

MAINTENANCE MANAGEMENT PLAN (MMP)

for the proposed

PROPOSED KLEINVLEI DAM DEVELOPMENT

FARM KLEINVLEI 209, PORTION 1, CERES, WESTERN CAPE

DEADP reference number: 16/3/3/2/B5/2/1029/23

APRIL 2023

Compiled by: ***EnviroAfrica cc***

INDEPENDENCE & CONDITIONS

EnviroAfrica is an independent consulting firm that has no interest in the proposed activity other than fair remuneration for services rendered. Remuneration for services is not linked to approval by decision making authorities and EnviroAfrica has no interest in secondary or downstream development as a result of this project. There are no circumstances that compromise the objectivity of this EMP. The findings, results, observations and recommendations given here are based on the author's best scientific and professional knowledge and available information. EnviroAfrica reserves the right to modify aspects of this report, including the recommendations if new information becomes available which may have a significant impact on the findings of this report.

RELEVANT QUALIFICATIONS & EXPERIENCE OF THE EAP

This River Maintenance and Management Plan was prepared Clinton Geyser who has a MSc. Degree in Environmental Management. He has been working as an Environmental Assessment Practitioner since 2009 and is currently employed at EnviroAfrica cc.

Qualifications:

- BSc. Earth Sciences, Majors in Geology and Geography and Environmental Management (1998 – 2000) and;
- BSc. (hons): Geography and Environmental Management (2001) and;
- MSc. Geography and Environmental Management (2002), all from the University of Johannesburg.

Expertise:

Clinton Geyser has over thirteen years' experience in the environmental management field as an Environmental Assessment Practitioner and as an Environmental Control Officer, having worked on a variety of projects in the Western, Eastern and Northern Cape.

The whole process and report was supervised by Bernard de Witt who has more than 20 years experience in environmental management and environmental impact assessments.

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1. EXECUTIVE SUMMARY

TSR Boerdery (Pty) Ltd is proposing the development of a dam on Farm Kleinvlei 209, Portion 1, Ceres.

The proposed Kleinvlei dam will have a total storage capacity of approximately 176 840m³ and it would exclusively be filled with an existing water use, namely winter water from the Houdenbeks River as been included and motivated by the validation & verification process. The existing water use however, has been utilised before by abstracting directly from the Houdenbek River during summer months to sustain an annual 50% vegetable rotation of about 58ha in total. With the proposed Kleinvlei dam, they will create the opportunity to store winter water for summer irrigation during times when the Houdenbeks river nearly runs dry.

The proposed Kleinvlei dam will be a zoned earthfill embankment across the valley including an open channel spillway provisionally against the northern bank plus a pipe outlet under the central embankment. The proposed dam is considered an in-stream dam with a straight alignment across the valley. The dam wall will have a maximum wall height of approximately 7.8m and a crest length of 130m and crest width of 4.0m. The maximum flooded area will be approximately 10.47ha, and the dam will have a total footprint of 10.8ha.

The site is located approximately 23km north of Prince Alfred Hamlet, 5km south of Op Die Berg, off the R303.

Site co-ordinates: Proposed dam wall: 33° 04' 02.50" S, 19° 19' 57.50" E.

According to the Freshwater Ecological Assessment, based on the outcome of the risk assessment, the proposed Kleinvlei Dam development is expected to have a low risk significance to the excavated channel and ultimately to the Houdenbek River, however, the loss of EWR (albeit limited volumes) must be verified by a suitably qualified hydrologist to ensure no significant loss of recharge to the Houdenbek River will occur which could pose a risk to the long term ecological functioning of the system (see Section 10.3 below). It is considered imperative that all works be undertaken during the drier summer months to limit surface water contamination and the need for any surface water diversion during the construction works. Should construction be scheduled for the winter rainy season, the construction of silt traps in the excavated channels prior to any construction activities will limit the impact of edge effects from occurring on the downstream Houdenbek River.

1.1 PURPOSE OF THE MMP

The main purpose of this maintenance management plan is to guide the applicant and landowner, TSR Boerdery (Pty) Ltd, which actions to follow to prevent avoidable damage to the aquatic habitat associated with rehabilitation and maintenance activities of the proposed Kleinvlei dam and weir, as well as to enhance the positive benefits of the project.

It should be noted that this MMP should be read in conjunction with the Environmental Management Programme (EMPr).

2. DEFINITIONS AND ABBREVIATIONS:

2.1 DEFINITIONS

Applicant: the person or responsible person from an organization who applied for the proposed activity described in the ROD.

Bund: enclosure under / around a storage facility to contain spillage.

Construction: means the construction period of the project during which the actual works are carried out, deemed to include site establishment, site preparation, the works, maintenance period and decommissioning and is defined as from commencement of site establishment until site handover (practical completion).

Construction site: means the area influenced and affected by the construction activities or under the control of the Contractor often referred to as “the Site”.

Construction Supervisor: The person responsible (appointed by the Applicant) to ensure that the construction is carried out to completion on time, within budget and that the Contractor fulfils his obligations in terms of the EMP.

Contaminated water: means water contaminated by the Contractor's activities, *e.g.* concrete water and runoff from plant/ personnel wash areas.

Contractor: the principal persons / company and all other sub-contractors involved in the construction of the project.

Declaration of understanding: Form that is signed by all contractors involved in the construction works of their understanding and acceptance of the EMP and site-specific additions to the EMP.

Development site: boundary and extent of development works and infrastructure.

Environment: means the surroundings within which humans exist and that are made up of:

- the land, water and atmosphere of the earth;
- micro-organisms, plant and animal life;
- any part of the combination of the above two bullets and the interrelationships between them;
- the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being

Environmental Aspect: Any element of any construction activity, product or services that can interact with the environment.

Environmental Control Officer: The ECO must be independent and suitably qualified and must have a sound knowledge of the environment in which the activity will take place.

Environmental Impact: Any change to the environment, whether adverse or beneficial, wholly or partially resulting from any construction activity, product or services.

Method statement: A statement by the Contractor, describing the scope of intended construction works step-by-step, in order for the ECO and Construction Supervisor to understand the Contractors intentions and be able to comment on, so that they could assist with devising mitigating measures should it be necessary to avoid environmental impact.

No-Go Area(s): An area of such (environmental/aesthetical) importance that no person or activity are allowed within a designated boundary surrounding this area.

Site meetings: Periodic (weekly or monthly) meetings between the ECO, Construction Supervisor and Contractor to discuss construction activities that relate to the environment or any other environmental issues that might arise.

Works: The works to be executed in accordance with a contract.

Start-up meeting: a start-up meeting held on site, before any construction has begun to discuss EMP and determine site specific additions that will be included as the basis for the EMP.

Potentially hazardous substance: is a substance, which, in the reasonable opinion of the Engineer, can have a deleterious (detrimental) effect on the environment.

Precautionary principle: means the basic principle, that when in doubt or having insufficient or unreliable information on which to base a decision, to then undertake actions that will have minimum risk.

Reasonable: means unless the context indicates otherwise, reasonable in the opinion of the Engineer/Project Leader after he has consulted with a person, not an employee of the Applicant, suitably experienced in "environmental implementation plans" and "environmental management plans", both as defined in the Environmental Management Act (Act No 107, 1998).

Solid waste: means all solid waste, including construction debris, chemical waste, excess cement/concrete, wrapping materials, timber, tins and cans, drums, wire, nails, food and domestic waste (e.g. plastic packets and wrappers).

2.2 ABBREVIATIONS

CARA	Conservation of Agricultural Resources Act no. 43 of 1983
CBA	Critical Biodiversity Area
DEA	Department Environmental Affairs
DEA&DP	Department of Environmental Affairs and Development Planning (Western Cape)
DWS	Department of Water and Sanitation
EA	Environmental Authorization (Record Of Decision) issued by relevant authority for the authorisation to commence construction under certain environmental compliances
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer - Must be a suitably qualified independent environmental consultant appointed to ensure compliance to the EMP
EIA	Environmental Impact Assessment
EIS	Ecological Importance and Sensitivity
ESA	Ecological Support Area
EMP	Environmental Management Plan or Programme
FEPA	Freshwater Ecological Support Area
GPS	Global Positioning System
IHI	Index of Habitat Integrity
HWC	Heritage Western Cape
NWA	National Water Act
NEMA	National Environmental Management Act no. 107 of 1998.
NEM: AQA	National Environmental Management: Air Quality Act 39 of 2004.
NEM:BA	National Environmental Management: Biodiversity Act 10 of 2004.
NEM: PAA	National Environmental Management: Protected Areas Act 57 of 2003

NEM: WA	National Environmental Management: Waste Act 59 of 2008.
NFA	National Forest Act 84 of 1998.
NHRA	National Heritage Resources Act 25 of 1999.
NVFFA	National Veld and Forest Fire Act 101 of 1998.
NWA	National Water Act 36 of 1998
PES	Present Ecological State
Sub-WMA	Sub – Water Management Area
WMA	Water Management Area

3. LEGISLATIVE FRAMEWORK

The following specific environmental legislative is applicable to this **Maintenance Management Plan**:

- This Maintenance Management plan is to be approved in terms of the **NEMA EIA Regulations 2014** (as amended) and only relates to **Activity 19, Listing Notice 1 (GN R.327)**;
- The requirements of the **National Water Act 36 of 1998** (as amended);
- The requirements of the **National Environmental Management: Biodiversity Act 10 of 2004 (NEMBA)** in terms of:
 - National list of ecosystems that are threatened and in need of protection (GN 1002 of 9 December 2011).
 - Alien and invasive species list 2016 (GN R. 864 of 29 July 2016).
- **Conservation of Agricultural Resources Act 43 of 1983**, as amended (CARA) in terms of:
 - Combating/preventing erosion; and
 - Combating weeds and invader plants

Overview of other applicable legislation:

- **Constitution of the Republic of South Africa (1996)**: of special relevance in terms of environment is section 24
- **Conservation of Agricultural Resources Act 43 of 1983 (CARA)**: supports conservation of natural agricultural resources (soil, water, plant biodiversity) by maintaining the production potential of the land and combating/preventing erosion; for example, by controlling or eradicating declared weeds and invader plants.
- **Fertilizer, Farm Feeds, Agricultural Remedies and Stock Remedies Act (Act No. 36 of 1947)**, to control the sell, purchase, use and disposal of agricultural or stock remedies.
- **Hazardous Substances Act 15 of 1973**: to control substances that may cause injury, ill-health, or death through their toxic, corrosive, irritant, strongly sensitizing or flammable nature, or by the generation of pressure
- **National Environmental Management Act 107 of 1998 (as amended)**: replaces the Environmental Conservation Act (ECA) and establishes principles for decision-making on matters affecting the environment, and for matters connected therewith.
- **Environmental Impact Assessment Regulations**: identifying activities (listed activities) for which environmental authorisation must be obtained.
- **National Environmental Management: Biodiversity Act 10 of 2004 (NEMBA)**: supports conservation of plant and animal biodiversity, including the soil and water upon which it depends.
- **National list of ecosystems that are threatened and in need of protection** (GN 1002 of 9 December 2011).
- **Alien and invasive species list 2016** (GN R. 864 of 29 July 2016).
- **National Environmental Management: Protected Areas Act 57 of 2003 (as amended Act 31 of 2004) (NEMPAA)**: To provide for the protection and conservation of ecologically viable areas representative of South Africa's biological diversity and its natural landscapes and seascapes.
- **National Environmental Management: Waste Act 59 of 2008 (NEMWA)**: To reform the law regulating waste management in order to protect health and the environment by providing reasonable measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development.
- **List of Waste Management Activities that have, or are likely to have a detrimental effect on the environment**: Identifies activities in respect of which a waste management license is required.
- **National Forests Act 84 of 1998 (as amended)**: supports sustainable forest management and the restructuring of the forestry sector.
- **List of protected tree species** (GN 716 of 7 September 2012)

- **National Heritage Resources Act 25 of 1999:** supports an integrated and interactive system for the management of national heritage resources, including supports soil, water and animal and plant biodiversity.
- **National Veld and Forest Fire Act 101 of 1998 (NVFFA):** protects soil, water and plant life through the prevention and combating of veld, forest, and mountain fires
- **National Water Act 36 of 1998 (NWA):** promotes the protection, use, development, conservation, management, and control of water resources in a sustainable and equitable manner.

4. INTRODUCTION AND PROJECT BACKGROUND

TSR Boerdery (Pty) Ltd is proposing the development of a dam on Farm Kleinvlei 209, Portion 1, Ceres.

The proposed Kleinvlei dam will have a total storage capacity of approximately 176 840m³ and it would exclusively be filled with an existing water use, namely winter water from the Houdenbeks River as been included and motivated by the validation & verification process. The existing water use however, has been utilised before by abstracting directly from the Houdenbek River during summer months to sustain an annual 50% vegetable rotation of about 58ha in total. With the proposed Kleinvlei dam, they will create the opportunity to store winter water for summer irrigation during times when the Houdenbeks river nearly runs dry.

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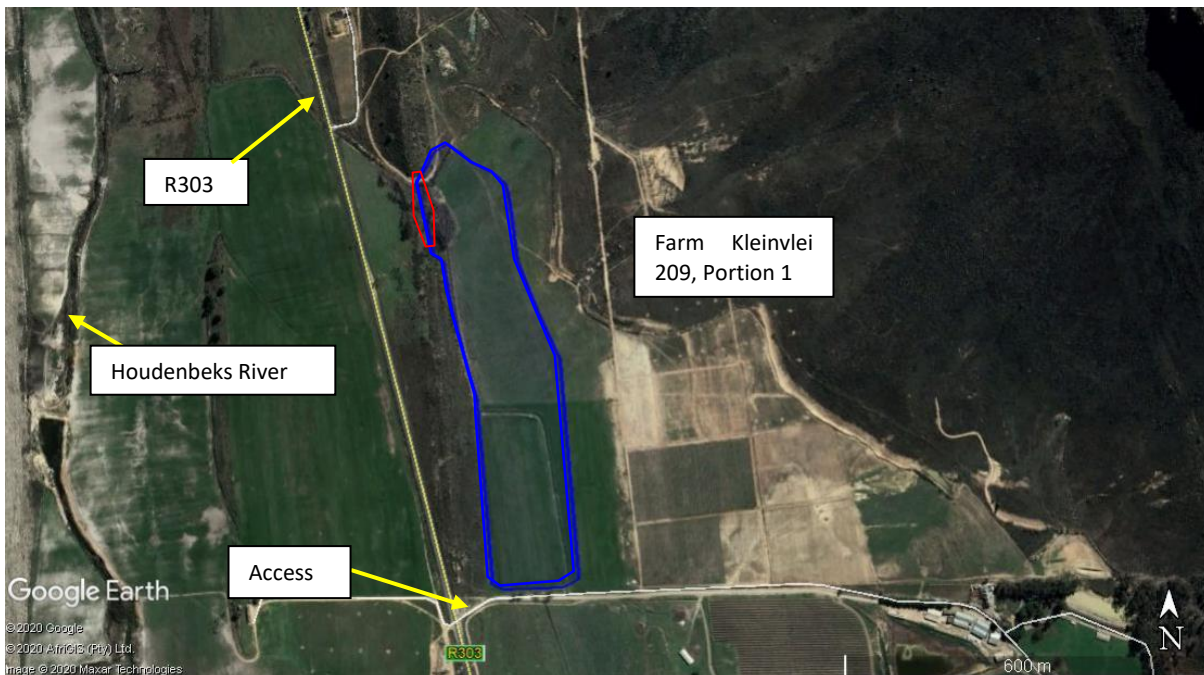


Figure 1: Google Earth image of the site. The blue polygon represents the approximate high-water mark of the dam. The red polygon the approximate dam wall/embankment footprint.

5. SITE LOCATION AND DESCRIPTION

The site is located approximately 23km north of Prince Alfred Hamlet, 5km south of Op Die Berg, off the R303.

Site co-ordinates: Proposed dam wall: 33° 04' 02.50" S, 19° 19' 57.50" E.

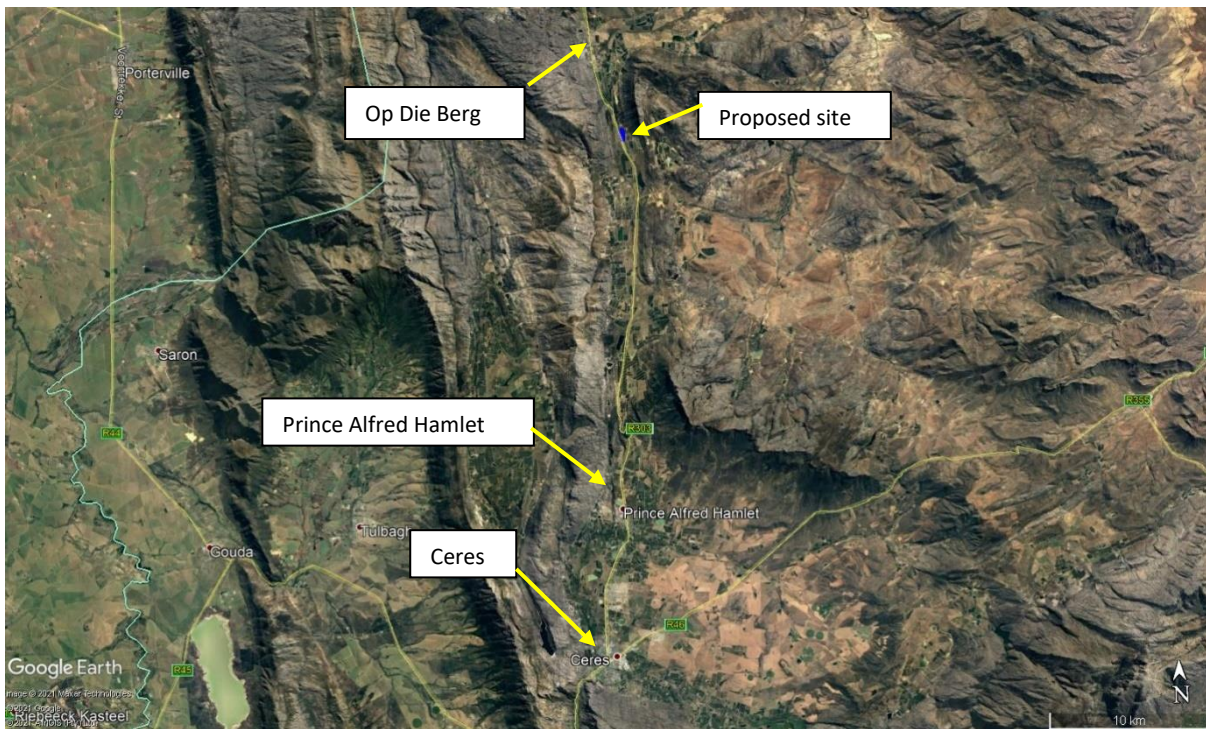


Figure 2: Google Earth image showing the locality of the proposed Kleinvlei Dam.

5.1 **BIODIVERSITY FEATURES**

The site is located on old, cultivated fields, part of which has recently been used for orchids. There is a small patch of natural vegetation to the north of the proposed dam wall which may be inundated at the high-water mark of the dam, which will therefore be lost. A large, mature stand of Poplar Trees (*Populus x canescens*) is located on the location of the proposed dam wall, between the two ridges. Although the majority of the dam development footprint is within an area that has been previously cleared and cultivated, the construction of the dam and dam wall will involve the removal or inundation of some indigenous vegetation, and a large stand of poplar trees, which may exceed 1ha in extent.

According to the Vegetation map of South Africa, Lesotho and Swaziland (Mucina & Rutherford, 2006, as updated in the 2012 beta version) only one broad vegetation type is expected on the majority of the proposed site, namely Kouebokkeveld Shale Fynbos, which is classified as Vulnerable.

According to biodiversity overlay maps from Cape Farm Mapper the site partially falls within a Critical Biodiversity Area (CBA), as well as Ecological Support Areas (ESA & ESA2s).

From the SANBI National Freshwater Ecosystem Priority Areas map, there are a number of non-perennial rivers to the north and east of the site. These ephemeral drainage lines convey surface water into a number of excavated channels within, and adjacent to, the proposed site, and into the Houtekop River, located approximately 590m to the west of the dam site.

5.1.1 **Botanical:**

According to the Botanical Assessment, the proposed Kleinvlei Dam is located in an area that was originally Kouebokkeveld Shale Fynbos.

Kouebokkeveld Shale Fynbos is a moderately tall and dense proteoid shrubland on shale slopes, with asteraceous shrubs prominent. Waboomveld i.e., where *Protea nitida* is common occurs on colluvial soils.

Restiols occur in bottomlands and this is what would have been present in the 'dam basin' before it was cleared.

A few isolated patches of shrubby Winterhoek Sandstone Fynbos dominated by *Cliffortia ruscifolia*, occur in the area. These patches of fynbos vegetation on sandstone are very old and not sensitive; they have not been burnt for a very long time and are somewhat moribund.

At the proposed dam wall location, is a dense stand of poplar trees, with no indigenous vegetation found at this location, neither under the trees, nor outside in the area used for grazing.

The Botanical Assessment concluded that the construction of the Kleinvlei Dam would not result in the loss of much natural terrestrial vegetation. The basin of the dam of all alternatives would be on areas that have been historically disturbed and where there is no longer any Kouebokkeveld Shale Fynbos. The dam walls of all three alternatives would have a limited (small) effect on isolated patches of old Winterhoek Sandstone Fynbos that has low sensitivity.

5.1.2 Freshwater:

According to the Freshwater Ecological Assessment, several episodic drainage lines were identified in the eastern portion of the investigation area, conveying surface water into the excavated channels in the study area, which ultimately flow into the Houdenbek River, located to the west of the study area. Historically (prior to any land use transformation) these excavated channels were potentially functioning waterways (as part of the upstream drainage lines) which have become severely degraded as all indigenous vegetation has been removed, and the channels straightened to optimise the area for cultivation, to the point that they only function as artificial waterways, through episodic conveyance of water from the limited upgradient catchment area to the downstream Houdenbek River. Thus, these excavated channels do not receive and retain sufficient water to support a wetland response or sustain riparian characteristics.

The Freshwater Ecological Assessment concluded that based on the findings of the watercourse assessment and the results of the impact assessment, it is the opinion of the ecologist that the proposed Kleinvlei Dam poses a low risk to the integrity of the watercourses downgradient of the proposed dam development provided that adherence to cogent, well-conceived and ecologically sensitive construction plans are implemented and the mitigation measures provided in this report as well as general good construction practice are adhered to.

6. OBJECTIVES OF MAINTENANCE ACTIVITIES/ TERMS OF REFERENCE

The main objectives of this river maintenance and management plan (MMP) is to guide the landowner and other responsible parties to correctly implement mitigation measures to protect the integrity of the aquatic habitat and to minimise the impact of the proposed dam on the receiving environment. Dams require regular maintenance and monitoring to remain in a good working condition and to ensure these structures work in harmony with the environment.

This MMP aims to set guidelines for the correct management procedures and methods, in such a manner that they may be flexible.

6.1 TERMS OF REFERENCE

- Undertake a site visit in order to assess the site areas;
- Desktop review of DEADP's Maintenance Management Plan Guidelines;
- Identify the environmental risks associated with the maintenance management activities;
- Recommend appropriate, practicable mitigation measures that will reduce all major impact or enhance potential benefits, if any;
- Compile an MMP that takes into account all the aspects outlines in the DEADP Maintenance Management Plan Guidelines.

7. BRIEF DISCRPTION OF MAINTENANCE ACTIVITIES:

The following section briefly describe the maintenance activities. Site specific Method Statements were developed for river maintenance from recommendations made by the specialists. The MMP should be approved by the deciding authority and subsequently complied with by the landowner and responsible parties during maintenance activities.

The engineer responsible for the design and building of the dam must submit Operating, Maintenance and Emergency plan to DWS/BGCMA as a requirement of the dam safety regulation after construction which must be implemented.

The following general management activities and mitigation measures have been identified and must be implemented, should maintenance management activities be conducted:

- Repairs and maintenance should be undertaken within the dry season, except for emergency maintenance works.
- The contractor must demarcate the boundaries of the site or area scheduled for maintenance during the maintenance management activities as required.
- Where at all possible, existing access routes should be used. Access routes across the excavated channels should be avoided.
- Responsible management of pollutants through ensuring handling and storage of any pollutants is away from the watercourse. When machinery is involved, ensure effective operation with no leaking parts and refuel outside of the riparian area, at a safe distance from the watercourse to manage any accidental spillages and pose no threat of pollution.
- At no time should the flow of the watercourse be blocked (temporary diversions may be allowed) nor should the movement of aquatic and riparian biota (noting breeding periods) be prevented during maintenance actions.
- No new berms can be created.
- In circumstances which require the removal of any top soil, this must be sufficiently restored through sustainable measures and practices.
- Concerted effort must be made to actively rehabilitate repaired or reshaped banks with indigenous local vegetation.
- No deepening of the watercourse beyond the original, pre-damage determined thalweg, unless such deepening is directly related to the natural improved functioning and condition of such a watercourse.
- The build-up of debris/sediment removed from a maintenance site may:
 - be utilised for the purpose of in-filling or other related maintenance actions related to managing erosion, which form part of an adopted MMP;
 - not be used to enlarge the height, width or any extent of existing berms;
 - not be deposited anywhere within the watercourse or anywhere along the banks of a river where such action is not part of the proposed maintenance activity (ies). Material that cannot be used for maintenance purposes must be removed out of the riparian area to a suitable stockpile location or disposal site. Further action and consideration may be required where the possibility of contaminated material may occur, such as in urban watercourses.
- The use of foreign material, such as concrete, rubble, woody debris and/or dry land based soil, is strictly prohibited from being used in maintenance actions, unless for the specific purpose of repairs to existing infrastructure, coupled with appropriate mitigation measures.
- Maintenance material should be certified free of invasive alien plant seed to prevent infestation in the watercourse.

7.1 SITE SPECIFIC MAINTENANCE ACTIVITIES AND MITIGATION MEASURES

Site specific maintenance activities aim to protect the integrity of the aquatic habitat by mitigating, where possible, the loss aquatic habitat during maintenance activities.

The following site specific mitigation measures were provided by the Freshwater Ecological Assessment. This includes pre-construction and construction mitigation measures, which must still be considered during the operational and maintenance phases of the dam:

- Site preparation prior to construction
 - It is imperative that all construction works be undertaken during the dry, summer months as it is expected that surface runoff collected in the excavated channels will be minimal and no diversion of flow would be necessary and would prevent any indirect effects impacting on the downstream Houdenbek River;
 - Due to the accessibility of the site, no unnecessary crossing of the excavated channels may be permitted (with specific mention of the excavated channel section between the proposed dam wall and the R303 road). This will limit edge effects, erosion and sedimentation of the downstream excavated channel (the portion of channel between the proposed dam wall and the R303 crossing) which connects to the Houdenbek River;
 - Contractor laydown areas, vehicle re-fuelling areas and material storage facilities to remain outside of the excavated channels and may be located either south of the proposed dam wall or north east thereof but must be at least 10m away from the excavated channels. These localities and the access to them are considered to have the minimal edge effects on the downstream excavated channel;
 - The removal of the poplar trees may potentially result in an increase of dust and sediments in the downstream excavated channel. Thus, sediment control devices (such as silt traps) should be constructed in the downstream excavated channel (just before the R303 road crossing culvert) prior to any vegetation clearing, if construction occurs during the wet winter season. This will prevent any blockages of the portion of excavated channel before the R303 road crossing;
 - All cleared vegetation must be stockpiled in a designated area, at least 10m from the excavated channels. Vegetation may not be disposed of in the excavated channels as this may cause blockages. During the removal of the poplar trees, a temporary stockpile may be created directly east thereof (in the proposed dam footprint). Once all clearing activities has commenced all material must be disposed of at a registered garden refuse site and may not be burned or mulched on site;
 - Any topsoil removed must be stockpiled separately from all other materials, for use covering the new dam wall. Soil stockpiles may not be contaminated, and it must be ensured that the minimum surface area is taken up, however the stockpiles may not exceed 2m in height;
 - All exposed soils must be protected for the duration of the construction phase with a suitable geotextile (e.g. Geojute or hessian sheeting) in order to prevent dust generation resulting in vegetation smothering and sedimentation of the downstream excavated channel. This is especially important since the surrounding landscape is utilised for harvestable fruits/crops that may be sensitive to excessive dust.

- Construction
 - On completion of the civil works for the construction of the dam wall, the wall must be covered with topsoil (removed during site preparation activities), specifically the crest and outer side;
 - Should additional topsoil be imported, it must be ensured that the topsoil used are weed-free to limit the establishment of alien and invasive vegetation species;
 - The slope of the dam wall may not exceed the maximum slope ratio of 3:1, and must be stabilised (on the western embankment of the dam wall) during the construction phase with the use of a geotextile product such as hessian or Geojute, which is to be staked to the surface of the dam wall slope while revegetation of the dam wall occurs;

- The dam wall must be revegetated after the construction activities, to stabilize the soils and prevent erosion of the dam wall. A graminoid seed mixture (such as the MayFord Fynbos Biomosome seed mixture) can be used for this purpose, as it will allow for quick establishment.
 - The proposed spillway placement must connect with the downstream excavated channel that has a culvert below the R303;
 - No mixed concrete may be deposited outside of the designated construction footprint. The following recommendations must be adhered to:
 - Fresh concrete and cement mortar should not be mixed near the excavated channel. Preferably in the laydown area/construction camp, may not be mixed on bare soil, and must be within a lined, bound or bunded portable mixer. Consideration must be taken to use ready mix concrete;
 - No mixed concrete shall be deposited directly onto the ground within the excavated channel. A batter board or other suitable platform/mixing tray is to be provided onto which any mixed concrete can be deposited whilst it awaits placing;
 - A washout area must be designated outside of the excavated channel and dam footprint area, and wash water must be treated on-site or discharged to a suitable sanitation system. Wash water may not be discharged into the excavated channel without treatment;
 - Empty cement bags must be disposed of through the hazardous substance waste stream;
 - Concrete spillage outside of the demarcated area must be promptly removed and taken to a suitably licensed waste disposal site.
 - The inlet and outlet of the proposed spillway must be of equal width to allow water to enter the spillway and diffusely flow through the spillway and into the downstream excavated channel, without the flow being concentrated.
- Operation
- The dam and spillway should regularly be inspected for erosion, especially after heavy rainfall events when overflow from the dam is expected and the flow velocity is increased. If erosion is noted, this should be rectified, preferably reinstating vegetation in the eroded areas in the excavated channel. If erosion is pronounced, additional erosion control devices should be considered, in consultation with a freshwater ecological specialist;
 - If erosion is apparent on the dam wall, immediate measures such as strategic placement of hessian sheets or gum poles or stabilisation with sandbags must be taken in order to prevent additional erosion from occurring;
 - The spillway and excavated channel must be maintained free of any debris and silt/sediment that could block the system.
- Maintenance
- Control measures applicable to this activity would be as per Construction and Operation above. Additionally, the following is applicable:
 - During desilting, silt associated with the dam should immediately be removed in order to prevent sedimentation of the downstream excavated channel. Additionally, during desilting a temporary silt trap would be installed at the spillway and in the excavated channel. This would be emptied on a regular basis and not allowed to reduce the capacity of the dam.
 - During the site visit undertaken, no obligate freshwater vegetation species were noted in the drainage line. To increase the habitat of the immediate environment, indigenous obligate freshwater vegetation species should be established in the areas where extended periods of saturation would occur, such as within the drawdown area of the constructed dam; and
 - Implement an alien and invasive species control plan to prevent the establishment of such species.
 - The spillway should regularly be inspected for erosion, especially after heavy rainfall events when overflow from the dam is expected and the flow, velocity is increased. If erosion is noted, this should be rectified, preferably by the reinstatement of the embankments through compaction of soil and

revegetation thereof. If erosion is pronounced, erosion control devices such as reno mattresses should be considered, in consultation with a freshwater ecological specialist.

- The spillway should be maintained free of any debris and silt/sediment.
- During desilting, silt associated with the dam should immediately be removed to prevent sedimentation of the downgradient drainage line reach. Additionally, during desilting, a temporary silt trap should be installed at the spillway. This must be emptied regularly and not permitted to reduce the capacity of the dam.

It must be noted that the site specific mitigation measures listed above are for both the construction, operational and maintenance phases. However, the mitigation measures for the construction phase must also be noted, and should also be applied to the maintenance activities.

Objective: Mitigate and monitor alien plant invasion on the property

The landowner/ applicant is responsible for the removal of alien invasive plant species on their properties, especially within the riparian zone, downstream and upstream of the dam.

Mitigation Action:

- Removal of the invasive and alien plants should be according to the appropriate invasive plant clearing guidelines/ methods provided by the Working for Water Programme
- Alien and invasive plant species should be removed manually as far as possible, from the site as well as any areas on the property. All work will be done by hand (manually), either by pulling, using shears, hand saws or chainsaws (depending on the size of the tree). The use of vehicles or mechanical means for alien removal will be prohibited within the riparian zone.
- The use of herbicides should be avoided. However, only herbicides which have been certified and proved for wetland/ aquatic environments by an independent testing authority may be considered.
- No obligate freshwater vegetation species were noted in the drainage line. As per the freshwater specialist recommendations, to increase the habitat of the immediate environment, indigenous obligate freshwater vegetation species should be established in the areas where extended periods of saturation would occur, such as within the drawdown area of the constructed dam.
- An alien and invasive species control plan must be implemented to prevent the establishment of such species.
- Once alien species are removed, they may not be stockpiled on site, but must immediately be removed from the site and disposed of at a registered waste disposal facility;
- Any topsoil used are weed free to limit the establishment of alien and invasive vegetation species.

Objective: Mitigate the disturbance of habitat and compaction of soils up and down stream of the proposed sites due to maintenance activities.

Maintenance activities such as the indiscriminate movement of vehicles and personnel and the dumping of excavated materials may result in the disturbance of wetland vegetation and the compaction/ disturbance of soil located up and down stream of the proposed dam. Disturbance may also result in the proliferation of alien and invasive plant species.

Mitigation Action:

- Demarcate working area and put up signage to ensure maintenance activities only remain within the dedicated area
- Immediately rip compacted soil to a depth of 300mm and reprofile the area according to natural terrain units where any accidental disturbance to portions of the unchanneled valley bottom wetland falling outside of the demarcated maintenance footprint area has taken place.
- If the disturbed area will be prone to erosion (sheet runoff or formation of gullies), it is recommended that straw bales (not Lucerne or hay) are used to intercept the bulk of the runoff. The bales should be placed strategically along contour lines and pegged. Disturbance and removal of vegetation within the immediate vicinity of the area where the bales are placed should be kept to a minimum.
- Sediment should be cleared manually as needed.
- If stockpiling of materials is required, stockpiles must be placed 32m from the border of the drainage line
- Prohibit dumping of excess excavated material within the drainage line
- Once maintenance is completed, all waste i.e. rubble and equipment must be removed and disposed of in an appropriate manner as per the EMP.

Objective: Mitigate the increased stormwater runoff, erosion and sedimentation during maintenance activities

An increase in stormwater runoff from cleared, disturbed and compacted areas may result in an increase in stormwater flows and flow velocities into the aquatic habitat which can cause erosion. Earth moving activities can also result in an increase in the runoff of sediment onto the downstream aquatic habitat.

Mitigation Action:

- It is suggested that the maintenance of the dam should be undertaken during the dry summer months.
- Use should be made of existing roads to gain access to the proposed dam footprint area. Due to the relative accessibility of the site, no unnecessary crossing of the drainage line may be permitted. This will limit any further erosion of the drainage line and its downstream reach;
- Exposed soils to be protected using a suitable geotextile covering such as hessian sheeting.
- Ensure sediment control devices are in place before the start of the maintenance activities;
- Maintain sediment/erosion control devices to minimise the risk of sedimentation of the downgradient drainage line reach using silt traps;

Objective: Mitigate the increased stormwater runoff, erosion and sedimentation during maintenance activities applicable to the spillway

The spillway outlet of the dam should be constructed from energy dissipating structures (such as Armorflex or reno mattresses) to slow down the velocity of water inflow into the downgradient drainage line reach and preventing erosion thereof. This is to be maintained to prevent erosion and scouring of the drainage line where the overflow will be discharged;

Mitigation Action:

- At the outlet, rocks must be placed and vegetation established (if applicable considering the highly episodic nature of the system) to bind the soil of the bed, and to prevent erosion. This will also diffuse flow and lower the velocity of water into the lower reach of the drainage line. These are to be maintained, replaced or repaired
- Upon completion of any maintenance activities, all footprint areas should be revegetated with indigenous vegetation.
- The spillway should regularly be inspected for erosion, especially after heavy rainfall events when overflow from the dam is expected and the flow, velocity is increased. If erosion is noted, this should be rectified, preferably by the reinstatement of the embankments through compaction of soil and revegetation thereof. If erosion is pronounced, erosion control devices such as reno mattresses should be considered, in consultation with a freshwater ecological specialist.
- The spillway should be maintained free of any debris and silt/sediment.
- The dam wall must be revegetated after the construction activities, to stabilize the soils and prevent erosion of the dam wall. A graminoid seed mixture (such as the MayFord Fynbos Biomosome seed mixture) can be used for this purpose, as it will allow for quick establishment.
- The proposed spillway placement must connect with the downstream excavated channel that has a culvert below the R303;
- As a precautionary principle, it should be ensured that the spillway (when in use) does not cause erosion of the downstream excavated channel when water is flowing. As such, scour protection (either loose rocks or reno mattresses) must be placed at the base of the outlet to decrease the velocity of water and prevent erosion from occurring;
- The inlet and outlet of the proposed spillway must be of equal width to allow water to enter the spillway and diffusely flow through the spillway and into the downstream excavated channel, without the flow being concentrated.

Objective: Maintenance of the Dam Wall including inspections, desilting and leak detection.

Mitigate the run-off from which the potential to increase silt loads within the downstream drainage line due to desilting activities resulting in the Removal of vegetation (terrestrial and wetland) and Earthworks and silt stockpiling.

Mitigate the increase in water quantity which could cause extended periods of water saturation of the downstream drainage line reach due to leaks within the dam wall.

Mitigation Action:

- During desilting, silt associated with the dam should immediately be removed to prevent sedimentation of the downgradient drainage line reach. Additionally, during desilting, a temporary silt trap should be installed at the spillway. This must be emptied regularly and not permitted to reduce the capacity of the dam.

- Repair leaks as soon as possible, taking the mitigation measures above, and as specified in the EMP for construction activities.

Objective: Mitigate water quality impairment of the wetland habitat during maintenance activities

The movement of vehicles through the unchanneled valley bottom wetland increases the possibility of the contamination of the wetland by hydrocarbons which may leak from vehicles during maintenance activities. Runoff cement could also cause contamination of the wetland.

Mitigation Action:

- Avoid the use of infill material or maintenance material with pollution / leaching potential.
- Clean up any spillages (e.g. concrete, oil, fuel), immediately. Remove contaminated soil and dispose of it appropriately.
- Store fuel, chemicals and other hazardous substances in suitable secure weather-proof containers with impermeable and bunded floors to limit pilferage, spillage into the environment, flooding or storm damage.
- Inspect all storage facilities and vehicles daily for the early detection of deterioration or leaks.
- Dispose of used oils, wash water from cement and other pollutants at an appropriate licensed landfill site. Disposal of any of these within the valley bottom wetland should be strictly prohibited.
- Dispose of concrete and cement-related mortars in an environmental sensitive manner (can be toxic to aquatic life). Washout should not be discharged into the valley bottom wetland.
- Provide portable toilets where work is being undertaken. These toilets must be located at least 32m from the boundary of the valley bottom wetland and must be serviced regularly in order to prevent leakage/spillage.

Objective: Ensure discharge points do not become blocked with sediment, debris, driftwood/nuisance vegetation

Mitigation Action:

- Removal of blockages must be conducted by hand wherever possible
- Use of machinery should only be as a last resort
- All debris, sediment and nuisance vegetation should be removed and properly disposed off
- If vegetation does not establish after maintenance, revegetate discharge areas with wetland species indigenous to the area. Vegetation will aid in dispersing concentrated flows and will decrease the velocity and erosive potential of flows. Furthermore, the roots of vegetation will aid in binding the soils thereby reducing the possibility of erosion

8. METHOD STATEMENTS

Method Statements, as described in Section 7.6 of the EMPr, will be required for each of the objectives in Section 7 above.

A method statement forms the base line information on which sensitive area work takes place and is a “live document” in that modifications are negotiated between the Contractor and ECO/applicant, as circumstances unfold.

All method statements will form part of the MMP documentation and are subject to all terms and conditions contained within the MMP, and the EMP main document.

These documents must be available to the authorities for inspection or on request.

The Contractor must submit the method statement before any particular maintenance activity is due to start. Work may not commence until the ECO and applicant have approved the method statement.

Method statements need to be compiled by the contractor for approval by Applicant and the ECO.

9. RESPONSIBLE PARTIES

- **The Applicant/client** – the applicant (TSR Boerdery (Pty) Ltd is responsible for employing the Contractors for the duration of the maintenance work. The applicant will employ the ECO. The applicant/ client will ensure, as a signatory to the MMP, that the Contractor fulfil their obligation in terms of this MMP

The applicant will be held responsible for the correct implementation of the river maintenance management plan.

- **Principal agent** - the Principal Agent is appointed by the client and is responsible to the client for ensuring that the maintenance work is carried out to completion on time, in budget and that the Contractor fulfils their obligations in terms of the MMP. The Principal Agent and ECO are expected to develop a close working relationship and to communicate frequently. The Principal Agent must be recognized as the senior authority on site and all communications and instructions between the ECO and the Contractor must occur via the Principal Agent. The Principal Agent is also responsible for deducting environmental penalties from the Contractor. The Principal Agent must ensure that the Contractor has a copy of this MMP and all approved Method Statements and that the Contractor is familiar with the relevant documentation.
- **The ECO** – the ECO must be appointed prior to the commencement of any maintenance activities. The ECO will advise the Contractor of any environmentally related issues during the maintenance phase of the development.
 - The responsibilities of the ECO will include monitoring of compliance of the MMP by the contractor
 - The ECO has the authority to recommend the cessation of works or any portion of the maintenance activity to the Principal Agent. This will be triggered if in his/her opinion the activity has caused or will imminently cause significant damage and/or harm to the environment or is in contravention of the relevant environmental legislation/permits/authorizations applicable to the site and/or activity/ies.
 - If the Contractor fails to show adequate consideration to the MMP or the recommendations of the ECO, then the ECO may recommend that the Contractor’s representative or any employee/s

responsible for not showing adequate consideration to the MMP are removed from the site. Alternatively, the ECO may recommend that all maintenance work on site be suspended until the matter is remedied. All costs will be carried by the Contractor.

- Should modifications to this document be required, these must be agreed to by all parties concerned.

- **The Contractor** – the Contractor will adhere to the conditions of this MMP and ensure that all of its sub-Contractors, employees, suppliers, agents and so forth, for whom the Contractor is fully responsible for their actions on site, are fully aware of this MMP, its requirements and the consequences of any breach of the requirements of this MMP. The Contractor is fully responsible for implementing the MMP. The Contractor will ensure that works on site are conducted in an environmentally responsible manner and in accordance with the requirements of this MMP.

- **Problematic Issues** – should problematic issues arise, as identified by the ECO, the ECO has the authority to call a special meeting with the Principal Agent to address and rectify the matter.

9.1 CONTACT DETAILS OF APPLICANT/ CLIENT

Relevant parties	TSR Boerdery (PTY) LTD
Maintenance Proponent	Mr Theo van Rooyen
Landowner	Same as Applicant
Address:	P.O. Box 86 Koue Bokkeveld Ceres 6836
Email:	tsr@howbill.co.za

10. ENVIRONMENTAL AWARENESS TRAINING

The applicant (who is also the landowner) has been involved during the NEMA EIA application process and understands the implications of the recommendations made by the various specialists' reports, especially the freshwater specialist. By signing the declaration of understanding (**Appendix F**) the applicant declares that he understands his responsibility towards the implementation of the MMP and EMPr.

General awareness training will be given (as needed) in accordance with the EMPr.

- An ECO should be appointed prior to the commencement of any maintenance activities.
- The ECO should train the Contractor on site in order to ensure that all parties involved are familiar with the potential impacts and environmental risks of the maintenance and monitoring activities as well as the mitigation measures to reduce or avoid these impacts and potential pollution or degradation of the site and surrounding environment.

As a minimum, the following should be included in the awareness programme:

- Explanation of the importance of this MMP;
- Discussion of the potential environmental impacts of maintenance activities;
- Explanation of the management structure of individuals responsible for matters pertaining to this MMP;
- employees' roles and responsibilities, including emergency preparedness (also refer to **Section 7.11 of the EMPr**);
- Explanation of the mitigation measures that must be implemented when carrying out maintenance activities; and
- Explanation of the Environmental Do's and Don'ts (please refer to the **Appendix 3 of the EMPr** for the Environmental Education section).

Attention should be focussed on the following areas of sensitivity:

- Removal/ disturbance of riparian vegetation;
- Aquatic habitat disturbance
- Soil erosion and sedimentation; and
- Water Quality degradation due to siltation and debris.

The awareness training for the maintenance activities should aim to prevent, and where prevention is not possible, mitigate detrimental health, safety and environmental impacts. In particular, it should promote awareness of environmental risk and management thereof.

11. GENERAL CONTROL

The following additional general management activities and mitigation measures have been identified and should be implemented where required during the maintenance management activities:

Description of the Activity & Associated Impacts	Site Boundaries and No-Go Areas
Measures to be implemented during maintenance activities	<ul style="list-style-type: none"> • The Contractor must demarcate the boundaries of the site or area scheduled for maintenance during maintenance management activities as required. • The minimum area scheduled for the maintenance activities should be demarcated. • Access to the site during maintenance activities must be restricted to ensure to only the required personnel in order to gain access via the designated, controlled access points. Sensitive areas must be demarcated in conjunction with the ECO prior to any maintenance work starting on site.

Description of the Activity & Associated Impacts	Use of Materials Potential environmental impact as a result of the use/misuse of inappropriate materials
Measures to be implemented during maintenance activities	<ul style="list-style-type: none"> • The principle of “re-use and recycle” (i.e. try to use recycled materials) should be implemented as far as possible on site for all maintenance related activities. • The Contractor must at all times carefully consider the requirements of the NEMA Principles and take appropriate measures to implement such as far as practicably possible.

Description of the Activity & Associated Impacts	Occupational Health and Safety Potential health and Safety Impacts associated with the maintenance activities on site
Measures to be implemented during maintenance activities	<ul style="list-style-type: none"> • All people working on site are responsible for their own safety on site. • Contractors must at all times comply with the relevant statutory requirements including the Occupational Health and Safety Act, Act 85 of 1993. • A comprehensive site specific first aid kit must be available on site at all times. • At least one person trained in safety and first aid and familiar with the first aid equipment on site must be present on the site at all times. Emergency procedures must also be established prior to the start of maintenance operations on site.

Description of the Activity & Associated Impacts	Waste Management Possible pollution of or damage to the environment in the general areas of the site, as a result of incorrect or poor waste management.
Measures to be implemented during maintenance activities	<p>Liquid waste: (if machinery is used)</p> <ul style="list-style-type: none"> • Use of machinery should only be as a last resort • Liquid dispensing receptacles (e.g. lubricants, diesel, shutter oil etc.) must have drip trays beneath them/beneath the nozzle fixtures. • Material safety data sheets (MSDS) must be available on site (if required) where products are stored, so that in the event of an incident, the correct action can be taken. • Depending on the types of materials stored on site during the maintenance activities, suitable product recovery materials (such as Spillsorb or Drizit products) must be readily available. Vehicles should ideally be washed at their storage yard as opposed to on site. • Storm water must be managed in such a way that no overland flow is possible onto any area of the site which could contain potential contaminants (such as concrete mixing areas, material and hazardous storage areas from any adjacent area). <p>Solid waste:</p> <ul style="list-style-type: none"> • Waste must be categorized by the Contractor and disposed of in a suitable manner into separate waste streams (this includes general, hazardous and recyclable waste) only at authorised waste disposal facilities. • The Contractor must provide an adequate number of waste receptacles for the duration of the maintenance management activities for general waste at points around the site as well as for hazardous and recyclable waste. • Waste is to be disposed via a licensed waste disposal Contractor. • The frequency of collections/emptying of waste receptacles will be of such a frequency that waste receptacles do not overflow. Particular care must be taken with the disposal of materials that could be wind-borne or waterborne to ensure that the release of these materials is minimised (the latter is a requirement for hazardous waste). The use of netting covers or similar sealed containers must be implemented as and when required by the ECO. • Areas demarcated for specific activities including food consumption must have suitable waste receptacles provided. • Wherever possible recycling must be carried out. • No dumping within the surrounding area is to be permitted. No burning of solid waste is allowed. • All material used by the Contractor during the maintenance management activities must be managed in such a way that it does not cause pollution, or that it minimises pollution. In the event of a spillage, the Contractor should have suitably trained personnel who can correctly clean up any spillage in an efficient and environmentally sound manner.

Description of the Activity & Associated Impacts	Erosion Control Erosion of soil and material resulting along the impacted areas.
Measures to be implemented during maintenance activities	<ul style="list-style-type: none"> • Soil erosion on site must be prevented at all times. • Maintenance activities should preferably be undertaken in the low rainfall months when the potential for erosion impacts from the maintenance activities can be contained.

Description of the Activity & Associated Impacts	Fire Safety Potential fire risk associated with the maintenance activities on site.
Measures to be implemented during maintenance activities	<ul style="list-style-type: none"> • Fires and burning of waste on site should not be allowed. • Open fires will not be permitted anywhere on the site during the maintenance activities.

12. REHABILITATION SPECIFICATIONS AND SITE CLEAN-UP

The following measures have been identified to ensure that restoration and rehabilitation of the environment affected by the maintenance activity following the completion of these activity:

- The contractor shall be responsible for rehabilitating (vegetation planting etc. where applicable) all disturbed areas during the maintenance activities to the satisfaction of the ECO.
- Vegetation to be replanted shall be indigenous species that are endemic to that region only. Any invasive alien plants within the disturbed area should be removed according to objective in Section 7.1, and according to the guidelines provided in the Working for Water Programme.
- Any soil and vegetation cover removed during the maintenance activities should be replaced at the same level as the existing level.
- All areas where temporary services were installed are to be rehabilitated to the satisfaction of the ECO.
- The implementing agent shall clear and clean the site and ensure that everything not forming part of the permanent works is removed from site before issuing the completion certificate or as otherwise agreed.
- Any rubble or waste associated with the maintenance activities should be removed to an approved disposal site after the maintenance activity is complete.
- Burying or burning rubble or waste on the site is prohibited.
- The site is to be cleared of all litter following the completion of maintenance activities.
- All surfaces are to be checked for waste products from maintenance activities and cleared in a manner approved by the ECO.

13. ENVIRONMENTAL MONITORING & REPORTING

Monitoring aims to detecting changes that will inform intervention or remedial actions that might be needed to inform environmental performance. Monitoring will be done by physically walking the property, inspecting the dam itself as well as the aquatic habitat up and down stream of the dam.

Part of the watercourse that is monitored	Frequency of Monitoring	Monitoring procedure	How results are analysed and presented	Comments
<p>The riparian habitat up and down stream of the dam must be monitored.</p>	<p>Prior to the commencement of activities and after activities are complete. If necessary also during the maintenance activities.</p>	<ul style="list-style-type: none"> ➤ The ECO will visit the site during the maintenance management activities and ensure that conformance with the MMP. ➤ Guidance will be given to the implementing agent as required with regards to implementing the MMP. ➤ Photographs of the maintenance management activity will be taken as a record of the correct undertaking of the specific maintenance management activity. 	<p>The record of the site visit undertaken during the maintenance management activities will include the following:</p> <ul style="list-style-type: none"> ➤ Report which will illustrate what activity was undertaken at the site; ➤ Correct implementation as well as non-conformance of the MMP will be outlined; ➤ Recommendations to ensure conformance with the MMP in future maintenance management activities if required. ➤ Photographs of all maintenance management activities undertaken at the site. 	<p>The following in particular should be monitored:</p> <ul style="list-style-type: none"> • During desilting, silt associated with the dam should immediately be removed in order to prevent sedimentation of the downstream excavated channel. Additionally, during desilting a temporary silt trap would be installed at the spillway and in the excavated channel. This would be emptied on a regular basis and not allowed to reduce the capacity of the dam.

13.1 MONITORING REPORT

Monitoring report will focus mainly on physical site inspections aiming at early detection of erosion and the need for intervention and the measures to be taken. As such the monitoring report needs to address the following minimum criteria, namely the date of inspection, the portion of the river that was inspected, the result of the inspection and any actions that was or needs to be taken as well as photographs showing the site before and after the maintenance activity was completed.

The landowner is responsible to ensure a record of all maintenance activities is recorded as per the forms below. Form A and B below must also be sent to the Provincial Department of Agriculture, Directorate: Sustainable Resource Management.

The Department may, within a reasonable notice period, request to evaluate the maintenance activities and assess the maintenance sites as per the adopted MMP.

Form A should be completed at least 7 working days before the commencement of any maintenance activity and Form B at least 3 working days following the completion of the maintenance activity(ies). At least two photographs are required from two different points of perspective (A and B) looking at the site (coordinates of these points are required). When listing the type and reference code, this must be done by specifically listing the relevant detail within the adopted MMP.

REPORTING FOR INTENT TO UNDERTAKE MAINTENANCE ACTIVITIES – FORM A

Section A: Landowner Details

Name	Surname	Farm No.	Erf No.	Today's Date

Section B: Details of proposed maintenance activity

WUA/GA reference number and DEA&DP reference number for MMP.	Activity Type:	Reference code (make reference to MMP)	Footprint area (m²)	Volume of material (m³)

Equipment to be used:	Description of method for planned activity:	Date when work will commence:

Date of last flood event for site:	Note any further damage and comments regarding the state of the site

Section C: Photographs of activity location before maintenance

Before A	
Coordinates:	
S E	

Before B	
Coordinates:	
S E	

Date of photos taken:				
REPORTING COMPLETION OF MAINTENANCE ACTIVITIES – FORM B				
Section A: Landowner Details				
Name	Surname	Farm No.	Erf No.	Today's Date
Section B: Details of proposed maintenance activity				
WUA/GA reference number and DEA&DP reference number for MMP.	Activity Type:	Reference code (make reference to MMP)	Footprint area (m²)	Volume of material (m³)
Equipment that was used:	Description of method for completed activity and if the commence date changed			Date when work will commence:
Date of last flood event for site:	Note any challenges or difficulties experienced in following the MMP method statement			
Section C: Photographs of activity location after maintenance				
Before A Coordinates: S E				
Before B Coordinates: S				

E Date of photos taken:	
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