

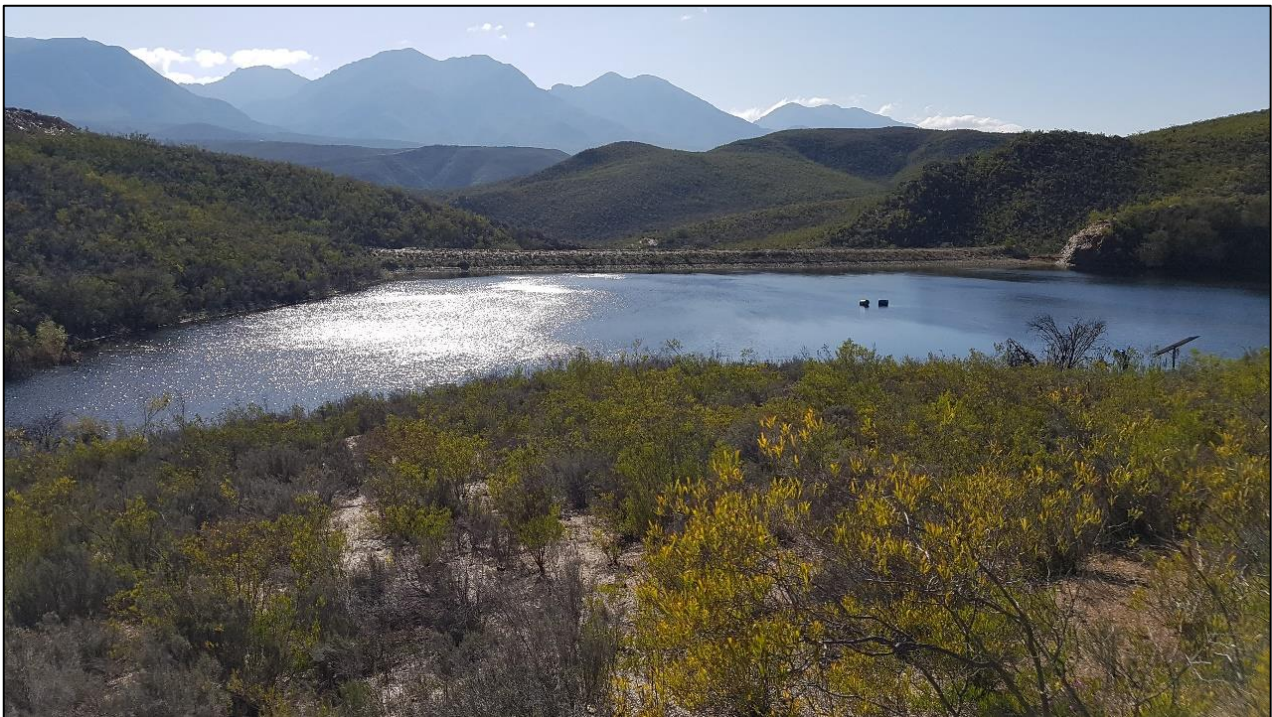


## OPERATIONAL ENVIRONMENTAL MANAGEMENT PROGRAMME

In terms of the **Section 24G** application process for the consequences of unlawful commencement of listed activity/ies in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), ("NEMA") for:

### Rectification of Two Unlawful dams on Portion 42 and Portion 34 of Farm 46 Buffelsrivier, George, Western Cape.

DEA&DP REF: 14/1/1/E3/5/10/3/L1212/22



**PREPARED FOR THE APPLICANT:**

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02/11/2023

EAP Signature: \_\_\_\_\_

## ENVIRONMENTAL MANAGEMENT PROGRAMME REQUIREMENTS:

Appendix 4 of Regulation 982 of the 2014 EIA Regulations contains the required contents of an Environmental Management Programme (EMP). The table below serves as a summary of how these requirements were incorporated into this EMPR:

(1) An EMPr must comply with section 24N of the Act and include:-

<p>(a) Details of –</p> <p>(i) The EAP who prepared the EMPr; and</p> <p>(ii) The expertise of the EAP to prepare an EMPr, including a curriculum Vitae;</p>	<p>This EMPr was prepared by Janet Ebersohn of Eco Route Environmental Consultancy. Janet has a BSc. Honours in Environmental Management and has 14 years' experience as an Environmental Assessment Practitioner. Please see attached CV of the EAP (Appendix 1).</p>
<p>(b) A detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description;</p>	<p>Section 2 provides specific project details.</p>
<p>(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;</p>	<p>Section 4 provides mapping which superimpose the proposed activity onto environmentally sensitive areas.</p>
<p>(d) A description of the impact management outcomes, including management statements, identifying the impacts and risks that need to be avoided, managed and mitigated as identified through the environmental impact assessment process for all phases of the development including –</p> <p>(i) planning and design;</p> <p>(ii) pre-construction activities;</p> <p>(iii) construction activities;</p> <p>(iv) rehabilitation of the environment after construction and where applicable post closure; and</p> <p>(v) where relevant, operation activities;</p>	<p>Addressed in Sections 3, 4 and 10.</p>
<p>(f) a description of proposed impact management actions, identifying the manner in which the impact management outcomes contemplated in paragraph (d) will be achieved, and must, where applicable, include actions to –</p> <p>(i) avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation;</p> <p>(ii) comply with any prescribed environmental management standards or practises;</p> <p>(iii) comply with any applicable provisions of the Act regarding closure, where applicable; and</p> <p>(iv) comply with any provisions of the Act regarding financial provision for rehabilitation, where applicable;</p>	<p>Addressed in Sections 3, 4 and 10.</p>

(g) the method of monitoring the implementation of the impact management actions contemplated in paragraph (f);	Addressed in Section 10.
(h) the frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f);	Section 7.1 and 10.
(i) an indication of the persons who will be responsible for the implementation of the impact management actions;	Section 5 and 10.
(j) the time periods within which the impact management actions contemplated in paragraph (f) must be implemented;	Sections 10.
(k) the mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f);	Section 10.
(l) a program for reporting on compliance, taking into account the requirements as prescribed by Regulations;	Section 7.
(m) an environmental awareness plan describing the manner in which –  (i) the applicant intends to inform his or her employees of any environmental risk which may result from their work; and  (ii) risks must be dealt with in order to avoid pollution or the degradation of the environment; and	Section 7 and 10.
(n) any specific information that may be required by the competent authority.	Sections 10 and 14.

## Glossary of Terms

<b>BAR</b>	<b>Basic Assessment Report</b> – A tool used by the EAP to submit to the competent authority if listed activities is triggered in Regulations GNR 327 and GNR 324 as per NEMA to make a decision regarding a proposed development.
<b>DFFE</b>	<b>Department Forestry Fisheries and Environment</b> – the national authority for sustainable environmental management and integrated development planning.
<b>DFFE&amp;DP</b>	<b>Department of Environmental Affairs and Development Planning</b> – the provincial authority for sustainable environmental management and integrated development planning.
<b>CBA</b>	<b>CBA Critical Biodiversity Area</b> – Areas in a natural condition that are required to meet biodiversity targets, for species, ecosystems or ecological processes and infrastructure.
<b>EAP</b>	<p><b>Environmental Assessment Practitioner</b> – An EAP and a specialist, appointed in terms of regulation 12(1) or 12(2) must –</p> <ul style="list-style-type: none"> <li>(a) be independent.</li> <li>(b) Have expertise in conducting environmental impact assessments or undertaking specialist work as required, including knowledge of the Act, these regulations and any guidelines that have relevance to the proposed activity.</li> <li>(c) Ensure compliance with these Regulations</li> <li>(d) Perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the application.</li> <li>(e) Take into account, to the extent possible, the matters referred to in regulation 18 when preparing the application and any report, plan or document relating to the application; and</li> <li>(f) Disclose to the proponent or applicant, registered and affected parties and the competent authority all material information in the possession of the EAP and, where applicable, the specialist, that reasonably has or may have the potential of influencing – <ul style="list-style-type: none"> <li>i. Any decision to be taken with respect to the application by the competent authority in terms of these regulations; or</li> <li>ii. The objectivity of any report, plan or document to be prepared by the EAP or specialist, in terms of these Regulations for submission to the competent authority; unless access to that information is protected by law, in which case it must be indicated that such protected information exists and is only provided to the competent authority.</li> </ul> </li> </ul> <p>(2) In the event where the EAP or specialist does not comply with sub regulation (1)(a), the proponent or applicant must, prior to conducting public participation as contemplated in chapter 5 of these regulations, appoint another EAP or specialist to externally review all work undertaken by the EAP or specialist, at the applicants cost.</p> <p>(3) An EAP or specialist appointed to externally review the work of an EAP or specialist as contemplated in sub regulation (2), must comply with sub regulation (1).</p>
<b>ECO/ESO</b>	<b>Environmental Control Officer</b> – A site agent who needs to ensure that all environmental authorisation and conditions are adhered to during the operational phase of the project.

<b>EMPr</b>	<b>Environmental Management Programme</b> – can be <b>defined</b> as “an <b>environmental management</b> tool used to ensure that undue or reasonably avoidable adverse impacts of the construction, operation and decommissioning of a project are prevented; and that the positive benefits of the projects are enhanced”.
<b>ESA</b>	<b>Ecological Support Area</b> – Areas that are not essential for meeting biodiversity targets, but that play an important role in supporting the functioning of Pas or CBAs, and are often vital for delivering ecosystem services.
<b>MMP</b>	<b>Maintenance Management Plan</b> – means a maintenance management plan for maintenance purposes defined and adopted by the competent authority
<b>NEMA</b>	<b>National Environmental Management Act (Act 107 of 1998) as amended 2017</b> – national environmental legislation that provides principles for decision-making on matters that affect the environment.
<b>PA</b>	<b>Protected Area</b> - A protected area is an area of land or sea that is formally protected by law and managed mainly for biodiversity conservation. Protected areas recognised in the National Environmental Management: Protected Areas Act (Act 57 of 2003) (hereafter referred to as the Protected Areas Act) are considered formal protected areas in the NPAES. This is a narrower definition of protected areas than the International Union for Conservation of Nature (IUCN) definition. <sup>1</sup> The NPAES distinguishes between land-based protected areas, which may protect both terrestrial and freshwater biodiversity features, and marine protected areas.

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# 1. INTRODUCTION

In accordance with the Integrated Environmental Management Guidelines published by the Department of Forestry, Fisheries and the Environment (DFFE) in 1992, the purpose of an Environmental Management Programme (EMPr) is "to describe how negative environmental impacts will be managed, rehabilitated or monitored and how positive impacts will be maximised".

Section 28 of NEMA (National Environmental Management Act, Act 107 of 1998) states that:

Duty of care and remediation of environmental damage -

"(1) 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 to the environment is authorised by law or cannot be reasonably avoided or stopped, to minimise and rectify such pollution or degradation of the environment"

This EMPr must be read in conjunction with the Environmental Impact Assessment Report dated October 2022 and the accompanying specialist reports. All recommendations, relevant conditions and mitigation measures provided in these documents must also be adhered to.

This EMPr must form an integral part of the contract documents, as it outlines the methodology & duties required so that the project objectives can be achieved in an environmentally sustainable manner; with particular reference to the prevention and mitigation of environmental impacts caused by operational activities associated with this project.

These requirements will have a financial impact on the project's costings.

This EMPr is a dynamic document that may need to evolve during its implementation period so that it recognises any new issues that may arise; or changes in the parameters of identified issues and can address these issues with the required/amended mitigation.

## 1.1. Purpose of the EMPr

The purpose of this EMPr is to ensure that the negative environmental impacts of the activities are managed, mitigated, and kept to a minimum during the operation of the dams. The EMPr focuses on avoiding damage or loss on ecosystems and the services they provide, and to enhance positive environmental impacts where possible.

The EMPr is a living document that is flexible and responsive to new and changing circumstances, however, should a change be made within the EMPr permission from DEA&DP must first be obtained.

Once the EMPr is approved by DEA&DP it is seen as a legal binding document on the following affected parties:

- 1 Project Applicant.
- 2 All contractors.
- 3 Sub-contractors and staff.
- 4 The appointed ECO monitoring the operational phase.

Copies of this EMPr must be kept on site and all senior personnel are expected to familiarise themselves with the content of this EMPr.

It is suggested that the EMPr be reviewed on a 5 yearly basis if required. Should any amendments need to be made during operational phase, written authorisation should be obtained from DEA&DP.



## 1.2. The Polluter-Pays Principle

This principle provides for “the costs of remedying pollution, environmental degradation and consequent adverse health effects and of preventing, controlling or minimizing further pollution, environmental damage or adverse health effects must be paid for by those responsible for harming the environment.” The Polluter Pays Principle will be rigorously applied throughout the operational/rehabilitation/decommissioning phase of this project.

## 2. PROJECT DETAILS

**Eco Route Environmental Consultancy** has been appointed by the Applicant **Jakobus Christo Janse van Rensburg**, to ensure rectification of unlawful commencement of an activity in terms of Section 24G of the National Environmental Management Act (Act 107 of 1998) for the ‘unlawful commencement of listed activities: clearance of indigenous vegetation, enlargement of a dam, construction of a new dam, and the altering of watercourses on portions 34 and 42 of Farm Buffelsrivier 46, George, Western Cape.

The owner of Portion 42/46 Farm Buffelsrivier enlarged an instream dam, known as **Groot Dam**, in 2016 from a volume of approximately 4000 m<sup>3</sup> to 49861 m<sup>3</sup>. The enlargement was also meant to replace storage in a dam downstream of approximately 5600 m<sup>3</sup> which is no longer being used.

The original two dams were clearly evident in the 2004 image (Figure 1). The two dams collectively impound the network of streams arising in the hills forming the extent of their catchment to the south. The image from 2014 indicates when the upstream of the two dams was enlarged, with an overlay of the approximate size of the original dam (Figure 1). The enlarged dam subsequently intercepts water from all the streams except a small inflow immediately upstream of the lower dam. While the upstream dam in its enlarged state has largely replaced the lower dam in terms of storage, a small volume of water is still retained in the lower of the two dams<sup>1</sup>.



**Figure 1: Historical aerial photos of the project area pre- and post-enlargement.**

The enlargement of the Groot Dam is motivated to store the water that can be regarded as Existing Lawful Water Use and it combine two existing small dams, however the capacity was increased from a total

<sup>1</sup> Aquatic Specialist Assessment for a Section 24G and WULA for an Enlarged Dam on Farm Buffelsrivier 42/46 and 34/46, George, Dr. Jackie Dabrowski of Confluent Aquatic Consulting & Research, August 2022.

combined capacity of 9 000m<sup>3</sup> to 49 861m<sup>3</sup>. The water to fill the dam is mainly diverted from a “sloot” in the Klein Rivier that is regulated by means of a “beurt” allocation system. The storage will provide a buffer during high summer when water is not necessarily available from the “sloot” for the irrigation of permanent crops and vegetables when required.

The offstream dam known as **Kop Dam** on Portion 34/46 was newly constructed in 2014 with a storage capacity of 20145 m<sup>3</sup>.

The water assurance during periods of low flows in the Kamanassie Rivier will provide buffer storage in the Kop Dam. The water will be taken directly from the Kamanassie during high flow conditions to store a volume of 20 145m<sup>3</sup> in the Kop Dam. This will increase the water surety for the irrigation of permanent crops on Portion 34 of farm Buffels Rivier 46, George.

The water to fill the Kop Dam is taken from the Kamanassie Rivier according to a historic water use. The allocation of 108 000m<sup>3</sup> /a can be regarded as Existing Lawful Water Use.

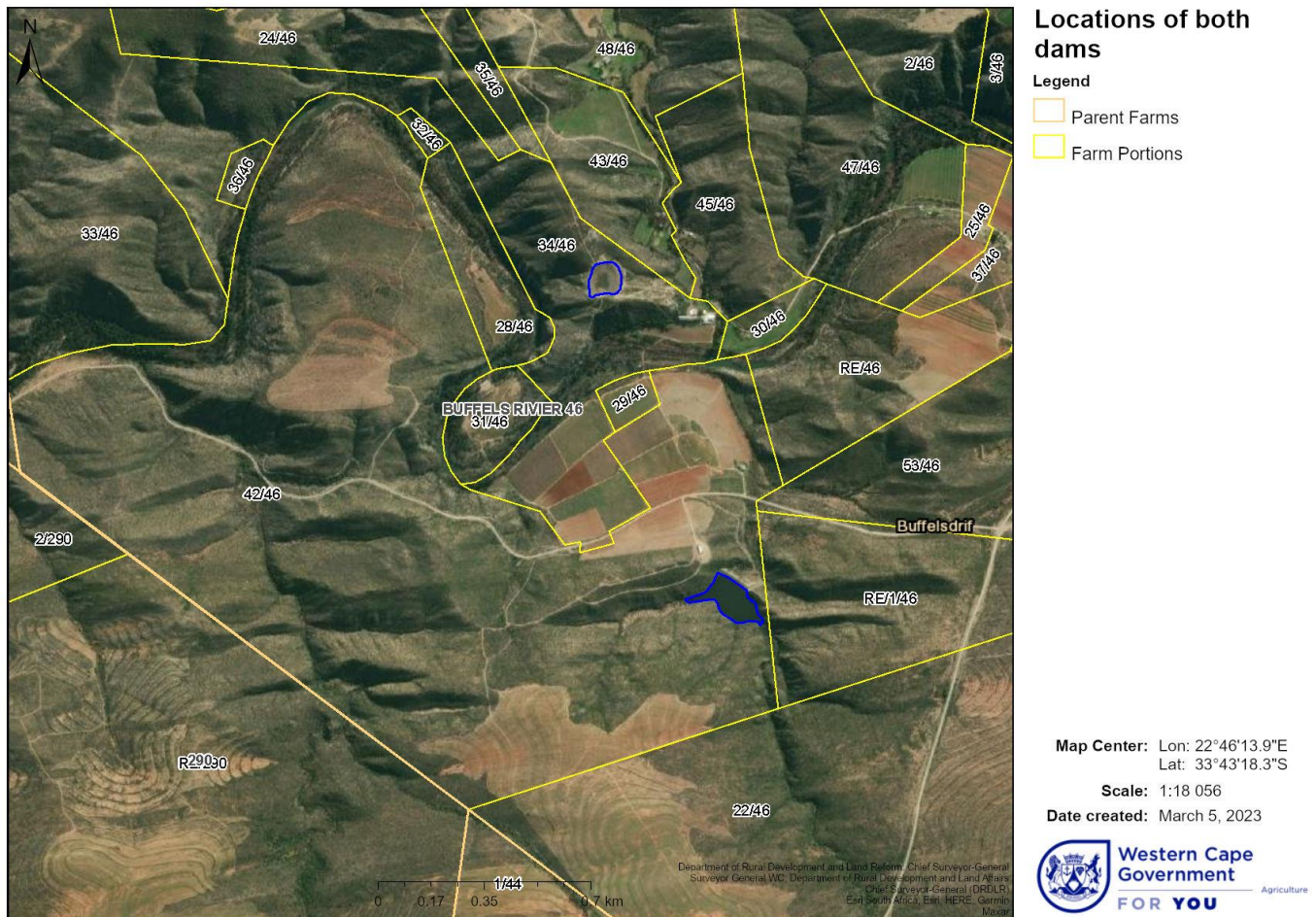


**Figure 2: Location of Kop Dam post-construction.**

## 2.1. Site Description

<b>Property location(s):</b>	Buffels Rivier, Ward 25 (Uniondale), George Municipality, Western Cape
<b>Farm/Erf name(s) &amp; number(s) including portion(s)</b>	Portion 42 and Portion 34 of Farm 46 Buffels Rivier
<b>Property size(s) (m<sup>2</sup>)</b>	290.98 ha (portion 42) and 209.68 ha (portion 34)
<b>Development footprint size(s) (m<sup>2</sup>)</b>	1.90 ha (enlarged dam on portion 42) 0.68 ha (offstream dam on portion 34)
<b>SG21 Digit code(s)</b>	C02700000000004600042 C02700000000004600034

## 2.2. Locality

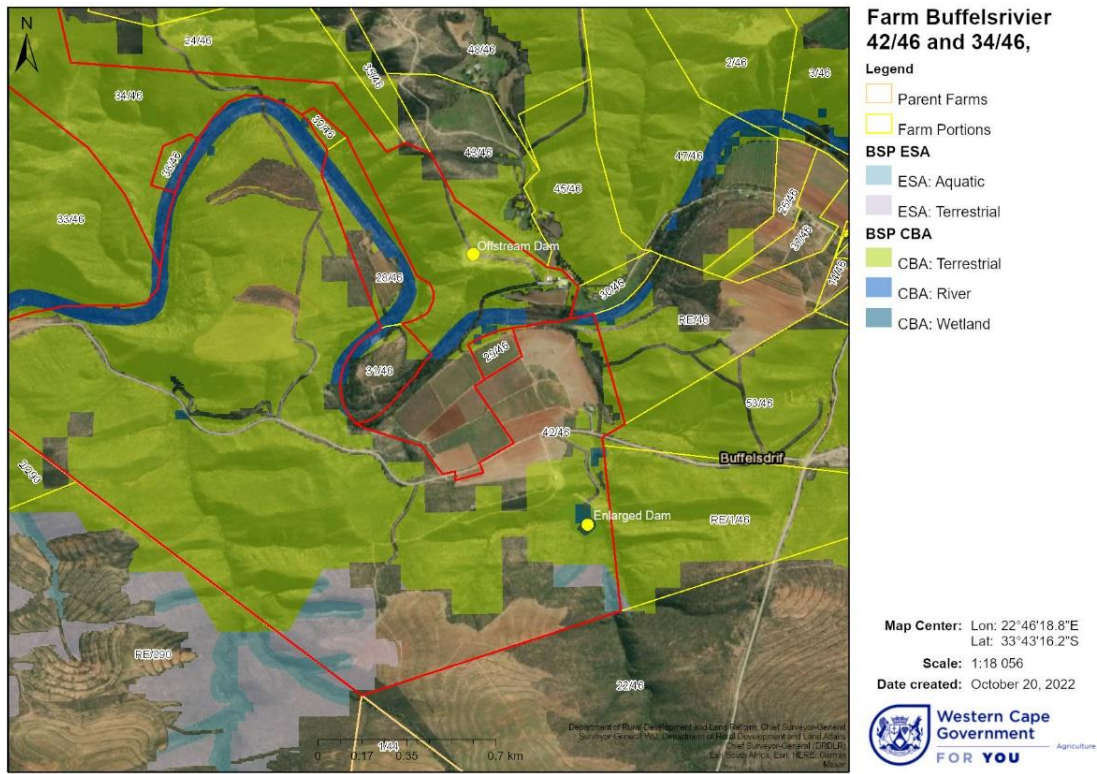


**Figure 3: Location of Groot Dam (north, blue line) and Kop Dam (south, blue line).**

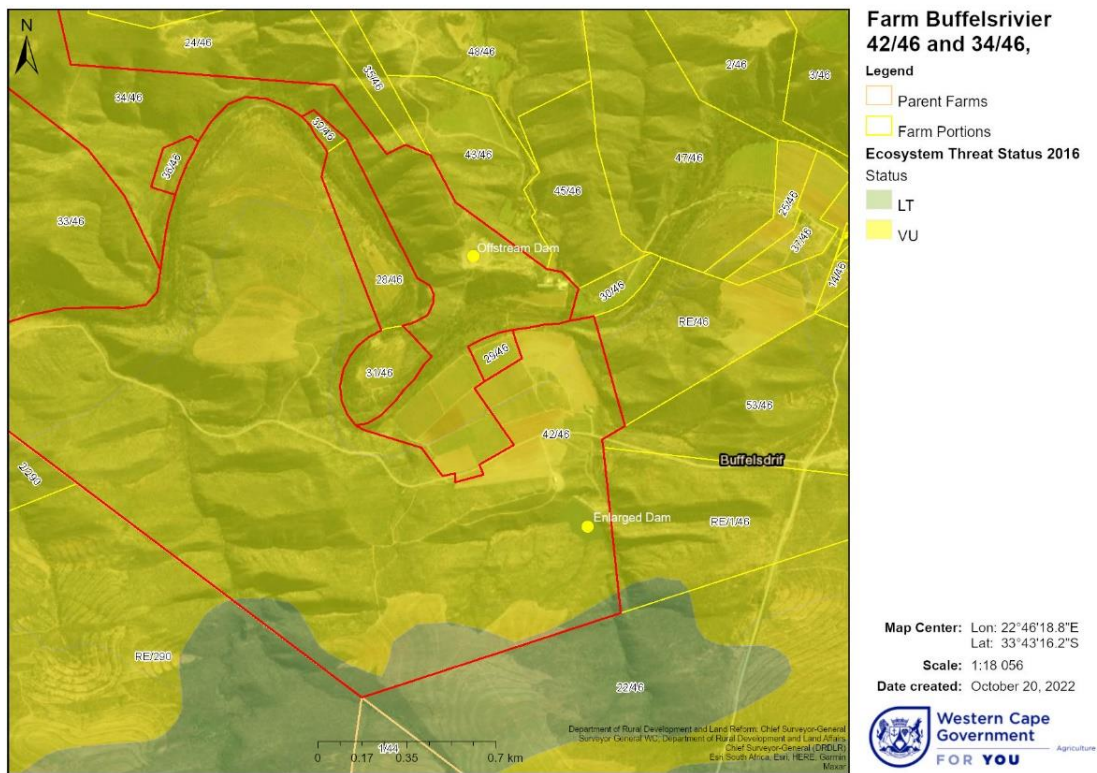
## 2.3. Environmental Considerations

The instream dam that was enlarged is on a network of unnamed streams indicated as non-perennial drainage lines which historically flowed into the Kammanassie River (NGI, 1:50 000 drainage lines). The dams are in quaternary catchment J34C. Altitude ranges between 100 – 1 300 m.a.m.s.l. The Mean Annual Precipitation (MAP) is 674 mm. Rainfall in the catchment can occur year-round, although there are bimodal seasonal peaks in autumn and spring. The Western Cape Biodiversity Spatial Plan (WC BSP; 2016) indicates that the dams are located in Critical Biodiversity Area 1 (Terrestrial) with areas downstream of the Groot Dam classified as Ecological Support Area 2. The lower conservation status of the watercourse downstream of the dam indicates that it has already been degraded due to historical impoundment by the two dams.

The mapped vegetation type at Groot Dam is Eastern Little Karoo (SKv11) and for Kop Dam is Uniondale Shale Renosterveld (FRs 16) both of which have a conservation status of Least Concern (SANBI NVM, 2018).



**Figure 4: Critical Biodiversity Areas and Ecological Support Areas.**



**Figure 5: Ecosystem Threat Status – Vulnerable (VU).**

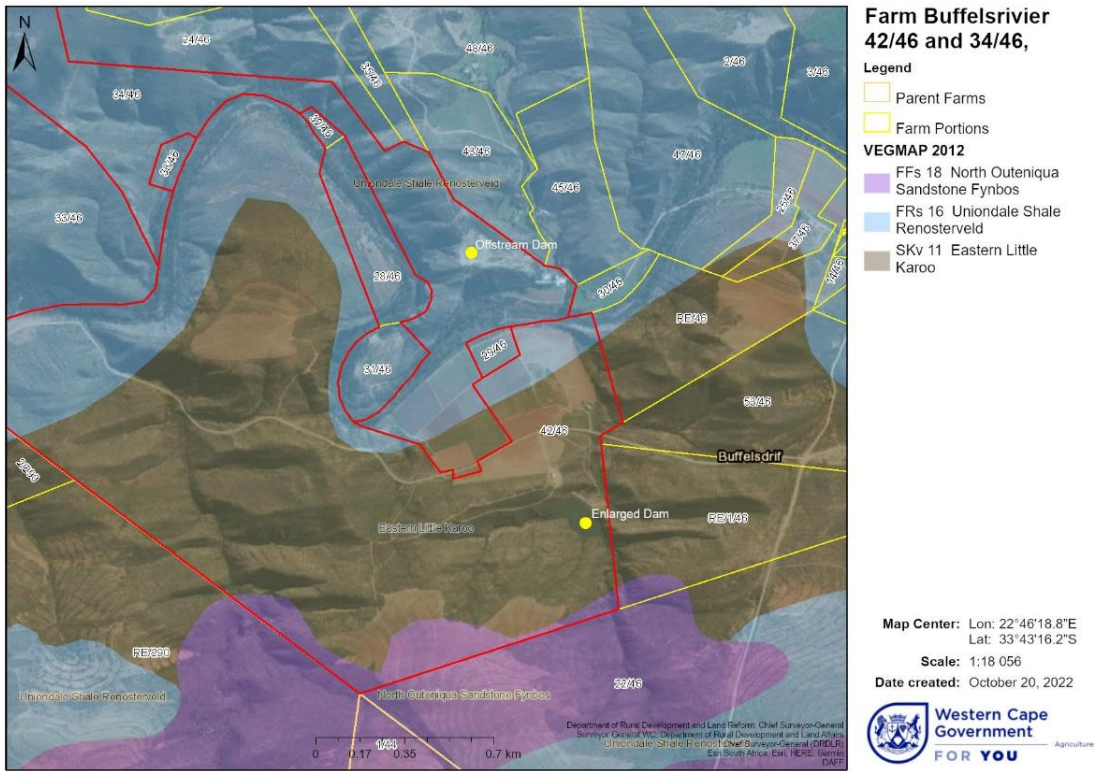


Figure 6: Vegetation Types (VegMap 2012).

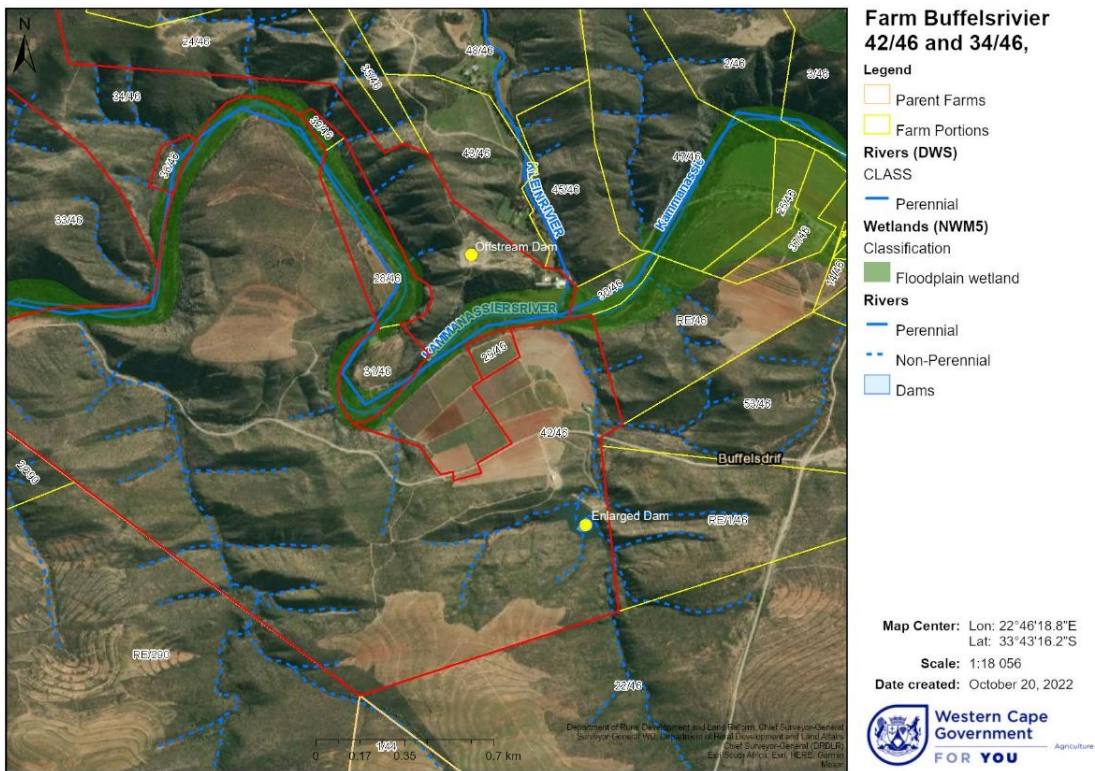


Figure 7: Rivers and Wetlands.

## 2.4. Key Issues

These are issues of importance and should be addressed during the Operational Phase as well as the future management of the property.

The relevant Key Issues identified in the Aquatic Assessment with regard to the Receiving Environment include:

- A dam's primary impacts are usually associated with **altered hydrology and flows**. In this situation, the same streams were impounded both pre- and post-enlargement of the Groot Dam. While the dam was primarily enlarged to store water from the Klein River allocation, when water levels draw down this creates more potential storage volume than was present pre-enlargement, which could lead to reduced flows reaching downstream. However, the lower dam's outlet has since been opened allowing water from its small catchment to permanently drain downstream, which did not happen historically. The enlarged dam is therefore believed to increase the impact in terms of abstraction and flow to a minor degree.
- The **riparian vegetation lost** by inundation post-enlargement measures approximately 0.5 ha in extent for Groot Dam and 0.84 ha for Kop Dam. This excludes vegetation loss due to the pre-enlargement dam. However, much of the catchment above the dam remains in a largely natural condition with only two small dams further upstream (on neighbouring properties). Riparian zones upstream of the dam consist primarily of indigenous vegetation and have little to no disturbance. Downstream of the existing dam towards the Kammanassie River, the riparian zone is minimal and agricultural fields have historically replaced areas of riparian vegetation. The **indigenous vegetation lost** by construction activities for Kop Dam measures approximately 0.5 ha in extent, of which a portion of this was the existing road.
- Downstream of the Groot Dam, the **impoundment** has blocked any flows from reaching the western watercourse. Rocks cleared from agricultural fields have been dumped into this watercourse, smothering some riparian and instream habitat.
- The **wetland** is a distinct hydrogeomorphic unit (HGM) but it must be noted that it is a very small section of the eastern tributary between the enlarged Groot Dam and existing dams. It measures approximately 0.1 ha in extent. On the day of the site visit, a shallow (approx. 2 cm deep) film of water was moving through the wetland, and abundant instream wetland vegetation was present. Species include *Phragmites australis*, *Typha capensis*, *Cyperus textilis*, *Cliffortia strobilifera* and at least two *Juncus* spp. The historical road was placed across the wetland > 80 years ago, and the existing dam has been at this location for several decades. These two barriers represent the main impacts affecting the Present Ecological Score of the wetland prior to the upper dam's enlargement. The main impact of the latter was an area of the wetland where sand from the spillway was dumped into the watercourse. This is having a very localised **impact on hydrology, geomorphology and vegetation**, but did not result in the PES downgrading from the dam's pre-enlargement state.

## 3. IMPACTS ASSOCIATED WITH THE OPERATION OF THE ACTIVITY

### 3.1. Assessment Criteria

The criteria are based on the EIA Regulations, published by the Department of Forestry, Fisheries and the Environment (April 1998) in terms of the Environmental Conservation Act No. 73 of 1989. These criteria include:

#### Nature of the impact

This is an estimation of the type of effect the construction, operation and maintenance of a dams would have on the affected environment. This description should include what is to be affected and how.

#### Extent of the impact

Describe whether the impact will be: local extending only as far as the development site area; or limited to the site and its immediate surroundings; or will have an impact on the region or will have an impact on a national scale or across international borders.

#### Duration of the impact

The specialist should indicate whether the lifespan of the impact would be short term (0-5 years), medium term (5-15 years), long term (16-30 years) or permanent.

#### Intensity

The specialist should establish whether the impact is destructive or benign and should be qualified as low, medium or high. The specialist study must attempt to quantify the magnitude of the impacts and outline the rationale used.

#### Probability of occurrence

The specialist should describe the probability of the impact actually occurring and should be described as improbable/unlikely (low likelihood), probable (distinct possibility), highly probable (most likely) or definite (impact will occur regardless of any prevention measures).

#### Reversibility

- Completely reversible – the impact can be reversed with the implementation of minor mitigation measures.
- Partly reversible – the impact is reversible but more intense mitigation measures are required
- Barely reversible – the impact is unlikely to be reversed even with intense mitigation measures
- Irreversible – the impact is irreversible, and no mitigation measures exist

#### Irreplaceable loss of resources

Describes the degree to which resources will be irreplaceably lost due to the proposed activity. It can be no loss of resources, marginal loss, significant loss or complete loss of resources.

#### Cumulative effect

An effect which in itself may not be significant but may become significant if added to other existing or potential impacts that may result from activities associated with the proposed development. The cumulative effect can be:

- Negligible – the impact would result in negligible to no cumulative effect
- Low – the impact would result in insignificant cumulative effects
- Medium – the impact would result in minor cumulative effects
- High – the impact would result in significant cumulative effects

#### Significance

Significance of impacts are determined through a synthesis of the assessment criteria and is described as –

- Low negative– where it would have negligible effects and would require little or no mitigation
- Low positive – the impact will have minor positive effects
- Medium negative – the impact will have moderate negative effects and will require moderate mitigation
- Medium positive – the impact will have moderate positive effects
- High negative – the impact will have significant effects and will require significant mitigation measures to achieve an accepted level of impact
- High positive – the impact will have significant positive effects
- Very high negative – the impact will have highly significant effects and are unlikely to be able to be mitigated adequately
- High positive – the impact will have highly significant positive effects.

<b>Impacts on the geographical and physical aspects:</b>	
Nature of impact:	Flow modification
Extent and duration of impact:	Site Related. Long Term
Probability of occurrence:	Definite
Degree to which the impact can be reversed:	Partly reversibly
Degree to which the impact may cause irreplaceable loss of resources:	Marginal Loss
Cumulative impact prior to mitigation:	Low- Medium Negative
Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High)	Low- Medium Negative
Degree to which the impact can be mitigated:	Medium
Proposed mitigation:	<ul style="list-style-type: none"> <li>• If deemed necessary, a EWR should be calculated.</li> <li>• Confirmation of the exact volume of water to be abstracted from the Klein River on an annual basis along with proof of the lawfulness of this abstraction must be provided.</li> </ul>
Cumulative impact post mitigation:	Low- Medium
Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	Low negative

<b>Impacts on the geographical and physical aspects:</b>	
Nature of impact:	Erosion of excavated slope/dam wall. Historically disturbed soil may be difficult to stabilise and protect from erosion.
Extent and duration of impact:	Limited
Probability of occurrence:	Low
Degree to which the impact can be reversed:	Medium
Degree to which the impact may cause irreplaceable loss of resources:	Low
Cumulative impact prior to mitigation:	N/A
Significance rating of impact prior to mitigation	Minor Negative



(Low, Medium, Medium-High, High, or Very-High)	
Degree to which the impact can be mitigated:	Medium
Proposed mitigation:	<ul style="list-style-type: none"> <li>• A combination of active and passive revegetation must take place in exposed areas: Active = planting recommended indigenous species, and Passive = not disturbing plants that naturally germinate.</li> <li>• Revegetation of the dam wall must be actively monitored to ensure a dense cover of &gt; 80% of grass. Gaps should be actively reseeded.</li> <li>• Alien vegetation must be actively removed before it becomes established when it can either be hand pulled or removed with a tree popper. NO heavy machinery can be used within previously disturbed area for the purpose of alien removal.</li> <li>• Revegetation must be monitored 6-monthly for 3 years by an Environmental Control Officer / Aquatic Ecologist.</li> </ul>
Cumulative impact post mitigation:	N/A
Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	Negligible - Negative

<b>Impact on biological aspects:</b>	
Nature of impact:	Loss of indigenous terrestrial vegetation or Kop Dam
Extent and duration of impact:	Limited to the site – Long term
Probability of occurrence:	Definite
Degree to which the impact can be reversed:	Low – Partly reversible
Degree to which the impact may cause irreplaceable loss of resources:	Marginal – Significant
Cumulative impact prior to mitigation:	Medium negative
Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High)	Medium negative
Degree to which the impact can be mitigated:	Medium
Proposed mitigation:	<p>Rehabilitate disturbed area; install berms and anti-erosion measures; side/drains / culverts for access tracks; no instream dam.</p> <p>Encourage regrowth of indigenous vegetation on disturbed and exposed areas around the dam.</p> <p>A guided alien vegetation removal plan should also be followed for the remaining alien vegetation on site.</p>
Cumulative impact post mitigation:	Low - Medium negative
Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	Medium negative

<b>Project phase</b>	<b>Operation</b>			
<b>Impact</b>	<b>Hydrological impacts to downstream watercourses</b>			
<b>Description of impact</b>	<b>Reduced base flow and flood flows reaching downstream watercourses</b>			
<b>Mitigatability</b>	Medium	Mitigation exists and will notably reduce significance of impacts		
<b>Potential mitigation</b>	<ul style="list-style-type: none"> <li>• Compile a rehabilitation plan to improve hydrological connectivity for the wetland area and dam downstream of the enlarged dam. This must include detailed methods to remove any infilling from the historical road (which is no longer needed), reduction / removal of the lower dam's embankment, and revegetation of disturbed areas. Existing 'vlei' habitat in the dam should be retained.</li> <li>• Ensure the Section 21a water use from the Klein River has been validated and verified and confirm the volumes abstractable from this source.</li> <li>• Seek advice from someone suitably qualified in dam design to determine whether the spillway is well located and adequate for the dam. One alternative may be to move the spillway to the other side of the dam wall, as there is also a watercourse at this point which is already channelled. Wetland vegetation below the existing spillway could be washed away and the channel incised should the dam spill over into it.</li> </ul>			
<b>Assessment</b>	<b>Without mitigation</b>		<b>With mitigation</b>	
<b>Nature</b>	Negative		Positive	
<b>Duration</b>	Permanent	Impact may be permanent, or in excess of 20 years	Permanent	Impact may be permanent, or in excess of 20 years
<b>Extent</b>	Limited	Limited to the site and its immediate surroundings	Limited	Limited to the site and its immediate surroundings
<b>Intensity</b>	Moderate	Natural and/ or social functions and/ or processes are moderately altered	Moderate	Natural and/ or social functions and/ or processes are moderately altered
<b>Probability</b>	Certain / definite	There are sound scientific reasons to expect that the impact will definitely occur	Likely	The impact may occur
<b>Confidence</b>	High	Substantive supportive data exists to verify the assessment	Medium	Determination is based on common sense and general knowledge
<b>Reversibility</b>	Medium	The affected environment will only recover from the impact with significant intervention	Medium	The affected environment will only recover from the impact with significant intervention
<b>Resource irreplaceability</b>	Medium	The resource is damaged irreparably but is represented elsewhere	Low	The resource is not damaged irreparably or is not scarce
<b>Significance</b>	<b>Moderate - negative</b>		<b>Minor - positive</b>	
<b>Comment on significance</b>	Mitigation measures will result in an improvement compared to the current and historical hydrology of the watercourse(s) downstream of the enlarged dam.			
<b>Cumulative impacts</b>	No applicable			

<b>Project phase</b>	<b>Operation</b>			
<b>Impact</b>	<b>Dam Maintenance</b>			
<b>Description of impact</b>	<b>Silt removal, flood repairs, dam wall vegetation control</b>			
<b>Mitigatability</b>	Medium	Mitigation exists and will notably reduce significance of impacts		
<b>Potential mitigation</b>	<ul style="list-style-type: none"> <li>• Heavy machinery for dredging the dam of periodic siltation may only gain access to the basin from the spillway 'road' and the dam wall. Earth-moving vehicles may not drive over anyshoreline vegetation to access the dam.</li> <li>• To minimise the impact of dredging on instream biota (plants and animals) dredging must be conducted in mid-winter to avoid the breeding season.</li> <li>• If aquatic vegetation has established over large areas, only 60% of vegetation that has established (reeds etc.) can be removed, working from the central basin outwards. <ul style="list-style-type: none"> <li>• Make an effort to rescue any obvious wildlife from disturbance such as frogs.</li> </ul> </li> <li>• Work should be conducted when the water level is as drawn down as low as possible to minimise increasing suspended sediments in the dam, as this can harm aquatic biota.</li> <li>• The dam's capacity must not be increased in volume, and records of the cubic metres of sediment removed must be maintained. <ul style="list-style-type: none"> <li>• No trees or large shrubs must be allowed to grow on the dam embankment (wall) as these can lead to piping erosion and dam wall failure. Existing trees must be removed carefully, roots and all. Guidance in this respect must be obtained from a person experienced in dam design and maintenance.</li> </ul> </li> <li>• In the event of flood damage, soil from any eroded areas must be replaced as before and revegetated with indigenous plants. Heavy vehicles may not enter the bed or banks of inflowing or outflowing watercourses unless in agreement through consultation with the BGCMA.</li> </ul>			
<b>Assessment</b>	<b>Without mitigation</b>		<b>With mitigation</b>	
<b>Nature</b>	Negative		Negative	
<b>Duration</b>	Short term	Impact will last between 1 and 5 years	Brief	Impact will not last longer than 1 year
<b>Extent</b>	Limited	Limited to the site and its immediate surroundings	Very limited	Limited to specific isolated parts of the site
<b>Intensity</b>	Moderate	Natural and/ or social functions and/ or processes are moderately altered	Low	Natural and/ or social functions and/ or processes are somewhat altered
<b>Probability</b>	Probable	The impact has occurred here or elsewhere and could therefore occur	Rare / improbable	Conceivable, but only in extreme circumstances, and/or might occur for this project although this has
<b>Confidence</b>	Medium	Determination is based on common sense and general knowledge	Medium	Determination is based on common sense and general knowledge
<b>Reversibility</b>	Medium	The affected environment will only recover from the impact with significant intervention	Medium	The affected environment will only recover from the impact with significant intervention
<b>Resource irreplaceability</b>	Medium	The resource is damaged irreparably but is represented elsewhere	Medium	The resource is damaged irreparably but is represented elsewhere
<b>Significance</b>	<b>Minor - negative</b>		<b>Negligible - negative</b>	
<b>Comment on significance</b>				
<b>Cumulative impacts</b>	Not applicable			

## 4. SPECIALIST RECOMMENDATIONS/MANAGEMENT ACTIONS

### 4.1. Aquatic Specialist Assessment

In conclusion, the network of affected watercourses was already impacted through impoundment by two dams. Enlargement of the upstream dam has resulted in a decrease in the PES of the system by one level due to loss of riparian and aquatic habitat. The increased volume of the enlarged dam is much greater than the sum of storage in the two existing dams. However, it is understood that the intention of the enlarged dam was to store an allocation of water from the Klein River, and not to store additional surface runoff from the catchment. The landowner effectively decommissioned storage in the downstream dam letting most of the water run out of the dam creating the opportunity to rehabilitate one previously impounded reach in the stream network.

It is recommended that the enlarged dam be retained with the following provisions:

- A comprehensive rehabilitation plan for the downstream wetland and decommissioned dam must be compiled and fully implemented.
- Confirmation of the exact volume of water to be abstracted from the Klein River on an annual basis along with proof of the lawfulness of this abstraction must be provided.
- All water abstraction points must be metered to ensure over-abstraction doesn't occur.
- An assessment of the dam wall and spillway by a suitable professional must be undertaken to ensure the dam poses no risk to the receiving wetland.
- Aquatic habitat that has established vlei-like conditions in standing water in the downstream dam should be maintained with a trickle-flow of water released from the dam provided this is available. This is achievable using a siphon system with a valve to open / close the pipe

### 4.2. Water Use Authorisation Report for Portion 42/46

This WUL serves as motivation to enlarge the Groot Dam to a capacity of 49 861 m<sup>3</sup>. The water to fill the dam can be regarded as ELU and it will be taken from the Klein Rivier according to a historic share agreement.

The Groot Dam can be regarded as an in-stream dam and Dr. Jackie Dabrowski from Confluent Environmental (Pty) Ltd was appointed to perform a Freshwater Specialist Study.

The development of the property will realise the following benefits:

- The property is in a re-development phase where a more secure water source will be required. The applicant has transformed the historic grazing areas into permanent fruit crops and summer vegetables cultivation. The storing of water in the Groot Dam will increase the water security for the sustainable development of Portion 42 of farm Buffels Rivier 46, George.
- The storing of water in the Groot Dam is critical to the successful development of the property that includes the cultivation of permanent fruit crops. The storage dam will increase the water surety which will provide a buffer on the water availability from the Klein Rivier. Water is not always available during summer for the irrigation of the agriculture crops.
- The taking of water from the Klein Rivier can be regarded as ELU. The water from the Klein River is taking 2.2km away from the Groot Dam and the dam can be filled with gravity that save on electricity.
- The development will ensure that water will be used beneficially and effectively. The water surety will increase production in the cultivation of crops and it will contribute to the Gross Domestic Product of the country.

### 4.3. Water Use Authorisation Report for Portion 34/46

This WUL serves as motivation to enlarge the Kop Dam to a capacity of 20 145 m<sup>3</sup>. The water to fill the dam can be regarded as ELU and it will be taken from the Kamannassie Rivier.

The Kop Dam can be regarded as an off-channel dam and Dr. Jackie Dabrowski from Confluent Environmental (Pty) Ltd has confirmed that no freshwater impacts will be experienced during the construction and operation of the Kop Dam.

The development of the property will realise the following benefits:

- The existing irrigation areas were in the recent year planted with permanent crops that required a more secure water source during certain growing seasons.
- The capacity of the Kop Dam is within the allowable 50 000m<sup>3</sup> that was published during the promulgation of the Olifants River (Oudtshoorn) GWCA whereby each property that falls within the GWCA are allowed storage credits of 50 000m<sup>3</sup>.
- The storing of water in the Kop Dam is critical to the successful fruit orchard development on Portion 34 of farm Buffels Rivier 46, George. The storage will only provide a buffer volume of 20 145m<sup>3</sup> for when no water is available in the Kamannassie River during high summer times.
- The taking of water of 108 000m<sup>3</sup>/a can be regarded as ELU and it will not have a further negative effect on the resource or on any person's water use.

## 5. LEGISLATIVE REQUIREMENTS

### 5.1 Signing of the EMPr

The acknowledgement form at the back of the approved EMPr is to be signed by the holder of the Environmental Authorisation (the Applicant), the Site Manager and the ECO; acknowledging that all parties are familiar with the requirements of the EMPr. All employees, especially the machine and equipment operators, are to be made aware of the conditions as contained in the EMPr as well as the contractual conditions relating to the environment as contained in the contract document.

### 5.2. Legislation

Of importance are all national, provincial and municipal by-laws and regulations. Statutes are amended periodically and it is the Applicant's responsibility to identify legislation relevant to the proposed activity.

Title of legislation, policy or guideline:	Administering authority:	Date:
Constitution of the Republic of South Africa. (Act 108 of 1996)	All State and Provincial Departments as well as Local Authorities that have been identified as relevant Competent Authorities.	Relevant Consideration
Environmental Conservation Act (Act 73 of 1989)	Department of Economic Development, Environmental Affairs & Tourism	Relevant Consideration
National Environmental Management Act (Act 107 of 1998)	Department of Economic Development, Environmental Affairs & Tourism	Authorization

National Environmental Management: Biodiversity Act (Act 10 of 2004)	Department of Economic Development, Environmental Affairs & Tourism	Relevant Consideration
National Environmental Management: Integrated Coastal Management Act (Act 24 of 2008)	Department of Forestry, Fisheries, and the Environment (DFFE), Branch Oceans & Coasts (O&C)/ Department of Economic Development, Environmental Affairs & Tourism	Comment/ Relevant Consideration
National Environmental Management: Protected Areas Act (Act 57 of 2003)	Department of Economic Development, Environmental Affairs & Tourism	Relevant Consideration
National Water Act (Act 36 of 1998)	Department of Water and Sanitation	License
Water Services Act (Act 108 of 1997)	Department of Water and Sanitation	Relevant Consideration
Sea Shore Act (Act 21 Of 1935)	Department of Forestry, Fisheries, and the Environment (DFFE), Branch Oceans & Coasts (O&C)/ Department of Economic Development, Environmental Affairs & Tourism	Relevant Consideration
Conservation Of Agricultural Resources Act (Act 43 of 1983)	Department of Agriculture, Forestry and Fisheries	Relevant Consideration
National Heritage Resources Act (Act 25 of 1999)	Eastern Cape Provincial Heritage Resources Authority	Comment/ Relevant Consideration

### 5.3. Project Responsibilities

Responsibility for the implementation of the EMPr lies with the Applicant who must retain the services of a suitably experienced Environmental Control Officer (ECO) who will monitor the operational processes and activities periodically.

The ECO's responsibilities must include, *inter alia*:

- Secure the protection and rehabilitation of the environment.
- Guide, advise and consult the relevant authority on environmental issues during operation/rehabilitation/decommissioning.
- Guide, advise and consult any sub-contractors, suppliers etc. who will be involved in this project.
- Revise the EMPr as required and inform the relevant parties of the changes.
- Ensure that the EMPr has been accepted and understood as a contractually binding document on all parties involved with this project.
- Ensure staff operating equipment are adequately trained, certified and sensitised to any potential hazards associated with their tasks.
- Educate staff as to the need to refrain from indiscriminate waste disposal and/or pollution of local soil and water resources, ensure that they (the staff) have received the necessary safety training, and are aware of the importance of a "clean-site policy".
- The management guidelines contained in this document must form part of the contractual agreements between the Applicant, Site Manager and the ECO.

## 6. REPORTING PROCEDURES

### 6.1. Documentation

The following documentation must be kept on site in order to record compliance with the EMPr:

An Environmental File which includes:

- Copy of the EMPr;
- Copy of the EA;
- Copy of all other licences/permits;
- Environmental Method Statements;
- Non-conformance Reports;
- Environmental register, which shall include:
  - Communications Register – including records of complaints, minutes and attendance registers of all environmental meetings;
  - Monitoring Results – including environmental monitoring reports, register of audits, non-conformance reports; and
  - Incident book – including copies of notification of Emergencies and Incidents, this must be accompanied by a photographic record.
- Waste Documentation such as, but not necessarily limited to: Waste Manifest Documents;
- Material Safety Data Sheets (MSDSs) for any hazardous substances; and
- Written Corrective Action Instructions.

### 6.2. Environmental Register

The Applicant will put in place an Environmental Register and will ensure that the following information is recorded for all complaints / incidents:

- Nature of complaint / incident.
- Causes of complaint / incident.
- Party/parties responsible for causing complaint / incident.
- Immediate actions undertaken to stop / reduce / contain the causes of the complaint / incident.
- Additional corrective or remedial action taken and/or to be taken to address and to prevent reoccurrence of the complaint / incident.
- Timeframes and the parties responsible for the implementation of the corrective or remedial actions.
- Procedures to be undertaken and/or penalties to be applied if corrective or remedial actions are not implemented.
- Copies of all correspondence received regarding complaints/incidents.

### 6.3. Non-Conformance Report

A Non-Conformance Report (NCR) will be issued to the Applicant as a final step towards rectifying a failure in complying with a requirement of the EMPr. This will be issued by the ECO to the Applicant in writing. Preceding the issuing of a NCR, the Applicant must be given an opportunity to rectify the issue.

Should the ECO assess an incident or issue and find it to be significant (e.g. non-repairable damage to the environment), it will be reported to the relevant authorities and immediately escalated to the level of a NCR. The following information should be recorded in the NCR:

- Details of non-conformance;
- Any plant or equipment involved;
- Any chemicals or hazardous substances involved;
- Work procedures not followed;
- Any other physical aspects;
- Nature of the risk;
- Actions agreed to by all parties following consultation to adequately address the non-conformance in terms of specific control measures and should take the hierarchy of controls into account;
- Agreed timeframe by which the actions documented in the NCR must be carried out; and
- ECO should verify that the agreed actions have taken place by the agreed completion date, when completed satisfactorily; the ECO and Applicant should sign the Close-Out portion of the Non-Conformance Form and file it with the contract documentation.

## 6.4. Emergency Response

The Applicants environmental emergency procedures must ensure appropriate responses to unexpected / accidental actions / incidents that could cause environmental impacts.

The Environmental Emergency Response Plan is separate to the Health and Safety Plan as it is aimed at responding specifically to environmental incidents and must ensure and include the following:

- Employees shall be adequately trained in terms of incidents and emergency situations;
- Details of the organisation (i.e. manpower) and responsibilities, accountability and liability of personnel;
- A list of key personnel and contact numbers;
- Details of emergency services (e.g. the fire department / on-site fire detail, spill clean-up services) shall be listed;
- Internal and external communication plans, including prescribed reporting procedures;
- Actions to be taken in the event of different types of emergencies;
- Incident recording, progress reporting and remediation measures to be implemented; and
- Information on any hazardous materials, including the potential impact associated with each, and measures to be taken in the event of accidental release.

## 7. COMPLIANCE WITH THE EMPr

### 7.1 Monitoring and Compliance

The monitoring and compliance of the development should take place as follows:

- The ECO has the authority to instruct the Applicant to cease a particular operation causing or liable to cause significant environmental damage, and issue fines or penalties for non-compliance of the Environmental Management Programme/ EMPr.
- An Environmental Control Officer (ECO) must audit the site and compile an audit report on a monthly basis until rehabilitation is successful.



- The holder of the environmental authorisation (the Applicant) is responsible to ensure that an environmental audit report is submitted to the Department of Environmental Affairs and Development Planning (DEA&DP) as per the timeframes stipulated in the Environmental Authorisation (EA).

## 7.2 Auditing Process

The terms of reference for the audits must comprise the following:

- Develop a checklist against which the criteria can be referenced during the audit.
- During the audit process, key individuals involved with the management of the project are to be given the opportunity to comment on issues being audited and will be invited to accompany the auditor during the site inspection.
- Compile an audit report on the implementation of the EMPr and compliance to the Environmental Authorisation and submit this report to the competent authority (DEA&DP).

Compliance ratings against which the listed criteria are assessed are as follows:

Symbol	Rating	Interpretation
Y	Yes	Evidence of compliance
P	Partial	Evidence of partial compliance
N	No	Evidence of non-compliance
NR	Not Relevant	The condition or commitment is not relevant at this stage of the development or it is inappropriate
NA	Not Audited	Not audited

## 7.3 Non-Compliance

### Definition

The non-compliance is defined as, and will be issued for:

- Any deviation by the Applicant from the environmental conditions and requirements as set out in the EA and EMPr, or;
- Any contravention by the Applicant of environmental legislation, or;
- Any unforeseen environmental impact resulting from direct or indirect actions or activities on site that would be considered as a significant impact. Significance will be determined by the Environmental Control Officer (ECO) but will be informed by geographic extent, duration, lasting effects of the impact and extent of remediation to the impact.

### Types of non-compliances issued

Two types of non-compliances may be issued:

#### A. Stop Works Non-Compliance

Stop Works Non-Compliance will require that all works as described in the non-compliance will stop immediately and may only continue on a formal written permission from the ECO.

Stop Works Non-Compliance will be issued under the following conditions:

- Total disregard by the Applicant to the environmental conditions and requirements listed in the EA and EMPr;

- An activity that if left unattended will escalate the degree, severity or extent of the environmental impact.

## B. General Non-Compliance

A general non-compliance will allow work and activity by the receiving party to continue while the corrective action takes place.

## 7.4 Issuing a Non-Compliance

Non-compliance may be issued to:

- The Applicant.
- Any representative of the Applicant.

## 7.5 Process of Issuing Non-Compliance

The appointed Environmental Control Officer (ECO) may issue a formal non-compliance to the Applicant. A copy of the non-compliance issued will be placed in the EMPr file. The Applicant will be responsible for returning a formally signed off corrective action (as per template) to the ECO to be placed in the EMPr file. The ECO will be required to sign-off on the corrective action, indicating that it has been completed within the timeframes and to the satisfaction of the ECO.

## 7.6 Failure to complete corrective actions

In the event that the Applicant fails or refuses to complete the corrective action, either at all or within the allocated timeframe, the ECO shall,

- Inform DEA&DP in writing that a condition of approval for the project is not being met.

The DEA&DP office is responsible for resolving the impasse with the Applicant.

The Applicant is deemed not to have complied with the EA and EMPr if:

- Within the boundaries of the site and site extensions there is evidence of contravention of clauses;
- Environmental damage occurs due to negligence; inappropriate actions taken by the Applicant or any of his staff.

On receiving a notice of non-compliance the Applicant is required to swiftly address the issue/s taking all corrective actions required to rectify the situation. Penalties will be applied for non-compliant situations. Penalties/fines are advocated to ensure corrective measures are successfully undertaken and the necessary standard of rehabilitation is achieved.

The penalty associated with a chemical spill is not a set amount but will depend on the nature and extent of the spill; the cost of any soil and /or groundwater monitoring and any soil and /or groundwater remediation required by authorities will be to the Applicant's account.

The imposition of such a penalties / fines shall not preclude the relevant competent authority from applying an additional penalty in accordance with statutory powers.

Failure to redress the cause shall be reported to the relevant authority for them to deal with the transgression as deemed fit.

## 7.7 Unlawful Activity/ies

NEMA and its Regulations entitle environmental authorities to administer a fine not exceeding R 5 million or 10 years imprisonment and/or a fine and imprisonment for a person guilty of an unlawful activity. The Act makes allowance for the rectification of unlawful activity and may charge up to R1 million administration fees over and above the remediation costs.

NEMA makes provision for damages to be awarded by the courts where loss or damage has occurred as a result of a contravention of other environmental statutes. Importantly, NEMA provides for the liability of conviction of employees, managers, agents and directors for any offences resulting from the failure to take all the reasonable steps that were necessary under the circumstances to prevent the commission of an offence.

## 8. AMENDMENTS TO THE EMPr

This EMPr outlines the environmental practices and mitigation measures to be adhered to during the operational phase, rehabilitation, and decommissioning phase in order to curtail and/or minimise potential negative impacts and promote sound environmental practises.

Any major issues not covered in the EMPr as submitted, will be addressed as an addendum to this EMPr, and submitted for approval. The EMPr is a living document and is subject to change from time to time in consultation with the DEA&DP. Any amendments to the EMPr will require approval from the DEA&DP.

## 9. ENFORCING THE EMPr

The holder of the Environmental Authorisation (EA) has a responsibility to ensure that all those people involved in the project are aware of and familiar with the environmental requirements for the project (this includes casual labour, etc.). The EA and EMPr shall be part of the terms of reference for all stakeholders.

All senior and supervisory staff members shall familiarise themselves with the full contents of the EA and EMPr. They shall know and understand the specifications of the EA and EMPr and shall be able to assist other staff members in matters relating to the EA and EMPr.

**TABLE OF RESPONSIBLE PARTIES BELOW:**

<b>Responsibility</b>	<b>Name of Responsible Party</b>
<b>Applicant</b>	<b>Jakobus Christo Janse van Rensburg</b>
<b>Environmental Control Officer/ ECO</b>	<b>(To be appointed)</b>
<b>Site Manager</b>	<b>(To be appointed)</b>

## 10. ENVIRONMENTAL MANAGEMENT PROGRAMME

### 10.1 OPERATIONAL PHASE

Activity	Management / Mitigation	Responsibility	Frequency / Timing
<b>Authorisations, Licences and Permits</b>	<b>Environmental Authorisations</b>		
	All necessary authorisations, permits and licences must be obtained by the Applicant. This includes permits for the removal of protected plants.	Applicant	Once-off
<b>Appointment of Environmental Control Officer</b>	<b>Appointment of Environmental Control Officer</b>		
	An Independent ECO must be appointed at the Applicant's cost to monitor the implementation of the EMPr.	Applicant & ECO	Once-off
	Fourteen (14) days written notice must be given to the Department that the activity will commence. Commencement for the purposes of this condition includes site preparation. The notice must include a date on which it is anticipated that the activity will commence which includes site preparation and demolition.		
	The nomination of the ECO must be given to DEA&DP, in writing fourteen (14) days prior to commencement of authorised activities. The notification must include contact details for the ECO and details pertaining to the ECO's relevant experience.		
Should the ECO for the development change at any time, this must be communicated, in writing, to DEA&DP, within fourteen (14) days of appointing the new ECO. The notification must include contact details for the ECO, details pertaining to the ECO's relevant experience and reasons for the change in ECO.	As required		
<b>Notifying Relevant I&amp;APs</b>	<b>Notice of Environmental Authorisation (EA)</b>		
	A written notice must be given to all relevant I&APs notifying them of the EA. The notice must include a date on which the EA was received and the reference number for the EA. Commencement of authorised activities may not begin until 21 days after the notification, provided no appeals have been lodged against the EA.	Applicant	Prior to commencement
<b>Education of Site Staff on General and Environmental Conduct</b>	<b>Environmental Awareness and Training</b>		
	Contractor staff must be adequately educated by the ECO as to the provisions included in the EMPr, and in terms of general environmentally-friendly practice.	ECO	Once-off and as required

Activity	Management / Mitigation	Responsibility	Frequency / Timing
<p>A general regard for the social and ecological wellbeing of the site and adjacent areas is expected of the site staff.</p>	<p>The ECO must ensure that all staff, and if applicable, Contractors / Sub-contractors / Suppliers / Service Providers are trained on the environmental, occupational safety and/or legal responsibilities expected from them.</p> <p>The training must take into account language and literacy requirements as well as measures to determine the effectiveness of the training. Proof of training must be attached to the ECO's audit reports.</p>		
	<p>Consideration of the implications of the EA and EMPr must form part of the formal site induction for all contractors, sub-contractors and casual labourers, preferably in their native language.</p> <p>The induction training will, as a minimum, include the following:</p> <ul style="list-style-type: none"> <li>➤ The importance of conformance with all environmental policies;</li> <li>➤ The environmental impacts, actual or potential, of their work activities;</li> <li>➤ The environmental benefits of improved personal performance;</li> <li>➤ Their roles and responsibilities in achieving conformance with the environmental policy and procedures and with the requirement of the Consultant's environmental management systems, including emergency preparedness and response requirements; and</li> <li>➤ The mitigation measures required to be implemented when carrying out their work activities.</li> </ul>		
	<p>All contractors, sub-contractors and casual labourers must acknowledge their understanding of the EMPr and environmental responsibilities by signing an induction attendance record.</p>	ECO	Once-off
	<p>Staff, operating equipment, shall be adequately trained and sensitised to any potential hazards associated with their tasks.</p>	Applicant	During staff induction, followed by on-going monitoring
	<p>Translators are to be used where necessary during staff training.</p>	ECO	
	<p>The ECO must be on hand to explain more difficult / technical issues and to answer questions which may be raised.</p>	ECO	
	<p>Staff must be made aware that they are not to make excessive noise e.g. shouting, hooting.</p>	ECO & Applicant	
	<p>All employees must undergo the necessary safety training and wear the necessary protective clothing at all times.</p>		
<p>No alcohol / drugs to be present on site; no vehicles or machinery are to be operated whilst under the influence of alcohol or drugs.</p>			

Activity	Management / Mitigation	Responsibility	Frequency / Timing
	No firearms allowed on site or in vehicles transporting staff to / from the site (unless used by security personnel).		
	No unsocial behaviour will be permitted.		
	Bringing pets onto site is forbidden.		
	Staff must make use of facilities provided for them, as opposed to ad-hoc alternatives (e.g. fires for cooking, the use of surrounding bush as a toilet facility is strictly forbidden).		
	No fires to be permitted on site.		
	Trespassing on private / commercial properties adjoining the site is forbidden.		
	No worker may be forced to do work that is potentially dangerous or for what he / she is not so trained		
	The staff conduct rules are described in a separate table of rules in the EMPr. This is aimed at providing staff with the basic information regarding worker conduct on site.		
<b>Site Management</b>	<b>Access</b>		
	No vehicles may drive onto the adjacent properties and any other no-go areas.	Site Manager	On-going
	<b>Site Management</b>		
	The Contractor must restrict all activities, materials, equipment, and personnel within the area specified or restrict activities to areas that are necessary to undertake the work.	Site Manager	On-going
Adequate drainage and erosion protection must be provided around the site and where necessary.			
Access points and other cleared surfaces must be dampened whenever necessary and especially in dry and windy conditions to avoid excessive dust. Alternatively, a binding product such as Dustex (supplied by Patch Industrial Supplies) could be used.			
<b>Sewage and Sanitation</b>	<b>Ablutions</b>		
	Toilets must be no closer than 32m from any watercourse. Such facilities, which shall comply with local authority regulations, shall be maintained in a clean and hygienic condition. Their use shall be strictly enforced. They must be positioned in an appropriate place, also taking into consideration, gradient of the land.	Site Manager	Immediately & on-going
	The Site Manager must ensure that toilets are cleaned weekly or more regularly, if found to be necessary.		On-going
	Unauthorised spilling of waste from the septic tank into the environment and burying of waste are strictly prohibited.		
Ablution facilities must not cause any pollution to any water resource and it must not be a health hazard to the general public.			

Activity	Management / Mitigation	Responsibility	Frequency / Timing
<b>Social Impacts</b>	<b>Communication Between Site Manager, Site Staff and I&amp;APs</b>		
	Should the staff be approached by members of the public or other stakeholders, they must assist them in locating the Site Manager, or provide a number on which they may contact the Applicant/ Site Manager.	Site Manager	On-going
	The conduct of the staff when dealing with the public or stakeholders shall be in a manner that is polite and courteous at all times.		
Drivers of heavy-duty vehicles must exercise care when travelling to and from the site – and adhere to all legally enforceable requirements.			
<b>Equipment lay-down and storage</b>	<b>Storage Areas</b>		
	Choice of location for equipment lay-down and storage areas must take into account prevailing winds, distances to "No Go" areas, general on-site topography and water erosion potential of the soil. Impervious surfaces, bunded areas or drip trays must be provided where necessary.	Site Manager	On-going
	Material stockpiles must be protected against rain and flooding.		
Equipment lay-down and storage areas must be designated, demarcated and signed.			
<b>Conservation of the Natural Environment</b>	<b>Hydrological impacts to downstream watercourses</b>		
	Compile a rehabilitation plan to improve hydrological connectivity for the wetland area and dam downstream of the enlarged dam. This must include detailed methods to remove any infilling from the historical road (which is no longer needed), reduction / removal of the lower dam's embankment, and revegetation of disturbed areas. Existing 'vlei' habitat in the dam should be retained.	Site Manager	Immediately
	Ensure the Section 21a water use from the Klein River has been validated and verified and confirm the volumes abstractable from this source.		
	Seek advice from someone suitably qualified in dam design to determine whether the spillway is well located and adequate for the dam. One alternative may be to move the spillway to the other side of the dam wall, as there is also a watercourse at this point which is already channelled. Wetland vegetation below the existing spillway could be washed away and the channel incised should the dam spill over into it.		
	<b>Erosion and Stormwater Control</b>		
Soil disturbance during the removal of alien invasive plants must be minimised as much as possible.	Site Manager	Throughout the duration of the project	
Storm water control must be undertaken to prevent soil loss and erosion impacts from the site.		Immediately	

Activity	Management / Mitigation	Responsibility	Frequency / Timing	
	Erosion prevention and control measures must be implemented. This may be by the use of mulch bags or silt fences (Section 12).		On-going	
	Provision shall be made for storm water management measures that will ensure effective run-off control and prevent erosion at run-off points.			
	Continuous monitoring for evidence of erosion must be undertaken around the site.			
	Earth, stone or rubble is to be properly disposed of so as not to obstruct natural water pathways over the site.			
	<b>Fauna and Flora</b>			
	Areas which are identified by the Environmental Control Officer (ECO) as being ecologically sensitive on or adjacent to the site are to be suitably demarcated to prevent damage by activities associated with operation / rehabilitation / decommissioning of the dams. These areas are to be recognised as "no-go" areas.	ECO & Site Manager	Immediately	
No natural vegetation may be cleared without prior permission from the ECO and if applicable from any relevant authority. Indigenous vegetation that is removed is to be replanted either back to the point from which it was taken or must be replaced by new relevant indigenous vegetation.	On-going			
All alien invasive plant species must be continuously removed around the site. The best way to do this is to remove the plants from the roots by hand and leave the plants in the sun to dry out and die before disposal. Please refer to the Alien Plant Control Programme.	ECO & Site Manager	Immediate and On-going		
Disturbance to birds, animals and reptiles and their habitats must be minimized wherever possible.	Site Manager			
<b>Waste Management</b>	<b>On-Site Waste Management</b>			
	The excavation and use of rubbish pits is forbidden.	Site Manager	On-going	
	Burning of waste is forbidden. <i>A possible exception to this may be that the alien invasive vegetation which is removed from the site should be burned to prevent the spread of the plants. The transportation of Alien Invasive Plants is strictly forbidden in terms of the Conservation of Agricultural Resources Act (CARA), especially if in seed; unless stored in a completely sealed container.</i>		On-going and monitored weekly	
	Littering on the site is forbidden and the site shall be cleared of litter at the end of each working day.		On-going monitoring	
	An adequate number of general waste bins must be arranged around the site to collect all domestic refuse, and to minimise littering.			
Solid waste must be managed and separated into recyclable and non-recyclable and disposed of accordingly.				



Activity	Management / Mitigation	Responsibility	Frequency / Timing
	<p>Waste must be removed from the site on a weekly basis.</p> <p>All waste generated during operational phase is to be disposed of at a facility registered in terms of section 20(b) of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008).</p>		
<b>Handling of Hazardous Materials (if necessary)</b>	<b>Hazardous Materials</b>		
	<p>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 must additionally include information on ecological impacts and measures to minimize negative environmental impacts during accidental releases or escapes.</p>	Site Manager	On-going
	<p>Potential environmental pollutants must be stored within an impermeable bunded, roofed and sign posted area.</p>		
	<p>All empty contaminated containers must be stored within a hazardous bunded area until collection by a reputable hazardous waste collection company. Waybills must be presented to the ECO for review and filing purposes.</p>		
<p>No vehicles transporting hazardous materials to the site may be washed on or near site. They must return to the supplier of such material to be cleaned out.</p>			
<b>Cultural Environment</b>	<b>Archaeology and Artefacts</b>		
	<p>No structures older than sixty years or parts thereof are allowed to be demolished altered or extended without a permit from Heritage Western Cape.</p>	Site Manager	Immediate and On-going
	<p>If any archaeological sites/materials are exposed, mitigation regarding the finds must be conducted with the Heritage Western Cape regarding the destiny of the material.</p> <p>Examples of heritage resources are as follow:</p> <ul style="list-style-type: none"> <li>• Human remains</li> <li>• Coins/Gold/Silver</li> <li>• Fossils</li> <li>• Fossils shell middens/ marine shell heaps</li> <li>• Pottery/ceramics</li> </ul>		
	<p>If Heritage Western Cape agrees to the removal of the material, an archaeologist must apply for a permit to scientifically excavate/collect the material.</p>		
<p>All costs must be financed by the applicant. This may include: All monitoring and mitigation expenses regarding the excavations/collecting of material, travel, accommodation and subsistence, analysis of the material,</p>			

Activity	Management / Mitigation	Responsibility	Frequency / Timing
	radiocarbon date(s) of the site(s) and a one-off curation/storage fee payable to the Western Cape Repository for Archaeological material.		
<b>Safety and Security</b>	<b>Safety and Security On-Site</b>		
	Material stockpiles or stacks must be stable and well secured to avoid collapse and possible injury to site workers / local residents.	Site Manager	On-going
	Firefighting equipment must be present on site at all times. All equipment on site must be used in accordance with the Occupational Health and Safety Act regulations of South Africa (OHSA), Act No. 85 of 1993); staff must be trained in firefighting procedures.		
No unauthorised person may be permitted to enter the site without prior permission of the site manager.			
<b>Dam Maintenance</b>	<b>Silt removal, flood repairs, dam wall vegetation control</b>		
	Heavy machinery for dredging the dam of periodic siltation may only gain access to the basin from the spillway 'road' and the dam wall. Earth-moving vehicles may not drive over any shoreline vegetation to access the dam.	Site Manager & Contractor	On-going as required
	To minimise the impact of dredging on instream biota (plants and animals) dredging must be conducted in mid-winter to avoid the breeding season.		
	If aquatic vegetation has established over large areas, only 60% of vegetation that has established (reeds etc.) can be removed, working from the central basin outwards.		
	Make an effort to rescue any obvious wildlife from disturbance such as frogs.		
	Work should be conducted when the water level is as drawn down as low as possible to minimise increasing suspended sediments in the dam, as this can harm aquatic biota.		
	The dam's capacity must not be increased in volume, and records of the cubic metres of sediment removed must be maintained.		
	No trees or large shrubs must be allowed to grow on the dam embankment (wall) as these can lead to piping erosion and dam wall failure. Existing trees must be removed carefully, roots and all. Guidance in this respect must be obtained from a person experienced in dam design and maintenance.		
	In the event of flood damage, soil from any eroded areas must be replaced as before and revegetated with indigenous plants. Heavy vehicles may not enter the bed or banks of inflowing or outflowing watercourses unless in agreement through consultation with the BGCMA.		
<b>Alien Invasive Plants</b>	<b>Alien plant eradication</b>		
	All invasive alien plants should be completely cleared from the property, and where a tree or bush cover is desired, replaced with suitable indigenous species.	ECO & Site Manager	Immediate and On-going

Activity	Management / Mitigation	Responsibility	Frequency / Timing
	<p>An Alien Invasive Plant Control Plan must be implemented, as encroachment of alien vegetation may increase as a result of disturbances from operational activities such as maintenance of the dams.</p> <p>Any action taken to control and eradicate a listed invasive species must be executed with caution and in a manner that may cause the least possible harm to biodiversity and damage to the environment.</p> <p>The methods employed to control and eradicate a listed invasive species must also be directed at the offspring, propagating material and re-growth of such invasive species in order to prevent such species from producing offspring, forming seed, regenerating or re-establishing itself in any manner.</p>		
<b>Fire management</b>	<p>No burning of vegetation to be permitted, even as part of alien plant management.</p> <p>Ensure that no refuse waste is buried or burnt on the site or surrounds.</p> <p>Smoking must not be permitted in areas considered to be a fire hazard.</p> <p>Undeveloped areas must be managed so that they do not pose a fire risk.</p> <p>The Southern Cape Fire Protection Association should be consulted regarding firebreaks, and fire management for the property in case of wildfires. It is recommended that the estate become a member of the SCFPA.</p>	Site Manager	On-going

### 10.3. REHABILITATION AND MAINTENANCE

**\*All rehabilitation measures must be implemented with consultation with an Alien Invasive Plant Control Plan**

Activity	Management / Mitigation	Responsibility	Frequency / Timing
<b>Vegetation Rehabilitation</b>	<p><b>Vegetation</b></p> <p>All disturbed areas, or areas which have been disturbed for the purpose of the dams, are to be re-vegetated. This will aid in preventing erosion within the site. A 100% indigenous planting plan must be adhered to in terms of all planting carried out on the site. Consultation must be made with a Botanical Specialist for a site-specific vegetation list.</p> <p>Erosion prevention and control measures must be implemented. Organic mulch or sand bags must be used to contain all sediment and prevent erosion during rehabilitation.</p>	Applicant, Site Manager & ECO	On-going site maintenance

Activity	Management / Mitigation	Responsibility	Frequency / Timing
	All rehabilitated areas must be maintained through weekly inspections until a 100% success rate has been achieved.		
	Encroachment of invasive alien plants in this regard will need to be monitored on a regular basis to prevent re-infestation. This would need to be undertaken by the ECO or a designated specialist.		
<b>Land Rehabilitation</b>	<b>Disturbed Areas</b>		
	Rehabilitation must be executed in such a manner that surface runoff will not cause erosion of disturbed areas during and after rehabilitation.	Site Manager & Contractor	Project completion
	The surface of all disturbed areas must be left rough to facilitate binding of topsoil and vegetation.		
	Areas that are disturbed through operational/decommissioning/rehabilitation activities should be suitably rehabilitated without delay. Failure to do so will have a knock-on effect on biodiversity in the form of an increase in wind erosion, soil exposure and a loss of the soil micro-organisms that are essential for plant growth. Use complete cover of locally chipped woody material (for example Acacia cyclops stems and branches but not the seed pods).		
	<b>Disposal of excess soil and rocks</b>		
	Soil discarded into the wetland must be carefully removed and indigenous vegetation rehabilitated.	Site Manager & Contractor	Progressive rehabilitation
Rocks discarded in the drainage line below the dam must be carefully moved out of the drainage line and any bare soil must be revegetated with indigenous vegetation.			
The above work should be done by hand without the use of heavy machinery.			
<b>Stormwater Management</b>	<b>Stormwater</b>		
	Any negative stormwater effects, related to the operational phase, must be remediated.	Applicant & Site Manager	On-going site maintenance
On-going monitoring and assessing of stormwater drainage must occur on site during the operational phase of the proposed project.			

### 10.3. DECOMMISSIONING PHASE

Activity	Management / Mitigation	Responsibility	Frequency / Timing
<b>Earthworks</b>	<b>Removal of soil from the dam embankment</b>		
	Demarcate the area to be cleared and ensure all workers know this is the limit of disturbance and vehicle access.	Site Manager & Contractor	Throughout the duration of the project phase
	Construction vehicle parking and equipment stores must be located at least 100m from the demarcated area to prevent fuel and material spills from entering the watercourse.		
	Fence off the watercourse and wetland area downstream of the dam for the duration of decommissioning. These must be demarcated 'No-go Areas' for people and vehicles.		
	Draw down the water level of the dam if necessary to ensure earthworks are undertaken under dry conditions. Water can be released downstream using a siphon system, but the flow velocity existing the pipe must not cause erosion.		
	Replace and reshape disturbed soils to natural contours in the order in which they were removed. ie. rock layer followed by subsoils (usually yellowish colour). Topsoil must be placed over the subsoil, but the latter must not be compacted.		
	Topsoil must be at a depth greater than or equal to 50 cm to facilitate revegetation.		
	Attempt to reshape and slope the valley to the natural site contours, avoiding the creation of ditches and cuts which channel water flow and cause erosion.		
	Work must not be conducted during periods of rainfall to avoid further disturbance		
	Work must not be conducted during periods of rainfall to avoid further disturbance		
The depth of topsoil and final landform must be independently assessed by an Environmental Control Officer / Aquatic Ecologist using an auger prior to revegetation to ensure a uniform distribution of topsoil has been achieved.	Site Manager & ECO	After decommissioning phase	
<b>Restoration of the stream bed</b>	<b>Erosion, channel incision and sedimentation downstream</b>		
	Install 4 - 5 small (1 layer high) hay-bale check dams perpendicular to the water flow, equally spaced at intervals along the stream channel. The purpose is to slow and filter flows and encourage settling of sediment upstream of each check dam.	Site Manager & Contractor	Throughout the duration of the decommissioning / rehabilitation phase
Hay-bale check dams must be correctly installed wrapped in a biodegradable material such as hessian to hold them together. They should be 'dug in' to the stream bed and keyed into the banks.			

Activity	Management / Mitigation	Responsibility	Frequency / Timing
	Cover approximately 40% of the stream bed with cobbles and small rocks (Approx. 30 cm width) placed randomly along the length of the stream bed. Rocks removed from agricultural fields would be acceptable for this purpose but must be placed in a single layer, not as a pile.		
<b>Erosion control</b>	<b>Erosion of recently disturbed soil</b>		
	Lightly seed the slopes and stream bed with the grass <i>Cynodon dactylon</i> (kweek). Seed into topsoil and cover with a thin layer of mulch.	Applicant, Site Manager & ECO	Throughout the duration of the decommissioning / rehabilitation phase
	On slopes greater than 1:3, nail in overlapping soil saver matting to protect the soil.		
	On steep slopes silt fences must be installed perpendicular to the slopes and parallel to each other approximately 8 - 10 m apart (Methods provided Section 12).		
	Revegetated slopes must be actively monitored to ensure a dense cover of > 80% of grass. Gaps should be actively reseeded.		
	The indigenous seed bank may have been destroyed through inundation by dam water or lost through earth-moving. Passive establishment of indigenous plants must be monitored. If after one full growing season following decommissioning of the dam there is still < 50% cover with indigenous seedlings, active planting may be necessary (see plant list). This must be monitored and overseen by an Aquatic Ecologist.		
	Alien vegetation must be actively removed before it becomes established when it can either be hand-pulled or removed with a tree popper. NO heavy machinery can be used within the recovering watercourse or previously disturbed area for the purpose of alien plant removal.	Applicant	On-going monitoring
	Revegetation of the riparian area and previously excavated area must be monitored 6-monthly for 3 years by an Aquatic Ecologist		
Monitoring should also take place by the landowner following heavy rainfall to identify and proactively address erosion before it can progress too severely.		On-going	
Eroded areas of the steep banks must be refilled with topsoil, reseeded with grass, covered with a light mulch and protected with soil saver mats. Silt fencing must be used in problem areas to provide further protection against erosion.			

## 11. ALIEN PLANT CONTROL PROGRAMME

**Please consult a Botanical specialist before attempting to remove Alien Invasive Plants.**

### **Benefits of control**

- Elimination of spread of these species into non-affected areas.
- Improvement of water quality and quantity.
- Legal compliance: landowners are required to eradicate or control declared weed and alien invader plants in terms of the Conservation of Agricultural Resources Act 43 of 1983 and the National Environmental Management: Biodiversity Act 10 of 2004.
- Improvement of biodiversity in conservation areas. Fast growing invader plants suppress indigenous flora, with a resultant loss in overall biodiversity.
- Commercial reasons: alien vegetation can spread from conservation areas into production land resulting in greater weed control costs.

### **Important factors influencing the effectiveness of a control programme**

- Timely implementation of control operations is important for alien plants.
- Operations must be directed towards killing alien vegetation. This is best achieved by using an effective herbicide chosen by the ECO and applied by using the "cut-stump; frilling or ring barking methods. Under no circumstances may spraying with a "Rose" or multi-stream nozzle head be done.

### **Requirements for an effective alien vegetation control programme**

- Identify the problem: extent, location and species of problem plant.
- Divide the problem areas into manageable units, taking budget and resource constraints into account.
- Identify any sensitive ecosystems, rare or endangered plants etc. which may be affected by a control programme. Identify the original ecosystem applicable to the area.
- Make provision for a number of follow up operations. The initial clearing operation is only part of the total programme. Failure to follow up will result in a failure of the entire programme.

While the importance of removing or clearing of alien or exotic vegetation is recognised, there should be control over the way in which this takes place. Often what generally appears to be covered by alien vegetation, actually contains pockets of sensitive vegetation or protected species. It is for this reason that clearing of such areas must be undertaken by hand (*Guidelines for the Control and Management of Activities in Sensitive Coastal Areas, first edition, 1998*).

**It is important to note that all of the above must be performed with instruction by the ECO, as well as in the presence of an ECO at all times.**

### 11.1 Legislation

The National Environmental Management Act, No 107 of 1998, creates a duty of care towards the environment. Within the preface of this Act, it is stated thus:

*"Everyone has the right to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that prevent pollution and*

*ecological degradation; promote conservation; and secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development: the environment is a functional area of concurrent national and provincial legislative competence, and all spheres of government and all organs of state must co-operate with, consult and support one another."*

Any person or business found to be responsible for illegally introducing an invasive plant or species, and allowing it to spread, may be compelled, by this Act to desist with their actions and remove the source of invasion.

The Conservation of Agricultural Resources Act, No 43 Of 1983 (CARA) was passed to protect soil, water resources and vegetation. This included measures to manage and control weeds and invader vegetation species. The CARA regulations declare several species of "weeds" or "invader plants." These species have been divided into three categories:

### **Category 1a Listed Invasive Species:**

Category 1a Listed Invasive Species are those species listed as such by notice in terms of section 70(1)(a) of the National Environmental Management: Biodiversity Act/ NEMBA (Act 10 of 2004) as species which must be combatted and eradicated.

A person in control of a Category 1a Listed Invasive Species must-

- (a) comply with the provisions of section 73(2) of the NEMBA;
- (b) immediately take steps to combat or eradicate listed invasive species in compliance with sections 75(1), (2) and (3) of the NEMBA; and
- (c) allow an authorised official from the Department to enter onto land to monitor, assist with or implement the combatting or eradication of the listed invasive species.

If an Invasive Species Management Programme has been developed in terms of section 75(4) of the NEMBA, a person must combat or eradicate the listed invasive species in accordance with such programme.

### **Category 1b Listed Invasive Species:**

1) Category 1b Listed Invasive Species are those species listed as such by notice in terms of section 70(1)(a) of the NEMBA as species which must be controlled.

2) A person in control of a Category 1b Listed Invasive Species must-

- (a) control the listed invasive species in compliance with sections 75(1), (2) and (3) of the NEMBA.
- (b) must allow an authorised official from the Department to enter onto the land to monitor, assist with or implement the control of the listed invasive species, or compliance with the Invasive Species Management Programme contemplated in section 75(4) of NEMBA.



3) If an Invasive Species Management Programme has been developed in terms of section 75(4) of the NEMBA, a person must combat or eradicate the listed invasive species in accordance with such programme.

### **Category 2 Listed Invasive Species:**

1) Category 2 Listed Invasive Species are those species listed by notice in terms of section 70(1)(a) of the NEMBA as species which require a permit to carry out a restricted activity within an area specified in the Notice or an area specified in the permit, as the case may be.

2) Unless otherwise indicated in the Notice, no person may carry out a restricted activity in respect of a Category 2 Listed Invasive Species without a permit.

3) A landowner on whose land Category 2 Listed Invasive Species occurs or person in possession of a permit, must ensure that the specimens of the species do not spread outside of the land or the area specified in the Notice or permit.

4) Unless otherwise specified in the Notice, any species listed as Category 2 Listed Invasive Species that occurs outside the specified area contemplated in sub-regulation (1), must, for purposes of these regulations, be considered to be a Category 1b Listed Invasive Species and must be managed according to Regulation 3 above.

5) Notwithstanding the specific exemptions relating to existing plantations in respect of Listed Invasive Plant Species published in *Government Gazette* No. 37886, Notice 599 of 1 August 2014 (as amended), any person or organ of state must ensure that the specimens of such Listed Invasive Plant Species do not spread outside of the land over which they have control.

6) If an Invasive Species Management Programme has been developed in terms of section 75(4) of the NEMBA, a person must combat or eradicate the listed invasive species in accordance with such programme.

### **Category 3 Listed Invasive Species:**

1) Category 3 Listed Invasive Species are species that are listed by notice in terms of section 70(1)(a) of the NEMBA, as species which are subject to exemptions in terms of section 71(3) and prohibitions in terms of section 71A of the NEMBA, as specified in the Notice.

2) Any plant species identified as a Category 3 Listed Invasive Species that occurs in riparian areas, must, for the purposes of these regulations, be considered to be a Category 1b Listed Invasive Species and must be managed according to regulation 3 below.

3) If an Invasive Species Management Programme has been developed in terms of section 75(4) of the NEMBA, a person must combat or eradicate the listed invasive species in accordance with such programme.

Should any invasive plant species occur, other than those stated in The Act, the land user must control them by species-specific control methods. Caution should ALWAYS be taken when dealing with noxious chemicals, and care should be taken to cause the least amount of harm to the environment.

## 11.2 Ways to Eradicate Alien Vegetation

This alien eradication and control program comprises the following three steps:

### **Step 1**

The first step of the Alien Plant Eradication Programme will be to undertake an inception and educational meeting, where the people employed to undertake this activity are able to identify the correct species as aliens and the manner in which to remove and control them.

### **Step 2**

The second step will be to identify the Alien Invasive Species and start a process of removing the individuals that occur on the site. The removal of the alien species must be in a stepwise manner and be undertaken within a single area at a time. This will ensure that all individuals are removed at the same time to reduce re-infestations. Below are a number of methods that may be employed to undertake the activity of removing alien plant species. These methods are dependent on the size and nature of the plant that is to be removed.

#### **Mechanical Methods:**

##### ***Hand-pulling***

This method of removal is only really an option during the summer months and when the alien plant species that are requiring removal are very small, and their root system is not very well established. The only precautionary note here is that many alien plant species may look similar to indigenous species when they emerge, so the labour force must be extremely well versed in the individuals that will require removal.

##### ***Up-rooting***

This method is similar to hand-pulling but is undertaken on slightly older individuals of the target species. It only has one drawback; a relatively large area can be disturbed with the soils being altered and opening the area up to re-infestation.

##### ***Lasso & Winch***

This method is the upgraded version of the up-rooting, with the same principles applying, that is of trying to remove the entire plant with all the root system attached, to prevent re-growth. This can have a serious destabilizing effect on the receiving environment and should definitely not be undertaken on slopes or sandy soils.

##### ***Cutting / Slashing***

This method is not a suitable method for control and long term management if used as a stand-alone technique because many of the alien plant species will simply coppice or re-sprout during the summer periods. Many, if not most, alien plants species are annual species, and through their natural life strategy (r-selected) are able to withstand disturbance, even extreme disturbance as in this instance.

### **Ring-barking**

This involves the removal of bark in a 30 centimetre band. This technique is used to desiccate the plant through killing the phloem and xylem and thus preventing transpiration. Further it also facilitates pathogen infestation. It is very effective on large trees if undertaken correctly.

### **Strip-barking**

As with ring-barking, just at a larger scale.

### **Frilling / Girdling**

Girdling and frilling are methods of killing standing trees that may be done with or without an herbicide. Girdling involves cutting a groove or notch into the trunk of a tree to interrupt the flow of sap between the roots and crown of the tree. The groove must completely encircle the trunk and should penetrate into the wood to a depth of at least 1.5 centimetres on small trees, and 2.5 to 4 centimetres on larger trees. Girdling can be done with an axe, panga or chain saw. When done with an axe or panga, the girdle is made by striking from above and below along a line around the trunk so that a notch of wood and bark is removed. The width of the notch varies with the size of the tree. Effective girdles may be as narrow as 2.5 to 5 centimetres on small-diameter trees, and as wide as 15 to 20 centimetres on very large-diameter trees. When a chain saw is used to girdle, two horizontal cuts between 5 and 10 centimetres apart are usually made completely around the tree when no herbicide is used and one horizontal cut is made completely around the tree when herbicide is used.

Frilling is a variation of girdling in which a series of downward angled cuts are made completely around the tree, leaving the partially severed bark and wood anchored at the bottom. Frilling is done with an axe or panga.

By themselves, girdling and frilling are physical methods to deaden trees that require very little equipment and may be done without herbicides. Both techniques require considerable time to carry out, particularly with an axe or panga. The effectiveness of girdling and frilling depends on the tree species and on the size and completeness of the girdle or frill. To be effective, girdles and frills must completely encircle the tree. Because frills can heal-over more easily, girdling is usually more effective.

The effectiveness of both girdling and frilling can be increased by using herbicides. With frilling and girdling, water soluble forms of herbicides are most commonly used to get maximum movement of herbicide within the plant. When using water-soluble herbicides, the herbicide/water mixture is commonly applied by squirting it on the girdle or frill until the cut surface is wet. Hand-held, spray bottles, such as those available at local garden stores, are ideal for applying herbicide to the girdle. Again, note that a single, rather than double chain saw girdle is used when a water soluble herbicide is to be applied.

### **Chemical Methods**

The use of chemicals in controlling and removing of alien plant species should not be excluded as a possible option. Once the alien plant species are more manageable the use of chemicals should be reduced or excluded completely. The best option would be to pursue a combination of mechanical and chemical control in the early stages.

The only negative impact of the use of chemicals is that if used incorrectly may result in plant species being able to develop some form of resistance to the herbicide. If herbicides are used as a foliar spray, drift will cause non-target species to be impacted upon. The only method that should be undertaken is the cutting of the plants prior to the treatment of the remaining stems using a "stem painting" technique.

It is imperative that the herbicides used are dye treated or that the end-user add a dye to ensure that all stems that have been treated are easily identified. Note, the application of the chemical solution must follow directly after the cutting of the vegetation. Therefore, a small area should be selected and all cutting and stem painting be undertaken on that area prior to moving to the next area.

## **Environmental Safety**

In order to minimise the impact of the activities on the natural environment the following must be observed.

- ❖ Area contamination must be minimised by careful accurate application with a minimum amount of herbicide to achieve good control.
- ❖ All care must be taken to prevent contamination of any water bodies. This includes due care in storage, application, cleaning equipment and disposal of containers, product and spray mixtures.
- ❖ Equipment should be washed where there is no danger of contaminating water sources and washings carefully disposed of at a suitable site.
- ❖ To avoid damage to indigenous or other desirable vegetation product should be selected that will have the least effect on non-target vegetation.
- ❖ Coarse droplet nozzles should be fitted to avoid drift onto neighbouring vegetation, e.g. TG-1 or equivalent.
- ❖ The correct protective clothing is to be used in line with manufacturer's instructions and / or the Occupational Health & Safety Act, Act 85 of 1993 (and amendments) and,
- ❖ All MSDS sheets are to be made available on site along with a Medical First Aid Kit.

## **Disposal of Alien Vegetation**

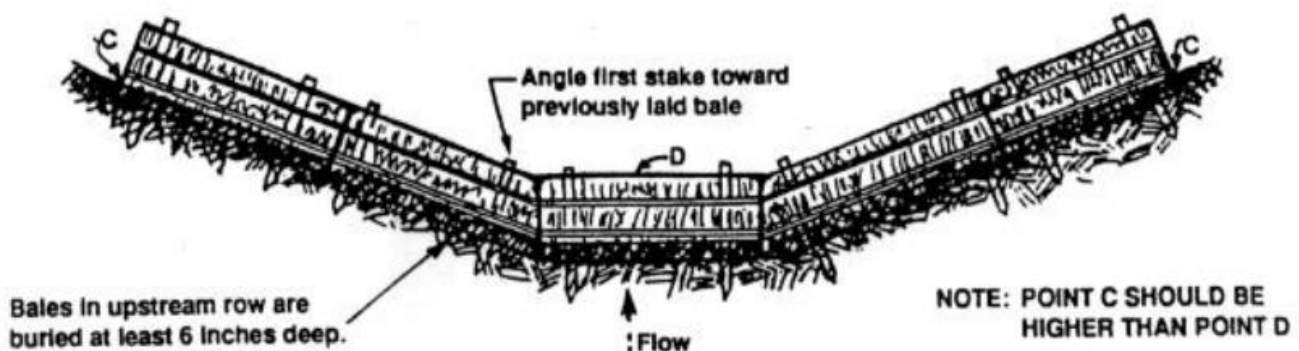
- ❖ Plant material should be used beneficially wherever possible, as opposed to disposing of it at a landfill site where it takes up valuable airspace, or let it further propagate on unchecked, vacant land.
- ❖ Woody and dry material, provided no seeds are present, can be chipped and used as mulch or made available to the local community for firewood.

- ❖ Wet material and aquatic weeds should be combined with other organic matter and composted. Alternatively, it may be possible to use it for basket making, animal feed or other uses.
- ❖ Burning of alien vegetation waste material is prohibited.
- ❖ Burying of alien vegetation waste material in or near the stream, drainage lines, dams, wetlands and their buffer zones is prohibited.
- ❖ Any vegetation which is not viable for use must be disposed of at a registered disposal unit.

## 12. REHABILITATION AND RESTORATION

### 12.1. Hay-bale Check Dams

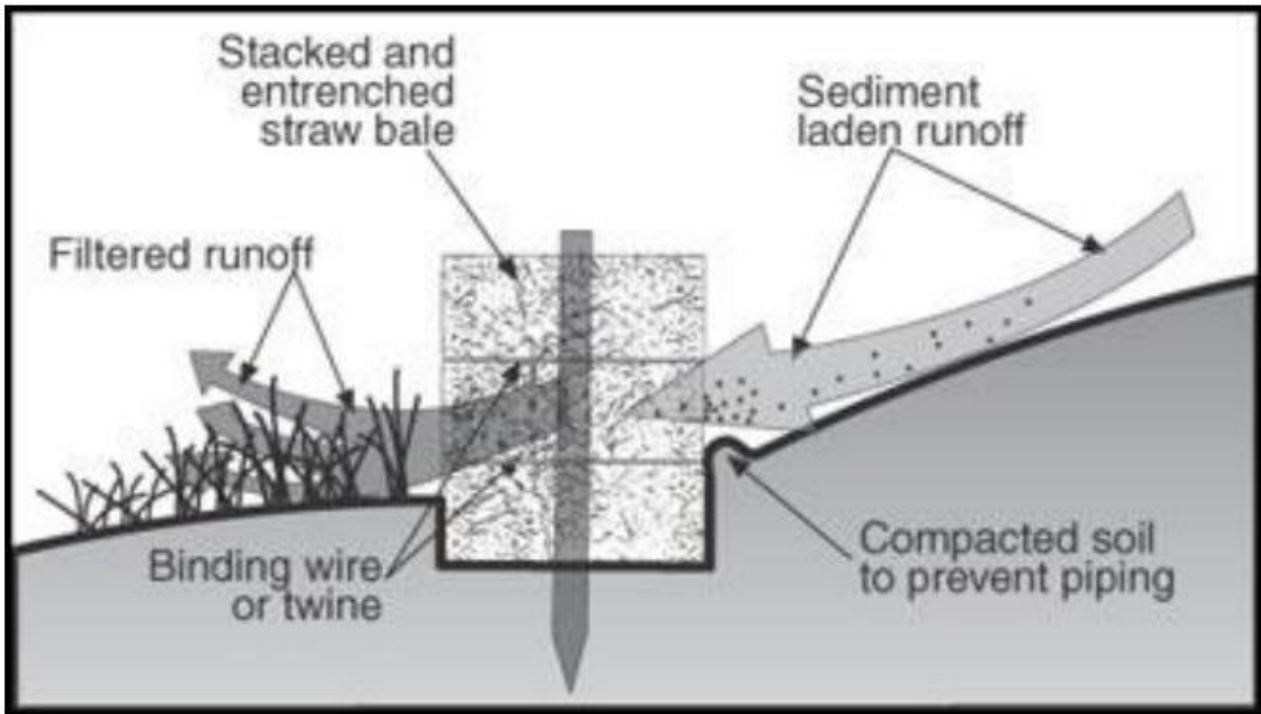
- Bales should be bound with wire or nylon string. Twine bound bales are less durable.
- The check dams should cross the stream bed and extend slightly up the slope on both sides of the valley (figure 8).



**Figure 8: Cross-section of a hay bale check dam.**

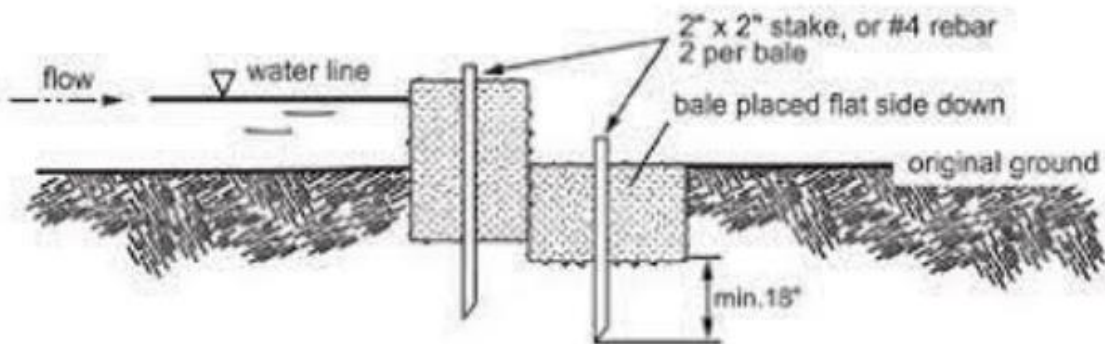
- Hay bales should be dug into a shallow trench approximately 15 cm deep.
- Soil must then be replaced and compacted around the base of the bales.
- The row of bales must be orientated perpendicular to the flow of water to capture water from the slope above.
- Bales must then be secured using wooden stakes hammered in the soil angled towards each neighbouring bale to ensure a seamless barrier (Figure 9).

No gaps must be present at the base of the bales as this will create preferential flow paths resulting in erosion. The purpose of this intervention is to capture high velocity runoff in a check dam and allow it to slowly filter through the bales.



**Figure 9: Cross-section of installed hay bale check dam indicating staking and excavation of bales into soil.**

The lowest check dam at the outflow must include an additional row of hay bales downstream placed on their side in case the dam fills with water and overflows. This measure is to prevent erosion of a plunge pool below the bales (Figure 10).



**Figure 10: Cross section of the lowest check dam showing the second row of bales on their side.**

## 12.2. Placement of soil protecting matting

Exposed soil on slopes or within the watercourse will be vulnerable to erosion and must be stabilised with vegetation. A combination of temporary vegetation cover and soil matting is recommended. The following steps must be taken.

- Lightly rake over the soil to create a uniform surface.
- Seed the areas with *Cynodon dactylon* and *Digitaria eriantha* purchased from a registered supplier (e.g. Agricol). These grasses will rapidly provide cover and stabilise the soil. The seeding rate should be 20 -30 kg / ha. Seed should be scattered as uniformly as possible to prevent clumping.
- The seeded area must be covered in a light mulch (1-2cm deep). This can consist of shredded woody material but must not be wood chips. Chipped alien vegetation is not suitable as it will contain seeds of alien vegetation.
- Cover the seeded and mulched slopes with a rolled erosion control product (such as jute, coir or straw matting). Preferably a natural (vs. man-made), bio-degradable product should be used. The use of a jute geotextile called Soilsaver is recommended. It is available from Kaytech in Port Elizabeth and in Cape Town. The role of the erosion control matting is not to provide long-term protection for slopes from erosion, but to protect the soil surface until vegetation can establish and become the permanent stabilising feature. The slope should be seeded and mulched, and then covered with erosion control matting which will remain in place until the vegetation has established. Matting should be overlapped by about 10cm and secured using wooden stakes along the edges. Terminal ends of the matting can also be staked or buried in an anchor trench (Figure 11).

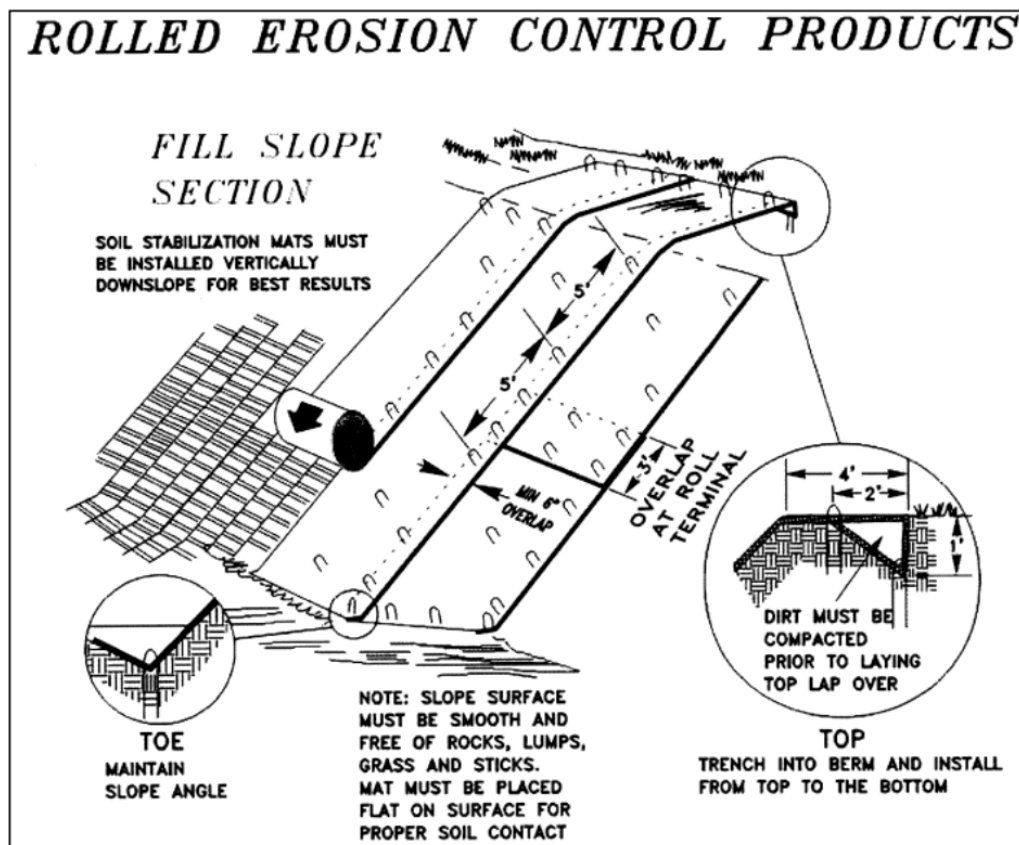


Figure 11: Example of methods recommended to install erosion control matting on sloping areas that require revegetation (Source: Department of Environmental Protection, West Virginia).

### 12.3. Silt Fencing Methods

Proper installation of soil erosion control fences is necessary for them to be effective. Silt fences will only be necessary where the slope exceeds 1:3 increasing the risk of erosion. These guidelines must be followed:

- Geotextile fences must be installed perpendicular to the direction of water flow and along a line of uniform elevation or contour. In other words, they should not waiver up and down the slope, but should be in a straight line across the slope. If this guideline is not followed, water will flow along the fence to the lowest point creating stress and potential collapse at this point.
- Use synthetic UV resistant geotextile fabric able to withstand at least 6 months of sun exposure. The product Grassfence (available from Kaytech) is specifically made for this application and is available in rolls 500mm and 700mm wide. The material must be able to allow water to move through it, so materials like bidim are not suitable, but 70-80% shadecloth can be used if necessary.
- Silt fences can be staked using wooden stakes. Metal droppers are preferable but could be stolen. The stakes should be arranged in straight lines across the area to be rehabilitated, at most 3m apart and firmly driven into the ground. A steel wire along the top of the stakes and also along the ground must then be secured and to which the geotextile is fastened, top and bottom.
- A 250 to 350 cm wide and 10 cm deep trench must be dug upslope of the location of the fence and the bottom half of the geotextile then laid into the trench.
- The trench must be backfilled and the soil compacted over the geotextile;
- The height of the silt fence should be between 20 and 30 cm.
- The distance between silt fences should be 8-10m. This results in 4 silt fences at the site, with the lowest one following the line of the lowest uncleared vegetation.
- Geotextile should be in a continuous roll to avoid joins which weaken the structure. Where joins are unavoidable both fabric ends should be wound around stakes to prevent it from unravelling (See Figure 16);
- Terminal ends of the silt fence should run slightly uphill to prevent runoff from going around the ends of the fences.
- Silt fences will be removed once vegetation has established on exposed areas.



**Figure 12: Installation of the soil erosion control fence. A: Installing the standards and wires and preparing the trench. B: Fitting the geotextile, tying it on with wire. C: Filling in the trench over the geotextile. D: Applying a mulch against the completed fence (Photos courtesy Ken Coetzee).**



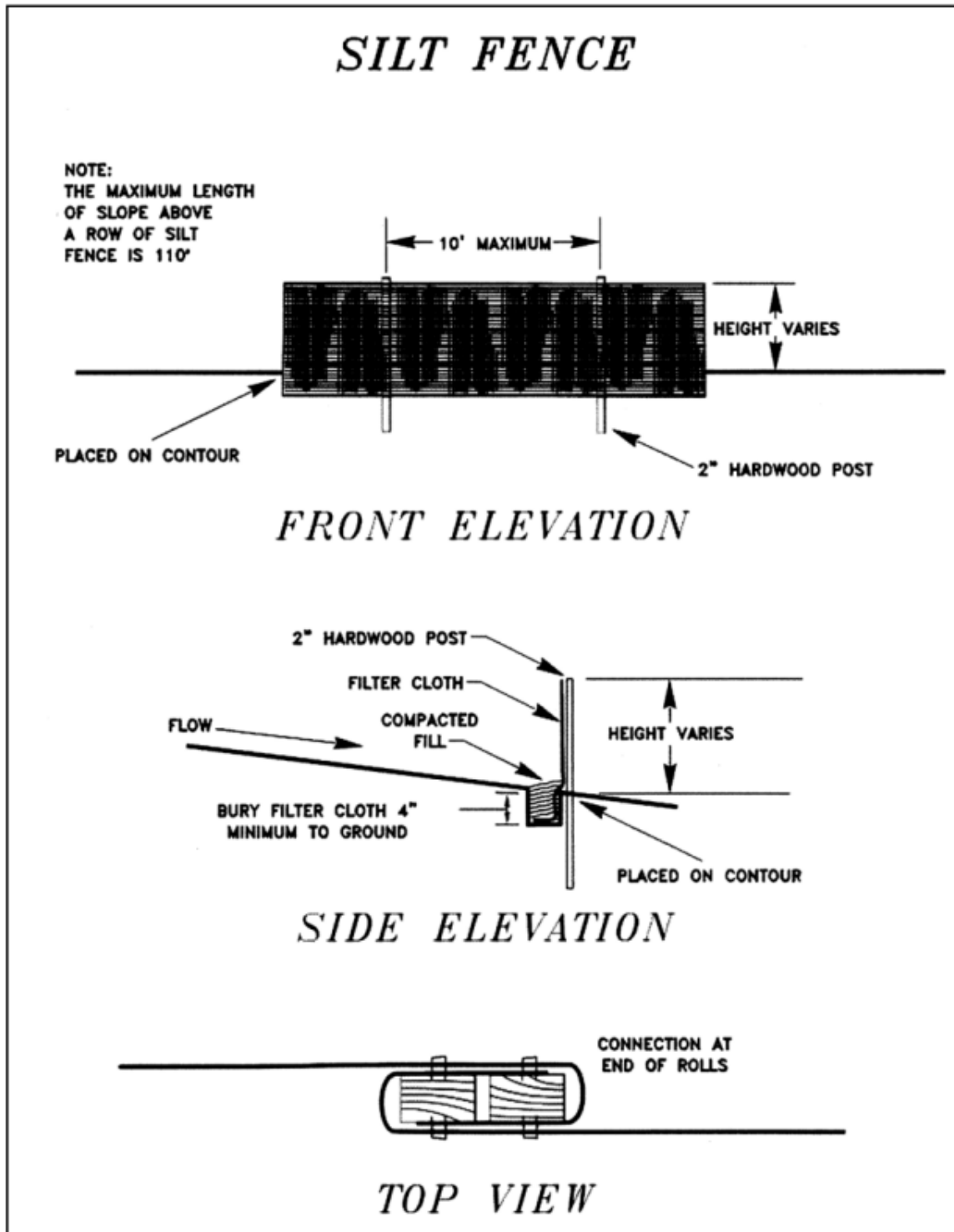


Figure 13: Example of methods recommended to install silt fencing (Measurements in inches; Source: Department of Environmental Protection, West Virginia).

### 12.3. Maintenance and Aftercare<sup>2</sup>

Once the rehabilitation is complete, the Applicant will need to identify a suitable entity that will be able to take over and maintain the monitoring cycle and initiate adaptive management as soon as it is required. Monitoring personnel must be adequately trained. The following are the minimum criteria that should be monitored:

- ❖ Composition and density of replanted vegetation, distinguishing between species introduced for initial revegetation only and species that are part of the pre-determined desirable end state.
- ❖ Associated nature and stability of surface soils.
- ❖ Re-emergence of alien and invasive plant species – if noted, remedial action must take place immediately.

The initial revegetation period post rehabilitation is estimated to be over a period of 3 months. Maintenance and aftercare must be planned for 2-3 years after the land preparation and replanting of vegetation has been completed. The following protocol is recommended:

- ❖ Re-vegetated areas should be monitored every 4 months for the first 12 months following rehabilitation.
- ❖ Re-vegetated areas showing inadequate surface coverage (less than 20% within 12 months of re-vegetation) should be prepared and re-vegetated.
- ❖ Continuous erosion monitoring of rehabilitated areas and slopes should be undertaken and zones with excessive erosion should be identified. The cause of the erosion should be identified, and rectified. Zones with erosion will need to be recontoured and seeded/replanted with locally occurring species which grow quickly.

If the plants have not established and the acceptable plant cover is not achieved within the specified maintenance period, maintenance of these areas shall continue until an acceptable plant cover is achieved.

### 12.4. Planting List

If more active revegetation is required following a full growing season, the plants listed in Table 1 can be used to revegetate the riparian zone. A Botanical specialist should be consulted for a comprehensive list in this regard.

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<sup>2</sup> Riparian and Wetland Rehabilitation plan for the alleged unlawful activity on Portion 17, Farm 116 Avontuur, George, Western Cape APRIL 2018 Compiled by: Ms. Jeanne Snyman (M.Sc. Env Water Sciences, Pr. Sci. Nat).

**Table 1: Selected indigenous plant species for active replanting in riparian and wetland areas.**

Species Name	Common Name
<b>Riparian Plants</b>	
<i>Vachellia karroo</i>	Sweet thorn
<i>Aloe ferox</i>	Cape aloe
<i>Searsia lucida</i>	Blinktaaibos
<i>Euclea undulata</i>	Common guarri
<i>Carissa bispinosa</i>	Numnum
<i>Osteospermum moniliferum</i>	Bitou
<i>Themeda triandra</i>	Red grass
<i>Cynodon dactylon</i>	Kweek / Bermuda
<i>Carprobrotus sp.</i>	Creeping sour fig
<b>Wetland Plants</b>	
<i>Cyperus textilis</i>	Mat sedge
<i>Typha capensis</i>	Bulrush
<i>Phragmites australis</i>	Fluitjiesriet
<i>Cliffortia strobilifera</i>	Cone river caperose

### 13. STAFF CONDUCT CONTROL AND INFORMATION SHEET

<b>ALL STAFF MUST OBEY THE FOLLOWING RULES:</b>	
1	<b>DO NOT</b> tamper with or destroy nesting sites, lairs or any other form of animal shelter.
2	<b>DO NOT</b> feed the native animals.
3	<b>DO NOT</b> leave the project site untidy and strewn with rubbish that will attract pests.
4	<b>DO NOT</b> bring any pets onto the project site.
5	<b>DO NOT</b> trespass onto private properties not linked to the project.
6	<b>DO NOT</b> carry a weapon onto the project site or in the vehicles transporting workers to and from the site.
7	<b>DO NOT</b> set fires.
8	<b>DO NOT</b> cause any unnecessary disturbing noise at the project site or at any designated worker collection/drop off points.
9	<b>DO NOT</b> drive a vehicle under the influence of alcohol.
10	<b>DO NOT</b> exceed the national speed limits on public roads or exceed the recommended speed limits in this management plan (where applicable)
11	<b>DO NOT</b> drive a vehicle that is generating excessive noise (noisy vehicles must be reported and repaired as soon as possible).
12	<b>DO NOT</b> litter along the roadsides, including both public and private roads.
13	<b>DO NOT</b> remove or destroy vegetation around the site without the prior consent of the site manager and Environmental Control Officer.
14	<b>DO NOT</b> tamper with, destroy or remove vegetation from any areas that have been fenced off or marked.
15	<b>DO NOT</b> pollute watercourses, whether flowing or not.
16	<b>DO NOT</b> drive through watercourses.
17	<b>DO NOT</b> operate critical items of mechanical equipment without having been trained and certified.
18	<b>ALL</b> employees must undergo the necessary safety training and wear the necessary protective clothing at all times.
19	<b>NO</b> unsocial behaviour will be permitted e.g., excessive shouting, hooting etc.
20	<b>NO</b> ad-hoc activities are to be undertaken e.g. fires for cooking, the use of surrounding bush as a toilet facility is strictly forbidden
21	<b>NO</b> trespassing on private / commercial properties adjoining the site is forbidden.
22	<b>NO</b> worker may be forced to do work that is potentially dangerous or for what he / she is not trained to do.

## 14. RESPONSIBILITIES

The “Responsibility” column is merely a guide and does not relieve the Applicant of his responsibilities in terms of overall compliance with the EA and EMPr.

FUNCTION	RESPONSIBILITY
<b>Applicant</b>	<ul style="list-style-type: none"> <li>The Applicant is ultimately responsible for the ensuring compliance with all the requirements associated with the operation, rehabilitation and decommissioning phases of the project.</li> </ul>
<b>Site Manager</b>	<ul style="list-style-type: none"> <li>The Site Manager is responsible to ensure that all necessary communication and submission of required documentation concerning this project is submitted to the relevant authorities.</li> <li>The site manager is required to adhere to the EMPr and is responsible to ensure that all staff appointed also adhere the EMPr.</li> <li>Ensures that all staff are made aware of the need to conduct activities in an environmentally responsible manner.</li> <li>(Site Manager) On instruction by the ECO, ensures that storm/surface water controls are established.</li> <li>Ensures prompt remediation of any sewage spills.</li> <li>Stockpiles are protected from aeolian effects, stormwater effects, or being driven over by workers.</li> <li>Ensures that a “clean-site” policy is applicable at all times.</li> <li>Ensures that all complaints by residents are dealt with promptly.</li> <li>Is responsible for any contravention/s by staff or any non-compliance with the EMPr.</li> </ul>
<b>Environmental Control Officer (ECO)</b>	<ul style="list-style-type: none"> <li>The ECO is to have access to the site at all times, for the purpose of inspections to ensure that the environmental conditions of the EMPr as well as the conditions stipulated to in the EA and the recommendations made in the EIR are being implemented and adhered to.</li> <li>The ECO must report on the environmental aspects of the project to the responsible person/authority at agreed intervals.</li> <li>The need for any deviations or variations in the environmental conditions must be reported to the DEA&amp;DP for approval prior to these being undertaken.</li> <li>The ECO must be fully cognisant with the contents of the Environmental Authorisation as well as this EMPr and any other applicable legislation</li> </ul>
<b>Competent Authority</b>	<ul style="list-style-type: none"> <li>The Compliance Officer appointed by the Competent Authority is responsible for the ensuring that the Applicant, Site Manager and ECO are compliant with the provisions of the EA and EMPr.</li> </ul>

## ACKNOWLEDGEMENT FORM

Record of signatures providing acknowledgment of being aware of and committed to complying with the contents of this Environmental Management Programme (EMPr), which relates to the environmental mitigation measures for the project outlined below, and the environmental conditions contained in all other contract documents.

**PROJECT NAME:**

**Rectification of Two Unlawful dams on Portion 42 and Portion 34 of Farm 46 Buffelsrivier, George, Western Cape.**

**DEA&DP REF: 14/1/1/E3/5/10/3/L1212/22**

**APPLICANT:**

Signed: ..... Date: .....

**SITE MANAGER:**

Signed: ..... Date: .....

**ENVIRONMENTAL CONTROL OFFICER**

Signed: ..... Date: .....

# Appendix A: CV of the EAP

**Joclyn Joe Marshall**

**Heatherhill Farm, P.O. Box 19, Rheenendal, 6576**

**Contact: 072 126 6393**

**Email: [joclynjoe@gmail.com](mailto:joclynjoe@gmail.com)**

## **CAREER HISTORY**

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**July 2022 – current**

**Eco Route Environmental Consultancy  
Environmental Assessment Practitioner**

- Environmental screening for new projects.
- Compile Basic Assessment Report and EIA's (NOI, Application, DBAR, EMP, FBAR, etc);
- Compile EMP's, MMP's, screening reports, rehabilitation plans, AIS Control Plans, and any other reports required.
- Liaise with clients, specialists, and competent authorities.
- Complete EIA Checklists.
- OSCAER permit and EMMS compilations and submission.
- Environmental audits.
- S24G applications.
- Prepare Public Participation documents and registers.
- Completed Projects:
  - BAR for beachfront security estate on Portion 66 & 67 of Farm 443 Plettenberg Bay.
  - BAR for a single residential dwelling on ERF 8 Konkiebaai, Eersterivier.
  - Part 1 Amendment for Erf 1262 Wilderness and application for adoption of MMP.
  - Rehabilitation Plan for Remainder Erf 2 of farm 189 Boven Lange Valley.
  - Screening Report for Remainder Erf 444 Granse Vallei\_August 2022.
  - EIA Checklist for Portion No 33 Farm 440 Roodefontein.
  - EIA Checklist for Portion 7 of the Farm Wittedrift No. 306, Bitou Municipality.
  - Various OSCAER Permits with EMMS in the Knysna and Plettenberg Bay areas.

**August 2020 – August 2022**

**Moira Cloete Environmental Assessment Practitioner  
Sub-Consultant**

- Perform tasks and functions as set out in the EIA Regulations 2014, as amended, specifically in line with Appendices 1-4 thereof.
- Complete environmental screening tool reports.
- Complete EIA/BAR application forms.
- Draft Scoping Reports.
- Draft EIAs/BARs.
- Prepare Public Participation documents, EMPs and BID documents.
- Completed Projects:
  - EIA for proposed construction of a water storage dam on Argyll Farm 218 for irrigation of 80ha of lucerne.
  - EIA for proposed construction of a water storage dam on Coldstream Farm 970 for irrigation of 80ha of lucerne.
  - BAR for proposed development of a poultry facility for egg production on Confluence Farm 143.
  - EMP for operating an organic composting facility for Meat Traders Abattoir.

**February 2012 – April 2019**

**Knysna Municipality  
Senior Environmental Officer**

- Preparation of EMP's, MEMP's, EMM's for municipality and clients.
- Carrying out ECO work on municipal projects and other construction sites.
- Commenting on Land Use applications, EIA applications and issuing of OSCAER permit.
- Conducting various site inspections and audits including taking water samples for analysis.
- Applying environmental legislation and regulations to applications and other environmental matters.
- Liaising with other Governmental Departments, NGO's, Forums, Committees and Conservancies.
- Campaigning in environmental education and development of educational programmes.
- Report writing, research and project development.
- Advising and assisting public on environmental matters and various related tasks.

**February 2011 – January 2012**

**Allanson Associates cc.**

**Research assistant at the Knysna Basin Project**

- Field work that included water sample collection and analysis, critical observations of environmental health, monitoring of Waste Water Treatment Works outflow;
- Lab work that included water quality analysis (including chemical methodology), fluorometry, microscopy and scientific report writing and publication.

**June - July 2010**

**Department of Environmental Science, Rhodes University**

**Field assistant**

- Harvesting, transporting, shredding and drying spekboom material.

**2009 – 2010**

**Department of Environmental Science, Rhodes University**

**Graduate Assistance**

- Assisted in second year practicals and field trips, and data input.

**2007**

**Departments of Zoology and Botany, Rhodes University**

**Demonstrator**

- Assisted in first year practicals and field trips, and marking practical reports.

## **ACADEMIC QUALIFICATIONS**

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**2009 – 2010**

**Masters in Environmental Science** by research dissertation

Rhodes University

Thesis: Population assessments of priority plant species used by local communities in and around four Wild Coast Reserves, Eastern Cape, South Africa

**2008**

**Honours in Biodiversity and Conservation** (*Joint Botany and Environmental Science*)

Rhodes University

**2005 -2007**

**Bachelor of Science** with Majors in Botany and Zoology

Rhodes University

**1998 – 2004**

**Heatherhill College (Cambridge University International Examination)**

HIGCSE: Art and Design (2), First Language English (3), Biology (1), Mathematics (2), Physical Science (2), Afrikaans as a Second Language (3). IGCSE: Information Technology (B)

## **PUBLICATIONS**

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- B.R. Allanson & J.J. Fearon (2012): Growth rate of juvenile *Siphonaria compressa* (Gastropoda: Pulmonata), *Invertebrate Reproduction & Development*, DOI:10.1080/07924259.2011.646447

## **OTHER SKILLS AND TRAINING**

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- Registered with the Environmental Assessment Practitioners Association of South Africa (EAPASA) – Registration number 2022/5006
- Registered as a Candidate Natural Scientist in Environmental Science. Registration number: 100121/11
- SAGIC Invasive Species Training, 15-18 May 2018. Stellenbosch, Western Cape.
- Certificate of competence in Herbicide Applicator – Noxious Weeds, 18 May 2018. Invader Plant Specialists (Pty) Ltd. Stellenbosch, Western Cape.
- Certificate attained for Management of Estuaries in South Africa short learning programme. NMMU, Stellenbosch, Western Cape.
- Certificate attained for Urban Interface Fire Management Short Course, 10-12 November 2015. NMMU Saasveld.
- Certificate of attendance attained for ArGIS Basic Training, 4 May – 8 May 2015. ESRI South Africa.
- Certificate attained for Basic Training Course for Environmental Management Inspector, 17 November 2014 - 15 December 2014. Western Cape Department of Environmental Affairs and Development Planning.
- Certificate attained for Fire Ecology and Conservation Short Course, 14-18 July 2014. NMMU Saasveld.

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- Certificate attained for EIA Short Course, 13-17 May 2013. Rhodes University.
- Computer literacy: Microsoft Office including Word, Excel, Powerpoint, Access and photodraw V2, Statistica, StatPlus, FISAT II, ArcView GIS 3.2, ArcMap GIS, Coral Draw.
- Drivers license code 08.

#### **REFERENCES ARE AVAILABLE ON REQUEST**

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Janet Ebersohn  
Lead EAP: Eco Route Environmental Consultancy  
Email: [janet@ecoroute.co.za](mailto:janet@ecoroute.co.za)

Moira Cloete  
Lead EAP: Moira Cloete Environmental Consultancy (MCEC)  
Email: [moira@mcec.co.za](mailto:moira@mcec.co.za)

Pamela Booth  
Manager: Environmental Management Department, Knysna Municipality  
Email: [pbooth@knysna.gov.za](mailto:pbooth@knysna.gov.za) / Cell: 060 998 6967