ECO ROUTE ENVIRONMENTAL CONSULTANCY

DRAFT OPERATIONAL ENVIRONMENTAL MANAGEMENT PROGRAMME

RECTIFICATION OF UNLAWFUL COMMENCEMENT OF LISTED ACTIVITIES: CLEARANCE OF INDIGENOUS VEGETATION, REPAIR AND ENLARGEMENT OF A DAM, AND THE ALTERING OF WATERCOURSES ON PORTIONS 17 AND 19 OF FARM AVONTUUR 166, HOEKWIL, GEORGE, WESTERN CAPE

DEA&DP Reference: 14/2/4/1/D2/30/0006/18

April 2019 – Revised November 2020

Compiled by:

Eco Route Environmental Consultancy
Tel: +27 (0)67 3911 243

TABLE OF CONTENTS

Appendix 4 of Regulation 982 of the 2014 EIA Regulations contains the required contents of an Environmental Management Programme (EMPr). The checklist below serves as a summary of these requirements:

(a) Details of (i) the EAP who prepared the EMPr; and (ii) The expertise of that EAP to prepare an EMPr, including a curriculum vitae.	This EMPr was prepared by Samantha Robertson of Eco Route Environmental Consultancy. Samantha has a BSS Geography and Environmental Management degree and has 6 years' experience as an Environmental Assessment Practitioner, of which she has spent 4 years at Eco Route. Samantha is currently based at Eco Route's Durban office. Please see attached CV of the EAP.
(b) A detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description.	This EMPr covers all aspects involved in the rectification of unlawful commencement of clearance of indigenous vegetation and the repair of a dam wall on portions 17 and 19 of farm Avontuur 166, Hoekwil, George, Western cape Section 2 provides specific project details.
(c) A map at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that should be avoided, including buffers	Section 2 provides GIS mapping which superimpose the proposed activity onto environmentally sensitive areas.
(d) A description of the impact management objectives, including management statements, identifying the impacts and risks that need to be avoided, managed and mitigated as identified through the environmental impact assessment process for all the phases of the development including – (i) Planning and design; (ii) Pre-construction activities; (iii) Construction activities; (iv) Rehabilitation of the environment after construction and where applicable post closure; and (v) Where relevant, operation activities	Addressed in Sections 3 and 9.
(e) A description and identification of impact management outcomes required for the aspects contemplated above.	Addressed throughout the EMPr, specifically in Sections 3 and 9.

(f) A description of the proposed impact management actions, identifying the manner in which the impact management objectives and outcomes contemplated above will be achieved and must, where applicable include actions to – (i) Avoid, modify, remedy control or stop any action, activity or process which causes pollution or environmental degradation; (ii) Comply with any prescribed environmental management standards or practises; (iii) Comply with any applicable provisions of the Act regarding closure, where applicable; and (iv) Comply with any provisions of the Act regarding financial provisions for rehabilitation, where applicable.	Addressed throughout the EMPr, specifically in Sections 4 and 9.
(g) The method of monitoring the implantation of the impact management actions contemplated above.	Section 6.
(h) The frequency of monitoring the implementation of the impact management actions contemplated above.	Section 6.
(i) An indication of the persons who will be responsible for the implementation of the impact management actions.	Sections 6, 8, 9 and 13.
(j) The time periods within which the impact management actions must be implemented.	Section 9.
(k) The mechanism for monitoring compliance with the impact management actions.	Sections 5 and 6.
(l) A program for reporting on compliance, taking into account the requirements as prescribed in the Regulations.	Section 6.
(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	Sections 8 and 9.
(n) Any specific information that may be	All required information has been addressed

required by the competent authority.	within this EMPr and annexures.

1. INTRODUCTION

In accordance with the Integrated Environmental Management Guidelines published by the Department of Environmental Affairs & Tourism (DEAT) 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".

National Environmental Management Act, (Act 107 of 1998)

(i) 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 Section 24G Environmental Impact Assessment Report dated November 2020, all specialist reports, and all Maintenance Management Plans. 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 projects 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.

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 phase of this project.

2. PROJECT DETAILS

Eco Route Environmental Consultancy has been appointed as independent environmental practitioners by the proponent, Petrus Willem Turvey, 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, repair and enlargement of a dam, and the altering of watercourses on portions 17 and 19 of farm Avontuur 166, Hoekwil, George, Western Cape'.

The Farm Avontuur 166 is approximately 128 0000 m^2 in extent, however the activity footprint is approximately 124294 m^2. The property abuts, and is partially within, the Wilderness Protected Environment (previously the National Lakes Area), abutting the proclaimed Wilderness National Park managed by SANParks.

Portion 17/166

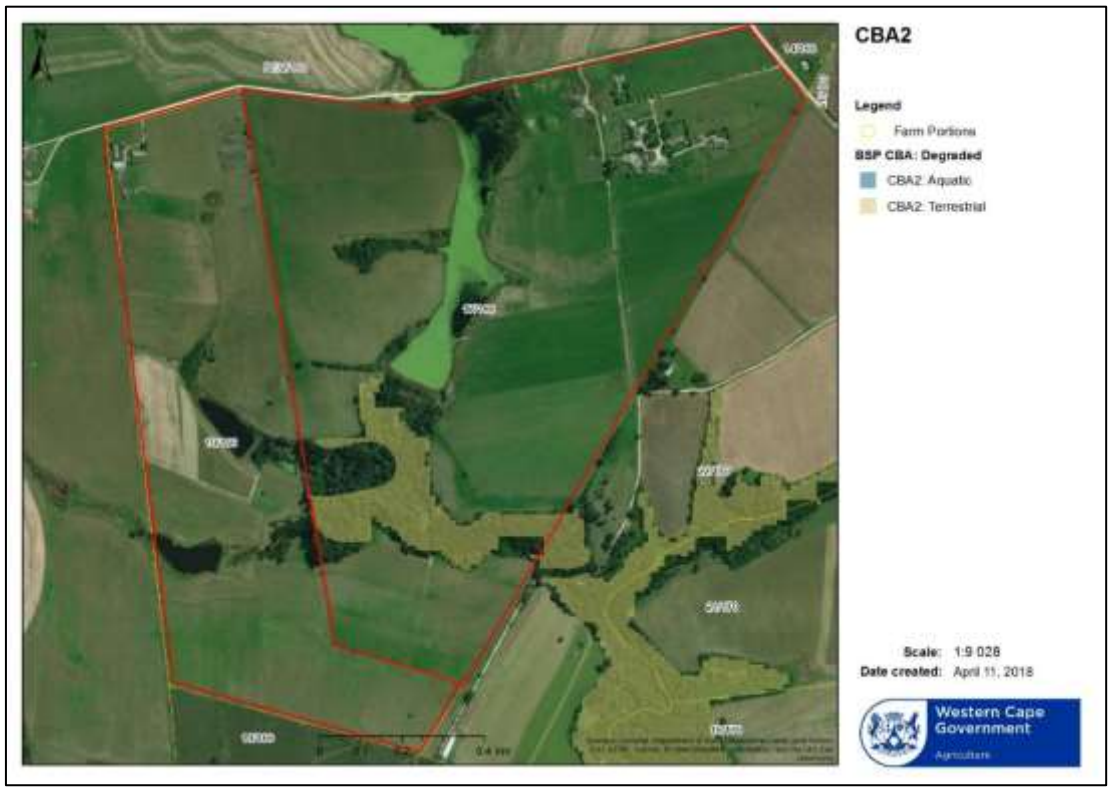
The landowner commenced with the clearing of vegetation to expand the area of Macadamia orchards. Due to excavations and infilling of the wetland area approximately 80m of an unnamed watercourse was straightened and has resulted in loss of riparian vegetation. The applicant had excavated and straightened the watercourse to remove the decaying carcasses of cattle buried within the river by the previous owner. Approximately 12.43ha of indigenous and alien invasive plant species were cleared.

Portion 19/166

Dam 1 (as per below) was enlarged, increasing its footprint and water storage capacity from 25 000m^3 to 75 000m^3. The dam wall before construction was not surveyed; however, it was estimated to be approximately 3m in height. The dam wall "as built" now measures 6.9m in height.

Access: Site access exists via Divisional Road DR01629

Locality Map of farm Avontuur 166, George Municipality



Critical Biodiversity Areas

Ecological Support Areas

3. IMPACTS ASSOCIATED WITH THE OPERATION OF THE ACTIVITY

Impacts on geographical and physical aspects:	
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 reversible
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:	If deemed necessary, an EWR should be calculated for Dam 1. It is also proposed that the spillway of the dam be redirected down Drainage Line A. As previously mentioned, if any repair work is to be done in future to Dam 2 and 3, an EWR should be calculated for these as well.
Cumulative impact post mitigation:	Low – Medium negative
Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	Low negative

Impacts on geographical and physical aspects:	
Nature of impact:	Water quality impairment
Extent and duration of impact:	Site related. Medium term
Probability of occurrence:	Definite
Degree to which the impact can be reversed:	Partly reversible
Degree to which the impact may cause irreplaceable loss of resources:	Marginal loss

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:	The freshwater system (unnamed stream, drainage lines and wetland areas), are to be properly rehabilitated and re-vegetated with appropriate vegetation. It is proposed that a River Maintenance and Management Plan be followed for this area.
Cumulative impact post mitigation:	Low negative
Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	Low negative

Impact on biological aspects:	
Nature of impact:	Loss of riparian, aquatic and terrestrial vegetation
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:	Setback from Watercourse and steep slopes; rehabilitate watercourse area; install berms and anti-erosion measures; side/drains / culverts for access tracks; no instream dam.

	The whole freshwater system (unnamed stream, drainage lines and wetland areas), are to be properly rehabilitated and re-vegetated with appropriate vegetation. A guided alien vegetation removal plan should also be followed for the remaining alien vegetation on site. All future agricultural practices should be kept outside of the 30m buffer area, and if the dam walls of Dam 2 and 3 are to be repaired in future, an EWR should be determined for these as well.
Cumulative impact post mitigation:	Low - Medium negative
Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	Medium negative

Impact on biological aspects:	
Nature of impact:	Spread of alien plants
Extent and duration of impact:	Limited to the site – long term
Probability of occurrence:	Definite
Degree to which the impact can be reversed:	Partly reversible
Degree to which the impact may cause irreplaceable loss of resources:	Marginal loss
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 – High
Proposed mitigation:	Alien plants must be continually removed from disturbed (and other) areas. This activity should commence immediately as there are already a

	number of alien plants regrowing in disturbed areas.
Cumulative impact post mitigation:	Low
Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	Low negative

Impacts on the socio-economic aspects:	
Nature of impact:	The activity has created 20 new employment opportunities
Extent and duration of impact:	Local and Long-term
Probability of occurrence:	Definite
Degree to which the impact can be reversed:	N/A
Degree to which the impact may cause irreplaceable loss of resources:	N/A
Cumulative impact prior to mitigation:	Increased job security may contribute to improved living standards and social wellbeing within the community.
Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High)	Low – Medium positive
Degree to which the impact can be mitigated:	N/A
Proposed mitigation:	N/A
Cumulative impact post mitigation:	N/A
Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	N/A

3.2 Specialist inputs and recommendations

As per the Freshwater Impact Assessment compiled by Everwater, February 2018 - Please note that "Dam 2" referred to in this specialist report is named as "Dam 1" in this EIR and other specialists reports**:**

In order to get a good representation of the present ecological state of the affected stream, a formal River Habitat Integrity (IHI), Present ecological state, Wetland Habitat Integrity (PES), EIS (Ecostatus level III), Wetland function and REC assessment together with a wetland delineation were conducted.

River Assessment:

From both the IHI and PES assessment, both the riparian and instream integrity of the freshwater system at the confluence was found to be in a seriously to critically modified state, improving further downstream towards the Bo-Langvlei to Largely Natural/Moderately modified state. The degraded state at the study site can be attributed to both upstream impacts as well as that caused by the unlawful activities. Upstream from the dam several instream dams occur within the stream channel, abstracting a significant amount of the flow that would naturally exist in the stream together with farm lands adjacent to the stream often encroaching onto the little riparian area still left. At the study site, unlawful activity has led to the complete modification of the streams, where most vegetation has been removed, the stream channels and banks modified and wet areas filled in at places. The enlargement of Dam 2 and redirection of overflow towards Dam 3, has also lead to no release down drainage line A and thus a cessation of this stream towards the confluence.

The Ecological Importance and Sensitivity for this freshwater system in its current state was found to be Low. (differing greatly from the larger quaternary catchment, K30D which is very high). This stream in its unmodified state were most probably relatively sensitive to flow modifications and had only a small capacity for use, although in its current state poses a much lower EIS.

Regarding EWR, taking into account the small catchment area of the enlarged dam, the impact of abstraction on the larger quaternary catchment area would be negligible. In terms of aquatic ecosystems downstream of the dam, a complete loss of water in the smaller system would lead to the loss of aquatic and riparian vegetation around the confluence of the streams. Dam 1 and Dam 3 both have leaking dam walls which at present feed into two of the three streams. With the wetland areas present in the previous channel of Drainage line 2, it would be proposed that Dam 2 spillway be redirected to flow down drainage line 2 when overflowing and some sort of release is incorporated into the dam operation rules. Comment can only be made on the EWR as soon as the real capacity of the dam is known.

Wetland Assessment:

As mentioned, several small channelled valley bottom wetland areas were found along the confluence of the three streams, being fed largely by groundwater inflow as well as overland flow. From the Wetland IHI assessment, the present ecological state of the larger wetland area was found to be in a Seriously modified state, where a large loss of natural habitat, biota and basic ecosystem functions has occurred. The main impact on this section of the wetland, is the major loss of natural vegetation due to the excavation and infilling of some parts together with the construction of the new dam wall, reducing all water supply down the stream channel.

The EIS score for the wetland unit on site was found to be Low, and could largely be attributed to the fact that this wetland area has been significantly transformed. In its natural, pristine state, it would have probably have scored a Moderate to high EIS score.

The key services provided by the wetland area includes limited maintenance of biodiversity, carbon storage, phosphate trapping and streamflow regulation.

According to the Buffer Zone Tool for the Determination of Aquatic Impact Buffers a 30m buffer

area is proposed for all freshwater features found on site.

The REC deemed appropriate for the watercourse/wetland features is a C.

The greatest impact caused by the unlawful activity, is that of loss of habitat and biodiversity, with some flow modification and some erosion and sedimentation issues. Recommendations made in order to mitigate these impacts include the following:

- The whole freshwater system falling within the study area (unnamed stream, drainage lines and wetland areas), are to be properly rehabilitated and re-vegetated with appropriate vegetation. This is to be done according to a formal rehabilitation plan as prepared by botanical or freshwater specialist.
- A guided alien vegetation removal plan should be followed for removal of the remaining alien vegetation on site.
- The dam capacity of Dam 2 should be calculated in order to determine an EWR (if required) which should then be addressed on a practical level. It might be sufficient that the spillway be redirected into Drainage line A.
- All future agricultural practices should be kept outside of the 30m buffer area, and if the dam walls of Dam 1 and 3 are to be repaired in future, an EWR should be determined for these as well.
- It is proposed that a River Maintenance and Management Plan be followed for any future work in this area.

As per the Biodiversity Impact Assessment compiled by Cape Vegetation Surveys, March 2019:

Environmental Risks

Encroachment into wetlands / watercourse area:

The activity has encroached into forest and riparian habitat and flat bench or channelled valley bottom wetlands. It is advised that adequate setbacks (between 30 and 60 metres) are implemented to prevent erosion and increased stormwater velocity. The removal of all vegetation within the watercourse area is concerning as this may increase the velocity of water flow and cause erosion and further incise the valley bottom lands downstream and increase the potential for flooding. the realignment of the watercourse in two places will change the flow velocity and it is recommended that the riverbanks be rehabilitated with vegetative cover. When felling trees the debris piles should be placed away from watercourses and used for mulch and slope stabilization.

Increased wildfire and erosion risk with Invasive Alien Species:

The current infestation of Black Wattle (*Acacia mearnsii*), Blackwood (*Acacia melanoxylon*) and to a lesser extent *Eucalyptus cladocalyx* remaining within the study area and adjacent forested watercourse areas is a high risk in terms of increasing the potential for a wildfire at the property. The high biomass levels can damage the soil structure and fuel load and debris act as "fire ladders" which penetrate into forest. In addition Black Wattle on steep slopes tend to destabilize the ground layer often falling over and damaging slopes and river banks. This increases the risk of erosion of watercourses and facilitates headcuts of streams or rivers due to shading / destroying of indigenous flora and collapsing of banks. Whereas the cultivated area at the property presents a

low fire risk.

The remaining infested area needs to be cleared of Invasive Alien Species. It is recommended that clear-felling be conducted without the use of heavy machinery with plant biomass and debris stacked into heaps for either chipping and mulching or burning.

Conservation and Rehabilitation

The watercourse area could be rehabilitated either passively (allow to further rest) and / or actively (intervene by sowing wild collected local seed and replanting). Rehabilitation is a positive impact for conservation of biodiversity and associated ecosystem services provided by it.

The uncleared remaining pockets of mature indigenous trees within the watercourse afford refuge for raptors and are a plant propagule source for natural succession into the area and worthy of conservation for biodiversity. Planting indigenous trees and shrubs along the realigned riverbank will ameliorate loss of habitat for wildlife and assist with bank stabilization.

Restoration and reducing impacts on ecological processes and structural functioning is key for biodiversity and ecosystem services provided by indigenous vegetation and watercourses, and also allowing for movement of fauna and avifauna.

It is recommended that no further cultivation occur within the ecological setback area as recommended by the aquatic report; and as a minimum at least 32 metres from the riverbank.

Recommendations for cultivation (should it be approved)

It is proposed to cultivate most of the level plateau terrain with adequate setbacks from watercourses and abutting slopes. A trade off for use of the land for agriculture will be to conserve the remainder of the riparian and forest habitat, and rehabilitate areas to near-natural and plant select species, with a phased removal of spreading and existing invasive alien plant species from the property.

A biodynamic approach could be done within the orchards by planting either exotic or indigenous cover crops like nitrogen-fixing plants or annual grasses and herbs within the ridged plant beds.

The No-Go Alternative

Should no development of cultivation occur at the property; and if the land at the study area is left unmanaged the cleared areas and realigned riverbanks would become further infested with Invasive Alien Species and further compromise ecological and hydrological functioning. An unchecked infestation of Invasive Alien Species may increase fire risk; or increase the potential for erosion of riverbanks.

Mitigation and Recommendations for management

Rehabilitate the valley bottom wetland and watercourse habitat and minimize impacts on ecological processes and ecological infrastructure functioning by an adequate ecological setback. Allow for natural flows and prevent erosion. Manage the wetland areas for conservation

and mitigation of runoff and natural filtration.

Prevent the spread of invasive alien plant species from entering or dispersing downstream from set aside natural areas.

Install contour berms where erosion has occurred to ensure that no new erosion pathways are formed, and inspect for new arrivals of Black Wattle or other Invasive Alien Species.

Ensure drainage and runoff is managed to prevent erosion and soil loss, with natural instream vegetation retained within watercourses.

Utilize remaining stack piles and debris along contours for mitigation against erosion and soil loss by wind and water.

Install a culvert over the watercourse at the new access track.

As per the Dam Safety Report compiled by Gorra Water, August 2020:

Site details -

The dam inundates approximately 1.7ha to store 75 064m3 with an approximate embankment volume of 19 082m³ resulting in a 1:3.93 wall-to-storage ratio.

The main affected area during a dam break scenario, is the dam safety risk to AD2, the Toorbos River and Rondevlei village. This is countered by a dam safety assessment and compliance ito the requirements of the internationally accepted South African National Commission on Large Dams (SANCOLD) standards.

Hydrology of the Spillway –

At this stage of the process the Avontuur Dam 1/ AD1 is assumed (NOT BY THE DAM SAFETY OFFICE) to be a Small sized dam with a Significant hazard potential, as a Category II dam. The criteria outlined in the 1991 SANCOLD guidelines [25] on dam safety evaluation and the Groundwater Complete report4 were adopted for review purpose of this assumption. The highest value of the RM 100 year flood event of 6mm3/s (see the Rational Method result in Table 3 of the Groundwater Complete Report) can be routed through the spillway without overtopping and received by AD2 adjacent to AD1.

The Design Flood, the Safety Evaluation Flood and Extreme Flooding conditions were considered and found to be safely accommodated the existing spillway crest and available freeboard.

- Dam site and basin –

Left Flank

Weathered products and soils of the Cape Granite suit is exposed originally covered with a thin

overburden of soils. The exposed left flank slope to be stable over the 4 years since AD1 was enlarged.

Central Section

The central section was the primary source of embankment material and permeability of this exposed inundated surface resulted in minor and insignificant seepage typical of an earth embankment of this size and water depth.

Right Flank

Again, weathered products and soils of the Cape Granite suit is exposed originally covered with a thin overburden of soils.The exposed left flank slope has proofed to be stable over the 4 years since AD1 was enlarged.

Dam Basin

It is unlikely that major slope failures may occur within this area (keeping the adjacent Kaaimans Group in mind which did fail near Kaaimans Rail Bridge), although localised small-scale slope failures of unconsolidated material are possible during saturation of the slopes. No economic deposits occur within the dam basin. The possibility of fractures leading to major dam water loss through seepage has proven not to exist during the 4 years service period of the AD1.

Engineering Assessment

The geological assessment is satisfied that the AD1 site is geologically suited to a zoned embankment dam with a central clay core, and geomorphically, the side channel spillway was appropriately constructed. The rock permeabilities are generally very low and the majority of the rock mass can be considered to be nearly impervious. The spillway draining to the adjacent AD2 non dam safety dam, proved to be adequately serviced by the local geology under smaller and more extreme flooding.

Excavation Depths

Excavation depths for the AD1 embankment dam range from 1.5m on the left flank, to 3m in the central section, and to 1 m on the right flank. No outlet pipe was installed and should it be directed after Classification, the founding material would demand a concreted encased unit.

Spillway –

Design Approach

The spillway is sized with the objective to discharge excess inflow in a controlled manner, safely and effectively without endangering the AD1 dam itself or downstream AD2 Dam, inhabitants/pedestrians or vehicular traffic on road R622.

Spillway Selection

The spillway selection and constructed was based on operational management of valuable irrigation water efficiency and costs. The following options were considered:

i. Conventional mass concrete spillway with the length of spillway 176,6m - rejected.

ii. A concrete "morning glory" type spillway - rejected.

iii. A 17660 meter uncontrolled earth side channel spillway - implemented.

An uncontrolled earth side channel spillway was selected and constructed, since it:

i. Satisfied the operational criteria ;

ii. Is more economical than the central trough option and the morning glory type.

This existing spillway's backwater impact was found to be insignificant and acceptable.

Energy Dissipation

The proposed means of energy dissipation were considered with the methods in Kroon [18] and Novak [20] as guideline. As the spillway is an earth structure, the energy dissipation along the spillway was also taken into consideration. The results were that the following three options were considered:

i. The existing side spill uncontrolled earth spillway with no dissipating structure discharging into the smaller dam – accepted and constructed

ii. The United States Bureau of Reclamation USBR) Type 3 Stilling Basin - rejected;

iii. A Hydraulic Jump - rejected

iv. A Ski-jump option - rejected.

The existing side spill uncontrolled earth spillway discharging into the smaller dam proved to be the most favourable option. This earth structure is a varying 8m wide and with a freeboard at inlet of 1.34m high. This was tested against the basis of the 6.0m3/s design flood, and the corresponding tail-water depth of 0.20m.

It is recommended that the possible erosion due to energy dissipation where discharging into the AD2 Dam be monitored.

RIVER OUTLET

No under embankment pipeline is available as an outlet works. The outlet is a floating unit serving irrigation requirements. The discharge rating curve for the e l e c t r i c a l p ump i s

available. This floating unit pump is partly able to empty the Avontuur Dam No 1 in the case where an emergency rapid drawdown is required.

Please consult the dam safety report in Appendix H for construction details.

CONCLUSIONS AND RECOMMENDATIONS –

The layout option was considered for the FSL of 207,66 mamsl. The conclusion is reached that based on structural integrity, hydrological capacity in terms of floods that the AD1 can comply with a conservative Dam Safety Classification of Medium Sized Category 2 dam – obviously with the Authorisation and final Classification of the Dam Safety Office.

4. LEGISLATIVE REQUIREMENTS

4.1 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 Proponent), 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.

4.2 Legislation

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

LEGISLATION	ADMINISTERING AUTHORITY	TYPE Permit/ license/ authorization/comment
BILL OF RIGHTS – CHAPTER 2 OF THE SOUTH AFRICAN CONSTITUTION	All State and Provincial Departments as well as Local Authorities	RELEVANT CONSIDERATION
NATIONAL WATER ACT 1998	Department of Water and Sanitation	LICENSE
NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998 (ACT NO 107 OF 1998)	Western Cape Government Environmental Affairs and Development Planning	AUTHORIZATION

NATIONAL ENVIRONMENTAL MANAGEMENT AMENDMENT ACT (ACT 62 OF 2008)	Western Cape Government Environmental Affairs and Development Planning	AUTHORIZATION
ENVIRONMENTAL CONSERVATION ACT (ACT 73 OF 1989)	Western Cape Government Environmental Affairs and Development Planning	RELEVANT CONSIDERATION
NATIONAL ENVIRONMENTAL MANAGEMENT: BIODIVERSITY ACT (ACT NO 10 OF 2004)	Western Cape Government Environmental Affairs and Development Planning	RELEVANT CONSIDERATION
WESTERN CAPE NATURE CONSERVATION LAWS AMENDMENT ACT (ACT 3 OF 2000)	CapeNature	COMMENT/ RELEVANT CONSIDERATION
CONSERVATION OF AGRICULTURAL RESOURCES ACT (ACT 43 OF 1983)	Department of Agriculture	RELEVANT CONSIDERATION/ LICENSE
NATIONAL HERITAGE RESOURCES ACT (ACT 25 OF 1999)	South African Heritage Resources Agency / Western Cape Heritage	RELEVANT CONSIDERATION

4.3 Project Responsibilities

Responsibility for the implementation of the EMPr lies with the Proponent 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.
- 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 Proponent, Site Manager and the ECO. A tabulated synopsis of relevant responsibilities is appended hereto.

5. REPORTING PROCEDURES

5.1 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.

5.2 Environmental Register

The Proponent 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.

5.3 Non-Conformance Report

A Non-Conformance Report (NCR) will be issued to the Proponent 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 Proponent in writing. Preceding the issuing of a NCR, the Proponent 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 Proponent should sign the Close-Out portion of the Non-Conformance Form and file it with the contract documentation.

5.4 Environmental Emergency Response

The Proponents 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.

6. COMPLIANCE WITH THE EMPr

6.1 Monitoring and Compliance

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

- The ECO has the authority to instruct the Proponent 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 Proponent) 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).

6.2 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

6.3 Non-Compliance

Definition

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

- Any deviation by the Proponent from the environmental conditions and requirements as set out in the EA and EMPr - or;
- Any contravention by the Proponent 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 Proponent 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.

6.4 Issuing a Non-Compliance

Non-compliance may be issued to:

- The Proponent
- Any representative of the Proponent

6.5 Process of Issuing Non-Compliance

The appointed Environmental Control Officer (ECO) may issue a formal non-compliance to the Proponent. A copy of the non-compliance issued will be placed in the EMPr file. The Proponent 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.

6.6 Failure to complete corrective actions

In the event that the Proponent 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 Proponent.

The Proponent 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 Proponent or any of his staff.

On receiving a notice of non-compliance the Proponent 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 Proponent'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.

6.7 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.

7. 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.

8. 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:

Responsibility	Name of Responsible Party
Proponent	**Mr Petrus Willem Turvey**
Environmental Control Officer/ ECO	**(To be appointed)**
Site Manager	**(To be appointed)**

9. ENVIRONMENTAL MANAGEMENT PROGRAMME

9.1 OPERATIONAL PHASE

Activity	Management / Mitigation	Responsibility	Frequency / Timing
Authorisations, Licences and Permits	**Environmental Authorisations**		
	All necessary authorisations, permits and licences must be obtained by the Proponent.	Proponent	Once-off
Appointment of Environmental Control Officer	**Appointment of Environmental Control Officer**		
	An Independent ECO must be appointed at the Proponent's cost to monitor the implementation of the EMPr.	Proponent & ECO	Once-off
	The nomination of the ECO must be given to DEA&DP, in writing. 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
Preparation of Method Statements	**Method Statements**		
	Method Statements must be submitted by the Proponent to the ECO and must be adhered to by the Proponent. These relate to water and stormwater management requirements, solid waste management requirements, the storage of hazardous materials (if applicable), and standard emergency procedures.	Proponent	Once-off
	The ECO will monitor the implementation of the Statements.	ECO	On-going
Notifying Relevant I&APs	**Notice of Environmental Authorisation (EA)**		
	A written notice must be given to all relevant I&APs notifying them of the EA.	Proponent	Once-off

Activity	Management / Mitigation	Responsibility	Frequency / Timing
	The notice must include a date on which the EA was received and the reference number for the EA.		
Education of Site Staff on General and Environmental Conduct *A general regard for the social and ecological wellbeing of the site and adjacent areas is expected of the site staff.*	**Environmental Awareness and Training**		
	Operational 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
	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. 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.		
	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. The induction training will, as a minimum, include the following: ➢ The importance of conformance with all environmental policies; ➢ The environmental impacts, actual or potential, of their work activities; ➢ The environmental benefits of improved personal performance; ➢ 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 ➢ The mitigation measures required to be implemented when carrying out their work activities.		
	All contractors, sub-contractors and casual labourers must acknowledge their	ECO	Once-off

Activity	Management / Mitigation	Responsibility	Frequency / Timing
	understanding of the EMPr and environmental responsibilities by signing an induction attendance record.		
	Staff, operating equipment, shall be adequately trained and sensitised to any potential hazards associated with their tasks.	Proponent	During staff induction, followed by on-going monitoring
	Translators are to be used where necessary during staff training.	ECO	
	The ECO must be on hand to explain more difficult / technical issues and to answer questions which may be raised.	ECO	
	Staff must be made aware that they are not to make excessive noise e.g. shouting, hooting.	ECO & Proponent	
	All employees must undergo the necessary safety training and wear the necessary protective clothing at all times.		
	No alcohol / drugs to be present on site; no vehicles or machinery are to be operated whilst under the influence of alcohol or drugs.		
	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.		
Site Management	**Access**		
	No vehicles may drive onto the adjacent properties and any other no-go areas.	Site Manager	On-going

Activity	Management / Mitigation	Responsibility	Frequency / Timing
	Site Management		
	Adequate drainage and erosion protection must be provided around the site and where necessary.	Site Manager	On-going
	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.		
Sewage and Sanitation	**Ablutions**		
	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 regularly.		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.		
Social Impacts	**Communication Between Site Manager, Site Staff and I&APs**		
	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 Proponent/ 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.		
Equipment lay-down and storage	**Storage Areas**		
	Choice of location for equipment lay-down and storage areas must take into account prevailing winds, distances to water bodies, general on-site topography and water erosion potential of the soil. Impervious surfaces, bunded	Site Manager	On-going

Activity	Management / Mitigation	Responsibility	Frequency / Timing
	areas or drip trays must be provided where necessary.		
	Equipment lay-down and storage areas must be designated, demarcated and signed.		
Conservation of the Natural Environment	**Erosion and Stormwater Control**		
	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 from the site.		Immediately
	Erosion prevention and control measures must be implemented. This may be by the use of mulch bags or silt fences.		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.		
	Fauna and Flora		
	Areas which are identified by the Environmental Control Officer (ECO) as being ecologically sensitive and which are adjacent to the site are to be suitably demarcated to prevent damage by operational practices. 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
	The ECO must identify and make known to the team all Red Data listed vegetation species. All permits for the removal/ translocation of the identified protected vegetation species must be obtained prior to any ground clearance from the Department of Agriculture, Forestry and Fisheries (DAFF).		On-going

Activity	Management / Mitigation	Responsibility	Frequency / Timing
	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
	When removing alien invasive plants from the riparian area, caution must be taken to ensure that indigenous species are not being removed and all embankments are stable. Indigenous plants must be planted immediately to rehabilitate these areas.		
	Disturbance to birds, animals and reptiles and their habitats must be minimized wherever possible.	Site Manager	
Conservation of Water Resources	**Water Sources**		
	The use of water from the farm dam is not permitted without a Water Use License.	Site Manager	On-going
	Under no circumstances may any materials or waste generated from the project be disposed of into the farm dam.		
	All parked vehicles/ trucks must have drip trays placed underneath the vehicle where potential leaks may occur.	Site Manager	On-going
Waste Management	**On-Site Waste Management**		
	The excavation and use of rubbish pits is forbidden.	Site Manager	On-going
	Burning of waste is forbidden. *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.*		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-		

Activity	Management / Mitigation	Responsibility	Frequency / Timing
	recyclable and disposed of accordingly.		
	All waste generated during operation 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).		
Handling of Hazardous Materials (if necessary)	**Hazardous Materials**		
	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.	Site Manager	On-going
	Cement and other potential environmental pollutants must be stored within an impermeable bunded, roofed and sign posted area.		
	Cement and other potential environmental pollutants must be mixed on an impermeable surface that is bunded to prevent the leakage of pollutants onto the ground (if necessary).		
	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.		
	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.		
Cultural Environment	**Archaeology and Artefacts**		
	No structures older than sixty years or parts thereof are allowed to be demolished altered or extended without a permit from Heritage Western Cape.	Site Manager	On-going
Safety and Security	**Safety and Security On-Site**		
	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		

Activity	Management / Mitigation	Responsibility	Frequency / Timing
	firefighting procedures.		
	No unauthorised person may be permitted to enter the site without prior permission of the site manager.		
	Vehicle speeds shall not exceed 45km/h along dust roads or 20km/h when traversing unconsolidated and non-vegetated areas		

9.2 REHABILITATION AND MAINTENANCE

***All rehabilitation measures must be implemented with consultation with the Freshwater Impact Assessment and Biodiversity Survey and Alien Invasive Plant Control Plan**

Activity	Management / Mitigation	Responsibility	Frequency / Timing
Vegetation Rehabilitation	**Vegetation**		
	A 100% indigenous planting plan must be adhered to in terms of all planting carried out on the site. Please consult the attached Freshwater Rehabilitation Report and Biodiversity Impact Assessment.	Proponent, Site Manager & ECO	On-going site maintenance
	Erosion prevention and control measures must be fully implemented (if necessary).		
	All rehabilitated areas must be maintained through weekly inspections until the 80% success rate has been achieved (if applicable).		
	Encroachment of invasive alien plants in this regard will need to be monitored on a regular basis to prevent re-infestation.		
Stormwater Management	**Stormwater**		
	Any negative stormwater effects, related to the operational phase, must be remediated.	Proponent & Site Manager	On-going site maintenance

Activity	Management / Mitigation	Responsibility	Frequency / Timing
	On-going monitoring and assessing of stormwater drainage must occur on site during the operational phase of the proposed project.		

10. 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

- Timeous 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.

10.1 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 0f 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.

10.2 Top 10 Alien Vegetation Affecting the Western Cape (Cape Nature, *Alien vegetation management*, 2016)

COMMON NAME	BOTANICAL NAME	PLANT TYPE	CATEGORY	IDENTIFICATION
Australian myrtle	*Leptospermum laevigatum*	Tree	1	

Black wattle	*Acacia mearnsii (Fabaceae)*	Tree	2	
Blackwood	*Acacia melanoxylon*	Tree	2	

Cluster pine	*Pinus pinaster*	Tree	2	
Long-leafed wattle	*Acacia longifolia*	Shrub	1	

Port Jackson	*Acacia saligna*	Tree	1	
Rooikrans	*Acacia cyclops*	Shrub/ tree	1	

Silky hakea	*Hakea sericea*	Shrub	1	
Spider gum	*Eucalyptus conferruminata*	Tree	1	

Stinkbean	*Paraserianthes lophantha (Fabaceae)*	Shrub/tree	1	

10.3 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 operation 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 composed. 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.

11. Species Planting List

Please consult with a Botanical specialist for a comprehensive list.

12. STAFF CONDUCT CONTROL AND INFORMATION SHEET

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

13. RESPONSIBILITIES

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

FUNCTION	RESPONSIBILITY
Proponent	• The Proponent is ultimately responsible for the ensuring compliance with all the requirements associated with the operation, rehabilitation and decommissioning phases of the project.
Site Manager	• 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. • The site manager is required to adhere to the EMPr and is responsible to ensure that all staff appointed also adhere the EMPr. • Ensures that all staff are made aware of the need to conduct activities in an environmentally responsible manner. • (Site Manager) On instruction by the ECO, ensures that storm/surface water controls are established. • Ensures prompt remediation of any sewage spills. • Stockpiles are protected from aeolian effects, stormwater effects, or being driven over by workers. • Ensures that a "clean-site" policy is applicable at all times. • Ensures that all complaints by residents are dealt with promptly. • Is responsible for any contravention/s by staff or any non-compliance with the EMPr.
Environmental Control Officer (ECO)	• 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. • The ECO must report on the environmental aspects of the project to the responsible person/authority at agreed intervals. • The need for any deviations or variations in the environmental conditions must be reported to the DEA&DP for approval prior to these being undertaken. • The ECO must be fully cognisant with the contents of the Environmental Authorisation as well as this EMPr and any other applicable legislation
Competent Authority	• The Compliance Officer appointed by the Competent Authority is responsible for the ensuring that the Proponent, Site Manager and ECO are compliant with the provisions of the EA and EMPr.

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 UNLAWFUL COMMENCEMENT OF LISTED ACTIVITIES: CLEARANCE OF INDIGENOUS VEGETATION, REPAIR AND ENLARGEMENT OF A DAM, AND THE ALTERING OF WATERCOURSES ON PORTIONS 17 AND 19 OF FARM AVONTUUR 166, HOEKWIL, GEORGE, WESTERN CAPE

DEA&DP Reference: 14/2/4/1/D2/30/0006/18

PROPONENT:

Signed: …….. Date: …….....

SITE MANAGER:

Signed: …….. Date: …….....

ENVIRONMENTAL CONTROL OFFICER

Signed: …….. Date: …….....

Appendix A: CV of the EAP