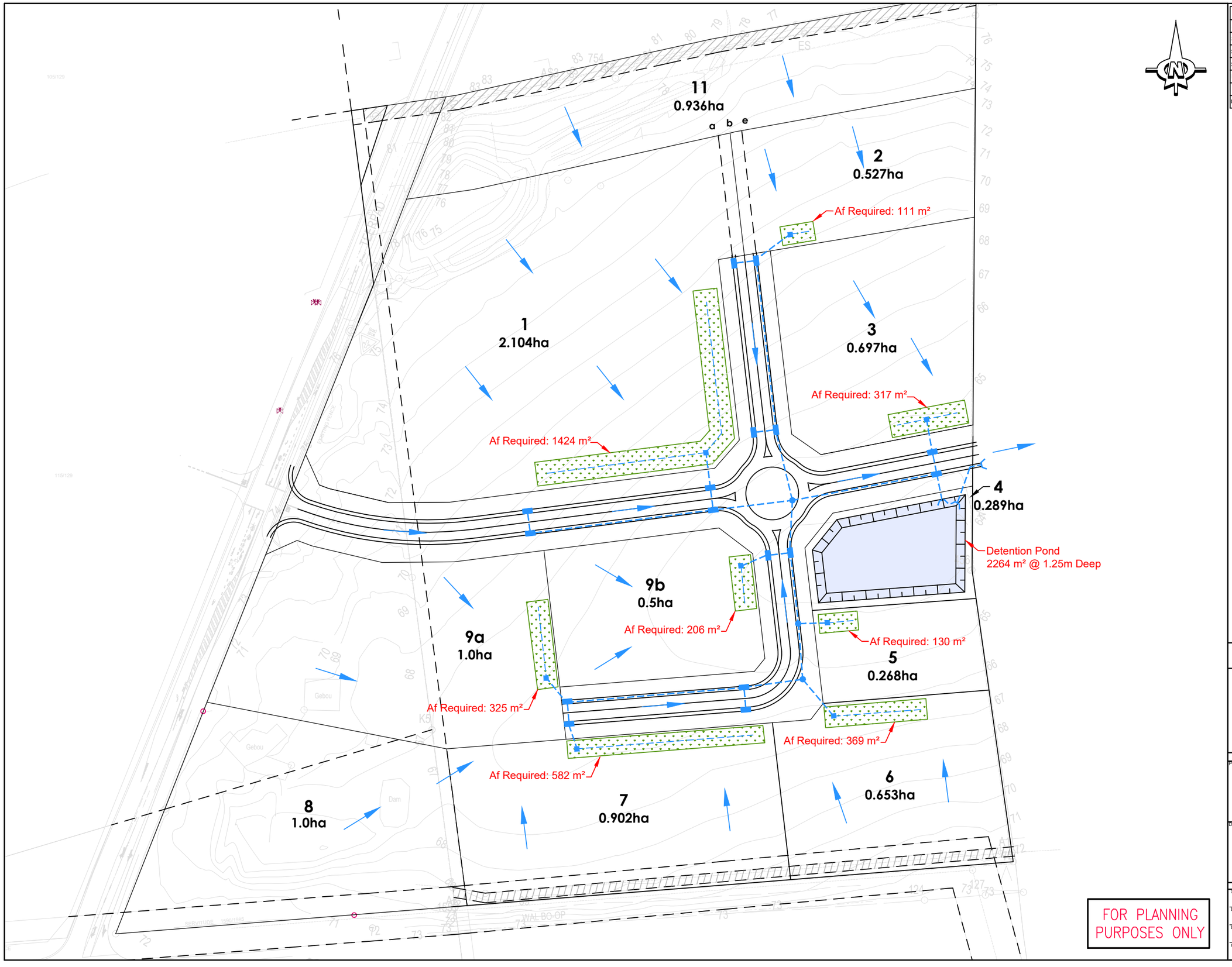
Project name: Dolfin Circle

Drawing Description: Consolidation, Rezoning and Subdivision Plan Locality Plan

Design Centre
creating meaningful work
Design Centre and Associates
Architecture, Interior Design, Town Planning & Landscape Design
p.o. box 7 mckenzie 6537 - cell no.: 083 899 2882
Email: pieterdesigncentre@gmail.com

ANNEXURE B

STORMWATER LAYOUT



LEGEND:

STORMWATER PIPE	
SUBSOIL DRAINAGE	
STORMWATER MANHOLE	
STORMWATER CATCHPIT	
BIORETENTION AREA	
INLET / OUTLET STRUCTURE	
OVERLAND FLOW DIRECTION	

URBAN ENGINEERING
CONSULTING CIVIL AND STRUCTURAL ENGINEERS
18 VARING STREET
PO BOX 9059 GEORGE
TEL : 044-874 4098

Project
CONSOLIDATION, REZONING AND SUBDIVISION OF ERF 998 TERGNIET AND PTN 5 OF THE FARM ZANDHOOGTE NO. 139, MOSSEL BAY

Drawing Title
PROPOSED STORMWATER MANAGEMENT

Scale (Paper Size) 1 : 1500 (A3)	Date SEPT 2025
Designed DL	Drawing Number 22-160-01
Drawn DL	Revision -
Checked	