Appendix I: EMPr

POST CONSTRUCTION ENVIRONMENTAL MANAGEMENT PROGRAMME

Rectification of alleged clearance of vegetation on Portion 10 of Farm 502, Stellenbosch

August 2025

DOCUMENT NAME:

Rectification of alleged clearance of vegetation on Portion 10 of Farm 502, Stellenbosch

PROJECT NUMBER:	**DATE:**	**REPORT STATUS:**
N/A	August 2025	DRAFT REPORT

CARRIED OUT BY:

GroenbergEnviro (Pty) Ltd

COMMISSIONED BY:

Spier Farm Management (Pty) Ltd

CLIENT CONTACT DETAILS:

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AUTHOR(S):

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SYNOPSIS:

Not included in this report.

PREPARED BY:
GroenbergEnviro (Pty) Ltd

Revision Status

Rev No.	Issue Date	Author	Technical Review	Report Review
0	August 2025	M. Molife	H. Badenhorst/P. Badenhorst	H. Badenhorst/P. Badenhorst

Disclaimer

The opinions expressed in this report have been based on the information supplied to GBE by the Applicant. GBE has exercised all due care in reviewing the supplied information, with conclusions from the review being reliant on the accuracy and completeness of the supplied data.

GBE does not accept responsibility for any errors or omissions in the supplied information and does not accept any consequential liability arising from commercial decisions or actions resulting from them.

Professional environmental opinions presented in this report apply to the site conditions and features as they existed at the time of GBE's investigations, and those reasonably foreseeable. These opinions do not necessarily apply to conditions and features that may arise after the date of this report, about which GBE had no prior knowledge nor had the opportunity to evaluate.

POPIA

Regulation 42 of the Environmental Impact Assessment Regulations, 2014, as amended (EIA Regulations) provides for the opening and maintenance of a register of interested and affected parties (I&APs), by the proponent or applicant, which must contain personal information (names, contact details and addresses). It is therefore the duty of the proponent or applicant to collect the information that must be contained in the register.

Regulation 42 further requires that these registers must be submitted to the Competent Authority (CA). There is no legal requirement in the EIA Regulations that such registers must be included in the reports that are published for public consultation purposes or be made publicly available as part of the EIA process. Since the information in the registers is personal/private information, it should not be included in or attached to reports and be made available in the public domain. CAs, applicants and environmental assessment practitioners (EAPs) should take note that, if this information was previously included in reports and shared in the public domain, this now requires reconsideration in accordance with the POPIA. The Department realises that EAPs may have included some personal information in these reports when they receive and compile them. Likewise, this information may reach CAs who also now need to be sensitive about the management of this information.

Section 11(1)(a) of POPIA provides further that personal information may only be processed if the data subject consents to the processing.

The requirements of section 18.1 of POPIA requires that if personal information is collected, the responsible party must take reasonably practicable steps to ensure that the data subject is aware of, amongst other things, the information being collected, the name and address of the responsible party (in this case the EAP and applicant), the purpose for which the information is collected, whether or not the supply of the information by the data subject is voluntary or mandatory, the consequence of the failure to provide the required information,

further information such as the recipient of the information, as well as the existence of the right to object to the processing of the personal information.

EAPs should obtain express consent from commenting parties to include their names with their comments in the reports. It is therefore recommended that the EAP, when requesting comment, should also request the persons who may comment to provide consent that their names may be included with their comments in the reports. Commenting parties should also be informed that they may opt to not have their names shared, as well as an indication of the consequences of such an option being exercised, in which case only the comments will be included. This will ensure that the requirements of section 11(1)(a) of POPIA, which provides that personal information may only be processed if the data subject consents to the processing, is given effect to. Even when consent is obtained it is recommended that only the minimum details (the names) should be included in reports and the inclusion of unnecessary and excessive information should be avoided.

Contact Information

Please contact the undermentioned should you require further information.

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Address: Choose an office Office	Wellington Klein Opperhorst Private Bag X3036 Paarl 7620
Website	www.groenbergenviro.co.za
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List of Abbreviations

AQA	Air Quality Act
BSc	Bachelor of Science (Latin Baccalaureus Scientiae)
dBA	A-weighted decibels
DEA&DP	Department of Environmental Affairs and Development Planning
DWS	Department of Water and Sanitation
EA	Environmental authorisation
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
ECO	Environmental Control Officer as per the environmental authorisation
EMPr	Environmental Management Programme
EMS	Environmental Method Statement
EO	Environmental officer as appointed by the client or contractor
GN	Government Notice
HWC	Heritage Western Cape
I&AP	Interested and affected party
IAIASa	International Association for Impact Assessment South Africa
IEM	Integrated Environmental Management
NEMA	National Environmental Management Act
NEM:AQA	National Environmental Management: Air Quality Act
NEM:BA	National Environmental Management: Biodiversity Act
NEMWA	National Environmental Management: Waste Act
NHRA	National Heritage Resources Act
NWA	National Water Act
RE/Engineer	Resident Engineer Overseeing the Construction Activity
RP	Responsible person
SABS	South African Bureau of Standards
SDP	Site Development Plan

Definitions

For the purposes of this specification the following definitions shall apply:

Alien species - Plants and animals that do not arrive naturally in an area – they are brought in by humans. Alien plants often force indigenous species out of the area. *Rooikrans* is a good example of alien species in the Cape.

Alternative – A possible course of action in place of another that would meet the same purpose and need defined by the development proposal. Alternatives considered in the Environmental Impact Assessment (EIA) process can include location and/or routing alternatives, layout alternatives, process and/or design alternatives, scheduling alternatives or input alternatives.

Aspect – Element of an organisation's activities, products or services that can interact with the environment.

Auditing – A systematic, documented, periodic and objective evaluation of how well the environmental management programme is performing to help safeguard the environment by facilitating the management control that would include meeting regulatory requirements. Results of the audit help the organisation to improve its environmental policies and management systems.

Biodiversity – The rich variety of plants and animals that live in their own environment. Fynbos is a good example of rich biodiversity in the Cape.

Built environment – Physical surroundings created by human activity, e.g. buildings, houses, roads, bridges and harbours.

Conservation – Protecting, using and saving resources wisely, especially the biodiversity found in an area.

Construction site, working area or site – Any area within the boundaries of the property(ies) where construction is taking place.

Contamination – Polluting or making something impure.

Corrective (or remedial) action – Response required to address an environmental problem that is in conflict with the requirements of the Environmental Management Programme Report (EMPr). The need for corrective action will be determined through monitoring, audits or management review.

Degradation – The lowering of the quality of the environment through human activities, e.g. river degradation, soil degradation.

Ecology – The scientific study of the relationship between living things (animals, plants and humans) and their environment.

Ecosystem – The relationship and interaction between plants, animals and the non-living environment.

Environment – Our surroundings, including living and non-living elements, e.g. land, soil, plants, animals, air, water and humans. The environment also refers to our social and economic surroundings and our effect on our surroundings.

Environmental Impact Assessment (EIA) – An Environmental Impact Assessment (EIA) refers to the process of identifying, predicting and assessing the potential positive and negative social, economic and biophysical impacts of a proposed development. The EIA includes an evaluation of alternatives, recommendations for appropriate management actions to minimised or avoid negative impacts and to enhance positive impacts, as well as proposed monitoring measures.

Environmental Management System (EMS) – Environmental Management Systems (EMS) provide guidance on how to manage the environmental impacts of activities, products and services. They detail the organisational structure, responsibilities, practices, procedures, processes and resources for environmental management. The International Standards Organisation. (ISO) ISO14001 EMS standard has been developed by the International Standards Organisation.

Environmental policy – Statement of intent and principles in relation to overall environmental performance, providing a framework for the setting of objectives and targets.

Fynbos – Low-growing and evergreen vegetation found only in the south Western Cape. Fynbos is known for its rich biodiversity.

Habitat – The physical environment that is home to plants and animals in an area. It is where they live, feed and reproduce.

Hazardous waste – Waste, even in small amounts, that can cause damage to plants, animals, their habitat and the well-being of human beings, e.g. waste from factories, detergents, pesticides, hydrocarbons, etc.

Impact – A description of the potential effect or consequence of an aspect of the development on a specified component of the biophysical, social or economic environment, within a defined time and space.

Indigenous species – Plants and animals that are found naturally in an area.

Infrastructure – The network of facilities and services that are needed for economic activities, e.g. roads, electricity, water, sewerage.

Integrated – Mixing or combining all useful information and factors into a joint or unified whole.

Integrated Environmental Management (IEM) – Managing the environment by including environmental factors in all stages of development. This includes thinking about physical, social, cultural and economic factors and consulting with all the people affected by the proposed developments.

Land use – The use of land for human activities, e.g. residential, commercial, industrial use.

Mitigation – Measures designed to avoid, reduce or remedy adverse impacts

Natural environment – Our physical surroundings, including plants and animals, when they are unspoiled by human activities.

No-Go area – Any area where no access is allowed.

Over utilisation – Over-using resources. This affects their future use and the environment.

Policy – A set of aims, guidelines and procedures to help make decisions and manage an organisation or structure. Policies are based on people's values and goals. See also Integrated Environment Management.

Process – A number of planned steps or stages.

Proponent and/or Developer – Entity who applies for environmental approval and is ultimately accountable for compliance to conditions stipulated in the Environmental Authorisation (EA) and requirements of the EMPr.

Recycling – Collecting, cleaning and re-using materials.

Refuse – refers to all solid waste, including construction debris (cement bags, wrapping materials), waste and surplus food, food packaging, organic waste etc.

Resources – Parts of our natural environment that we use and protect, e.g. land, forests, water, wildlife, and minerals.

Scoping Report – A report presenting the findings of the scoping phase of the EIA. This report is primarily aimed at reaching closure on the issues and alternatives to be addressed in the EIA. See also Integrated Environmental Management.

Stakeholders - A subgroup of the public whose interests may be positively or negatively affected by a proposal or activity and/or who are concerned with a proposal or activity and its consequences. The term includes the proponent, relevant authorities and all interested and affected parties.

Stormwater management – Strategies implemented to control the surface flow of stormwater, such that erosion, sedimentation and pollution of surface and ground water resources in the immediate and surrounding environments, are mitigated. This is specifically important during the construction and decommissioning phases of a project.

Sustainability – Being able to meet the needs of present and future resources.

Sustainable development – Development that is planned to meet the needs of present and future generations, e.g. the need for basic environmental, social and economic services. Sustainable development includes using and maintaining resources responsibly.

Waste Management – Classification, recycling, treatment and disposal of waste generated during the activities on site.

Wetlands – An area of land with water mostly at or near the surface, resulting in a waterlogged habitat containing characteristic vegetation species and soil types, e.g. vleis and swamps.

Zoning – The control of land use by only allowing specific type development in fixed areas or zones.

Requirements as stated in GN 982 Environmental Impact Assessment Regulations, 2014, Appendix 4 and corresponding section:

Requirement	Section
1. (1) An EMPr must comply with section 24N of the Act and include -	
(a) details of (i) the EAP who prepared the EMPr; and (ii) the expertise of that EAP to prepare an EMPr, including a curriculum vitae;	EAP Details, page v of the document
(b) a detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description;	Introduction, page 1
(c) a map at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that should be avoided, including buffers;	**Appendix F**, page 47
d) a description of the impact management objectives, including management statements, identifying the impacts and risks that need to be avoided, managed and mitigated as identified through the environmental impact assessment process for all phases of the development including- (i) planning and design; (ii) pre-construction activities; (iii) construction activities; (iv) rehabilitation of the environment after construction and where applicable post-closure; and (v) where relevant, operation activities;	Aims and Objectives of the EMPr, page 5 Proposed Impact Management Actions for Post-Construction , page 14

e) a description and identification of impact management outcomes required for the aspects contemplated in paragraph (d);	Proposed Impact Management Actions for Post-Construction , page 14
(f) a description of proposed impact management actions, identifying the manner in which the impact management objectives and outcomes contemplated in paragraphs (d) and (e) will be achieved, and must, where applicable, include actions to – (i)avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation; (ii) comply with any prescribed environmental management standards or practices; (iii) comply with any applicable provisions of the Act regarding the closure, where applicable; and (iv) comply with any provisions of the Act regarding financial provisions for rehabilitation, where applicable;	Proposed Impact Management Actions for Post-Construction , page 14
(g) the method of monitoring the implementation of the impact management actions contemplated in paragraph (f);	Proposed Impact Management Actions for Post-Construction , page 14
(h) the frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f);	Proposed Impact Management Actions for Post-Construction , page 14
(i) an indication of the persons who will be responsible for the implementation of the impact management actions;	Aims and Objectives of the EMPr, page 5 Compliance with Applicable Laws, page 5. Roles and Responsibilities on page 6.
(j) the time periods within which the impact management actions contemplated in paragraph (f) must be implemented;	Proposed Impact Management Actions for Post-Construction , page 14 Monitoring and Auditing, page 10

(k) the mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f);	Proposed Impact Management Actions for Post-Construction , page 14 Monitoring and Auditing, page 10
(l)a programme for reporting on compliance, taking into account the requirements as prescribed by the Regulations;	Monitoring and Auditing, page 10
m) an environmental awareness plan describing the manner in which - (i) the applicant intends to inform his or her employees of any environmental risk which may result from their work; and (ii) risks must be dealt with in order to avoid pollution or the degradation of the environment; and	Environmental Awareness Training, page 16
(n) any specific information that may be required by the competent authority	Environmental Authorisation, page 40

Details of EAP

Company of Environmental Assessment Practitioner (EAP):	GroenbergEnviro (Pty) Ltd	
EAP name:	Misché Molife	
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EAP Qualifications:	Mische Molife: BSc in Biodiversity and Conservation Biology, 11 years' experience in EIA, environmental management, report writing and project management.	
EAP registrations/Associations:	Mische – IAIAsa, EAPASA (2020/1410)	

1 Introduction

1.1 Project Description

Project Location and Background:

The development area is located on Portion 10 of Farm 502, Stellenbosch, off Annandale Road in the Western Cape Province, as shown in **Figure 1**.

Figure 1: Locality of the development area in relation to the surrounding area

The development required the clearance of approximately 2.1ha of indigenous vegetation in 2024, as shown in **Figure 2**. The clearance of vegetation was conducted during the preparation for the establishment of the approved vineyard, as shown in **Figure 3**. The clearance was done erroneously because the approved development area was not demarcated prior to commencement of the vineyard preparation.

Figure 2: Development area before clearance – light blue polygons

Figure 3: Cleared area in relation to the approved vineyard development

The approval of this EMPr will be done through the EA by the Department of Environmental Affairs and Development Planning (DEA&DP). The developer must ensure that its conditions are implemented by making the document available to the contractor and also ensure that an Environmental Control Officer (ECO) or the Resident Engineer (RE) are appointed, and systems are in place to evaluate compliance. The contractor(s) is/are expected to familiarise himself with the contents of this document and to implement its conditions.

Overall the EMPr will aim to:

- Control the operational activities in such a way that negative impacts on the physical environment, sensitive areas and surrounding residential areas are minimised or prevented.
- Ensure that mitigation and rehabilitation measures are implemented where required.

Please note that this document does not replace any other regulations, laws and bylaws that the contractor must adhere to. It specifically does not replace the regulations of the Occupational Health and Safety Act of 1993 (Act No. 85 of 1993).

Funding for the implementation of the EMPr is the financial responsibility of the developer.

The project's environmental issues are shown in Chapter 2 with the aim and objectives shown in Chapter 3 and compliance with applicable laws included in Chapter 4. Chapter 5 details the roles and responsibilities, while Chapter 6 discusses the monitoring and auditing, with the different schedules for auditing and monitoring shown in Chapter 7. The pre-construction and construction EMPr are shown in Chapter 8 and impact management actions included in Chapter 9. The operational management actions are included in Chapter 10.

Appendix A is earmarked for the environmental authorisation which will be included upon receipt. The tracking table is included in **Appendix B**, and the schedule of fines shown in **Appendix C**. The method statement forms are shown in **Appendix D** and **Appendix E**. The superimposed project map is shown in **Appendix F**.

2 Environmental Issues

2.1 Sensitive Environment

2.1.1 Terrestrial Biodiversity Assessment (Appendix H1 of the AR)

*"**Conclusions and Recommendations***
The retrospective ecological assessment of the2 ha unlawfully cleared area within Spier Wine Estate indicates that the impacts to terrestrial biodiversity, plant and animal species are minimal to low. The project area is ecologically degraded and primarily consists of secondary vegetation.

Given the limited scale and intensity of the impact:

- *Restoration should be undertaken in line with the approved Restoration Plan compiled by Holmes (2021).*
- *Ongoing monitoring should be conducted to ensure alien species do not establish and that secondary vegetation recovers.*
- *The cleared area should be incorporated into the existing conservation commitments under the biodiversity agreement with CapeNature as per the EA dated April 2021.*

In conclusion, although the unlawful activity triggered the need for a Section 24G process, the ecological consequences are not considered severe. With appropriate management and restoration, the area can be reintegrated into the estate's conservation framework and continue contributing to long-term biodiversity goals."

3 Aims and Objectives of the EMPr

The aim of the EMPr is to:

- Identify those construction activities identified for the proposed project that may have a negative impact on the environment;
- Outline the mitigation measures that will need to be taken and the steps necessary for their implementation; and
- Describe the reporting system to be undertaken during construction.

The objectives of the EMPr are to:

- Identify a range of mitigation measures to reduce and mitigate the potential adverse impacts to minimal or insignificant levels;
- Provide a pro-active and practical working mechanism to enable the measurement and monitoring of environmental performance on site; and,
- Ensure that the environmental specifications are identified, effective and contractually binding to ensure compliance on site.

4 Compliance with Applicable Laws

The supreme law of the land is the Constitution of the Republic of South Africa, which states: "*Every person shall have the right to an environment which is not detrimental to his or her health or well-being*." Laws applicable to the protection of the environment in terms of Environmental Management (and relating to construction activities) include, but are not restricted to:

- National Environmental Management Act (NEMA), No. 107 of 1998, as amended;
- National Environmental Management: Air Quality Act (NEM:AQA), No. 39 of 2004;
- National Environmental Management: Biodiversity Act (NEM:BA), No. 10 of 2004;
- National Environmental Management: Waste Act (NEMWA), No. 59 of 2008;
- National Heritage Resources Act (NHRA), No. 25 of 1999;
- National Water Act (NWA), No. 36 of 1998 and amendments;
- National Veld and Forest Fire Act, No. 101 of 1998;
- Occupational Health and Safety Act, No. 85 of 1993.

Of particular importance is Section 28 (1) of the NEMA, which places an obligation on all individuals to take due care of the environment and to ensure remedial action is instituted to minimise and mitigate environmental impact.

The EMPr forms part of the contract documentation and is thus a legally binding document. In terms of this Act, an individual responsible for environmental damage to both the environment and human health must pay for the costs, and for the preventative measures to reduce or prevent additional pollution and/or

environmental damage from occurring. This is referred to as the Polluter Pays Principle.

5 *Roles and Responsibilities*

The key role players during the proposed work are anticipated to be as follows:

- Applicant (Holder of the EA) – Spier Farm Management (Pty) Ltd;
- Responsible Person (RP), who will oversee the activities of the contractors on site;
- Environmental Control Officer (ECO);
- Contractor responsible for the construction and maintenance activities; and
- Any sub-contractors hired by the contractor.

The anticipated management structure (organogram) is presented in **Figure 4** below and shows the proposed lines of communication for construction and maintenance activities. The applicant retains overall responsibility for construction and maintenance and the implementation of the EMPr.

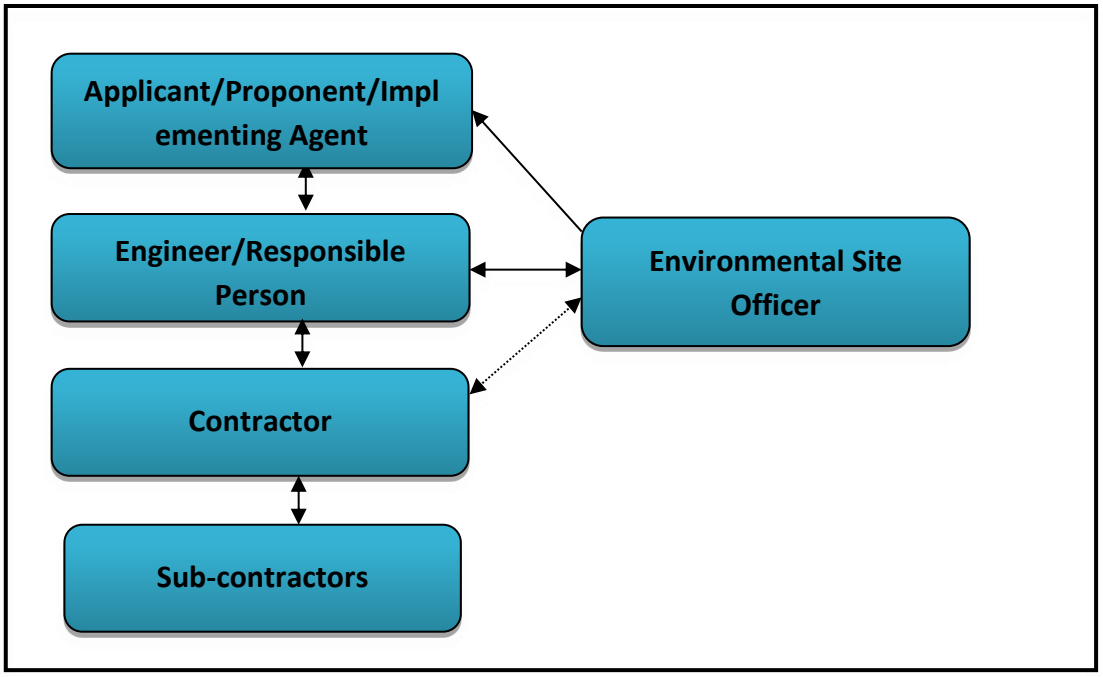


Figure 4: Management reporting structure

Key roles and responsibilities with respect to the implementation of an EMPr are outlined below.

5.1 Applicant – Spier Farm Management (Pty) Ltd

The applicant has overall responsibility for management of activities. In terms of environmental management, the applicant/proponent will:

- Appoint suitably experienced engineers, if required, who will be responsible for the overall management of activities on site;
- Identify any activities not covered by the scope of this EMPr, and determine the need for, and where required, obtain relevant authorisations;
- Ensure that the engineers are aware of the requirements of the EMPr, implement the EMPr and monitor the contractor's activities on site;
- Ensure that the contractor is aware of and contractually bound to the provisions of this EMPr by including the relevant environmental management requirements in tender and contract documents, as appropriate;
- Appoint a suitably qualified and experienced ECO to oversee environmental management of the required works;
- Ensure that the contractor remedies environmental problems timeously and to the satisfaction of the engineer and authorities (where necessary); and
- Notify the authorities, should problems not be remedied timeously.

5.2 Responsible Person

The applicant will appoint suitably qualified engineers (if necessary), who in turn will designate a Responsible Person (RP) to oversee activities of the contractor. This role will be fulfilled either by the Resident Engineer (RE) or a suitably qualified representative of the applicant, if applicable. The RP shall:

- Ensure that the contractor is duly informed of the EMPr and associated responsibilities and implications of this EMPr prior to commencement of construction and maintenance activities;
- Identify the need for, and request/provide method statements (MS) for future maintenance and repair works;
- Monitor the contractor's activities with regard to the requirements outlined in the EMPr;
- Report any environmental emergencies/concerns to the applicant immediately; and
- Ensure that non-compliance is remedied timeously and to the satisfaction of the relevant authorities.

5.3 Environmental Control Officer

The ECO shall be a suitably qualified/experienced environmental professional or professional firm appointed by the applicant/proponent (developer) for the duration of repair or maintenance works. The ECO shall:

- Request method statements (MS) from the contractor prior to the start of relevant activities, where required, and approve these (as appropriate) without causing undue delay;
- Monitor, review and verify compliance with the EMPr by the main contractor, as well as any sub-contractors and specialist contractors;
- Identify areas of non-compliance and recommend corrective actions (measures) to rectify them in consultation with the applicant, the RP and the contractor, as required;
- Compile a checklist highlighting areas of non-compliance following each ECO inspection;
- Ensure follow-up and resolution of all non-compliances;
- Provide feedback for continual improvement in environmental performance;
- Respond to changes in project implementation or unanticipated activities which are not addressed, and which could potentially have environmental impacts, and advise the applicant, the RP and contractor as required.

5.4 Contractor

The contractor will be required to appoint or designate a Contractor's Environmental Representative (CER) who will assume responsibility for the contractor's environmental management requirements on site and be the point of contact between the contractor, the ECO and the RP. The CER shall:

- Ensure that all activities on site are undertaken in accordance with the CEMPr and OEMPr and/or an approved MS;
- Monitor all sub-contractor(s)' activities with regard to the requirements outlined in the EMPr;
- Ensure that all employees and sub-contractors comply with the EMPr;
- Immediately notify the RP and ECO of any non-compliance with the EMPr, or any other issues of environmental concern; and
- Ensure that non-compliance is remedied timeously and to the satisfaction of the RP and ECO.

The contractors have a duty to demonstrate respect and care for the environment. The contractors will be responsible for the cost of rehabilitation of any environmental damage that may result from non-compliance with the EMPr, environmental regulations and relevant legislation.

5.5 Sub-contractors

All sub-contractors will be required to:

- Ensure that all employees are duly informed of the EMPr and associated responsibilities and implications of this EMPr prior to maintenance activities;
- Ensure that all activities on site are undertaken in accordance with the EMPr;
- Monitor employees' activities with regard to the requirements outlined in the EMPr;
- Immediately notify the RP and ECO of any non-compliance with the EMPr, or any other issues of environmental concern; and
- Ensure that non-compliance is remedied timeously and to the satisfaction of the RP and ECO.

The sub-contractor(s) has/have a duty to demonstrate respect and care for the environment. The sub-contractors will be responsible for the cost of rehabilitation of any environmental damage that may result from his/their presence on site, and thus his/their non-compliance with the EMPr, environmental regulations and relevant legislation.

6 *Monitoring and Auditing*

6.1 Monitoring

The holder of the EA must appoint a suitably experienced Environmental Control Officer (ECO), for the duration of the construction phase of implementation.

The **ECO** must –

- be appointed prior to commencement of any vegetation clearing or construction activities commencing;
- ensure compliance with the EMPr and the conditions contained herein;
- keep a record of all activities on site, problems identified, transgressions noted, and task schedule of tasks undertaken by the ECO; and
- Remain employed until all rehabilitation measures, as required for implementation due to construction damage, are completed and the site is ready for operation.

An ECO will implement and monitor environmental control of the development. The ECO duties will be as follows:

- Ensure implementation and monitoring of the EMPr;
- Make changes to the EMPr as required;
- Visit the site prior to the commencement of activities to ensure that the correct method statements are prepared.
- Prepare ECO reports as required by the EA;
- Maintain a photographic record of the work and environmental issues;
- ECO visits must take place 1) prior to construction and site clearing, 2) monthly after construction has commenced; and
- Site visit reports must be compiled and include photographic evidence and recommendations. The report must be made available to the contractor, applicant and applicable authorities.

6.1.1 Documentation

A copy of the Environmental Authorisation, EMPr, any independent assessments of rehabilitation and environmental liability, closure plans, audit reports and compliance monitoring reports must be kept at the site of the authorised activities.

Access to the site must be granted, and the environmental reports mentioned above must be produced to any authorised official representing the competent authority who requests to see it for the purposes of assessing and/or monitoring compliance with the conditions contained herein.

The **ECO** will maintain a file containing the following:

- Copy of the EMPr;
- Methodology statement(s) by the contractor(s);
- Site establishment plan;
- Letter from the contractor(s) indicating that he has familiarised himself with the contents of the EMPr;
- Letter from the contractor(s) on environmental awareness training;

The applicant must ensure that complaints received are documented.

The **contractor** shall maintain a copy of the following documents on-site:

- Operational Plan;
- Emergency response and remedial action plan;
- Environmental Management Programme (EMPr) and other documents related to the operation in the file.
- Tracking table (see **Appendix B**).

6.2 Independent Auditing

The holder must, for the period during which the environmental authorisation and EMPr remain valid-

- Ensure the compliance with the conditions of the environmental authorisation and the EMPr is audited,
- The auditing report will address the requirements of the Environmental Impact Assessment Regulations, 2014,
- The environmental audit report must be prepared and submitted to the competent authority, by an independent person with the relevant environmental auditing expertise as stipulated in the environmental authorisation;

7 Environmental Monitoring and Auditing Schedule

Environmental auditing and monitoring schedule			
Non-operational phases			
Activity	**Frequency**	**Record & duties to be fulfilled**	**Report**
ECO site visits	Once Monthly	• Ensure compliance with the EMPr and the conditions contained herein; • Keep a record of all activities on site; problems identified; transgressions noted, and a task schedule of tasks undertaken by the ECO; • Remain employed until all rehabilitation measures, as required for implementation due to construction damage, are completed and the site is ready for operation.	Site visit report to the holder of EA as well as other conditions that might be prescribed in the EA.
Close-out Report	Within sixty (60) days of completion of construction	Ensure the compliance with the conditions of the environmental authorisation and the EMPr.	Site visit report to the holder of EA as well as other conditions that might be prescribed in the EA
Post construction phases			
Environmental audit(s)	The frequency of the auditing will be stipulated in the environmental authorisation.	The holder must ensure that environmental audit(s) are performed as stipulated within the EA.	Environmental audit(s)

8 Non-Operational Management Programme – Pre-Construction and Construction

Please note that the activity has already commenced, therefore no construction related activities are supplied.

9 Proposed Impact Management Actions for Construction Phase

Please note that the activity has already commenced, therefore no construction related activities are supplied.

10 Proposed Impact Management Actions for Post-Construction

Activity	Proposed impact management action and Procedures / Mitigation measures to achieve it	Responsible person for implementation	Implementation timeframe and frequency	Outcome
General	• All applicable measures as indicated under the Construction EMPr must be implemented. • In terms of Section 35 (2) of the National Environmental Management: Air Quality Act No. 39 of 2004, the occupier of the premises must take all reasonable steps to prevent the emission of any offensive odour caused by any activity on such premises. • Fugitive dust emission abatement on existing farm roads shall be achieved by applying chemical stabilizers to the road surfaces. • Fugitive dust emission abatement is to be achieved at all road surfaces/existing farm roads.	Holder of EA or representative.	If and when applicable and required.	• Management of general aspects of the facility. • Complaints from neighbouring property owners or I&APs. • No visual sign of vermin and flies.
Emergency Preparedness Plan	• The emergency preparedness plan must be ready for implementation, at all times, should an emergency situation arise.	Holder of EA or representative.	Continuously post construction.	• To ensure preparedness for emergencies.
Sensitive environments and buffer area	Botanical Specialists: *Given the limited scale and intensity of the impact:* • *Restoration should be undertaken in line with the approved Restoration Plan compiled by Holmes (2021).* Refer to Appendix H. • *Ongoing monitoring should be conducted to ensure alien species do not establish and that secondary vegetation*	Holder of EA or representative.	Maintained throughout the project lifetime.	• No exotic plants used for rehabilitation. • Area successfully rehabilitated. • No alien plants visible. • Preventing destruction, degradation or pollution of sensitive environments.

Activity	Proposed impact management action and Procedures / Mitigation measures to achieve it	Responsible person for implementation	Implementation timeframe and frequency	Outcome
	recovers. • *The cleared area should be incorporated into the existing conservation commitments under the biodiversity agreement with CapeNature as per the EA dated April 2021.*			
Alien Vegetation	• Effective measures should be implemented for the eradication and long-term control of alien vegetation within the site and immediate surrounding areas.	Holder of EA or representative.	Maintained throughout the project lifetime.	• No exotic plants used for rehabilitation. • Area successfully rehabilitated. • No alien plants visible. • Preventing destruction, degradation or pollution of sensitive environments.
Fauna	• No faunal species must be harmed by workers during any routine maintenance.	Holder of EA or representative.	Continuously post construction. If and when applicable and required.	• No measurable or visible signs of harmed faunal species.
Water Use Management	• No abstraction or any use of surface water or groundwater shall be done without prior authorisation from the Department of Water and Sanitation, unless it is a Schedule 1 Use or an Existing Lawful Use if water is taken from a water resource. • All the requirements of the National Water Act. 1998 (Act 36 of 1998) regarding water use and pollution management must be adhered to at all times. • No pollution of surface water or ground water resources	Holder of EA or representative.	Continuously post construction. If and when applicable and required.	• Limiting environmental degradation or pollution as a result of ignorance or accidents. • Preventing destruction, degradation or pollution of sensitive environments.

Activity	Proposed impact management action and Procedures / Mitigation measures to achieve it	Responsible person for implementation	Implementation timeframe and frequency	Outcome
	shall occur due to activities on the property.			
Dust and Noise Management	• It is not expected that dust and exhaust emissions will be generated in large quantities during the operational phase of the proposed development and shall therefore not be a significant nuisance. • The Department of Environmental Affairs has gazetted dust regulations. The applicant must comply with the NEM: AQA National Dust Control Regulations (GN No. R. 827) of 01 November 2013. • Noise generated from the operation of the facility must conform to the Western Cape Noise Control Regulations of 2013 (P.N. 200/2013). ○ These regulations prohibit a person from conducting any activity in such a way as to give rise to dust in such quantities and concentrations so that the dust, or dust fall, has a detrimental effect on the environment including health.	Holder of EA or representative.	Continuously post construction. If and when applicable and required.	• Ensuring proper dust suppression and control of noise generated. • Minimizing the potential dust and noise impacts post construction. • Ensuring that complaints from I&APs are limited.

11 Appendices

11.1 Appendix A: Environmental Authorisation

11.2 Appendix B: Tracking Table

Required	Received		Date	Comment
	Yes	No		
Methodology statement				
Site establishment plan				
Letter re contents of EMPr				
Letter re awareness training				

11.3 Appendix C: Schedule of Fines

SCHEDULE OF FINES FOR ENVIRONMENTAL DAMAGE OR EMPr TRANSGRESSIONS

(Based on City of Cape Town: Standard Environmental Specifications – Ver. 5 (03/2002))

Note: The maximum fine for any environmental damage will never be less than the cost of applicable environmental rehabilitation.

EMPr TRANSGRESSION OR RESULTANT ENVIRONMENTAL DAMAGE	MIN. FINE	MAX. FINE
Failure to comply with prescriptions regarding appointment of an ESO and monitoring of EMPr compliance.	R500	R2000
Failure to comply with prescriptions regarding environmental awareness training.	R500	R5000
Failure to comply with prescriptions regarding method statements.	R500	R5000
Failure to report environmental damage or EMPr transgressions to the ESO.	R500	R1000
Failure to carry out instructions of the ESO regarding the environment or the EMPr.	R500	R1000
Failure to comply with prescriptions posting of emergency numbers.	R500	R5000
Failure to comply with prescriptions regarding a complaint register.	R500	R1000
Failure to comply with prescriptions regarding information boards.	R500	R1000
Failure to comply with prescriptions regarding site demarcation and enforcement of 'no go' areas.	R500	R5000
Failure to comply with prescriptions regarding site clearing.	R500	R5000
Failure to comply with prescriptions for supervision for loading and off-loading of delivery vehicles.	R500	R1000
Failure to comply with prescriptions for securing of loads to ensure safe passage of delivery vehicles.	R500	R1000
Failure to comply with prescriptions for the storage of imported materials within a designated contractor's yard.	R500	R1000
Failure to comply with prescribed administration, storage or handling of hazardous substances.	R500	R1000
Failure to comply with prescriptions regarding equipment maintenance and storage.	R500	R1000
Failure to comply with fuel storage, refuelling, or clean-up prescriptions.	R500	R1000
Failure to comply with prescriptions regarding procedures for emergencies (spillages and fires).	R1000	R5000
Failure to comply with prescriptions regarding construction camp.	R500	R5000
Failure to comply with prescriptions for the use of ablution facilities.	R500	R1000
Failure to comply with prescriptions regarding water provision.	R500	R1000

For each subsequent similar offence committed by the same individual, the fine shall be doubled in value to a maximum value of R50,000.

11.4 Appendix D: Method Statement Proforma

METHOD STATEMENT PROFORMA

METHOD STATEMENT FOR THE:

This method statement is to be completed by the contractor (in consultation with the Resident Engineer and EO) at least 5 working days prior to the proposed commencement date of the said work and represents a binding agreement to the method statement by all site contractors and sub-contractors involved in the work for which the method statement is submitted.

DATE OF SUBMISSION:

LEAD CONTRACTOR:

OTHER CONTRACTORS AND/OR SUB-CONTRACTORS:

Describe in detail what work is to be undertaken?

Describe in detail where on the site the works are to be undertaken and the extent? Provide a sketch plan and grid block reference**.**

Lead supervisor/foreman name and contact details:

Number of personnel:

Construction activities:

Plant and machinery to be used:

Other:

What environmental impacts are anticipated and what precautions are proposed to prevent these impacts? (Refer to the relevant sections of the EMPr for guidance and provide general site camp layout).

Toilet facilities:

Litter:

Security:

Plant/machinery (operation, servicing, management, storage, refuelling, etc.).

Emergencies and fire:

Hazardous materials (handling, management, storage):

Have all personnel involved been through an environmental induction course?

Petrochemical spill remediation and containment measures:

Other:

DECLARATION BY PARTIES

Contractor:

I understand the contents of the method statement and the scope of the works required of me. I further understand that the method statement may be amended on application to the above signatories and that the Environmental Officer will audit my compliance with the contents of this method statement.

Print Name

Date

Signed

Environmental Officer (EO):

The work described in this method statement, if carried out according to the methodology described, is satisfactory mitigation to prevent avoidable environmental harm.

Print Name

Date

Signed

Resident Engineer:

The work described in this method statement, if carried out according to the methodology described, is satisfactory mitigation to prevent avoidable environmental harm.

Print Name

Date

Signed

11.5 Appendix E: Method Statement Control Sheet

METHOD STATEMENT CONTROL SHEET

(This control sheet is to be attached to all methods statements)

CONTRACT NO: _____

MS Number:

THIS SECTION TO BE COMPLETED BY THE CONTRACTOR/METHOD STATEMENT AUTHOR ONLY

TITLE:
DESCRIPTION:
SUBMITTED BY:

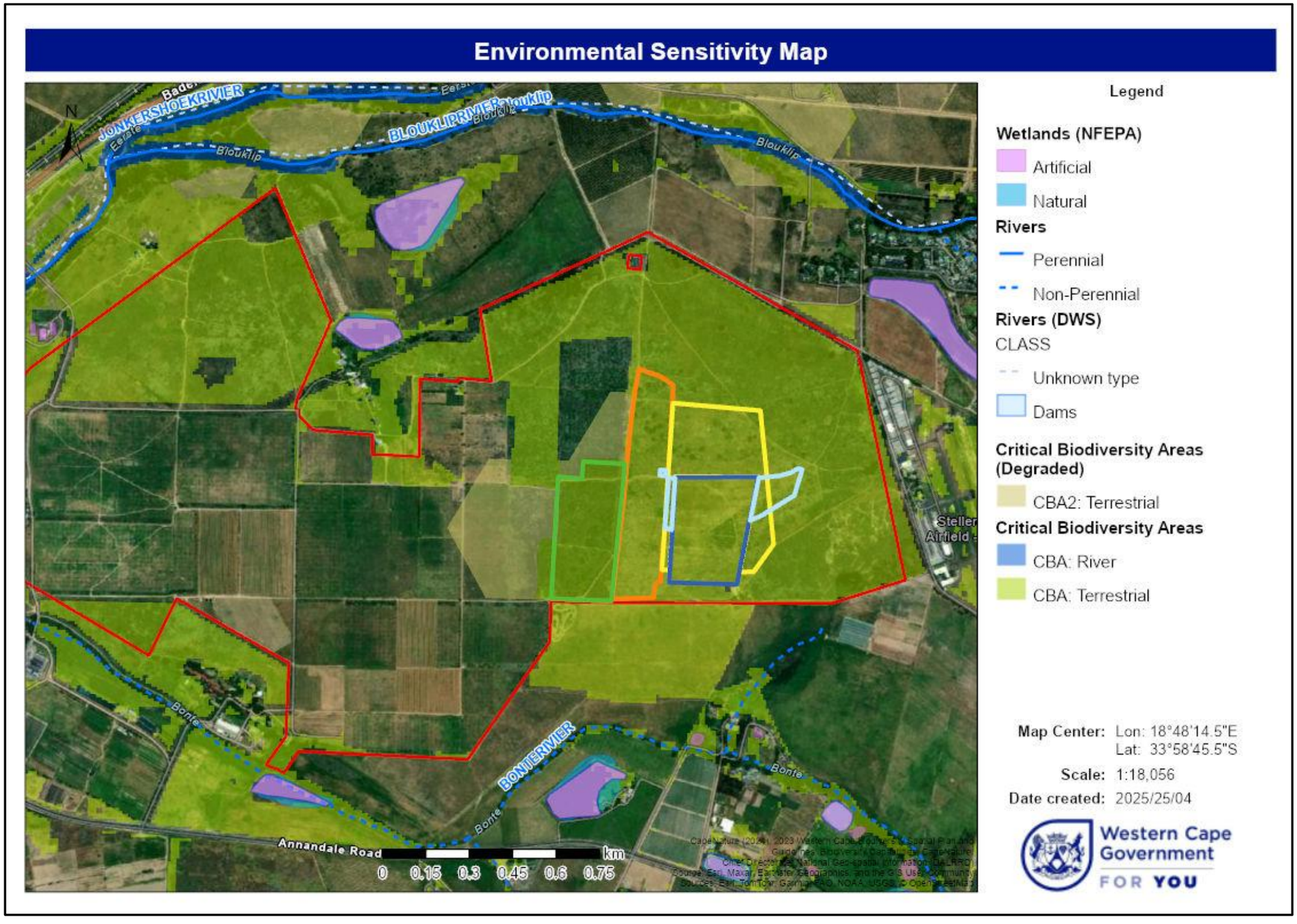
Date requested by: _____Date submitted: _____

Date response required by: _____Date work start: _____

REVIEW SCHEDULE		
Date	**Authority**	**Comments**

DISTRIBUTION AND AUTHORISATION			
	APPLICANT	**EO**	**CONTRACTOR**
Name			
Signature			
Date			

11.6 Appendix F: Superimposed Project Map



11.7 Appendix G: EAP Curriculum Vitae

GroenbergEnviro (Pty) Ltd
PO Box 1058
Wellington 7654

Phone: Not Available
Cell: 0791117378
Fax: 0864767139
E-mail: mische@groenbergenviro.co.za

Mische Molife

Nationality	South African	
Date of birth	14 May 1990	
Qualifications	B.Sc. Degree (Biodiversity and Conservation Biology)	University of the Western Cape - 2012
Special courses	Training Course: Environmental Impact Assessment ("EIA") Administration Administered by the University of Pretoria Coordinated by the National Government: The Department of Environmental Affairs Course Period: February 2014	
Professional membership	IAIAsa (5972) EAPASA (2020-1410)	
Career	**2017 - current** **2013 - 2016**	Environmental Consultant - GroenbergEnviro (Pty) Ltd - Wellington Environmental Officer – Department of Environmental Affairs and Development Planning
Current position	Environmental Consultant at GroenbergEnviro (Pty) Ltd (GBE). As a private consultant, at GBE I provide consultancy services in Environmental Management, Public Participation and Project Management.	
Professional experience	Currently a consultant in environmental studies and management. This include producing various Basic Assessment, Scoping and Environmental Impact Reports, Environmental Management Plans, Maintenance Management Plans, Water use licenses and as an Environmental Control Officer for developments. Previously an environmental officer at the Department of Environmental Affairs and Development Management. Job Description: To administer, implement and enforce statutory obligations in respect of Environmental Impact Management under the National Environmental Management Act, 1998 (Act No. 107 of 1998) ("NEMA"). Job Function: The administration and implementation of the relevant environmental legislation and the provision of comments and advice with respect to environmental matters.	
Publications/ Contracts (A full list is available on request)	• Projects in process o Annandale Mixed Use Development o Erf 17336, Fish Hoek Housing Development o Leeurivier 24G o Kanu Development o Kleinmond Golf Club 24G o Middelrivier Balancing Dam o N1 Gateway Development (Amendment) o Nuwepos Dam o Pat Barnard • Projects completed o Baldie and Sons Storage Facility o Bosplaas Dam (ALG) S24G o Chatsworth Primary School o De Hoop Nature Reserve (Potberg) - road upgrade and maintenance o Enkanini S24G o Firlands (Strand) Shaded Storage Development o Glen Oak Dam Expansion o Gousblomkraal Dam Expansion o Island Lake Resort Development o Klip Dam, Spier o Kloovenburg Dam Expansion o Korteshoven Agricultural Development o Long Acres Agricultural Development o Lucky Star Hout Bay AEL Renewal Public Participation Process o Moerasrivier Chicken Houses, Eastern Cape o Philippi Industrial Development o Pearly Beach o P.P.C. (De Hoek, Riebeeck, Saldanha) AEL Renewal Public Participation Process o Platkloof Dam Expansion o Southern Cape Fish Meal AEL Renewal Public Participation Process o Spier Vineyard o Sgb-Smit Power Matla AEL Renewal o Saldanha Bulk (Portion 3 of Farm 188), Mineral Storage S24G o Saldanha Primary School o Silver Oak Agricultural Development	

11.8 Appendix H: Approved Restoration Plan

RESTORATION PLAN TO IMPROVE THE STRUCTURE AND COMPOSITION OF DEGRADED SWARTLAND GRANITE RENOSTERVELD AT SPIER ESTATE, WESTERN CAPE

Prof. Patricia M Holmes (PhD), Cape Ecological Services

13th May 2020, updated 26th March 2021

INTRODUCTION

Spier Estate plans to cultivate an additional 19.5 hectares of virgin land (i.e. land left fallow for > 10 years) for vineyards on part of the Remainder Portion 10 of Farm 502, Stellenbosch District (Figure 1). As part of the environmental impact assessment, a specialist vegetation survey was conducted during Spring 2019 to determine the condition and sensitivity of the indigenous vegetation of the area identified as suitable for vineyard expansion (McDonald 2020). The vegetation type is Swartland Granite Renosterveld (Rebelo et al. 2006), which is Critically Endangered (NEM:BA). However, the vegetation survey concluded that the preferred area for development was disturbed secondary vegetation, dominated by pioneer shrubs, and suggested that it may have been cultivated more than 20 years previously.

The vegetation remnant is classified as a Critical Biodiversity Area in the Western Cape Biodiversity Spatial Plan; however McDonald (2020) concluded this to be an over-inflated category owing to the degraded nature of the vegetation and recommended that at most it should be classified as an Ecological Support Area. The specialist recommended that the preferred alternative of cultivating the 19.5 hectares of vegetation may be supported with mitigation to reduce the impact of habitat loss to 'very low negative'. The recommended mitigation is to conserve the remaining natural vegetation on site (both high quality and degraded areas) and to restore degraded vegetation towards a more diverse plant community more typical of Swartland Granite Renosterveld.

Terms of Reference

To compile a restoration plan to improve the ecological integrity and biodiversity of Swartland Granite Renosterveld in a 10 hectare degraded vegetation area that will form a corridor linking the undisturbed vegetation remnant to other semi-natural areas on the estate once the 19.5 hectare area has been developed to vineyards (Figure 1).

Note: The above ToR was updated in March 2021 following comments from DEA&DP in which only 10ha of the 19.5 hectare area was approved for development with the remainder to be included in the restoration plan (Figure 2).

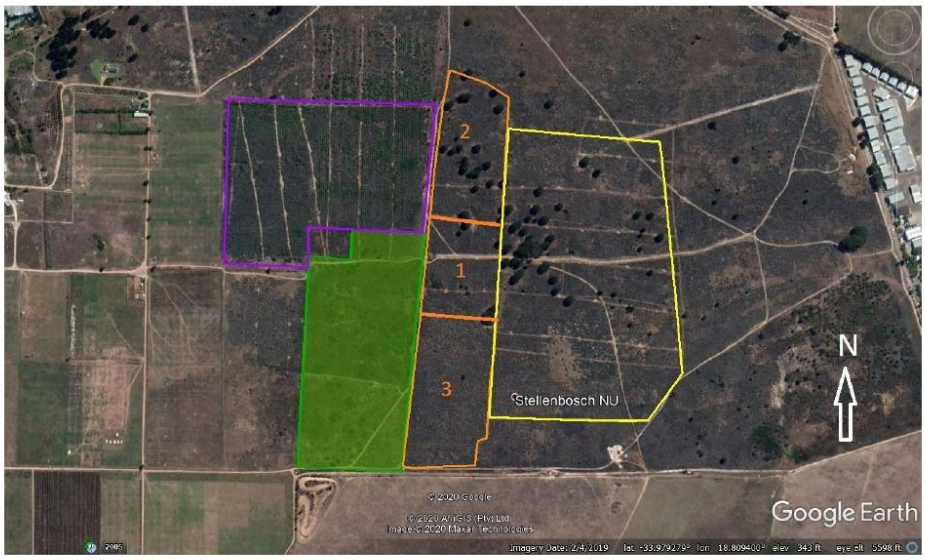


Figure 1. Aerial image of the relevant Spier Estate land portion, indicating cultivated areas, fallow areas supporting degraded renosterveld and a natural renosterveld area (green filled polygon). The preferred area for new cultivation is indicated by the yellow polygon and the identified corridor area targeted for mitigation action is indicated by the orange polygon. Portions 1, 2 and 3 of the corridor are described below. Large alien pine trees (*Pinus pinea*) are evident on the image.

SITE BIOPHYSICAL INFORMATION

Spier Estate soils are dominated by granitic parent materials that weather to coarse sandy or loamy soils. Where annual rainfall is less than 600 mm p.a. such clay-rich soils generally support renosterveld vegetation, in this case Swartland Granite Renosterveld, potentially grading into fynbos vegetation in any sandier, less fertile soils or in wetter areas where soils are more leached of nutrients. Although long-term average rainfall on Spier Estate is 700mm p.a., it is variable with only half that amount received over the last five years (Estate Manager, pers. Comm.).

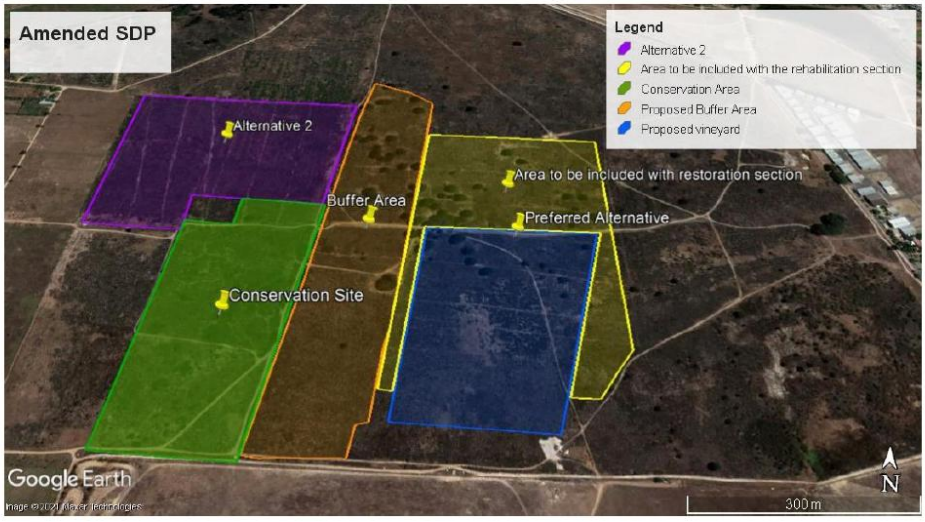


Figure 2. Updated aerial image (March 2021) showing the reduced area approved for vineyard development (blue polygon) and the additional area to be included with the restoration plan (yellow polygon).

In common with fynbos vegetation types, renosterveld vegetation is a fire-driven ecosystem requiring periodic summer fires to thrive and maintain ecological integrity. Plant species regenerate mainly during the rainy season after a fire. However, in contrast to fynbos, renosterveld historically supported episodic grazing and browsing by large ungulates: note that this was not continuous grazing, but short periods of intense grazing as herds of game migrated through the area and moved elsewhere, allowing time for subsequent vegetation recovery. Swartland Granite Renosterveld is described as a mosaic of herbaceous vegetation patches, dominated by perennial grasses, and shrubland dominated by ericoid- and cupressoid-leaved shrubs, such as renosterbos (*Elytropappus rhinocerotis*). Geophytes (e.g. bulbous and cormous species) and annuals are prominent after fires. Small trees and larger shrubs (e.g. Wild Olive, *Olea europaea* subs. *africana*) form thickets that are confined to fire-protected rocky outcrops or areas of high productivity, such as heuweltjies (Rebelo et al. 2006).

The degraded renosterveld on the estate, as described by McDonald (2020), is species-poor, missing some of the key growth form components such as geophytes and perennial tussock grasses, and dominated by a few indigenous pioneer Asteraceae shrub species.

Invasive alien tree and shrub species and other alien weeds, including annual grasses, are prominent (McDonald 2020).

Restoration of this site will require the re-establishment of ecological processes, such as a typical renosterveld fire regime with a fire return interval of 5-10 years in summer, and the re-introduction of missing components, such as key growth forms and plant species, either by seed or rootstock during the post-fire recruitment window. Control of invasive alien vegetation will be another important requirement (see "Fixing the Damage" chapter in "Fynbos Ecology and Management", edited by Esler et al. 2014).

Box 1 outlines the generalized species composition for Swartland Granite Renosterveld (Rebelo et al. 2006; note: some of the species' scientific names may require updating).

RESTORATION PLAN FOR THE DEGRADED TEN HECTARE CORRIDOR AREA

Restoration Goal

The restoration goal is to reinstate the natural renosterveld vegetation structure and functioning. This will ensure that the ecological integrity of the remnant approaches a near-natural state, whereby the Swartland Granite Renosterveld vegetation type is better conserved in the long-term.

The implementation of an effective management plan, with particular reference to veld restoration, fire management and invasive species management, will assist in the long-term contribution that the site makes towards the overall conservation efforts of this Critically Endangered vegetation type. Threatened and endemic taxa requiring population augmentation and other species of interest that historically would have occurred in the area may be re-introduced after future fire-cycles if not feasible to do so after the first prescribed burn.

Current corridor habitat condition

Please refer to figure 1 for locations of the corridor descriptions below.

Section 1

Section 1 lies across the hilltop and has more loamy (clay-rich) soils than the lower sections 2 and 3. Where rocky granite boulders or outcrops occur some thicket elements can establish, including *Olea africana* (Wild Olive). The vegetation here is dominated by common Asteraceae shrubs (*Elytropappus rhinocerotis, Eriocephalus africanus, Athanasia trifurcata,* Helichrysum crispum, *Seriphium plumosum*) and other common shrubs such as *Passerina*

corymbosa, *Anthospermum aethiopicum* and *Phylica c.f. imberbis*. There are a few forbs and graminoids such as *Senecio hastatus* and *Pentameris* sp. respectively. Weed species are relatively uncommon. Section 1 should be improved by the re-introduction of geophytes, perennial graminoids and additional perennial forb and shrub species to boost structure and diversity (see Table 2).

Photo: Section 1 degraded vegetation of proposed corridor

Section 2

Section 2 lies downslope and to the north of Section 1. It differs in having very sandy granitic soils and a dominant understorey of *Cynodon dactylon* (Kweek), possibly suggesting a different land-use history. The dominant shrubs are the same as above, with the addition of the common legume shrub *Otholobium hirtum*. The site conserves more geophytes, with some dense patches of bulbs coinciding with the shrub-free *Cynodon* patches (e.g. *Bulbine praemorsa, Moraea fugax, Geisorhiza aspera, Monsonia speciosa, Oxalis* spp and *Pelargonium myrrhifolium*). Here the dense turf of *Cynodon dactylon* would need to be removed before sowing a mix of additional indigenous species (possibly by applying herbicide on grass regrowth following a summer burn and before indigenous species emerge post-fire). Perennial forb, graminoid and shrub species should be re-introduced to boost structure and diversity (Table 2). The sandy nature of the soils indicates that some of the ecotonal species (i.e. between granite renosterveld and fynbos) could also be re-introduced. These include the restios: *Restio gaudichaudiana, Willdenowia glomerata,* Proteaceae such as *Leucadendron lanigerum*, *Leucospermum grandiflorum* and Ericaeae such as *Erica*

paniculata. This section has most of the mature pines occurring on the proposed corridor and these should be removed.

Photo: Section 2 of corridor showing Cynodon patches

Photo: Mature pines in Section 2 of proposed corridor

Section 3

Section 3 lies downslope and to the south of Section 1. It is similar to Section 2 in having very sandy, granitic soils. This section is the weediest of the three, probably because it was ploughed up for sweet potatoes as recently as 2005. The common Asteraceae shrub species are present, dominated by *Seriphium plumosum* but less dense than in the other sections. *Cynodon dactylon* is not evident as an understorey plant. The weedy indigenous herbaceous perennial, *Nidorella ivifolia* (Ovenbush, Oondbos) is quite prominent, as is the alien annual weed *Erigeron bonariensis*. Here a hot summer fire would help to reduce the annual weed presence (by burning their shallow seed banks), but a higher density of post-fire sowing and/or planting of rootstock would be required to restore structure and biodiversity here than in the other sections to compensate for the weedy nature of the site. It may also be appropriate to sow a higher density of indigenous annuals and fast-growing shrubs in this section to suppress any alien weeds that germinate. This section would also be suitable for the re-introduction of ecotonal fynbos elements as described above.

Additional Restoration Area (Figure 2. Yellow polygon)

This area has been degraded by previous ploughing and should be treated as for Section 2 where there is dense Kweek and Section 3 where Kweek is less dominant. Any dense turf of *Cynodon dactylon* would need to be removed before sowing a mix of additional indigenous species (possibly by applying herbicide on grass regrowth following a summer burn and before indigenous species emerge or are sown post-fire). Invasive alien species should be controlled both before and after the prescribed burn. Perennial forb, graminoid and shrub species should be re-introduced to boost structure and diversity after fire, as described above for Section 3 (Table 2).

Reference Ecosystem

The natural remnant adjacent to the corridor may be used as a reference for intact Swartland Granite Renosterveld (photo below). Other extant renosterveld remnants in the wider area, such as drier sections of the Bottelary Hills, may provide additional information on the structure and species composition of the target plant community.

Photo: Natural renosterveld remnant at Spier Estate

Photo: Rocky outcrop with taller thicket elements present

Box 1. Important and Endemic Taxa for Swartland Granite Renosterveld (Rebelo et al. 2006)

Important Taxa:

Tall Shrubs (Cape thickets=T): *Euclea racemosa subsp. racemosa T, Olea europaea subsp. africana T, Putterlickia pyracantha T, Searsia laevigata T, Aspalathus acuminata subsp. acuminata, Osteospermum monilifera, Diospyros glabra T, Dodonaea viscosa var. angustifolia, Maytenus oleoides T, Myrsine africana T, Passerina corymbosa, Searsia angustifolia T, S. crenata T, S. tomentosa T, S. undulata T, Wiborgia obcordata.*

Low Shrubs: *Anthospermum aethiopicum, Elytropappus rhinocerotis, Eriocephalus africanus var. africanus, Felicia filifolia subsp. filifolia, Salvia lanceolata, Anthospermum galioides subsp. galioides, Aspalathus hispida, Asparagus rubicundus, Athanasia trifurcata, Chironia baccifera, Erica paniculata, Galenia africana, Gnidia squarrosa, Helichrysum cymosum, H. dasyanthum, H. revolutum, H. teretifolium, Hermannia alnifolia, H. hyssopifolia, H. prismatocarpa, Leucadendron lanigerum var. lanigerum, Lobostemon argenteus, L. fruticosus, Nenax hirta subsp. hirta, Oftia africana, Phylica thunbergiana, Searsia dissecta, S. rosmarinifolia, Salvia africana-caerulea, Stoebe cinerea.*

Succulent Shrubs: *Lampranthus sociorum.*

Woody Climbers: *Cissampelos capensis, Microloma sagittatum.*

Herbs: *Helichrysum crispum, Annesorhiza macrocarpa, Cotula turbinata, Hebenstretia paarlensis, Lichtensteinia obscura, Stachys aethiopica.*

Geophytic Herbs: *Mohria caffrorum, Chlorophytum undulatum, Geissorhiza monanthos, Moraea papilionacea, Oxalis obtusa, O. pes-caprae, O. purpurea, Pelargonium longifolium, Romulea eximia, R. rosea, Sparaxis parviflora, Watsonia borbonica subsp. borbonica.*

Succulent Herb: *Crassula capensis.*

Herbaceous Climber: *Cynanchum africanum.*

Graminoids: *Ehrharta calycina, E. villosa var. villosa, Restio gaudichaudiana, Cymbopogon marginatus, Ehrharta longiflora, E. ottonis, E. thunbergii, Restio capensis, Thamnochortus bachmannii, Themeda triandra, Tribolium uniolae.*

Endemic Taxa:

Low Shrubs: *Agathosma hispida, A. latipetala, Aspalathus glabrata, A. rycroftii.*

Succulent Shrubs: *Antimima menniei, Erepsia hallii, Lampranthus citrinus, L. scaber, Phyllobolus suffruticosus, Ruschia klipbergensis.*

Herbs: *Arctopus dregei, Oncosiphon glabratum.*

Geophytic Herbs: *Babiana pygmaea, B. regia, B. rubrocyanea, Geissorhiza darlingensis, G. eurystigma, G. malmesburiensis, G. mathewsii, G. radians, Haemanthus pumilio, Ixia aurea, I. curta, Lachenalia purpureo-caerulea, Moraea amissa, Oxalis stictocheila, Watsonia humilis.*

Restoration Annual Plan of Operation

The Restoration Annual Plan of Operation (RAPO, Appendix 1) must include and integrate invasive alien plant control, fire management and species re-introduction by seed and/ or rootstock. The RAPO includes pre-fire and post-fire operations and therefore spans several years and will include the following generalized operational guidelines. Note that the factors outlined below may not all be relevant to every site, but should be considered in operational planning.

Alien Vegetation Control

Goal: To remove and control invasive alien vegetation by the most cost-effective method that simultaneously minimizes damage to indigenous vegetation. **Note:** *All the invasive alien trees listed in Table 1 must be removed from the conservation and restoration corridor areas prior to the prescribed burn, including the mature pines that fall into these sections.* These species outcompete and replace the indigenous species and will proliferate after fires.

Refer to Table 1 for examples of appropriate invasive alien plant species control methods. Note that initial and follow-up control will be required for most invasive species. The most important alien species to control ahead of prescribed burning are the trees and shrubs: *Pinus pinea* (Stone Pine), *Eucalyptus cladocalyx* (Sugar Gum), *Acacia longifolia* (Long-leaved Wattle), *Acacia saligna* (Port Jackson Willow), *Leptospermum laevigatum* (Australian Myrtle) and perennial herbs such as *Pennisetum clandestinum* (Kikuyu). Most of the alien annual weeds (e.g. *Erigeron* and *Bromus* species) with shallow soil seed banks may be controlled by the summer prescribed burn which should kill a large portion of their seed banks. However, herbs such as Patterson's Curse (*Echium plantagineum*) should be manually or chemically controlled to prevent further spread (this plant is toxic to herbivores).

Pre Operation: Site Evaluation:

a) Vegetation: Invasive alien species present and their perceived re-invasion potential (seed bank), density or coverage, area (ha), growth stage (vegetative, flowering, fruiting); indigenous species of concern (rare and threatened);

b) Terrain: slope, accessibility, mobility

c) Labour: type – skilled / unskilled

d) Method: type – manual, mechanical, chemical, biological, integrated

e) Biophysical conditions: environmental constraints, timing (season)

f) Costs: labour, transportation, maintenance, equipment

During – Operation

a) Monitor clearing process: ensure methods are applied correctly (quality control)

Post – Operation

a) Appropriate method for removal of alien slash material (e.g. ecological block burn, brush piles and/ or remove large wood to reduce risk of heat scars; *in corridor area remove large wood & scatter smaller branches to assist prescribed burn*)

b) Monitoring: follow-up requirement (regrowth of aliens)

    - Monitor alien regrowth from resprouts and seed germination
    - Apply appropriate follow-up control at optimal time & season.

Fire Management

Goal: To conduct a prescribed burn to promote indigenous vegetation recovery and provide a window for species re-introductions by seed and rootstock. **Note:** *Summer fire is an essential process, both for ecological restoration and long-term biodiversity management.* Fynbos and renosterveld flora and fauna are adapted to summer fires. In the case of some animals, like tortoises, they behave like plants in burying their eggs (rather than seeds) in the soil from where they hatch in April after the summer fire season. Late autumn fires can therefore kill young tortoises. The adults do not need to be removed before fire as the next generation will replace them (as for the plants that rely on seeds). If too many tortoises are "rescued" they will carry pathogens onto the next generation. They will also over-graze the young restoration seedlings that germinate post-fire. Only in extreme cases, such as for the Critically Endangered Geometric Tortoise (which does not occur at Spier) should animals be rescued ahead of fires.

The Spier site is relatively flat and will be surrounded by cultivated land so it should be relatively straightforward to conduct prescribed dry season burns. Remaining natural areas should be divided into blocks and burnt in consecutive years, with the 10 ha corridor area being the first block burnt to allow integration of the other restoration interventions. *Note that renosterveld dominated by renosterbos only burns well under hot, dry conditions and resists burning if the humidity is too high, so a summer burn should be planned for*. Reasonable pre-fire protection measures are necessary, as well as a plan of action in the event of wildfire. Consultation with the Municipality and independent stakeholders, as well as the local Fire Protection Association (FPA), is advised (refer to the National Veld and Forest Fire Act 101 of 1998) as a permit will be required for the burn.

Pre – Operation: Site Evaluation:

a) Vegetation: indigenous vegetation cover and condition; invasive alien vegetation present

b) Terrain: slope, accessibility, mobility (*not relevant in this case as accessible and relatively flat*)

c) Labour: type – skilled / unskilled

d) Method: type – brush piles, fire breaks, ecological block burns (*block burn in this case*)

e) Administration: permits, FPA letters, first aid kit; create check list for day of burn

f) Biophysical conditions: environmental condition, climatic conditions, timing (*season: summer in this case*)

g) Costs: labour, transportation, maintenance, equipment.

During – Operation

a) Equipment: appropriate equipment is available

b) Biophysical conditions: environmental conditions, climatic conditions and timing are to be monitored closely prior to the burn

c) Administration: permits, FPA letter, first aid kit (necessary documents must always be in hand; refer to fire check list)

Post – Operation

a) Monitoring of objectives: (note also immediate post-fire assessment e.g. fire debris that may pose a risk, soil erosion risk: *unlikely an issue here on gently undulating land*)
    - later post-winter assessment: Indigenous and alien vegetation regrowth
    - specific restoration operations to apply (fire, erosion control, re-introductions)

Re-introduction of Plant Species

Goal: To re-introduce key structural growth forms and plant species historically occurring in the degraded site in order to improve ecological integrity.

Ten hectares is a large area to restore in terms of obtaining sufficient seeds and rooted material to re-introduce post-fire. It is suggested to rather sow and plant a series of patches across the corridor, selecting species mixes and quantities that suit each of the three corridor sections. In fynbos biome ecosystems the general rule of thumb is to sow the

equivalent of 10kg cleaned seed per hectare. Seeds need not all require total cleaning, so if partial cleaning is done a higher mass of seeds must be sown to compensate for this. Depending on the amount of seed collected and the number of rooted plants propagated, the number and size of patches for re-introduction may be calculated and mapped. Here the idea is to facilitate future dispersal of desirable species from these patches across the site, so that with each fire event a larger proportion of the area becomes colonized with desirable renosterveld species. It is also possible in the second autumn post-fire to sow additional material into patches that remain very bare, provided seeds are pre-treated with smoke and/or heat if required. Similarly rooted material may be propagated in the second year to augment plants established in the first year, or replace those that died over the first summer.

Pre – Operation: Site Evaluation:

a) Vegetation: indigenous vegetation cover and condition; identification of missing growth forms and key species; species of concern (rare, endemic and threatened); areas to be targeted for re-introductions

b) Terrain: slope, accessibility, mobility

c) Method: collection (seed and/ or cuttings), re-introduction (seed and/ or planting); *refer to Table 2 for suitable species to re-introduce*; apply appropriate sowing pre-treatments, such as smoke or heat pulse

d) Biophysical conditions: environmental condition, climatic conditions, timing (season)

e) Costs: labour, transportation, propagation and seed storage, equipment

f) Specific objectives: set objectives for 1) canopy cover of re-introduced growth forms and species, 2) richness and density of re-introduced growth forms and species.

Post – Operation

a) Monitor planted rootstock according to set objectives (subsampling appropriate): Number of surviving plants per species after the first summer/ autumn season, and if possible in subsequent years, to inform whether methods are appropriate and whether further active restoration is required;

b) Monitor seeded areas according to set objectives (subsampling appropriate): Record the species and quantities of seeds sown (e.g. weight of uncleaned seed) and monitor establishment success over the next two seasons. Plots and/ or fixed point photographs may be used, but some recording of established species is advisable.

Table 1. Recommended invasive alien species control methods

Note: Use of herbicides is extremely damaging to indigenous species; herbicides (especially foliar spray) should only be used where absolutely necessary and limited to the dry season in wetlands. Herbicides used must be registered for the particular species and must be applied according to the manufacturer's instructions.

Species	Method	Herbicide
Acacia longifolia (Long-Leaved wattle)	Fell at ground level; hand pull seedlings	Not required if cut very low; otherwise treat as for *A. saligna*
Acacia saligna (Port Jackson Willow)	Fell at ground level and immediately stump-treat with herbicide to prevent resprouting; hand pull seedlings BUT ensure roots removed; kill saplings by cutting below the root crown or remove with tree-popper; coppice may be foliar-sprayed while <0.5m tall otherwise should be recut and stump-treated	Cut stump: triclopyr (e.g. Lumberjack, Timbrel) Foliar: glyphosate (e.g. Roundup, Mamba)
Eucalyptus cladocalyx (Sugar Gum)	Large trees should be frilled: i.e. bark & outside wood removed to a combined depth of about 25mm to expose cambium layer, then sprayed with systemic herbicide to kill tree. Smaller trees too large to hand-pull or tree-pop should be cut at ground level & stump treated as for *A. saligna.*	Glyphosate or triclopyr should be sprayed onto frilled area.
Leptospermum laevigatum (Australian Myrtle)	Fell at ground level; hand pull seedlings	Not required if cut very low; otherwise treat as for *A. saligna*
Pennisetum clandestinum (Kikuyu)	Foliar spray while actively growing in summer	Glyphosate, e.g. Roundup Turbo, Muscle-up
Pinus pinea (Stone Pine)	Fell at ground level or below lowest green leaf; hand pull seedlings	Not required

Table 2. Suggested Swartland Granite Renosterveld species for restoring growth form structure to degraded areas post-fire at Spier Estate

NB. Other species may be substituted depending on availability, location and plant community. The aim is to re-establish several species for each major growth form and thus improve vegetation resilience. Propagation: S=seed, B=Bulb/corm, C=cutting, D=division.

Species	Growth Form	Propagation
Cotula turbinata	Annual	S
Dimorphotheca pluvialis	Annual	S
Nemesia affinis	Annual	S
Polycarena capensis	Annual	S
Aristea capitata	Geophyte	S
Babiana rubrocyanea	Geophyte	S
Brunsvigia orientalis	Geophyte	S
Chasmanthe aethiopica	Geophyte	S, B
Geissorhiza monanthos	Geophyte	S
Moraea papilionacea	Geophyte	S
Oxalis pupurea	Geophyte	S, B
Pelargonium longifolium	Geophyte	S
Romulea rosea	Geophyte	S
Sparaxis parviflora	Geophyte	S
Watsonia borbonica subsp. *borbonica*	Geophyte	S, B
Cymbopogon marginatus	Graminoid	S, D
Ehrharta thunbergii	Graminoid	S, D
Restio gaudichaudiana	Graminoid	S, D
Themeda triandra	Graminoid	S, D
Tribolium uniolea	Graminoid	S, D
Annesorhiza macrocarpa	Perennial forb	S, C
Helichrysum crispum	Perennial forb	S
Indigofera digitata	Perennial forb	S, C
Lichtensteinia obscura	Perennial forb	S, C
Scabiosa columbaria	Perennial forb	S, C
Stachys aethiopica	Perennial forb	S, C
Anthospermum galioides subsp. *galioides*	Low shrubs	S
Aspalathus hispida	Low shrubs	S, C
Chironia baccifera	Low shrubs	S
Erica paniculata	Low shrubs	S
Felicia filifolia subsp. filifolia	Low shrubs	S
Gnidia squarrosa	Low shrubs	S
Helichrysum teretifolium	Low shrubs	S
Hermannia alnifolia	Low shrubs	S, C
Lampranthus sociorum (succulent shrub)	Low shrubs	S, C
Leucadendron lanigerum var, *lanigerum*	Low shrubs	S, C
Lobostemon argenteus	Low shrubs	S, C
Microloma sagitattum (vine)	Low shrubs	S
Oftia africana	Low shrubs	S, C
Phylica thunbergiana	Low shrubs	S, C
Searsia dissecta	Low shrubs	S, C
Salvia africana-caerulea	Low shrubs	S, C
Note: In areas ecotonal to fynbos, it may be possible to introduce other Proteaceae, such as *Serruria candicans*, *Protea repens*, *P. burchellii*, *Leucadendron rubrum*, *L.salignum*,		

Leucospermum calligerum and *L. grandiflorum;* Restionaceae such as *Restio gaudichaudiana, Willdenowia glomerata;* and *Erica paniculata;* select stock from the nearest natural populations.

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Appendix 1. Restoration Annual Plan of Operation for Spier Estate

A. Degraded Swartland Granite Renosterveld (SGR) areas. Note: different sections may be staggered, depending on availability of resources, especially renosterveld seeds.

	ACTIVITY	RESPON-SIBLE PARTY	BUDGET	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY
2020 to 2021 (pre-burn year)																
1	Control of Kikuyu (if needed)	Estate staff	Herbicide costs; staff time						x	x	x	x	x			
2	Initial control of invasive alien trees & shrubs	Estate staff &/ or appointed contractor	Herbicide costs; Staff time/ contractor costs					x	x	x	x					
3	Identify source sites for SGR species to be re-introduced & plan for seed & cutting collecting field trips	Estate staff &/ or appointed contractor	Staff time/ contractor costs	x	x											
4	Collect seed & cuttings for propagation	Estate staff &/ or appointed contractor	Staff time/ contractor costs		x	x	x	x	x	x	x	x				
5	Map most degraded areas in block for targeted sowing & planting	Estate staff &/ or appointed contractor	Staff time/ contractor costs				x	x								
6	Pre-treat seeds & prepare seed mixes	Estate staff &/ or appointed contractor	Staff time/ contractor costs									x	x			
From pre-burn year onwards (2021-2022+)																
7	Conduct prescribed burn	Estate staff &/ or appointed contractor	Staff time/ contractor costs										x	x		
8	*Cynodon dactylon* control in patches planned for sowing (spot herbicide spraying before indigenous species emerge)	Estate staff &/ or appointed contractor	Staff time/ contractor costs												x	
9	Sow pre-treated seed mixes in predetermined areas; embed in soil (rake in or provide cover by applying sparse wood chip mulch)	Estate staff &/ or appointed contractor	Staff time/ contractor costs												x	x
10	Plant hardened-off rooted material in mixed clumps in predetermined areas once soils moist	Estate staff &/ or appointed contractor	Staff time/ contractor costs	x	x	x										
11	Monitor sown & planted areas according to objectives (repeat following year); recommend further interventions if needed	Estate staff &/ or appointed contractor	Staff time/ contractor costs				x	x						x	x	