

**DRAFT ENVIRONMENTAL MANAGEMENT
PROGRAMME AND
MAINTENANCE MANAGEMENT PLAN**

PREPARED IN TERMS OF THE NATIONAL
ENVIRONMENTAL MANAGEMENT ACT, 1998 (ACT
NO. 107 OF 1998), ENVIRONMENTAL IMPACT

PROJECT:

SECTION 24G RETROSPECTIVE ENVIRONMENTAL
AUTHORISATION APPLICATION FOR THE DEVELOPMENT
OF A WEIR, BERMS, A WALKWAY, AND DIVERSION OF A
WATERCOURSE INTO A DAM ON FARM NO. 1314,
STELLENBOSCH RD, WESTERN CAPE PROVINCE

APPLICANT:

Dylan Property Trust

PREPARED BY:



NOVEMBER 2019

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List of Acronyms and Abbreviations

DEA&DP	Department of Environmental Affairs and Development Planning
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
ESA	Ecological support Area
EMPr	Environmental Management Programme
GA	General Authorisation, in terms of the National Water Act, 1998 (Act No. 36 of 1998)
GN	Government Notice
I&APs	Interested and Affected Parties
MMP	Maintenance Management Plan
NEMA	National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended
NWA	National Water Act, 1998 (Act No. 36 of 1998), as amended

Definitions

“Activity” is the relevant action that take place on the site, e.g. the Dylan Lewis Sculpture Garden.

“Diverting” as defined in the General Authorisation, in terms of section 39 of the National Water Act, 1998 (Act no 36 of 1998) for Water Uses as defined in Section 21(c) and 21(i) (GN. 509 of 26 August 2016), means to, in any manner, cause the instream flow of water to be rerouted temporarily or permanently.

“Ecological Infrastructure” refers to naturally functioning ecosystems that deliver valuable services to people, such as water and climate regulation, soil formation and disaster risk reduction.

“Environmental aspect” is a feature or characteristic of an activity that affects or can affect the environment.

“Environmental impact” is a change to the environment. Such change can be positive or negative. Environmental impacts are caused by environmental aspects;

“Environmental “Objective” is the specific environmental goal; and

“Environmental Target” is a detailed performance requirement. Environmental targets are derived from environmental objectives and are used to achieve these objectives. Targets should be measurable where possible.

“Flood event” is the event where land is inundated by the overflowing of water from a river channel and where this event causes significant damage to infrastructure or results in watercourse erosion and/or sediment deposition.

NOTE that flooding can be a natural phenomenon in many river or wetland systems which, due to encroachment and human modification of the form and function of the affected system, may have evolved into a potential hazard to life or property.

“Flow-altering” as defined in the General Authorisation, in terms of section 39 of the National Water Act, 1998 (Act no 36 of 1998) for Water Uses as defined in Section 21(c) and 21(i) (GN. 509 of 26 August 2016), means to, in any manner, alter the instream flow route, speed or quantity of water temporarily or permanently.

“General Authorisation” in this document refers to the General Authorisation in terms of section 39 of the National Water Act, 1998 (Act No. 36 of 1998) for Water Uses as defined in Section 21(c) or Section 21(i) (GN. 509 of 26 August 2016).

“Impeding” as defined in the General Authorisation, in terms of section 39 of the National Water Act, 1998 (Act no 36 of 1998) for Water Uses as defined in Section 21(c) and 21(i) (GN. 509 of 26 August 2016), means to, in any manner, hinder or obstruct the instream flow of water temporarily or permanently, but excludes the damming of flow so as to cause storage of water.

“Indigenous vegetation” refers to vegetation consisting of indigenous plant species occurring naturally in an area, regardless of the level of alien infestation and where the topsoil has not been lawfully disturbed during the preceding ten years.

“Listed Activity” means an activity identified in any notice published by the Minister or MEC in terms of section 24D(1)(a) of the Act as a listed activity or specified activity. Activity in this document refers to the activities as listed in Listing Notice 1, 2 and 3 of the Environmental Impact Assessment Regulations, 2014 (as amended), as well as other relevant regulations.

“Maintenance” means actions performed to keep a structure or system functioning or in service on the same location, capacity and footprint.

“Maintenance Management Plan” means a management plan for maintenance purposes defined or adopted by the competent authority.

“River Management Plans” as defined in the General Authorisation, in terms of section 39 of the National Water Act, 1998 (Act no 36 of 1998) for Water Uses as defined in Section 21(c) and 21(j) (GN. 509 of 26 August 2016), any river management plan developed for the purposes of river or storm water management in any municipal/metropolitan area or described river section, river reach, entire river or sub quaternary catchment that considers the river in a catchment context.

“River reach”, a length of river characterised by a particular channel pattern and channel morphology, resulting from a uniform set of local constraints on channel form. A river reach is typically hundreds of meters in length.

“Section 24G process” is a rectification process undertaken in terms of Section 24G of the NEMA to obtain retrospective authorisation for a project which commenced without the necessary authorisation, and which was thus undertaken illegally as defined in Section 24F of NEMA.

“Stretch” a section of watercourse, delineated between two or more mapped coordinates, within which proposed maintenance activities are to take place as guided by a MMP.

“Thalweg” refers to the line of lowest elevation within a valley or watercourse.

“Watercourse” means:

- a) a river or spring;
- b) a natural channel in which water flows regularly or intermittently;
- c) a wetland, lake or dam into which, or from which, water flows; and

any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse as defined in the National Water Act, 1998 (Act No. 36 of 1998); and

a reference to a watercourse includes, where relevant, its bed and banks.

“Wetland” means, land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically covered with shallow water, and which land in normal circumstances supports or would support vegetation typically adapted to life in saturated soil.

PART 1: REPORT DETAILS AND PROJECT DETAILS

1. Introduction

This combined Environmental Management Programme (EMPr) and Maintenance Management Plan (MMP) describes, amongst others, mitigation measures and identifies the specific people/entities that will be responsible for implementation of the identified mitigation measures in order to ensure that impacts on the environment are minimised and that positive impacts are optimised during the operational phase¹ of the listed activities related to Dylan Lewis Sculpture Garden on Farm 1314, Stellenbosch Registration Division (RD).

In the event of appointing external Contractors, this EMPr/MMP must form part of the contractual agreement between the relevant contractor(s) and the Applicant.

This report has been divided into four parts as follows:

- Part 1:** Provides an introduction to the project and the report, provides project details and describes the applicable Listed Activities;
- Part 2:** Details the operational phase management activities at the Dylan Lewis Sculpture Garden to ensure that identified impacts are adequately managed to prevent environmental impacts, and that positive impacts are optimised during the operational phase;
- Part 3:** Serves as a MMP for maintenance activities at the Dylan Lewis Sculpture Garden, which could impact on the watercourse; and
- Part 4:** Provides a reference list for this report.

2. Environmental Assessment Practitioner

This EMPr was prepared by Mari de Villiers of Cornerstone Environmental Consultants, the Environmental Assessment Practitioner (EAP) who undertook the Section 24G process for the project. The MMP section of this report was prepared by Toni Belcher and Stuart Barrow of BlueScience.

Mari holds a Masters' Degree in Environmental Management from the Free State University and has more than 15 years' experience as an Environmental Assessment Practitioner (EAP). She has led numerous Basic Assessment and EIA processes across South Africa, for a wide variety of projects. She has also undertaken several courses to further her career. She is a Senior Environmental Assessment Practitioner at Cornerstone Environmental Consultants and the past Chairperson of the Western Cape Branch of the International Association for Impact Assessors, South African Affiliate (IAIAsa).

See **Appendix A** for Mari de Villiers' Curriculum Vitae.

¹ Note that the construction phase / garden establishment phase has already been completed and as such, no construction related management measures have been included in the EMPr.

3. Project Description and Listed Activities Covered by this EMPr/MMP

3.1 Brief Project Description

The Dylan Lewis Trust acquired Farm 1314, Stellenbosch Registration Division (RD) during 2008. Up to 2008, the property was used for agricultural purposes. The Dylan Lewis Sculpture Garden was created gradually over time on Farm 1314, mostly between 2009 and 2017.

The main freshwater feature within the study area consists of the Paradyskloof Tributary of the Blaauwklippen River, a tributary of the Eerste River. During a gradual establishment of the garden, a weir, berms, and a walkway were constructed, and a watercourse was diverted into a small dam and artificial pond. These activities were undertaken without first obtaining environmental authorisation. This NEMA Section 24G process is aimed at obtaining retrospective environmental authorisation for these activities.

According to the Dylan Lewis Sculpture Garden's website, over 60 sculptures constituting a comprehensive record of Lewis's full artistic development thus far have been carefully placed in harmony with the landscape. Along four kilometres of paths, one is led on a journey through different 'rooms'. The garden focuses on indigenous species, particularly fynbos. Although planted to give year-round colour, it peaks in July and August into September, when its many buchus and ericas are in fragrant flower. A large selection of ericas, particularly unusual varieties such as *Erica verticillata*, extinct in the wild, was sourced from Kirstenbosch National Botanical Garden.

The website furthermore states that the garden *"is a place of expansive vistas, scents and the sounds of nature, with tranquil groves, hidden paths and lush indigenous vegetation"*.

See **Appendix B** for the locality map and the site layout plan.

3.2 Project Phases

Only one project phase is relevant to this project, namely the operational phase. The construction phase / garden establishment phase is completed. This EMPr/MMP does not address the decommissioning and closure phases, since it is not anticipated that the activity will be decommissioned in the foreseeable future. Should decommissioning be considered in future, the relevant listed activities applicable at that time would need to be applied for, and an EMPr developed for such activities.

3.3 Receiving Environment Summary

The main freshwater feature within the study area consists of the Paradyskloof Tributary of the Blaauwklippen River, a tributary of the Eerste River. The Paradyskloof River arises a short distance upstream of the site and flows in a south-westerly direction to its confluence with the Blaauwklippen River. There are some wetland areas along the length of the river and a number of small farm dams.

The Eerste River and Blaauwklippen River are not mapped as Freshwater Ecosystem Priority Area rivers, only the upper reaches of the Eerste River upstream of Stellenbosch. The dam on site is mapped as an artificial wetland. The 2017 Western Cape Biodiversity Spatial Plan for the study area has mapped some small aquatic critical biodiversity areas that are associated with wetlands within the site. The watercourse and its smaller tributaries are mapped as aquatic ecological support areas that provide important ecological services and should not be allowed to become degraded

The instream and riparian habitat of the upper Paradyskloof River has been moderately modified as a result of past disturbance of the areas adjacent to the watercourse as well as the construction of the dam within the site in the past. The instream aquatic habitat is in a slightly better condition, particularly as a result of the rehabilitation works undertaken and is considered to be in a largely natural to moderately modified ecological condition. The ecological importance and sensitivity of the upper reaches of the Paradyskloof River are considered to be moderate to high as the river plays an important role as providing an ecological corridor that links the lower Eerste River to the more natural habitat higher in the catchment.

There are three types of wetlands within the site: a hillslope seep wetland associated with the smaller tributary of the Paradyskloof River; some depression wetlands that have been artificially created and the valley bottom wetland associated with the Paradyskloof River channel. Although the depression wetlands are artificial wetlands they have been created and vegetated to form natural wetlands that provide valued goods and services and for this reason have been included in the freshwater ecology assessment.

The habitat of the seep area, although reduced from the original extent is considered to be largely natural in terms of its habitat integrity while valley bottom wetlands are considered to be largely natural to moderately modified and the depressions, although artificial have a habitat integrity that could be considered to be moderately modified. The wetland areas are impacted by much the same impacts as the watercourses that are associated with the past surrounding land use activities.

The wetlands due to their location on the hillslope and association with the watercourses, supply valued services in terms of regulating streamflow, mitigating erosion and providing habitat for biota amongst others. Given that much of the site has been rehabilitated for tourism / recreation purposes, this service is scored high. The wetlands are considered to be of a moderate to high ecological sensitivity and importance, providing a degree of refuge and connectivity for faunal and floral species within a landscape that is becoming increasingly cultivated.

According to the Department of Environmental Affairs (DEA) screening tool, the site is located within an area of “high archaeological or general heritage significance”, since it is situated within 1km from a protected area. The Hottentots Holland Mountain Catchment Area and the Jonkershoek Nature Reserve are respectively situated about 600m and 1000m east of Erf 1314, Stellenbosch RD. The potential impact of the activities on this area of high archaeological or general heritage significance is positive, since rehabilitation of the site and removal of alien vegetation are in line with the surrounding protected areas and compliments the surrounding natural landscape. According to the DEA’s screening tool, the site is not located in an area of palaeontological sensitivity. The applicant has also confirmed that no graves, burial grounds or other artefacts were found during establishment of the garden.

3.4 Impact Assessment Summary and Recommendations

It is unlikely that there have been any impacts on geographical, physical, palaeontological, noise and dust related aspects during the construction / garden establishment phase of the Dylan Lewis Sculpture Garden. Construction of the walkway and sculpture display within the watercourse, with the associated infilling, has resulted in impacts of low (negative) significance on freshwater ecology aspects during the construction phase / garden establishment. Diversion of the watercourse into a small dam and artificial pond and construction of a weir within a watercourse has resulted in impacts of a low (positive) significance on freshwater ecology aspects. The diversion of the watercourse has

resulted in impacts of low (negative) significance on downstream water quantity and quality. Job creation resulted in temporary positive socio-economic impacts during the construction phase.

No operational phase impacts are anticipated on geographical, physical, cultural-historical, noise, and visual / sense of place aspects. Operational phase activities associated with maintenance of the pathway and associated infrastructure in the adjacent watercourse may result in freshwater ecology impacts of low (negative) significance.

No decommissioning phase impacts are anticipated on geographical, physical, cultural-historical and noise aspects. The regrowth of alien vegetation may result in potential impacts on biodiversity aspects and visual / sense of place aspects of low (negative) significance. Job losses will occur if activities do not continue/decommission, which will result in an impact of medium (negative) significance. In such as event, the loss of income for the applicant / landowner will result in an impact of medium-high (negative) significance.

It is concluded that the activities on site have resulted in an overall improvement of the site condition, through revegetation with indigenous vegetation, addressing of erosion issues, and removal of alien vegetation.

All mitigation measures identified to reduce the significance of the anticipated environmental impacts are included within the EMPr/MMP and must be implemented by the Applicant.

3.5 Applicable EIA listed activities

The identified Listed Activities in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), for which Environmental Authorisation is being applied for through the Section 24G process, are listed below.

Table 1: Listed Activities applicable to this application

NEMA EIA Contraventions: between 03 July 2006 and 01 August 2010			
Activities unlawfully commenced with on or after 03 July 2006 and before 01 August 2010: EIA regulations promulgated in terms of the NEMA			
GN R386 Activity No(s): (Listing Notice 1 of 2006)	Describe the relevant listed activity/ies in writing as per GN No. R. 386 of 2006 ("NEMA 2006 Basic Assessment listed activity/ies")	Describe the portion of the development as per the project description that relates to the applicable listed activity.	State the date of commencement of each activity
1(m)	(m) any purpose in the one in ten-year flood line of a river or stream, or within 32 metres from the bank of a river or stream where the flood line is unknown, excluding purposes associated with existing residential use, but including - (i) canals; (ii) channels; (iii) bridges; (iv) <u>dams</u> ; and (v) <u>weirs</u> ;	The dam on the property was enlarged during 2009. It is not known exactly when the weir was built.	According to Google Earth, the dam was built in 2009.
4	The dredging, excavation, infilling, removal or moving of soil, sand or rock exceeding 5 cubic metres from a river, tidal lagoon, tidal river, lake, in-stream dam, floodplain or wetland.		

NEMA EIA Contraventions: between 02 August 2010 and 07 December 2014			
Activities unlawfully commenced with on or after 02 August 2010 and before 07 December 2014: EIA regulations promulgated in terms of the NEMA, Act 107 of 1998,			
GN No. R. 544 Activity No(s): (Listing Notice 1 of 2010)	Describe the relevant listed activity(ies) in writing as per GN No. R. 544 of 2010("NEMA 2010 Basic Assessment listed activity/ies")	Describe the portion of the development as per the project description that relates to the applicable listed activity.	State the date of commencement of each activity
11	The construction of: (i) canals; (ii) channels; (iii) bridges; (iv) dams ; (v) weirs ; (vi) bulk storm water outlet structures; (vii) marinas; (viii) jetties exceeding 50 square metres in size; (ix) slipways exceeding 50 square metres in size; (x) buildings exceeding 50 square metres in size; or (xi) infrastructure or structures covering 50 square metres or more, where such construction occurs within a watercourse or within 32 metres of a watercourse, measured from the edge of a watercourse, excluding where such construction will occur behind the development setback line.	Construction of a weir, berms, a walkway, and diversion of the watercourse into a dam.	According to Google Earth, these activities mostly took place between 2010 and 2014.
18	The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock from (i) a watercourse ; (ii) the sea; (iii) the seashore; (iv) the littoral active zone, an estuary or a distance of 100 metres inland of the high-water mark of the sea or an estuary, whichever distance is the greater - but excluding where such infilling, depositing, dredging, excavation, removal or moving (i) is for maintenance purposes undertaken in accordance with a management plan agreed to by the relevant environmental authority; or (ii) occurs behind the development setback line.		
NEMA EIA Contraventions: between 08 December 2014 and 07 April 2017			
Activities unlawfully commenced with on or after 08 December 2014 and 07 April 2017: EIA regulations promulgated in terms of the NEMA, Act 107 of 1998			
GN No. R. 983 Activity No(s): (Listing Notice 1 of 2014)	Describe the relevant listed activity(ies) in writing as per GN No. R.983 of 2014("NEMA 2014 Basic Assessment listed activity/ies")	Describe the portion of the development as per the project description that relates to the applicable listed activity.	State the date of commencement of each activity
12	The development of- (i) canals exceeding 100 square metres in size; (ii) channels exceeding 100 square metres in size; (iii) bridges exceeding 100 square metres in size; (iv) dams, where the dam, including infrastructure and water surface area, exceeds 100 square metres in size;	Further work on the weir, berms, walkway, and the diversion of the watercourse into the dam.	It is not clear exactly when the various activities

	<p>(v) weirs, where the weir, including infrastructure and water surface area, exceeds 100 square metres in size; (vi) bulk storm water outlet structures exceeding 100 square metres in size; (vii) marinas exceeding 100 square metres in size; (viii) jetties exceeding 100 square metres in size; (ix) slipways exceeding 100 square metres in size; (x) buildings exceeding 100 square metres in size; (xi) boardwalks exceeding 100 square metres in size; or (xii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs-</p> <p>(a) within a watercourse; (b) in front of a development setback; or (c) if no development setback exists, within 32 metres of a watercourse, measured from (c) the edge of a watercourse; - excluding-</p> <p>(aa) the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour; (bb) where such development activities are related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies; (cc) activities listed in activity 14 in Listing Notice 2 of 2014 or activity 14 in Listing Notice 3 of 2014, in which case that activity applies; (dd) where such development occurs within an urban area; or (ee) where such development occurs within existing roads or road reserves.</p>		were undertaken. Some of these activities may have taken place between 2014 and 2017.
19	<p>The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 5 cubic metres from - (i) a watercourse; (ii) the seashore; or (iii) the littoral active zone, an estuary or a distance of 100 metres inland of the high-water mark of the sea or an estuary, whichever distance is the greater-</p> <p>but excluding where such infilling, depositing, dredging, excavation, removal or moving-</p> <p>(a) will occur behind a development setback; (b) is for maintenance purposes undertaken in accordance with a maintenance management plan; or (c) falls within the ambit of activity 21 in this Notice, in which case that activity applies.</p>		

It is of the utmost importance to prevent the triggering of further listed activities that may need to be authorised. It is recommended that an EAP be contacted to ascertain if proposed further activities will trigger any Listed Activities during the undertaking of management or maintenance activities at the sculpture garden. It is furthermore noted that the MMP detailed in Part 3 below lists the listed activities related to the maintenance activities in the relevant watercourse, which precludes the need to apply for further Environmental Authorisation.

4. Responsible Parties and Communication

Responsibility for the implementation of the EMPr/MMP lies with the Applicant, which is the Dylan Lewis Trust. This responsibility shall be delegated to contractors for practical purposes (if required), but the Applicant shall remain legally responsible for the implementation of the EMPr/MMP.

It is therefore the responsibility of the following individuals or groups to implement the EMPr/MMP and its management conditions:

4.1 Applicant

The Applicant has the responsibility of implementing the conditions of the EMPr and MMP, as well as those to be contained in the Environmental Authorisation (EA).

4.2 Applicant's Representative

This is the person responsible for managing the farm, including sculpture garden and related facilities on behalf of the Applicant.

Responsibilities include:

- The day-to-day running and maintenance of the garden.
- Appointment and management of relevant third parties as described below AND/OR management of internal employees conducting work related to management, maintenance, upkeep or improvement projects for the Dylan Lewis Sculpture Garden; and
- Overseeing the implementation of the EMPr and MMP.

5. Environmental Awareness Education

5.1 Environmental Awareness and Environmental Risk Induction

This section is applicable to both Parts 2 and 3 of this report. In this section, the following shall apply:

- During general operational activities, responsibility for training shall lie with the Applicant, and/or the Applicant's representative (i.e. Responsible Party). 'Staff' to be trained refers to general staff working at Dylan Lewis Sculpture Garden and related facilities

The Responsible Party must induct all staff to convey the importance and implications of this report and the conditions of the EA, and to familiarise them with the environmental aspects surrounding operational or maintenance activities. Staff must fill in an attendance register after attending an environmental induction session. The Applicant's Representative shall be responsible for record keeping and management of attendance registers. For ongoing work, such training should be repeated every 6 months. It is recommended that annual environmental awareness training be undertaken with operational staff, and when any new staff member is employed.

As part of the induction programme, staff shall be educated as to the need to refrain from destruction of animals and plants, as well as from indiscriminate defecation, waste disposal and/or pollution of local soil and water resources, from trespassing on surrounding private property and from theft from surrounding private property. Immediate and decisive action shall be taken should this occur.

Notwithstanding the specific provisions of this clause, it is incumbent upon the contractor to convey the spirit of this report to all staff involved with the works.

Where possible, the presentation needs to be conducted in the staff's language of choice. The environmental induction training shall, as a minimum, include the following:

- Sensitive and no-go areas on site;
- The importance of conformance with the EMPr/MMP;
- The significant 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 EMPr/MMP, including emergency preparedness and response requirements;
- The potential consequences of departure from specified operating procedures; and
- The mitigation measures required to be implemented when carrying out their work activities.

PART 2: OPERATIONAL PHASE ENVIRONMENTAL MANAGEMENT PROGRAMME

1. EMPr Content requirements

In terms of developing an EMPr in line with the requirements of Appendix 4 of the EIA Regulations, the content requirements for an EMPr also includes the need to comply with Section 24N (2) of the NEMA. The table below lists the relevant requirements, indicates whether the relevant information is included in this report or not, and provides cross-references as to where the relevant information can be found in this report.

Table 2: EMPr requirements in terms of Appendix 4 of the EIA Regulations of 2014, as amended

Appendix 4 of the EIA Regulations of 2014, as amended		Included (Yes, No or N/A)	Report Section Reference
1. An EMPr must comply with section 24N of the Act (NEMA) and include -			
(a)	details of -		
	(i) the EAP who prepared the EMPr; and	Yes	Part 1, Section 2; Appendix A
	(ii) the expertise of that EAP to prepare an EMPr, including a curriculum vitae;	Yes	
(b)	a detailed description of the aspects of the activity that are covered by the draft EMPr as identified by the project description;	Yes	Part 1, Section 3
(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;	Yes	Figure 1
(d)	a description of the impact management objectives, including management statements, identifying the impacts and risks that need to be avoided, managed and mitigated as identified through the environmental impact assessment process for all phases of the development including-	Yes	Part 2 Section 3
	(i) planning and design;		
	(ii) pre-construction and activities;		
	(iii) construction activities;		
	(iv) rehabilitation of the environment after construction and where applicable post closure;		
	(v) where relevant, operation activities;		
(e)	a description and identification of impact management outcomes required for the aspects contemplated in paragraph (d);	Yes	Part 2 Sections 2 and 3
(f)	a description of proposed impact management actions, identifying the manner in which the impact management objectives and outcomes contemplated in paragraphs (d) and (e) will be achieved, and must, where applicable, include actions to -	Yes	Part 2 Section 3
	(i) avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation;		
	(ii) comply with any prescribed environmental management standards or practices;		
	(iii) comply with any applicable provisions of the Act regarding closure, where applicable; and		

Appendix 4 of the EIA Regulations of 2014, as amended		Included (Yes, No or N/A)	Report Section Reference
	(iv) comply with any provisions of the Act regarding financial provisions for rehabilitation, where applicable;		
(g)	the method of monitoring the implementation of the impact management actions contemplated in paragraph (f);	Yes	Part 2 Sections 3 and 4
(h)	the frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f);	Yes	Part 2 Sections 3 and 4
(i)	an indication of the persons who will be responsible for the implementation of the impact management actions;	Yes	Part 1 Section 4; Part 2 Sections 3 and 4
(j)	the time periods within which the impact management actions contemplated in paragraph (f) must be implemented;	Yes	Part 2 Sections 3 and 4
(k)	the mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f);	Yes	Part 2 Sections 3 and 4
(l)	a program for reporting on compliance, taking into account the requirements as prescribed by the Regulations;	Yes	Part 2 Sections 3 and 4
(m)	an environmental awareness plan describing the manner in which-	Yes	Part 1 Section 5
	(i) the applicant intends to inform his or her employees of any environmental risk which may result from their work; and		
	(ii) risks must be dealt with in order to avoid pollution or the degradation of the environment; and		
(n)	any specific information that may be required by the competent authority.	-	-

2. Impacts and Mitigation Measures

A number of potential environmental impacts that may arise during the project's operational phase have been identified. These are outlined in Table 3, and mitigation measures are provided.

The Applicant and Contractor (if applicable) must familiarise themselves with the requirements of the EMPr, keeping in mind that other site-specific requirements as outlined in the EA must also be complied with.

3. Operational Phase Environmental Management Programme

The intention of providing an EMPr for the operational phase is to provide guidelines for management of infrastructure to safeguard the environment, i.e. the integrity of the sense of place etc., against negative environmental impacts, and to optimise positive impacts.

Table 3: General and Specific Operational Phase Management Measures

NO.	MANAGEMENT SPECIFICATIONS	MITIGATION / MANAGEMENT MEASURES	RESPONSIBLE PARTY/PERSON (to implement mitigation measures)	MONITORING: ACTION, RESPONSIBLE PERSON/PARTY AND FREQUENCY	Monitoring (Successfully Implemented / Corrective action required)
Terrestrial and Aquatic Ecological Impacts					
1	General Management Measures <u>ENVIRONMENTAL ASPECT:</u> Operational Phase (General activities) <u>POTENTIAL IMPACTS:</u> <ul style="list-style-type: none"> Water quality Littering and pollution Alien invasive vegetation Erosion <u>OBJECTIVE:</u> <ul style="list-style-type: none"> Prevent water quality deterioration Ensure an integrated waste management programme by waste minimization and recycling of all waste at source and ensure that recyclables enter the waste stream by engendering an ethic of waste management amongst property owners/occupiers and staff <u>TARGET:</u> <ul style="list-style-type: none"> No water quality deterioration is caused as a result of waste pollution 	The following general management measures should be implemented at and in the area surrounding the Dylan Lewis Sculpture Garden: <ul style="list-style-type: none"> Develop and maintain an integrated waste management approach, which is based on the waste hierarchy. The waste management approach must include minimisation / reduction, recycling and re-use. Disposal should be implemented as a last resort. Establish and maintain readily available waste bins, to be kept in a permanent weather and scavenger proof waste storage facility at the site. Waste should be sorted at source, in separate containers (plastic, paper, tins, and bottles into different containers). It should be ensured that recyclables are taken to the Stellenbosch Municipality's Materials Recovery Facility (along the R310, Devon Valley). Any solid waste that cannot be avoided, re-used, composted or recycled should be disposed of at the nearest waste disposal facility licensed in terms of the National Environmental Management: Waste Act, 1998 (Act 107 of 1998). No waste will be allowed to be dumped permanently on the property. Waste to be removed off site on a weekly basis. 	Applicant	Site Inspection/ maintenance activities <u>Responsible Person/Party:</u> Applicant <u>Monitoring Frequency:</u> Daily/Weekly/Mont hly	Periodic internal audits, and annual external audits (if required).
2	Specific Management Measures <u>ENVIRONMENTAL ASPECT:</u> Operational Phase	The following specific management measures should be implemented at and in the area surrounding the Dylan Lewis Sculpture Garden. Each measure relates to the equally numbered impact in the column to the left:	Applicant	Site Inspection/ maintenance activities	Periodic internal audits, and annual external

NO.	MANAGEMENT SPECIFICATIONS	MITIGATION / MANAGEMENT MEASURES	RESPONSIBLE PARTY/PERSON (to implement mitigation measures)	MONITORING: ACTION, RESPONSIBLE PERSON/PARTY AND FREQUENCY	Monitoring (Successfully Implemented / Corrective action required)
	<p>POTENTIAL IMPACTS:</p> <p>1) Impacts associated with the construction of a walkway and sculpture display within a watercourse with the associated infilling: The activities have resulted in the improvement of the ecological integrity of the aquatic features that had been modified by past agricultural activities. It has also resulted in increased aquatic habitat diversity. To conclude, the impacts of the construction of a walkway and sculpture display within the watercourse with the associated infilling are limited and of low significance considering the condition of the site prior to the activity. These impacts have largely already been mitigated.</p> <p>2) Diversion of the watercourse into a small dam and artificial pond:</p> <p>2.1) Impact on aquatic habitat and diversity of the site: Low positive significance.</p> <p>2.2) Impact on downstream water quantity and quality: Low negative significance.</p>	<ul style="list-style-type: none"> Impact 1: The only activity within or adjacent to the aquatic features that requires some rehabilitation is the infilled area adjacent to the Paradyskloof Stream. While it is not deemed necessary to remove the infilled material, it is recommended that the invasive kikuyu <i>Pennisetum clandestinum</i> grass cover on the embankment be removed and that the embankment be revegetated with indigenous vegetation. In particular, the banks of the stream where there is a bend in the watercourse should be vegetated and if necessary stabilised with larger boulders to prevent undercutting of the embankment by the stream. Impact 2: No mitigation required. The Freshwater Specialists (BlueScience) have indicated no rehabilitation measures are deemed necessary for this activity. Impact 3: No mitigation required. The Freshwater Specialists (BlueScience) have indicated no rehabilitation measures are deemed necessary for this activity. <p>Furthermore: Longer term monitoring and maintenance associated with the rehabilitated areas, such as erosion mitigation and alien vegetation clearing, should be ongoing.</p> <p>Refer to the MMP below for further operational phase management measures.</p>		<p>Responsible Person/Party: Applicant</p> <p>Monitoring Frequency: Weekly</p>	audits (if required).

NO.	MANAGEMENT SPECIFICATIONS	MITIGATION / MANAGEMENT MEASURES	RESPONSIBLE PARTY/PERSON (to implement mitigation measures)	MONITORING: ACTION, RESPONSIBLE PERSON/PARTY AND FREQUENCY	Monitoring (Successfully Implemented / Corrective action required)
	<p>3) Construction of a weir within a watercourse: The relevant impact is insignificant, with the potential for a positive impact. There was an existing structure at the site of the weir that was degraded and becoming undercut but the eroding river channel downstream. The construction of the weir has addressed erosion taking place within the stream. The structure does not appear to significantly impede flow in the watercourse, except to facilitate the creation of the depression wetland habitat upstream. The created pond has been shaped and vegetated such that new wetland habitat has been created with an associated positive impact. No rehabilitation measures are deemed necessary for this activity.</p> <p>OBJECTIVE:</p> <ul style="list-style-type: none"> Remove alien vegetation from the riparian areas and improve the riparian habitat on the property. <p>TARGET:</p> <ul style="list-style-type: none"> Absence of invasive kikuyu <i>Pennisetum clandestinum</i> grass 				

NO.	MANAGEMENT SPECIFICATIONS	MITIGATION / MANAGEMENT MEASURES	RESPONSIBLE PARTY/PERSON (to implement mitigation measures)	MONITORING: ACTION, RESPONSIBLE PERSON/PARTY AND FREQUENCY	Monitoring (Successfully Implemented / Corrective action required)
	cover on the embankment and revegetation of the embankment with indigenous vegetation.				
Socio-economic					
3	(ENVIRONMENTAL ASPECT): Operational Activities (Socio-economic issues) POTENTIAL IMPACT: Socio-economic impact on the surrounding community OBJECTIVE: To enhance the positive impacts associated with job creation. TARGET: <ul style="list-style-type: none"> Employment of as many people from the local community as possible, and well-skilled /trained employees. 	<ul style="list-style-type: none"> Permanent jobs should be given to local residents. Training / upskilling should take place as part of the employment. 	Applicant	Site Inspection/ maintenance activities Responsible Person/ Party: Applicant Monitoring Frequency: Monthly	Periodic internal audits, and annual external audits (if required).
Emergency Procedures					
4	SPECIFIC ACTIVITY (ENVIRONMENTAL ASPECT): Operational Activities (Emergency issues) POTENTIAL IMPACT: Emergencies OBJECTIVE: Comply with the EMPr measures. TARGET: No non-compliances to be received.	The Applicant shall define emergency reporting procedures in the event where the presence of the Dylan Lewis Sculpture Garden within the extent of the watercourse may cause pollution. Such reporting procedures should also include the following: <ul style="list-style-type: none"> Fire prevention and management. Firefighting equipment, i.e. a fire hydrant or fire extinguishers must be readily at hand. Flood management – this should be developed to address any potential damage from flood occurrences, as well as downstream debris that may be caused. 	Applicant	Site Inspection/ maintenance activities Responsible Person/ Party: Applicant Monitoring Frequency: Daily/ Weekly/ Monthly	Periodic internal audits, and annual external audits (if required). NEMA Section 30 emergencies to be indicated to DEA&DP and DWS as per the

NO.	MANAGEMENT SPECIFICATIONS	MITIGATION / MANAGEMENT MEASURES	RESPONSIBLE PARTY/PERSON (to implement mitigation measures)	MONITORING: ACTION, RESPONSIBLE PERSON/PARTY AND FREQUENCY	Monitoring (Successfully Implemented / Corrective action required)
		<ul style="list-style-type: none"> Ensure that all personnel are aware of emergency reporting procedures and their respective responsibilities. Telephone numbers of emergency services, including the local firefighting service, and ambulance service shall be kept at the Dylan Lewis Sculpture Garden office. Any emergency incident, originating at the Dylan Lewis Sculpture Garden, which falls within the definition of section 30(l)(a) of the NEMA must be dealt with by the facility in accordance with section 30 of NEMA. In the event of any incident, the facility must ensure containment of the spill or hazard, by the responsible person, and notify the Local Municipality and DEA&DP immediately after the situation is under control. 			requirements of the Act.

4. Environmental Monitoring and Auditing of the Operational Phase

It will be incumbent for the Applicant to undertake periodic internal audits of the activities on site to ascertain compliance with the mitigation/management measures in the tables of the EMPr and MMP. These audits should also be supplemented by an external audit, the frequency of which will be indicated in the Conditions of the Environmental Authorisation, to establish compliance with the EMPr and MMP and with the Environmental Authorisation of the development and any other permits or licences in place (if applicable).

The objectives of the environmental audit report, as per Regulation 34 and Appendix 7 of the EIA Regulations, 2014 as amended, is to:

- a) *report on-*
 - (i) *the level of compliance with the conditions of the environmental authorisation and the EMPr, and where applicable, the closure plan; and*
 - (ii) *the extent to which the avoidance, management and mitigation measures provided for in the EMPr, and where applicable, the closure plan achieves the objectives and outcomes of the EMPr, and closure plan.*
- b) *identify and assess any new impacts and risks as a result of undertaking the activity;*
- c) *evaluate the effectiveness of the EMPr, and where applicable, the closure plan;*
- d) *identify shortcomings in the EMPr, and where applicable, the closure plan; and*
- e) *identify the need for any changes to the avoidance, management and mitigation measures provided for in the EMPr, and where applicable, the closure plan.*

PART 3: MAINTENANCE MANAGEMENT PLAN



**Request for the relevant Competent Authority to define or adopt a Maintenance Management Plan
for a watercourse in terms of the National Environmental Management Act, 1998 (Act No. 107 of
1998), Environmental Impact Assessment Regulations, 2014 (as amended).**

File Reference Number:

Date Received by Department:

Date Received by Component:

Form Duly Signed and Dated:

	Yes No

PROJECT TITLE

**MAINTENANCE AND MANAGEMENT PLAN FOR MAINTENANCE OF INFRASTRUCTURE
WITHIN TRIBUTARIES OF THE PARADYSKLOOF RIVER AND ASSOCIATED WETLAND
AREAS ON FARM 1314, STELLENBOSCH RD**

A. SCOPE AND IMPORTANT INFORMATION

- 1) This document is to be used to ensure that the request for adopting or defining a Maintenance Management Plan (MMP) in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) ("NEMA"), Environmental Impact Assessment (EIA) Regulations, 2014 (as amended) is undertaken to the sufficient standard and requirements as defined by the competent authority, the Department of Environmental Affairs and Development Planning of the Western Cape Government (henceforth the Department). It is advised that the determination of applicability regarding the scale of the proposed maintenance/management activity(ies) be undertaken through a pre-application consultation with the Department.
- 2) The geographical scope of the MMP is limited to watercourses as defined in the EIA Regulations, 2014(as amended). The document does not relate to coastal activities or activities to be undertaken in an estuary.
- 3) The use of this document for the development of a MMP for a watercourse **will only** be considered when the proposed maintenance activities constitute any one of the following listed activities identified in terms of the NEMA EIA Regulations, 2014 (as amended):

EIA Regulations Listing Notice 1 of 2014 (as amended)

- Activity 19, Listing Notice 1: The infilling or depositing of any material of more than 10 cubic meters into, or the dredging, excavation, removal or moving of soil, sand, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse; but excluding where such infilling, depositing, dredging, excavation, removal or moving-
 - (a) will occur behind a development setback;

- (b) is for maintenance purposes undertaken in accordance with a maintenance management plan;
- (c) falls within the ambit of activity 21 in this Notice, in which case that activity applies;
- (N.B. Points (d) and (e) does not apply as these activities fall within the coastal zone)
- Activity 27, Listing Notice 1: The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for-
 - i. The undertaking of a linear activity; or
 - ii. Maintenance purposes undertaken in accordance with a MMP.

EIA Regulations Listing Notice 2 of 2014 (as amended)

- Activity 15, Listing Notice 2: The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for-
 - I. The undertaking of a linear activity; or
 - II. Maintenance purposes undertaken in accordance with a MMP.
- Activity 24, Listing Notice 2: The extraction or removal of peat or peat soils, including the disturbance of vegetation or soils in anticipation of the extraction or removal of peat or peat soils, but excluding where such extraction or removal is for the rehabilitation of wetlands in accordance with a MMP.

EIA Regulations Listing Notice 3 of 2014 (as amended)

- Activity 12, Listing Notice 3: The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a MMP.

i. Western Cape

- i. Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004;
- ii. Within critical biodiversity areas identified in bioregional plans;
- iv. On land, where, at the time of the coming into effect of this Notice or thereafter such land was zoned open space, conservation or had an equivalent zoning; or
- v. On land designated for protection or conservation purposes in an Environmental Management Framework adopted in the prescribed manner, or a Spatial Development Framework adopted by the MEC or Minister.

(NB. Point iii does not apply as this activity falls within the coastal zone)

- 4) In deciding the request, the competent authority may define conditions related to auditing compliance with the MMP; monitoring requirements; reporting requirements, review; updating and amending the document and period for which the MMP is defined/adopted.
- 5) The purpose of the MMP is to maintain both man-made and ecological infrastructure in a manner that either improves the current state of, and/or reduces the negative impacts on a watercourse to ensure that ecosystems services are preserved/improved and to prevent further deterioration of the watercourse.
- 6) Notwithstanding the MMP possibly being defined or adopted by the Competent Authority, any other applicable statutory requirement must still be complied with (e.g. any obligations under the National Water Act, 1998 (Act 36 of 1998) or the Conservation of Agricultural Resources Act, 1983 (Act 43 of 1983)).

- 7) The proponent must note that a MMP for a watercourse **must** be undertaken through consultation with the Department of Water and Sanitation and/or the relevant Catchment Management Agency (responsible water authority). This is to ensure compliance in terms of a Permissible Water Use as set out in the National Water Act, 1998 (Act No. 36 of 1998). It is recommended that this process for authorisation in terms of the National Water Act be clarified prior to the drafting and submission of the MMP.
- 8) The development of this document has been done in such a way so as to meet the requirements of both this Department as the competent authority in terms of the NEMA EIA Regulations, 2014 (as amended), as well as the requirements of the delegated water authority, regarding general authorisation considerations for sections 21(c) and (i) of the National Water Act, 1998 (Act No. 36 of 1998), to ensure alignment between the two authorities when defining or adopting the MMP.
- 9) In situations where a Water Use Licence Application (WULA) is required by the water authority regarding the proposed activities within a MMP, this will not prevent the proponent from submitting a request for a MMP to be defined or adopted by the Department.
- 10) Unless protected by law, all information contained in, and attached to this document, shall become public information on receipt by the competent authority.
- 11) A duly dated and originally signed copy of this document together with one hard copy and one electronic copy of the MMP must be posted, to the Department at the postal address given below, or delivered to the Registry Office of the Department.
- 12) A copy of the final defined/adopted MMP and cover letter **must** be submitted to the responsible water authority.
- 13) **NOTE: Adopting or defining the MMP does not absolve the proponent from complying with any applicable legislation or the general “duty of care” set out in Section 28(1) of the NEMA that states, “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 reasonably be avoided or stopped, to minimise and rectify such pollution or degradation of the environment.” (Note: When interpreting this “duty of care” responsibility, cognisance must be taken of the national environmental management principles contained in Section 2 of the NEMA.**
- 14) **NOTE: This document can be used as a template to assist in the information required and is to be filled out in full. The Department reserves the right to request any additional information during the initial development and submission of the draft MMP.**
- 15) **NOTE: The Department reserves the right to not adopt the MMP and require that an application be submitted to obtain Environmental Authorisation for the respective activities. Furthermore, consideration for the review should also be aligned to the periodic reviews of the General Authorisation for sections 21 (c) and (i) of the National Water Act, 1998 (Act No. 36 of 1998) to ensure continued alignment and compliance.**

B. MAINTENANCE MANAGEMENT PRINCIPLES

- 1) The following are overarching principles to be used by landowners and managers when considering the development and implementation of an MMP:
 - a. The anticipation and prevention of negative impacts and risks, then minimisation, rehabilitation or 'repair', where a sequence of possible mitigation measures to avoid, minimize, rehabilitate and/or remedy negative impacts is explicitly considered;
 - b. Avoid and reduce unnecessary maintenance;
 - c. Maintenance and management of a watercourse must be informed by the condition of the physical and ecological processes that drive and maintain aquatic ecosystems within a catchment, relative to the desired state of the affected system;
 - d. Management actions must aim to prevent further deterioration to the condition of affected watercourses and, overall, be guided by a general commitment to improving and maintaining ecological infrastructure for the delivery of ecosystem services;
 - e. Managers and organs of state must identify, address and, where feasible, eliminate the factors that necessitate intrusive, environmentally-damaging maintenance; and
 - f. A process of continuous management improvement be applied, namely Planning; Implementing; Checking (monitoring, auditing, determine corrective action) and Acting (management review).

- 2) The following table provides a simple overview for the determination of the need for a MMP:

	Question	If the answer to any of the questions is YES, then an MMP may be applicable.
2.1	Is there a watercourse on or adjacent to the property?	Yes
2.2	Has there been a history of flood damage or vandalism to the existing infrastructure or watercourse – erosion and/or sedimentation?	Yes
2.3	Is there infrastructure or any community at risk of being damaged by flooding?	Yes
2.4	Is the design of infrastructure considered inadequate in terms of managing the risk of flooding, erosion and/or sedimentation?	No
2.5	Would you consider an improved design to existing infrastructure to reduce maintenance needs?	No
2.6	Are there specific incidences where the watercourse is obstructed or blockages occur that alter the flow of the river during floods?	Yes
2.7	Is there an existing obstruction in the watercourse that has changed the flow of the river under normal conditions?	Yes
2.8	Is there a marked increase in the rate of erosion/sedimentation being experienced which threatens operations and assets?	No
2.9	Is there a presence of alien or bush encroachment vegetation within the watercourse and/or the presence of woody debris after flooding?	No

- 3) It is important to consider that the type of maintenance required will impact on the level of assessment needed in terms of the impact the activity will have on the system and how best to mitigate the impact. Types of maintenance can broadly be classified in the following categories, with recognition that maintenance activities vary across the rural and urban context:

Maintenance Category	Types of maintenance activities (examples only)
Category A: Sediment removal as a result of deposition or sediment deposition as a result of erosion	<ul style="list-style-type: none"> • Clearing sediment or placing sediment at: <ul style="list-style-type: none"> ○ Pump hole/trench ○ Return flow (irrigation) ○ Off-take weir ○ Stormwater outfall ○ Detention/retention ponds ○ Canalized urban rivers ○ Bridges, culverts and drifts • Prevent formation of islands in the channel of the river • Dredging of in-stream dams
Category B: Emergency repairs – urgent action required to manage risk and damage to assets	<ul style="list-style-type: none"> • Repair to erosion of riverbank or servicing infrastructure (e.g. pipelines/roads) • Removal of material built up as a result of flooding/sedimentation and increasing risk to infrastructure • Address damage or replacement of infrastructure (e.g. bridge, pipeline, pump house) • Manage the condition of flood protection berms, and existing structures such as gabions, canalized and stormwater systems • Installing temporary gravel approaches at flood-damaged river crossings
Category C: Managing alien invasive and bush encroachment plant species	<ul style="list-style-type: none"> • Clearing of alien invasive vegetation out of a watercourse to reduce maintenance requirements as they relate to erosion and sedimentation • Management of indigenous species categorized as bush encroachment, to improve hydrological flow and reduce associated flooding impacts
Category D: Rehabilitation and restoration activities for maintaining ecological infrastructure	<ul style="list-style-type: none"> • Development and maintenance of ecological buffering systems to improve and/or restore functioning (e.g. wetlands and stormwater detention ponds) • Actively rehabilitating riparian zones through planting of locally indigenous species • Bank grading and movement/removal of berms and barriers to flow

- 4) The development of appropriate method statements to mitigate the impact of the maintenance needs, should be aligned within the framework of these considerations:
 - a. Watercourses experience a natural process of sedimentation and erosion, with varying rates depending on the geomorphology and the integrity of the land-uses within the catchment;
 - b. Manipulation of the watercourse results in increased erosion and/or deposition being experienced further downstream, perpetuating greater need for manipulation and more drastic and costly maintenance interventions;
 - c. Locally indigenous riparian and wetland vegetation assists in the stabilization of river banks through effective root structures, while contributing to improve in-stream habitat and water quality conditions;
 - d. Invasive alien and bush encroachment vegetation significantly impacts on the functioning of a watercourse, often leading to increased flood associated damage, with further implications and a reduction in water quality and availability;
 - e. Persons undertaking maintenance activities have a responsibility to ensure a sense of duty of care is applied as prescribed within NEMA Section 28(1).

- 5) It is recognized that within urban areas, sedimentation and erosion rates are significantly amplified as a result of development in urban areas and thus systems associated with watercourses in such areas can no longer be considered as 'natural'. In such a context, the drivers of such a process are often located outside the control of the landowner or responsible authority (i.e. Municipality). Therefore, the response taken to address the needs of a maintenance management plan for a watercourse within the urban environment may be limited in mitigating the requirement for maintenance to be undertaken.

C. REQUEST FOR THE COMPETENT AUTHORITY TO DEFINE OR ADOPT A MAINTENANCE MANAGEMENT PLAN FOR A WATERCOURSE IN TERMS OF THE NEMA, EIA REGULATIONS 2014 (AS AMENDED).

The following information must be submitted as part of the request for the competent authority to define or adopt the MMP:

1. PERSONAL DETAILS

Highlight the Departmental Sub-Region(s) in which the maintenance is to be undertaken. (mark the appropriate box with an 'X'). For Departmental details see Annexure A.

REGION 1 (City of Cape Town Metropolitan and West Coast District) <input type="checkbox"/>	REGION 2 (Cape Winelands District, Overberg District) <input checked="" type="checkbox"/>	REGION 3 (Eden & Central Karoo Districts) <input type="checkbox"/>
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Name of person/authority who will undertake responsibility for the activity:	Dylan Property Trust		
Contact person (if other):	Wayne Tinline		
Postal address:	PO Box 1412, Stellenbosch		
Telephone:	021 880 0054	Postal code:	7599
Fax:	-	Cell:	071 352 3264
Email:	wayne@dylanart.co.za		
Name of person who has prepared the MMP:	Bluescience (Pty) Ltd		
Contact Person (if other):	Ms Toni Belcher and Mr Stuart Barrow		
Postal address:	PO Box 455, Somerset Mall		
Telephone:	021 8510555	Postal code:	7137
Fax:	-	Cell:	-
E-mail:	toni@bluescience.co.za		
Name of landowner(s) on whose behalf the plan has been developed:*	Dylan Property Trust		
Contact person(s):	Wayne Tinline		
Postal address:	PO Box 1412, Stellenbosch		
Telephone:	021 880 0054	Postal code:	7599
Fax:	-	Cell:	071 352 3264
E-mail:	wayne@dylanart.co.za		
Municipality for proposed project:	Stellenbosch Municipality		
Farm name(s), erf(s) and portion number(s) etc*:	Farm 1314, Stellenbosch RD		
Magisterial District or Town:	Stellenbosch		
Name(s) of watercourse(s) in question:	Tributaries of the Paradyskloof River and associated wetlands		

2. DECLARATION

THE PERSON THAT WILL BE UNDERTAKING THE MAINTENANCE

I, in my **personal capacity** or **duly authorised** (please circle the applicable option) by (name of legal entity) thereto hereby declare that I/we:

- Request the MMP to be adopted by the Competent Authority;
- Regard the information contained herein to be true and correct for this Maintenance Management Plan;
- Am fully aware of my responsibilities in terms of the National Environmental Management Act of 1998 ("NEMA") (Act No. 107 of 1998) and that, notwithstanding the adoption of this MMP, I/we shall comply with any other statutory requirement applicable, which may include, but not limited to the Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983), the National Water Act, 1998 (Act No. 36 of 1998) and the Environmental Impact Assessment Regulations, 2014 (as amended) ("EIA Regulations"), in terms of NEMA;
- Am fully aware that the proposed maintenance constitutes a listed activity in terms of the NEMA EIA Regulations, 2014 (as amended) and that an environmental assessment for environmental authorisation may be required for any other listed activities not included as part of this MMP;
- Acknowledge that any activity undertaken that does not form part of the defined and adopted MMP, will be subject to the Section 24(F) of NEMA and that appropriate enforcement and compliance requirements will follow;
- Shall undertake only those tasks described in the MMP, failing which environmental authorisation will be required, where applicable;
- Shall provide the competent authorities with access to all information at my disposal that is relevant to this request;
- Shall be responsible for any costs incurred in complying with environmental legislation;
- Hereby indemnify the government of the Republic, the competent authority and all its officers, agents and employees, from any liability arising out of, inter alia, any loss or damage to property or person as a consequence of undertaking this MMP; and
- Am aware that a false declaration is an offence in terms of Regulation 48(1)(a) GN No. R. 982 of 4 December 2014 (as amended).

Signature of the proponent:

Date:

Name of institution/company:

3. BACKGROUND AND INTRODUCTION

PROJECT INTRODUCTION AND ACTIVITY DESCRIPTION

The landowner of Farms 1314 and 1315 has constructed the following along and within tributaries of the Paradyskloof River and its associated wetlands:

- Construction of a walkway and sculpture display within the watercourse and associated infilling;
- Diversion of the watercourse into a small dam and
- Construction of a weir within a watercourse.

In time these features may require maintenance as a result of the dynamic nature of a watercourse. The maintenance activities proposed within the tributaries of the Paradyskloof River and its associated wetlands are as follows:

Activity 1: Control and management of nuisance *Typha capensis* bulrushes;

Activity 2: Repairs to infrastructure (large and small dam, walkways and weir structure);

Activity 3: Removal of sediment from infrastructure (from the large and small dam and weir pool) and

Activity 4: Sediment movement within the channel or on the banks to repair the banks of the stream (erosion mitigation).

Table 1. MMP process project team, roles, qualifications and registrations/associations

Team Member	Company	Expertise: Role	Qualifications	Registrations and Associations
Ms Toni Belcher	BlueScience (Pty) Ltd	Freshwater Ecologist: ecological assessment and MMP compilation	M.Sc. Environmental Management; 27 years' experience	Registered Natural Scientist - SACNASP No. 400040/10
Mr Dana Grobler	BlueScience (Pty) Ltd	Freshwater Ecologist: ecological assessment and MMP compilation	BSc (Hons) Terrestrial plant ecology; 29 years' experience	Registered Natural Scientist - SACNASP No. 400058/93
Mr Stuart Barrow	BlueScience (Pty) Ltd	Freshwater Ecologist: ecological assessment and MMP compilation	M.Sc. Conservation Ecology; 4 years' experience	Registered Natural Scientist - SACNASP No. 400128/17

3.1. DEFINITIONS OF TERMS AND ACRONYMS

Definitions:

Maintenance Management Plans (MMP) and Maintenance Activities

A MMP is a document that describes maintenance activities that need to take place within a riverine environment that have been pre-approved by the authorities. MMPs specifically relate to Activities 19 and 12 as listed in the NEMA EIA Regulations Listing Notice 1 of 2014 (GN R. 983) and Listing Notice 3 of 2014 (GN R. 985) respectively. Infilling or removal of more than 10m³ material within a watercourse, and/or removal of indigenous vegetation of more than 300m² within a Critical Biodiversity Area (CBA) are allowed, only if the works are undertaken for maintenance purposes AND form part of this MMP when approved by the DEA&DP.

Maintenance activities are activities performed to keep a structure or system functioning or in service on the same location, capacity and footprint. It is therefore activities that do not change the size of structures (thus "like for like" activities).

"Activity" means an activity identified in any notice published by the Minister or MEC in terms of section 24D(1)(a) of the Act as a listed activity or specified activity. Activity in this document refers to the activities as listed in Listing Notice 1, 2 and 3 of the Environmental Impact Assessment Regulations, 2014.

"Bush Encroachment" means stands of plants of the kinds specified in column 1 of Table 4 of the Conservation of Agricultural Resources Act (Act No. 43 of 1983) where individual plants are closer to each other than three times the mean crown diameter;

"Diverting" as defined in the General Authorisation, in terms of section 39 of the National Water Act, 1998 (Act no 36 of 1998) for Water Uses as defined in Section 21(c) and 21(i) (GN. 509 of 26 August 2016), means to, in any manner, cause the instream flow of water to be rerouted temporarily or permanently.

"Ecological Infrastructure" refers to naturally functioning ecosystems that deliver valuable services to people, such as water and climate regulation, soil formation and disaster risk reduction.

"Flood event" is the event where land is inundated by the overflowing of water from a river channel and where this event causes significant damage to infrastructure or results in watercourse erosion and/or sediment deposition.

NOTE that flooding can be a natural phenomenon in many river or wetland systems which, due to encroachment and human modification of the form and function of the affected system, may have evolved into a potential hazard to life or property.

"Flow-altering" as defined in the General Authorisation, in terms of section 39 of the National Water Act, 1998 (Act no 36 of 1998) for Water Uses as defined in Section 21(c) and 21(i) (GN. 509 of 26 August 2016), means to, in any manner, alter the instream flow route, speed or quantity of water temporarily or permanently.

"Impeding" as defined in the General Authorisation, in terms of section 39 of the National Water Act, 1998 (Act no 36 of 1998) for Water Uses as defined in Section 21(c) and 21(i) (GN. 509 of 26 August 2016), means to, in any manner, hinder or obstruct the instream flow of water temporarily or permanently, but excludes the damming of flow so as to cause storage of water.

"Indigenous vegetation" refers to vegetation consisting of indigenous plant species occurring naturally in an area, regardless of the level of alien infestation and where the topsoil has not been lawfully disturbed during the preceding ten years. Consideration will be made where the indigenous plants species are considered as bush encroachment species and thus requiring active maintenance.

“Maintenance” means actions performed to keep a structure or system functioning or in service on the same location, capacity and footprint.

“Maintenance Management Plan” means a management plan for maintenance purposes defined or adopted by the competent authority.

“River Management Plans” as defined in the General Authorisation, in terms of section 39 of the National Water Act, 1998 (Act no 36 of 1998) for Water Uses as defined in Section 21(c) and 21(i) (GN. 509 of 26 August 2016), any river management plan developed for the purposes of river or storm water management in any municipal/metropolitan area or described river section, river reach, entire river or sub quaternary catchment that considers the river in a catchment context.

“River reach”, a length of river characterised by a particular channel pattern and channel morphology, resulting from a uniform set of local constraints on channel form. A river reach is typically hundreds of meters in length.

“Stretch” a section of watercourse, delineated between two or more mapped coordinates, within which proposed maintenance activities are to take place as guided by a MMP.

“Thalweg” refers to the line of lowest elevation within a valley or watercourse.

“Watercourse” means:

- (a) a river or spring;
- (b) a natural channel in which water flows regularly or intermittently;
- (c) a wetland, lake or dam into which, or from which, water flows; and
- (d) any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse as defined in the National Water Act, 1998 (Act No. 36 of 1998);

a reference to a watercourse includes, where relevant, its bed and banks. The extent of a watercourse includes, where relevant, its bed and banks of which make up the riparian habitat or the 1:100 year flood line, whichever is the greatest.

“Wetland” means, land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically covered with shallow water, and which land in normal circumstances supports or would support vegetation typically adapted to life in saturated soil.

Acronyms:

BGIS	Biodiversity Geographic Information Systems
BID	Background Information Document
CARA	Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983), as amended
CBA	Critical Biodiversity Areas
DEADP	Department of Environmental Affairs and Development Planning
DWA	Department of Water Affairs (now Department of Water and Sanitation)
DWS	Department of Water and Sanitation
EAP	Environmental Assessment Practitioner
EI	Ecological Importance
EIA	Environmental Impact Assessment
ES	Ecological Sensitivity
ESA	Ecological Support Area
FEPA	Freshwater Ecosystem Priority Areas
GA	General Authorisation
GN	Government Notice
GPS	Global Positioning System
I&APs	Interested and Affected Parties
MMP	Maintenance Management Plan

NEMA	National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended
NEM:BA	National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)
NFEPA	National Freshwater Ecosystem Priority Areas
NWA	National Water Act, 1998 (Act 36 of 1998), as amended
PES	Present Ecological State
SANBI	South African National Biodiversity Institute
WMA	Water Management Area
WCBSP	Western Cape Biodiversity Spatial Plan
WUA	Water Users Association
WUL	Water Use License

4. ENGAGEMENT PROCESS

4.1 AUTHORITY ENGAGEMENT

Please indicate (with an 'x') which of the following authorities have been consulted to provide input based on the proposed maintenance activities:

- ☒ Department of Water and Sanitation
 - ☐ Catchment Management Agency
 - ☒ CapeNature
 - ☐ SANParks
 - ☒ Western Cape Department of Agriculture, Directorate: Sustainable Resource Management
 - ☒ District Municipality
 - ☒ Local Municipality
 - ☒ Irrigation Board / Water Users Association
 - ☐ Heritage Western Cape
 - ☒ Department of Agriculture, Forestry and Fisheries
 - ☒ Department of Environmental Affairs & Development Planning
 - ☐ Other (please list):
-

The above-indicated authorities will be consulted in the Section 24G documentation circulated to them for comment. The same applies to the section to be completed below as part of the final MMP document to be submitted to DEADP for approval.

4.2 PUBLIC PARTICIPATION

Single property / maintenance and management activities along a watercourse occurring along a stretch of no more than 1 kilometer (≤1000 meters):

(i) Given written notice to the owner or person in control of that land if the person undertaking the maintenance activity is not the owner or person in control of the land.	Yes / No	Not applicable.
(ii) Given written notice to adjacent landowners (up to 500m upstream and downstream from furthest upstream and downstream maintenance site and opposite side of the banks) of the development of the MMP.	Yes / No	As part of the Section 24G application public participation process
(iii) Stakeholder meeting held for adjacent landowners, in which MMP is presented. This must include an opportunity for adjacent landowners to provide comment.	Yes / No	Not applicable
(iv) Given written notice to any organ of state having jurisdiction in respect of any aspect of the activity(ies) proposed within the development of the MMP.	Yes / No	Written notice provided to relevant organs of state as part of the Section 24G public participation process.
(v) Provided written notice and confirmation to the relevant Water Users Association (WUA) or Irrigation Board (IB) of the development of the MMP, if applicable.	Yes / No	As part of the Section 24G application public participation process

5. DATA COLLECTION AND ASSESSMENT

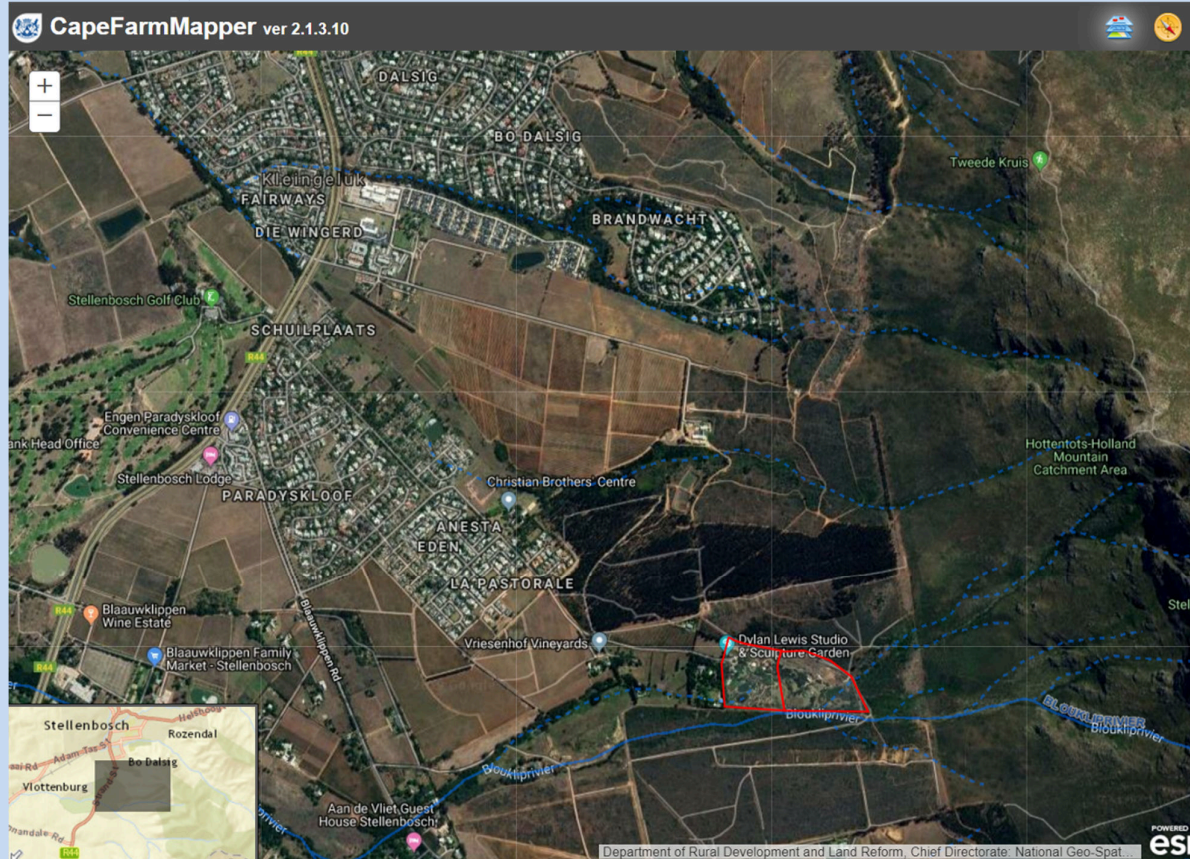
Map of the project area:

Figure 1. Map showing the locality of the property (CapeFarmMapper, 2019)

General Description of Watercourse

Table 2: Summary of key information related to the study area

Descriptor	Name / details	Notes
Water Management Area (WMA)	Berg Olifants WMA	
Catchment Area	Blaauwklippen River	Tributary in the Eerste River System
Quaternary Catchment	G22H	
Present Ecological State	Largely modified (D)	Blaauwklippen River (DWS PES, EI and ES;(2012)
Ecological Importance; Ecological Sensitivity	Moderate; High	
Type of water resource	Paradyskloof Tributary & associated wetlands	
Latitude	33°58'19.35"S	Location of weir
Longitude	18°52'21.02"E	

The main freshwater feature within the study area consists of the Paradyskloof Tributary of the Blaauwklippen River, a tributary of the Eerste River. The Eerste River originates as the Jonkershoek Stream in the Jonkershoek Valley and flows westwards towards Stellenbosch to be joined by the Kromme and Plankenbergh tributaries where it becomes the Eerste River.

Downstream of Stellenbosch the river is joined by the Veldwagters (originating in the Devon Valley), Blaauwklippen (originating in the Stellenbosch Berg) and Bonte rivers before its confluence with the Kuils River at Macassar. The river then flows into False Bay via a small estuary.

The Paradyskloof River is only still natural within its first kilometre within the Hottentots-Holland Mountain Catchment Area. Downstream of this it becomes increasingly modified. The upper reaches of the river are impounded by the dam within the site and then it flows through agricultural

areas to its confluence with the Blaauwklippen River. Through most of this area, apart from the flow modification from abstraction and storage, the river channel has been modified through removal of the riparian habitat and modifications to the channel. Within the site the river has been modified by past activities but has also be rehabilitated.



Figure 2. The rehabilitated Paradyskloof River within the site



Figure 3. View of the hillslope seep (top), valley bottom wetland (middle) and depression wetlands (bottom)



Figure 4. Google Earth image of the site with the present day delineated aquatic features, taken in February 2017

Biodiversity Conservation Importance:

Freshwater Ecosystem Priority Area (FEPA) wetlands were mapped nationally using available data. According to this mapping, the Eerste River and Blaauwklippen River are not mapped as FEPA rivers, only the upper reaches of the Eerste River upstream of Stellenbosch (Figure 5). The dam is mapped as an artificial wetland. Thus, in terms of the FEPA mapping, there are not considered to be any aquatic constraints to the proposed activity.

The 2017 Western Cape Biodiversity Spatial Plan for the study area has mapped some small aquatic critical biodiversity areas that are associated with wetlands within the site. The watercourse and its smaller tributaries are mapped as aquatic ecological support areas that provide important ecological services and should not be allowed to become degraded (Figure 6).

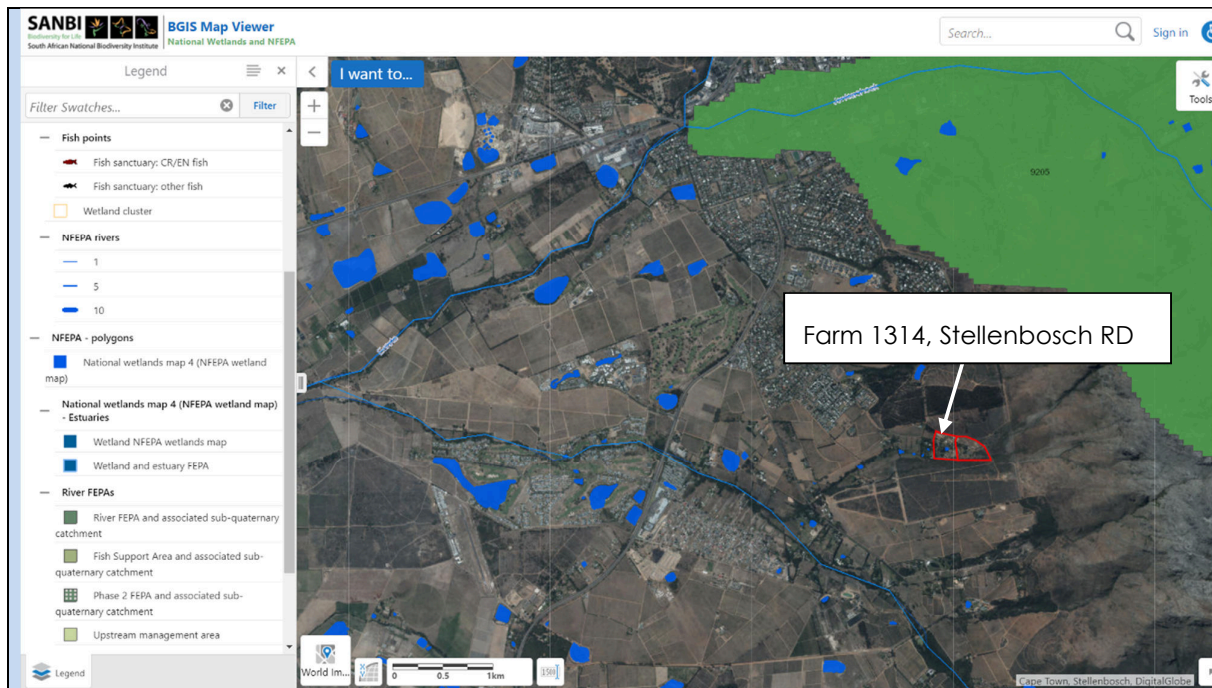


Figure 5. FEPA wetlands and rivers in the study area (SANBI Biodiversity GIS, 2019)



Figure 6. Critical Biodiversity Areas map for the study area (CapeFarmMapper, 2019)

Climate and Hydrology

The town of Stellenbosch has a Mediterranean climate. It receives most of its rainfall during a cold winter whilst its summers are typically hot and dry. The average rainfall for July is 37mm and the average daytime temperature is 20°C (Figure 7). In contrast, February receives an average of only 8mm and has an average temperature of 34°C. At the site, the mean annual rainfall is 781 mm with an annual evaporation total of 1115 mm. The average monthly flow distribution graph (Figure 8) shows that flows in the watercourses are slightly delayed to that of the average monthly rainfall pattern, with peak flows in the rivers typically occurring in August. Works in the watercourses should thus be avoided in the period June to September.

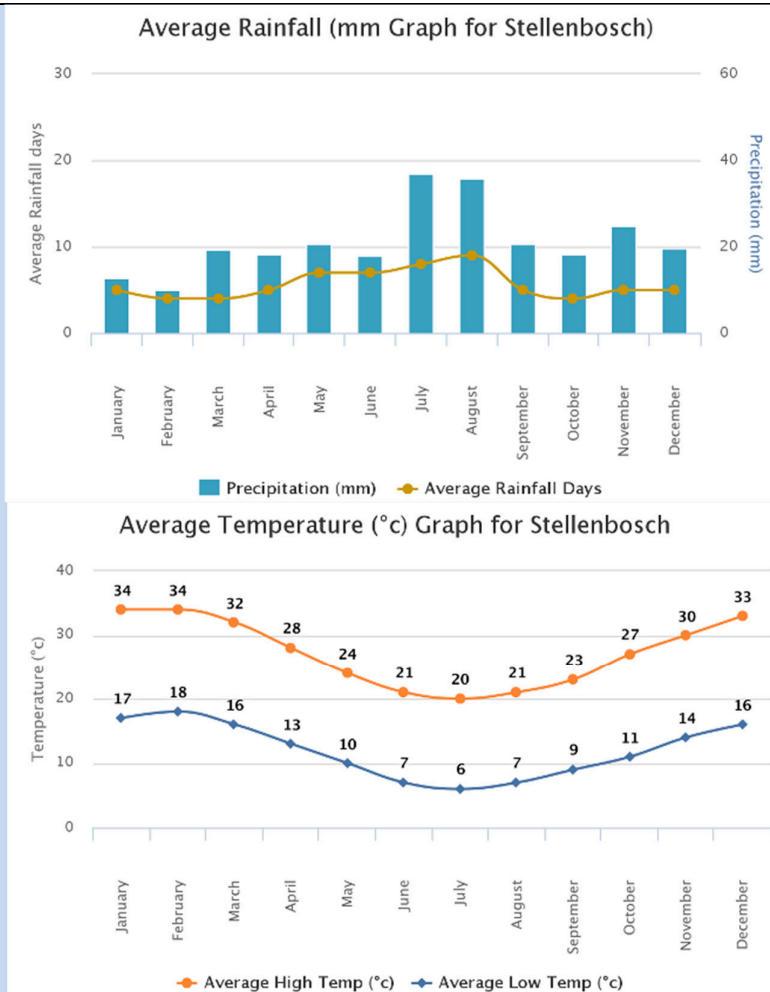


Figure 7. Average monthly rainfall and temperatures (Worldweatheronline, 2019)

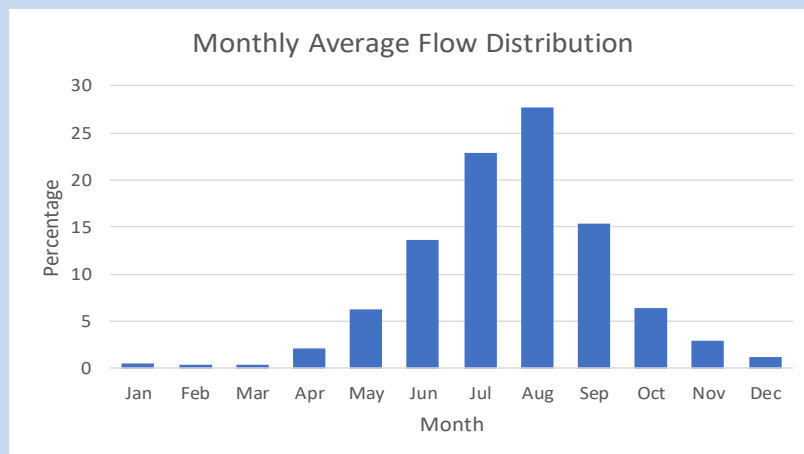


Figure 8. Average Monthly flows expressed as an average monthly percentage contribution to the mean annual runoff for watercourses within quaternary catchment G22H (Data obtained from Water Resources 2012)

Watercourse Assessment

Present Ecological Status

The instream and riparian habitat of the upper Paradyskloof River has been moderately modified as a result of past disturbance of the areas adjacent to the watercourse as well as the construction of the dam within the site. The instream aquatic habitat is in a slightly better condition, particularly

as a result of the rehabilitation works undertaken and is considered to be in a largely natural to moderately modified ecological condition.

Table 3. Geomorphological and Physical features of the upper Paradyskloof River

River	Paradyskloof River
Geomorphological Zone	Upper Foothill River
Lateral mobility	Partially confined
Channel form	Simple but has multiple channels in places
Channel pattern	Single to multiple thread: Low sinuosity
Channel type	Alluvium with boulders, cobbles and occasional bedrock
Channel modification	Moderate modification in the upper reaches
Hydrological type	Perennial mainstem with seasonal tributaries
Ecoregion	South Western Coastal Belt
DWA catchment	G22H
Vegetation type	Cape Winelands Shale Fynbos
Rainfall region	Winter

Table 4: Index of Habitat Integrity Assessment results and criteria assessed

Instream Habitat Integrity	Paradyskloof	Riparian Zone Habitat Integrity	Paradyskloof
Water Abstraction	7	Vegetation Removal	7
Flow Modification	9	Exotic Vegetation	5
Bed Modification	6	Bank Erosion	4
Channel Modification	9	Channel Modification	9
Water Quality	5	Water Abstraction	7
Inundation	3	Inundation	8
Exotic Macrophytes	3	Flow Modification	9
Exotic Fauna	2	Water Quality	5
Rubbish Dumping	2		
Integrity Class	B/C	Integrity Class	C

Ecological Importance and Sensitivity

The ecological importance and sensitivity of the upper reaches of the Paradyskloof River are considered to be moderate to high. Indigenous fish populations (Cape galaxias *Galaxia zebratus* and Cape kurper *Sandelia capensis*) still occur within the lower river system and the river plays an important role as providing an ecological corridor that links the lower Eerste River to the more natural habitat higher in the catchment. As the river still has elements of natural riparian vegetation, it is more sensitive to flow and water quality changes.

Table 5. Results of the EIS assessment for the upper Paradyskloof River

Biotic Determinants	Upper Paradyskloof
Rare and endangered biota	2
Unique biota	2
Intolerant biota	2.5
Species/taxon richness	2.5
Aquatic Habitat Determinants	
Diversity of aquatic habitat types or features	2.5
Refuge value of habitat type	2.5
Sensitivity of habitat to flow changes	2.5
Sensitivity of flow related water quality changes	2
Migration route/corridor for instream and riparian biota	2

National parks, wilderness areas, Nature Reserves, Natural Heritage sites, Natural areas, PNEs	2
EIS CATEGORY	Moderate to high

Wetland Assessment

Present Ecological Status

The hillslope seep and valley-bottom wetland areas were natural wetland areas that are currently in a modified ecological state as a result of the surrounding land use activities while the depression wetlands have been artificially created but then rehabilitated to create more natural habitat, the is with the exception of the large dam.

Table 6. Classification of wetlands occurring at the site

Name	Hillslope seeps	Valley bottom wetlands	Depressions
System	Inland		
Ecoregion	South Western Coastal Belt		
Landscape setting	Hillslope	Valley bottom	Flat/ depression on hillside
Hydrogeomorphic Type	Hillslope seep with channel	Valley bottom with channel	Depression (pond or dam)
Longitudinal zonation	Upper foothill		-
Drainage	Associated with smaller tributary	Associated with Paradyskloof River	Associated with watercourses through site
Seasonality	Seasonal to permanent		
Anthropogenic influence	Some habitat and flow modification		Artificially created
Vegetation	Cape Wineland Shale Fynbos with freshwater wetland vegetation		
Substrate	Sand and Clay		
Salinity	Fresh		

Table 7. Wetland habitat integrity assessment (score of 0=critically modified to 5=unmodified)

Criteria & Attributes	Hillslope seeps	Valley bottom wetlands	Depressions
Hydrologic			
Flow Modification	3.8	3.2	2.0
Permanent Inundation	2.1	2.6	1.5
Water Quality			
Water Quality Modification	4.1	3.9	3.9
Sediment Load Modification	3.5	2.9	3.0
Hydraulic/Geomorphic			
Canalisation	2.9	2.5	2.2
Topographic Alteration	3.4	3.2	1.8
Biota			
Terrestrial Encroachment	2.7	2.9	3.0
Indigenous Vegetation Removal	3.5	3.5	2.5
Invasive Plant Encroachment	3.8	3.0	3.4
Alien Fauna	3.8	3.7	3.0
Over utilisation of Biota	4.1	3.5	3.0
Category	B – Largely natural	B/C – Largely natural to moderately modified	C – Moderately modified

Ecological Importance and Sensitivity

From Figure 9 it can be seen that in terms of goods and services, the wetlands due their location on the hillslope and association with the watercourses, supply valued services in terms of regulating

streamflow, mitigating erosion and providing habitat for biota amongst others. Given that much of the site has been rehabilitated for tourism / recreation purposes, this service is scored high. The wetlands are considered to be of a moderate to high ecological sensitivity and importance, providing a degree of refuge and connectivity for faunal and floral species within a landscape that is becoming increasingly cultivated. The hillslope wetland and valley bottom wetlands are considered of high importance due to the ecological and hydrological importance that they provide while the depression wetlands are of moderate importance primarily of hydrological functionality as they form an integral part of the aquatic mosaic within the site.

Table 8. Goods and services assessment results for wetlands (high=4; low=0)

Goods and services	Hillslope seeps	Valley bottom wetlands	Depressions
Flood attenuation	1.8	2.6	3.5
Stream flow regulation	3.6	2.8	3.0
Sediment trapping	3.5	2.5	3.4
Phosphate trapping	2.8	2.1	2.2
Nitrate removal	2.5	2.4	2.0
Toxicant removal	1.5	1.3	1.0
Erosion control	2.6	2.5	3.8
Carbon storage	2.2	2.0	2.0
Maintenance of biodiversity	3.6	2.9	2.5
Water supply for human use	2.6	2.5	3.5
Natural resources	1.0	0.5	1.5
Cultivated foods	0	0	1.5
Cultural significance	0.5	0	0.5
Tourism and recreation	3.5	3.5	3.5
Education and research	1.5	1.5	1.0

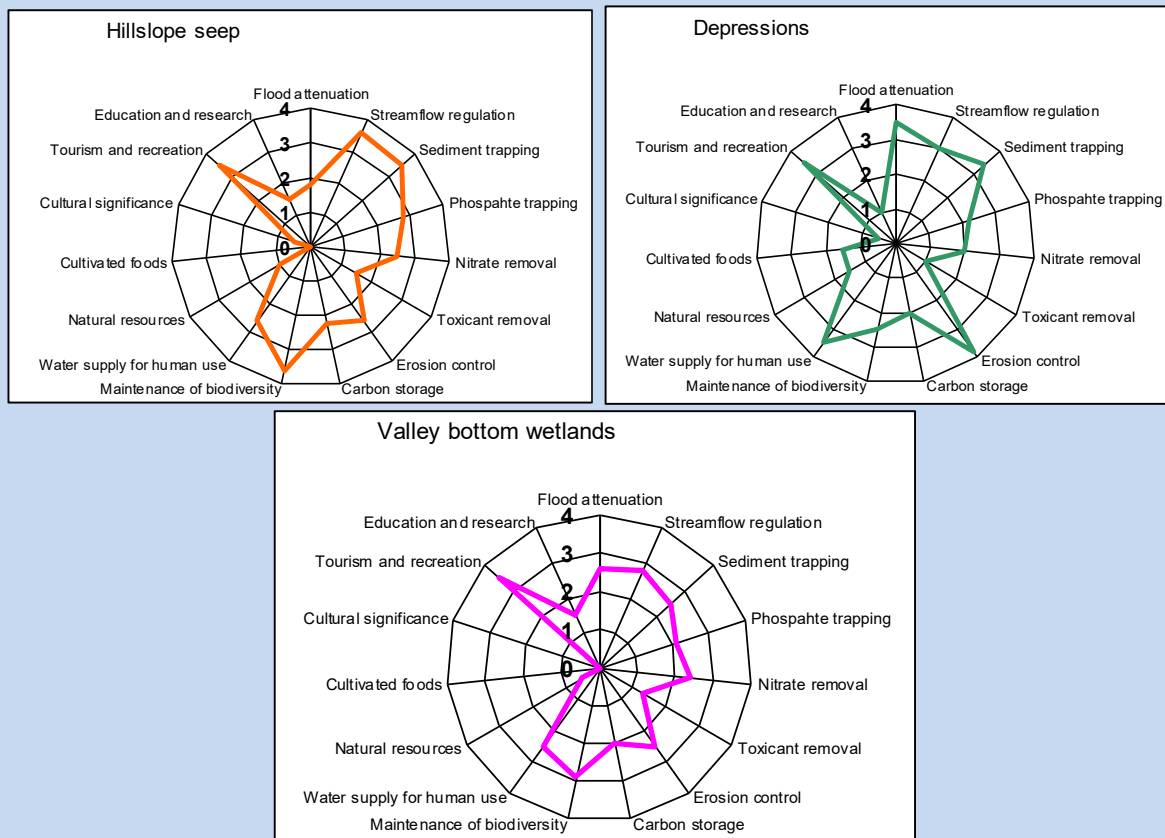


Figure 9. Ecosystem services provided by the wetlands within the site

Table 9. Results of the EIS assessment for the wetland area

ECOLOGICAL IMPORTANCE AND SENSITIVITY:	Hillslope seeps	Valley bottom wetlands	Depressions
Ecological Importance			
Biodiversity support	2.17	2.50	1.50
Presence of Red Data species	2	2.5	1.5
Populations of unique species	2.5	2.5	1
Migration/breeding/feeding sites	2	2.5	2
Landscape scale	1.70	1.70	1.30
Protection status of the wetland	1	2	1
Protection status of the vegetation type	2	2	2
Regional context of the ecological integrity	2	2	1.5
Size and rarity of the wetland type/s present	1.5	1	1
Diversity of habitat types	2	1.5	1
Sensitivity of the wetland	2.00	2.17	1.17
Sensitivity to changes in floods	1.5	2	1
Sensitivity to changes in low flows/dry season	2.5	2.5	1
Sensitivity to changes in water quality	2	2	1.5
ECOLOGICAL IMPORTANCE & SENSITIVITY	2.17	2.50	1.50
HYDROLOGICAL/FUNCTIONAL IMPORTANCE	2.56	2.28	2.61
IMPORTANCE OF DIRECT HUMAN BENEFITS	1.52	1.33	1.92
OVERALL IMPORTANCE	2.56	2.50	1.92

Freshwater Impact Assessment for Maintenance Activities

The impacts of the proposed activities included in this MMP are assessed in light of the ecological condition and sensitivity of tributaries of the upper Paradyskloof River and the associated wetlands on the site, as discussed above. As with the risk assessment, the nature of an MMP dictates that it only relates to the maintenance of the authorised structures or maintenance activities (as have been mapped as part of the assessment and stakeholder engagement process of this MMP).

Activity 1: Clearing of nuisance growth of indigenous vegetation

Common *Typha capensis* bulrushes are indigenous plants with an ecological function. Where natural vegetation occurs along the river channel it offers a degree of refuge and habitat for biota as well as providing essential ecological services such as reducing erosion, causing deposition of silt, cooling instream habitats and reducing wind, thereby reducing evaporation. It is thus essential that where natural vegetation exists it should be retained as far as possible and disturbed areas should be rehabilitated. Therefore, the objective of this activity is to control the bulrushes and not to eradicate them completely out of the river channel.

The primary impact of clearing of bulrushes is the disturbance of riparian and aquatic habitat. The control or clearing of these plants within the river channel can be conducted in several different ways. The level of impact of clearing varies depending on the methods used. For example, a bulldozer can be used to clear the vegetation but, in the process, all other plants are removed, and the stream banks and bed completely modified. The result is a high impact. Alternatively, the reeds can be cleared by hand or through grazing, resulting in a very low impact.

Secondary impacts would be the potential to facilitate erosion and the potential to facilitate the invasion of the area by alien plant species within the cleared areas. Furthermore, the reduction in surface roughness as a result of the cleared vegetation allows the river to flow through that reach at a higher velocity. If one doubles the velocity at which water is flowing, then the power of the water to cause erosion has been determined to increase fourfold.

Significance of impacts without mitigation: Low

Proposed mitigation:Methods for control of *Typha* bulrushes:

- The most successful method for control of *Typha* is through physical cutting and burning in conjunction with flooding. Cutting and/or burning should take place at the end of autumn when water levels are low but when the cut area will be submerged in at least 10 cm of water when water levels rise again. Two subsequent cuttings of the bulrush will be required within the end of the growing season to suppress the regrowth prior to the inundation; and
- Pulling of bulrush can work where the plants are small seedlings.

The following mitigation measures should be adhered to in conjunction with the above clearing methods:

- Removal of indigenous instream indigenous vegetation should be limited to nuisance growth of the bulrushes that impede flow in the channel;
- Clearing should be conducted at the end of summer and should not be conducted more than once a year;
- If mowers are used, care should be taken that they do not damage banks or other indigenous vegetation such as sedges and rushes;
- The remaining indigenous riparian vegetation within the scope of the MMP should not be cleared. The disturbance of the riparian zone when undertaking clearing activities should also be limited as far as possible, using existing access points;
- While the work is being carried out; if required, temporary sediment trapping – such as sandbags at the mouth of the channel to the pump station - should be put in place to filter water in the channel which will most likely contain high sediment loads;
- The upstream and downstream impacts of any vegetation clearing activities should be minimized, such as the prevention of increased sedimentation downstream of the site by not undertaking the activity during the rainy period;
- Indigenous sedges and other grasses should be allowed to establish in cleared sections
- Remove all cut reeds and cleared alien vegetation from the channel and riparian zone.

Significance of impacts after mitigation: Very Low

Impact table:

Potential impact on freshwater features	Clearing of nuisance growth of indigenous aquatic vegetation		
Nature	Disturbance of aquatic habitat and vegetation	Status	-
Impact source(s)	Clearing of instream and riparian vegetation		
Impacted aquatic ecosystem	Aquatic habitat and biota at the site where clearing takes place		
Irreplaceability of resources	Moderate to high		
Magnitude	Extent	Local	
	Intensity	Moderate	
	Duration	Short to medium term	
	Reversibility	Reversible	
	Probability	High	
Significance	Without mitigation	Low negative	L-
	With mitigation	Very Low negative	VL-
Cumulative impact	Without mitigation	Low	
	With mitigation	Very Low	
Confidence	Medium/high		

Activity 2: Repairs to infrastructure

This maintenance activity entails repair works to the dams and the weir as well as any infrastructure associated with the walkways through the watercourses. The works should be such that it retains its original footprint and capacity, a like-for-like scenario. Any additions to infrastructure are, by definition, not within the scope of an MMP. Repairs will typically involve a localised disturbance of the river channel or banks while infrastructure is repaired. Furthermore, disturbed areas following repairs can contribute towards high silt and sediment loads within the river as the material is not held by the roots of plants.

Significance of impacts without mitigation: Low

Proposed mitigation:

- Minimise the spatial extent of disturbance and the frequency of, or requirement for, maintenance activities. The disturbance footprint should be clearly demarcated. No activities should take place outside of this area;
- Repairs should be preferably conducted during the dry period (November/December to February/March) when there is lower flow in the watercourses;
- Do not impede the movement of aquatic and riparian biota while undertaking the works;
- Manual labour is preferred to the use of mechanical equipment to minimise physical disturbance around the activity location;
- Good house-keeping practices should be followed such as the use of machinery which does not leak oils or other substances, and if applicable adequate waste disposal and removal, as well as the adequate provision and servicing of toilets. The site of the maintenance activity must be managed so that construction material (especially cement and fuel products) is not washed into the watercourse during storm events. Emergency spill kits should be kept on site;
- The maintained infrastructure should not impact on the structural integrity of the watercourse nor result in any alteration to the flow- and sediment carrying-capacity of the stream;
- Any cleared sediment, vegetation or spoil material associated with the maintenance activity should be removed out of the watercourse channel, preferably to an approved disposal site;
- After construction, any areas within the maintenance footprint that have been degraded from their condition prior to construction and as a result of the maintenance activities must be restored to their former condition. If required disturbed areas should be revegetated with appropriate indigenous plant species.
- Clear alien plants to encourage regrowth of indigenous species; and
- All reasonable measures should be undertaken to ensure that river maintenance activities minimise future erosion of the stream bed and banks.

Significance of impacts after mitigation: Very Low

Impact table:

Potential impact on freshwater features	Repairs to infrastructure		
Nature	Impaired water quality and localized disturbance of habitat	Status	-
Impact source(s)	Pollutants, disturbed silt and sediments associated with repair works		
Impacted aquatic ecosystem	Aquatic habitat and biota within site and downstream		
Irreplaceability of resources	Moderate		
Magnitude	Extent	Local	
	Intensity	Moderate to low	
	Duration	Short term impacts	
	Reversibility	Reversible	
	Probability	Possible	
Significance	Without mitigation	Low negative	L-
	With mitigation	Very Low negative	VL-
Cumulative impact	Without mitigation	Low	

	With mitigation	Low
Confidence	Medium/high	

Activity 3: Sediment removal at infrastructure

Sediment and other materials are often removed to allow access to the infrastructure or to ensure that the infrastructure can continue to operate efficiently. In this case it may be required to remove sediment from the above the dams and the weir as well as any infrastructure associated with the walkways. The clearing of sediment at infrastructure can result in a localized disturbance within the riparian and aquatic habitats of the stream. This disturbance can result in further degradation as a result of erosion and invasion by alien plants occurring at the disturbed area.

Significance of impacts without mitigation: Low

Proposed mitigation:

- Material may be removed within the active channel only during the dry season (November/December to February/March) except for when emergency maintenance works need to be undertaken;
- The disturbed area around the infrastructure should be kept to a minimum and existing access points to the infrastructure used;
- Minimise upstream/downstream impacts on the reach in which the site is located;
- Minimise impact on the structural integrity of the watercourse and avoid channelisation or canalization of the watercourse rather maximise physical diversity. Valuable biophysical or aesthetic areas, including meanders, and in-channel and floodplain habitat, should be retained;
- Manual labour should be used where possible and the use of machinery within the stream channel should be minimized;
- The disturbed area should be kept to a minimum and where applicable should coincide with the programme and approach for clearing of nuisance Typha bulrush within the dams and channels;
- Where possible existing access points to the streams and dams should be used and any indigenous marginal vegetation that is established along the edges of the channel should preferably remain intact as it provides cover, habitat and food for the riverine biota;
- Disturbed areas should be kept clear of alien vegetation.
- Removed material should be taken out of the channel completely and should not be utilised to block the stream flow or to create berms on the top of the stream banks.
- Disturbed areas on the banks of the streams should be revegetated with indigenous plant species; and
- Removed material should not be directly sold for commercial gain by the land owner who is removing the material (this would result in the activity being classified as mining – mining is not authorized under this MMP).

Significance of impacts after mitigation: Low

Impact table:

Potential impact on freshwater features	Sediment movement at infrastructure		
Nature	Disturbance of riparian and aquatic habitat with the potential of increased turbidity downstream if activity takes place while there is flow in the watercourse	Status	-
Impact source(s)	Direct mechanical disturbance of stream bed and banks		
Impacted aquatic ecosystem	Aquatic habitat and biota within site		
Irreplaceability of resources	Moderate		
Magnitude	Extent	Local	
	Intensity	Moderate	
	Duration	Short term impacts	

	Reversibility	Reversible	
	Probability	Probable	
Significance	Without mitigation	Low negative	L -
	With mitigation	Low negative	L-
Cumulative impact	Without mitigation	Low	
	With mitigation	Low	
Confidence	Medium/high		

Activity 4: Sediment movement within the channel or on the banks to repair the banks of the stream (erosion mitigation)

The nature of a watercourse is such that banks do occasionally erode. Where this erosion becomes ecologically undesirable (if caused by man-made interventions) or threatens infrastructure – it may be required to reshape the eroded bank. This can be done by moving sediment and cobbles within the stream channel into the eroded bank to create a lower gradient to the slope of the bank and reinforce it.

Significance of impacts without mitigation: Moderate to Low

Proposed mitigation:

- Maintenance activities are best done during the dry season. Maintain a minimum base flow at all times and do not impede the movement of aquatic and riparian biota;
- Maintenance works, should as far as possible, be carried out by manual labour;
- The disturbed area around the bank being maintained should be kept to a minimum and where possible present existing access points to the infrastructure must be used;
- Minimise the impact on the structural integrity of the water course and avoid channelisation or canalization of the watercourse; look to maximise physical diversity of the channel banks and bed. Valuable biophysical or aesthetic areas, including meanders, and in-channel habitats, should be retained;
- Manual labor is preferred to the use of mechanical equipment in order to minimise physical disturbance around the activity location;
- Minimise alterations to flow- and sediment-capacity. All reasonable measures should be undertaken to ensure that river maintenance activities do not cause erosion;
- Any material used to repair banks should not contain seed of alien plants;
- Minimise upstream/downstream impacts on the reach in which the site is located;
- Disturbed areas should be kept clear of alien vegetation and where necessary should be planted with indigenous vegetation.;
- Provide some diversity in the shaping of the stream bed to create a healthy variety of habitats for the biota;
- Removed material should be taken out of the channel completely; and
- No foreign or waste material should be utilized to build up the banks. In particular, sediment brought in for filling purposes should be from a local source and free of invasive alien plant seed.

Significance of impacts after mitigation: Low

Impact table:

Potential impact on freshwater features	Sediment movement at infrastructure		
Nature	Disturbance of riparian and aquatic habitat with the potential of increased turbidity downstream if activity takes place while there is flow in the watercourse	Status	-
Impact source(s)	Direct mechanical disturbance of stream bed and banks		
Impacted aquatic ecosystem	Aquatic habitat and biota within site		
Irreplaceability of resources	Moderate		

Magnitude	Extent	Local	
	Intensity	Moderate	
	Duration	Short term impacts	
	Reversibility	Reversible	
	Probability	Probable	
Significance	Without mitigation	Moderate to Low negative	M/L -
	With mitigation	Low negative	L-
Cumulative impact	Without mitigation	Low	
	With mitigation	Low	
Confidence	Medium/high		

Risk Assessment

Risk assessments were carried out for the proposed activities in order to assess the potential or risk for the proposed activities of the MMP to alter the ecological condition of the aquatic ecosystems. In terms of the risks that the activities pose to the aquatic ecosystems (summaries provided in Table 10 to Table 14), the maintenance activities were all considered to be low.

Table 104: Summary risk assessment for Activity 1 – Clearing of *Typha* bulrushes

Phases	Activity	Aspect	Impact	Significance	Risk Rating
Control / clearing of alien vegetation	Access to site	Creating an access route to the site if required	Disturbance of soil and vegetation, flow impacts and water quality impairment	24	L
	Cutting and poisoning reeds/ rushes	Physical removal of plants		27	L

Table 11: Summary risk assessment for Activity 2 – Repairs to the infrastructure

Phases	Activity	Aspect	Impact	Significance	Risk Rating
Repairs to an existing piece of infrastructure in the channel or riparian zone	Pre-construction prep: Access site and clear vegetation if needed	Clearing and disturbance of vegetation and soil	Disturbance of aquatic habitat, short-term increased sediment loads in water	27	L
	Physically repairing a structure in a like-for-like fashion	Structural repairs - further disturbance and foreign substances (example: concrete) on site	Potential contamination of water quality, on-going disturbance of habitat	25	L
	Post construction: clearing site and rehabilitating where needed	Reshaping disturbed banks, removing construction material and equipment, planting indigenous vegetation if needed	No significant negative impact- potential for positive impacts if rehabilitation of site is adequate	20	L

Table 125. Summary risk assessment for Activity 3 – Sediment movement at infrastructure

Phases	Activity	Aspect	Impact	Significance	Risk Rating
Removing sediment	Access site and clear	Clearing and disturbance of vegetation and soil	Disturbance of soil and vegetation. Potential sedimentation.	27	L

from infrastructure	vegetation if needed				
	Physically removing the sediment	Lifting sediment out of channel and at the channel mouth		25	L
	Handling of removed sediment	Removing sediment from watercourse		23	L

Table 13: Summary risk assessment for Activity 4 – Sediment movement within the channel or on the banks to repair the banks of the stream (erosion mitigation)

Phases	Activity	Aspect	Impact	Significance	Risk Rating
Removing sediment from the channel of the river	Site access	Getting required equipment into the channel	Disturbance of riparian and aquatic habitat, increased sediment load	28.125	L
	Bringing material to site and shaping banks	Physical disturbance to substrate and banks of river		40.5	L

The risk rating scores are based on the assumption that the activity is conducted according to the method statements of this MMP. The nature of an MMP dictates that it only relates to the maintenance of authorized infrastructure structures or maintenance activities. The infrastructure will require a water use authorization issued from the Department of Water and Sanitation. It is recommended that the application for the authorization includes the application to conduct the above-assessed maintenance activities.

6. METHOD STATEMENT

- 6.1 The method statement must provide a step-by-step plan (which may include a schematic diagram etc.) to inform the responsible person(s) on the process and actions to take in a sequential and logical manner, which aims to reduce the impact of undertaking the activity within a reasonable timeframe and cost.
- 6.2 A method statement should be compiled for each individual activity given the likely specific circumstances and conditions of a site requiring maintenance. However, in situations whereby uniform conditions and circumstances are evident for multiple sites requiring the same type of activity, a method statement can be given for a specific type of activity to be undertaken at multiple sites given the aforementioned requirements.
- 6.3 The detail of the method statement will be assessed by the Department and other relevant regulatory authorities to ensure actions that are taken are such that they do not perpetuate increased incidences of erosion/deposition of material.
- 6.4 Time periods must be given within which the maintenance actions contemplated need to be implemented. An indication must be made whether maintenance actions will be repeated, e.g. clearing of silt/debris from under a bridge annually or after flood events.
- 6.5 The following serves as a general guide required to minimise the spatial impact of the maintenance activity:
 - Repairs and maintenance should be undertaken within the dry season, except for emergency maintenance works.

- Where at all possible, existing access routes should be used. In cases where none exist, a route should be created through the most degraded area avoiding sensitive/indigenous vegetation areas.
- 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.
- Where at all possible, limit the disturbance to the zone of the thalweg. This is due to the ecological importance of the low flow channel and respective habitat being allowed to re-establish improving the ecological condition.
- 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.
- On completion of the maintenance action, the condition of the site in terms of relative topography should be similar to the pre-damaged state (i.e. the shape of the river bank should be similar or in a state which is improved to manage future damage). This ultimately dictates that the channel, banks and bed cannot be made narrower, higher or deepened respectively. Exceptions are considered for systems involved with the management of stormwater and improvements for water quality within the urban context.

ACTIVITY 1: Clearing of nuisance growth of indigenous vegetation – *Typha capensis*

Typha bulrush growth in general needs to be managed in rivers within developed areas where the natural control measures such as floods have largely been removed and there is an elevated supply of nutrients. The removal of these plants may need to thus be periodically undertaken in order to maintain an open stream channel where there is the need to operate infrastructure. The control of nuisance growth of indigenous aquatic plants needs to be undertaken very judiciously, with careful control and consideration for the environment. **Control** should only aim to remove excessive plant growth and build-up of material that can cause flooding. Within the site, one would typically expect the dams and stream channels to become overgrown with bulrush that would need to be managed.

Maintenance activity	Activity 1: Clearing of nuisance growth of bulrush within the dams and stream channels	
Actions	<ul style="list-style-type: none"> The most successful method for control of <i>Typha</i> is through physical cutting and burning in conjunction with flooding. Cutting and/or burning should take place at the end of autumn when water levels are low but when the cut area will be submerged in at least 10 cm of water when water levels rise again. Two subsequent cuttings of the bulrush will be required within the end of the growing season to suppress the regrowth prior to the inundation; and Pulling of bulrush can work where the plants are small seedlings. 	
Impacts of actions	The following impacts are anticipated as a result of undertaking the inspection activity: Disturbance to aquatic habitat and vegetation	
Severity of impacts	Disturbance of aquatic habitat	If all mitigation measures are implemented the severity of the impact will be Low .
Measures to mitigate the severity of the impact	Disturbance to the local vegetation	<ul style="list-style-type: none"> The following mitigation measures should be adhered to in conjunction with the above clearing methods: Removal of indigenous instream indigenous vegetation should be limited to nuisance growth of the bulrushes that impede flow in the channel; Clearing should be conducted at the end of summer and should not be conducted more than once a year; If mowers are used, care should be taken that they do not damage banks or other indigenous vegetation such as sedges and rushes; The remaining indigenous riparian vegetation within the scope of the MMP should not be cleared. The disturbance of the riparian zone when undertaking clearing activities should also be limited as far as possible, using existing access points; While the work is being carried out; if required, temporary sediment trapping – such as - should be put in place to filter water in the channel which will most likely contain high sediment loads; The upstream and downstream impacts of any vegetation clearing activities should be minimized, such as the prevention of increased sedimentation downstream of the site by not undertaking the activity during the rainy period; Indigenous sedges and other grasses should be allowed to establish in cleared sections Remove all cut rushes and cleared alien vegetation from the channel and riparian zone.
Remedial measures if mitigation inadequate	There are no additional remedial mitigation measures other than those listed above. As such, all mitigation measures as outlined above should be implemented in full.	
Method of Access	Existing access roads or paths should be utilised as far as possible.	
Time for maintenance management activity	The time period of the maintenance management activity will vary depending on the level of <i>Typha</i> bulrush infestation.	

ACTIVITY 2: Repairs to infrastructure

This maintenance activity entails repairing the the dams and the weir as well as any infrastructure associated with the walkways so that they retain their original footprints and capacities, a like-for-like scenario. Any additions to infrastructure are, by definition, not within the scope of an MMP. Repairs will typically involve a localised disturbance of the river channel or banks while infrastructure is repaired. Furthermore, disturbed areas following repairs can contribute towards high silt and sediment loads within the river as the material is not held by the roots of plants.

Maintenance activity	Activity 2: Repairs to infrastructure	
Actions	Repair a defined piece of infrastructure	
Impacts of actions	Minor repairs typically involve a short term, localised disturbance of the stream channel or its banks at the site of the infrastructure being repaired.	
Severity of impacts	Impaired water quality and habitat disturbance	If all mitigation measures are implemented the severity of the impact will be Very Low/Insignificant .
Measures to mitigate the severity of the impact	Impaired water quality and habitat disturbance	<ul style="list-style-type: none"> • Minimise the spatial extent of disturbance and the frequency of, or requirement for, maintenance activities. The disturbance footprint should be clearly demarcated. No activities should take place outside of this area; • Repairs should be preferably conducted during the dry period (November/December to February/March) when there is lower flow in the watercourses; • Do not impede the movement of aquatic and riparian biota while undertaking the works; • Manual labour is preferred to the use of mechanical equipment to minimise physical disturbance around the activity location; • Good house-keeping practices should be followed such as the use of machinery which does not leak oils or other substances, and if applicable adequate waste disposal and removal, as well as the adequate provision and servicing of toilets. The site of the maintenance activity must be managed so that construction material (especially cement and fuel products) is not washed into the watercourse during storm events. Emergency spill kits should be kept on site; • The maintained infrastructure should not impact on the structural integrity of the watercourse nor result in any alteration to the flow- and sediment carrying-capacity of the stream; • Any cleared sediment, vegetation or spoil material associated with the maintenance activity should be removed out of the watercourse channel, preferably to an approved disposal site; • After construction, any areas within the maintenance footprint that have been degraded from their condition prior to construction and as a result of the maintenance activities must be restored to their former condition. If required disturbed areas should be revegetated with appropriate indigenous plant species. • Clear alien plants to encourage regrowth of indigenous species; and • All reasonable measures should be undertaken to ensure that river maintenance activities minimise future erosion of the stream bed and banks.
Remedial measures if mitigation inadequate	There are no additional remedial mitigation measures other than those listed above. As such, all mitigation measures as outlined above should be implemented in full.	
Method of Access	Existing access roads or paths should be utilised as far as possible.	
Period of maintenance management activity	The time period of the maintenance management activity will vary depending on the level of repairs required.	

ACTIVITY 3: Sediment removal at infrastructure

Sediment and other materials are often removed to allow access to the infrastructure or to ensure that the infrastructure can continue to operate efficiently. In this case it may be required to remove sediment from the above the dams and the weir as well as any infrastructure associated with the walkways. The clearing of sediment at infrastructure can result in a localized disturbance within the riparian and aquatic habitats of the river. This disturbance can result in further degradation as a result of erosion and invasion by alien plants occurring at the disturbed area.

Maintenance activity	Activity 3: Sediment removal at infrastructure	
Actions	<ul style="list-style-type: none"> • Access the site with team • Remove sediment from the location of infrastructure) • Remove to a suitable stockpile location outside the riparian zone • Revegetate any riparian areas disturbed by the activities 	
Impacts of actions	The following impacts are anticipated as a result of undertaking the inspection activity: Disturbance of aquatic habitat and vegetation	
Severity of impacts	Disturbance of aquatic habitat and vegetation	If all mitigation measures are implemented the severity of the impact will be Low
Measures to mitigate the severity of the impact	Disturbance of aquatic habitat and vegetation	<ul style="list-style-type: none"> • Material may be removed within the active channel only during the dry season (November/December to February/March) except for when emergency maintenance works need to be undertaken; • The disturbed area around the infrastructure should be kept to a minimum and existing access points to the infrastructure used; • Minimise upstream/downstream impacts on the reach in which the site is located; • Minimise impact on the structural integrity of the watercourse and avoid channelisation or canalization or the watercourse rather maximise physical diversity. Valuable biophysical or aesthetic areas, including meanders, and in-channel and floodplain habitat, should be retained; • Manual labour should be used where possible and the use of machinery within the stream channel should be minimized; • The disturbed area should be kept to a minimum and where applicable should coincide with the programme and approach for clearing of nuisance Typha bulrush within the dams and channels; • Where possible existing access points to the streams and dams should be used and any indigenous marginal vegetation that is established along the edges of the channel should preferably remain intact as it provides cover, habitat and food for the riverine biota; • Disturbed areas should be kept clear of alien vegetation. • Removed material should be taken out of the channel completely and should not be utilised to block the stream flow or to create berms on the top of the stream banks. • Disturbed areas on the banks of the streams should be revegetated with indigenous plant species; and • Removed material should not be directly sold for commercial gain by the land owner who is removing the material (this would result in the activity being classified as mining – mining is not authorized under this MMP).
Remedial measures if mitigation not adequate	There are no additional remedial mitigation measures other than those listed above. As such, all mitigation measures as outlined above should be implemented in full.	
Method of Access	Existing access roads or paths should be utilised as far as possible.	
Time period of maintenance management activity	The time period of the maintenance management activity should take place within one day.	

ACTIVITY 4: Sediment movement within the channel or on the banks to repair the banks of the stream (erosion mitigation)

The nature of a watercourse is such that banks do occasionally erode. Where this erosion becomes ecologically undesirable (if caused by man-made interventions) or threatens infrastructure – it may be required to reshape the eroded bank. This can be done by moving sediment and cobbles within the stream channel into the eroded bank to create a lower gradient to the slope of the bank and reinforce it.

Maintenance activity	Activity 4: Sediment movement in the channel or on banks for repairs to banks (erosion repairs from flooding)	
Actions	<ul style="list-style-type: none"> • Access the site with team or machinery • Move material into area/ bank requiring filling or repairs • Shape bank • Revegetate any riparian areas disturbed by the activities 	
Impacts of actions	Due to the volumes of material involved, the movement of material to reshape a bank is most commonly often conducted by machinery. The resulting disturbance through using machinery is intense. This disturbance can result in further degradation as a result of erosion and invasion by alien plants occurring at the disturbed area.	
Severity of impacts	Disturbance of aquatic habitat and vegetation	If all mitigation measures are implemented the severity of the impact will be Low
Measures to mitigate the severity of the impact	Disturbance of aquatic habitat and vegetation	<ul style="list-style-type: none"> • Maintenance activities are best done during the dry season. Maintain a minimum base flow at all times and do not impede the movement of aquatic and riparian biota; • Maintenance works, should as far as possible, be carried out by manual labour; • The disturbed area around the bank being maintained should be kept to a minimum and where possible present existing access points to the infrastructure must be used; • Minimise the impact on the structural integrity of the water course and avoid channelisation or canalization of the watercourse; look to maximise physical diversity of the channel banks and bed. Valuable biophysical or aesthetic areas, including meanders, and in-channel habitats, should be retained; • Manual labor is preferred to the use of mechanical equipment in order to minimise physical disturbance around the activity location; • Minimise alterations to flow- and sediment-capacity. All reasonable measures should be undertaken to ensure that river maintenance activities do not cause erosion; • Any material used to repair banks should not contain seed of alien plants; • Minimise upstream/downstream impacts on the reach in which the site is located; • Disturbed areas should be kept clear of alien vegetation and where necessary should be planted with indigenous vegetation.; • Provide some diversity in the shaping of the stream bed to create a healthy variety of habitats for the biota; • Removed material should be taken out of the channel completely; and • No foreign or waste material should be utilized to build up the banks. In particular, sediment brought in for filling purposes should be from a local source and free of invasive alien plant seed.
Measures if measures are inadequate	There are no additional remedial mitigation measures other than those listed above. As such, all mitigation measures as outlined above should be implemented in full.	
Method of Access	Existing access roads or paths should be utilised as far as possible.	
Period of maintenance management activity	The time period of the maintenance management activity should take place within one day.	

7. MONITORING AND REPORTING

The landowner is responsible for overseeing the monitoring of the maintenance and management activities under the auspices of this MMP. The table on the following page lists ongoing monitoring that would take place in the river to pro-actively address any potential impacts to the ecological integrity of the river associated with the MMP as well as the specific monitoring required during MMP activities.

Form A (attached) must be completed by the relevant person(s) before maintenance activities are undertaken and Form B after a maintenance activity has been completed. A copy of each completed Form A and B must be kept on record by the Landowner.

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 activity type and reference code, this must be done by specifically listing the relevant detail within the MMP.

It is important to note that any and all activities undertaken outside the scope of the MMP, in terms of the action outlined within the given method statement, the responsible person(s) will be subject to Section 24(F) of NEMA and that appropriate enforcement and compliance requirements will follow.

DEA&DP may, within a reasonable notice period, request to evaluate the maintenance activities and assess the maintenance sites as per 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 (m ²)	Volume of material (m ³)
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:	
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REPORTING FOR 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 (m ²)	Volume of material (m ³)
Equipment that was used:	Description of method for completed activity and if commence date changed			Date activity completed
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				
After A Coordinates: S E				

After B Coordinates: S Date of photos taken:	
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REFERENCE GUIDE FOR DRAFTING MMPs FOR A WATERCOURSE

Ecosystem Guidelines for Environmental Assessment in the Western Cape, Edition 2, 2016. Available at: www.bgis.org.za

Wetland offsets: A best practice guideline for South Africa, 2016. Available at: <http://www.wrc.org.za>

Preliminary guideline for the determination of buffer zones for rivers, wetlands and estuaries, 2014. Available at: <http://www.wrc.org.za>

National Water Act, 1998 (Act No. 36 of 1998). Available at: <http://www.gov.za/documents/national-water-act>

General Authorisation, in terms of Section 39 of the National Water Act, 1998 (Act No. 36 of 1998) for water uses as defined in Section 21(c) or Section 21(i).

ANNEXURE A**DEPARTMENTAL DETAILS**

CAPE TOWN OFFICE: REGION 1 (City of Cape Town & West Coast District)	CAPE TOWN OFFICE: REGION 2 (Cape Winelands District & Overberg District)	GEORGE OFFICE: REGION 3 (Central Karoo District & Eden District)
Requests for competent authority to adopt an MMP must be sent to the following details: Department of Environmental Affairs and Development Planning Attention: Directorate: Development Management (Region 1) Private Bag X 9086 Cape Town, 8000 Registry Office 1 st Floor Utilitas Building 1 Dorp Street, Cape Town Queries should be directed to the Directorate: Development Management (Region 1) at: Tel: (021) 483-5829 Fax (021) 483-4372	Requests for competent authority to adopt an MMP must be sent to the following details: Department of Environmental Affairs and Development Planning Attention: Directorate: Development Management (Region 2) Private Bag X 9086 Cape Town, 8000 Registry Office 1 st Floor Utilitas Building 1 Dorp Street, Cape Town Queries should be directed to the Directorate: Development Management (Region 2) at: Tel: (021) 483-5842 Fax (021) 483-3633	Requests for competent authority to adopt an MMP must be sent to the following details: Department of Environmental Affairs and Development Planning Attention: Directorate: Development Management (Region 3) Private Bag X 6509 George, 6530 Registry Office 4 th Floor, York Park Building 93 York Street George Queries should be directed to the Directorate: Development Management (Region 3) at: Tel: (044) 805-8600 Fax (044) 8058650

WESTERN CAPE DEPARTMENT OF AGRICULTURE DETAILS

Francis Steyn
 Director: Sustainable Resource Management, LandCare Programme
 Western Cape Department of Agriculture
 Private Bag X1
 Elsenburg
 7607
 Main Building, Elsenburg, Muldersvlei Road
 Tel: 021 808 5090
 Email: franciss@elsenburg.com

PART 4: REFERENCES

Belcher, T & Grobler, D., 2019. Freshwater Assessment for the works undertaken on Farm 1314 and 1315 near Stellenbosch in the Western Cape, July 2019. BlueScience: Somerset West.

Republic of South Africa. 2014. *NEMA EIA Regulations of 2014*. Department of Environmental Affairs. Pretoria.

Appendix A: EAP's Curriculum Vitae

Curriculum Vitae

MARI DE VILLIERS

**Principle Environmental Assessment and Public
Participation Practitioner:
Cornerstone Environmental Consultants (Pty) Ltd.**



MARI DE VILLIERS

PERSONAL INFORMATION

Full names: Maria Margaretha de Villiers (Mari)
ID Number: 810423 00710 88
Nationality: South African
Gender: Female
Marital Status: Married (Maiden name: Kirsten)
Health: Excellent
Language: Excellent verbal and written skills in English and Afrikaans
Drivers License: Code 08
Office Address: 17 Rokewood Avenue, Stellenbosch
Postal Address: PO Box 12606, Die Boord, 7613
Cell phone: 083 235 8733
E-mail: mari@cornerstoneenviro.co.za

PROFILE SUMMARY

I hold a Masters' Degree in Environmental Management and has more than 15 years' experience as an environmental assessment practitioner (EAP). I have undertaken several courses to further my career, the most notable being the Management Development Programme (MDP) at the University of Stellenbosch Business School, an IEMA¹ Approved Carbon Footprint Management Course, and several courses in ISO² 14064 Parts 1, 2 and 3 (GHG Inventories, Projects, Validation and Verification) presented by Carbon Action in conjunction with the CSA³.

I am a focused and self-motivated professional that strives to be involved in projects where I can add value and make a positive difference. I thrive in dynamic work environments and have a strong sense of responsibility and commitment. I have excellent interpersonal, project management and report writing skills. I have extensive knowledge and understanding of South Africa's environmental and related legislation and its associated application and licensing processes. I believe in attention to detail, but also in understanding the "bigger picture". I believe in the importance of professional collaborations and in the value of integrated project teams.

EDUCATION

2004 - 2005: **Master's Degree in Environmental Management**

University of the Free State

Lectured Master's Degree

Subjects: Physical Environment; Biological Environment; Environmental Sustainability;

Environmental Economics; Environmental Law and Policies; Development Planning; Project Management (request).

2000 - 2003: **Bachelor's Degree in Consumer Science (Housing)**

Stellenbosch University

(Academic Records are available upon request)

¹ Institute of Environmental Management and Assessment

² International Organisation for Standardisation

³ Canadian Standards Association

1999: **Senior Certificate:** Paarl Girls High
 Matric Subjects: Biology; Physical Science; Mathematics; Home Economics; English: First Language; and Afrikaans: First Language (*Senior Certificate is available upon request*).

CAREER ENHANCING COURSES

2014: GHG Protocol Scope 3 'train-the-trainer' course presented by the NBI⁴
 2014: Climate Change course presented by the University of Melbourne (online course hosted by Coursera)
 2014: Climate Change within the EIA/NEPA Process, presented by EIA Campus (online course)
 2013: ISO 14064-1 Essentials: Greenhouse Gas Inventories, presented by Carbon Action
 2013: ISO 14064-2 Essentials: Greenhouse Gas Projects, presented by Carbon Action
 2013: ISO 14064-2 Expert: Greenhouse Gas Projects, presented by Carbon Action
 2013: ISO 14064-3: Greenhouse Gas Validation, presented by Carbon Action
 2013: ISO 14064-3: Greenhouse Gas Verification, presented by Carbon Action
 2010: Management Development Programme (MDP), Stellenbosch University Business School
 2009: Golder Associates Africa Technical Writing Crouse
 2009: IEMA Approved Carbon Footprint Management: An Introductory Programme
 2006: Golder Associates Africa Project Management Course (PM24)
 2006: International Association for Public Participation (IAP2) training course, Modules 1, 2 and 3: Planning for Effective Public Participation, Techniques for Effective Public Participation, and Communications for Effective Public Participation
 2005: SABS ISO 14001: Environmental Management Systems - Auditing
 2005: SABS ISO 14001: Environmental Management Systems - Introduction

PAPERS AND LECTURES PRESENTED

2017: IAIAsa 2017 Conference: Paper presented: *Greenhouse Gas Impacts and Mitigation Opportunities within the Copper Mining Industry*
 2016: IAIAsa 2016 Conference. Paper presented: *Integrating Climate Change Impacts into South African Environmental Assessment Processes*
 2015: IAIAsa 2015 Conference. Paper presented: *Recommendations on how the Environmental Assessment process can contribute towards low-carbon economic reform in South Africa*
 2014: IAIAsa 2014 Conference. Paper presented: *International lessons for the incorporation of climate change considerations into environmental assessment in South Africa*
 2013: Lecture presented at the Centre for Renewable and Sustainable Energy Studies, University of Stellenbosch, as part of a post-graduate course: *"The EIA Process and the Challenges and Possible Solutions for the Renewable Energy Sector"*
 2012: Presented two lectures on Environmental Management at the Stellenbosch University's Engineering Faculty as part of their Master's Degree in Environmental Engineering
 2008: IAIAsa 2008 Conference. Paper presented: *The value of key stakeholder participation in Strategic Environmental Assessment: A South African case study*
 2006: IAIAsa 2006 Conference. Paper presented: *An investigation into the problems, shortcomings and benefits encountered during the environmental management processes of three golf course developments in South Africa (Master's Degree mini-thesis results)*

⁴ National Business Initiative

PROFESSIONAL AFFILIATIONS AND ASSOCIATIONS

- Chairperson of the International Association for Impact Assessors, South Africa (IAIAsa), Western Cape Branch, June 2016 to February 2019;
- Founder Member of the Environmental Assessment Practitioner's Association of South Africa (EAPASA)
- Member of the International Association for Public Participation, Southern Africa (IAP2)
- Member of the GHG Management Institute

WORK EXPERIENCE

- May 2014 to present: **Cornerstone Environmental Consultants (Pty) Ltd.**
Stellenbosch
Principle Environmental Assessment and Public Participation Practitioner
Project review and strategic input.
- September 2013 to April 2014: Self-employed
Stellenbosch
Responsibilities: External EIA reviewer and freelance environmental and carbon consultant.
- October 2009 to August 2013: **Full time employee: Withers Environmental Consultants (Pty) Ltd.,**
Stellenbosch
Principle Environmental Assessment Practitioner
Responsibilities: Managing a range of local and regional Environmental Impact Assessment (EIA) and public participation processes and drafting of the relevant documentation.
- April 2006 to September 2009: **Full time employee: Golder Associates Africa (Pty) Ltd.**
Midrand
Environmental Consultant
Responsibilities: Managing a range of local and regional EIA and public participation processes and drafting of the relevant documentation.
- May 2004 to April 2006: Full-time employee for employer owning two companies:
Centurion
Environmental Consultancy
Responsibilities: Managing environmental assessment applications and drafting of the relevant documentation.
And
Town Planning Practice
Responsibilities: Compilation of Subdivision Diagrams, Motivating Memorandums for Town Planning Applications, gathering of property information at various governmental offices, etc.
- 2003: **Department of Environmental Management, City of Cape Town**
(Internship)
Responsibilities: Research on European Green Procurement Policies.

PROJECT-RELATED EXPERIENCE

Afdakrivier Mixed-use Development

Western Cape Province, Hermanus

EIA and public participation process project manager for the proposed Afdakrivier mixed-use development. Activities performed include managing the EIA process, compiling EIA documentation, meeting facilitation, etc.

Highfield Vineyard Expansion

Western Cape Province, Grabouw

Basic Assessment and public participation process project manager for the proposed Highfield vineyard expansion. Activities performed include managing the Basic Assessment process, compiling Basic Assessment documentation, meeting facilitation, etc.

Bussell Low-level Bridge

Western Cape Province, Montagu

Basic Assessment and public participation process project manager for the proposed Bussell low-level crossing across the Kingna River. Activities performed include managing the Basic Assessment process, compiling Basic Assessment documentation, meeting facilitation, etc.

Various MMP Projects

Western Cape Province, Various towns

Responsible for public consultation and project management activities as part various large Maintenance Management Plan (MMP) projects in the Western Cape Province including MMPs for the following rivers/sections of river: Subdistricts 1, 2 and 2 of the Berg River, as well as the Kinga, Konings, Poesjesnels, Baden and Upper Olifants Rivers.

GHG Emissions Assessment for the PPM Plant Expansion

North West Province, Rustenburg

Prepared a GHG Emissions Assessment for the PPM plant expansion project. The Report included a GHG Inventory (also called a "Carbon Footprint"), assessing the significance of the potential impacts of the calculated emissions on climate change, as well as recommendations to reduce the GHG emissions associated with the project.

Three GHG Emissions Assessments, ERG-Africa

Democratic Republic of the Congo

Prepared a GHG Emissions Assessment for the Metalkol SA Roan Tailings Reclamation Project, the Frontier Project and the Comide Project in the Democratic Republic of the Congo. The Reports included GHG Inventories (also called a "Carbon Footprint"), assessing the significance of the potential impacts of the calculated emissions on climate change, as well as recommendations to reduce the GHG emissions associated with the projects.

GHG Inventory Report, SA Corporate Real Estate Fund

South Africa

Prepared an Equity Share GHG Inventory Report for SA Corporate Real Estate Fund using the *GHG Protocol Corporate Accounting and Reporting Standard Methodology* (hereafter "GHG Protocol").

GHG Management Services, P&B Lime Works, Overberg Agri

Western Cape Province, Bredasdorp

Participated in the preparation of a GHG Inventory Report for P&B Lime Works using the GHG Protocol. In the process of undertaking an integrated scope of work that is aimed at assisting P&B Lime Works in understanding its potential carbon tax liability, in identifying the possible strategic and other measures that could be taken to manage and mitigate the company's exposure to carbon tax, and finally in complying with the relevant legislated reporting obligations.

GHG Inventory Report, IAIAsa Conference 2013

Participated in the preparation of a GHG Inventory Report for the IAIAsa Conference 2013 hosted at the Black Mountain Leisure and Conference Hotel, Free State Province.

External EIA reviewer

Externally reviewed various EIA-related reports and documents for technical and process-related accuracy for a third party environmental consultancy.

Cape Lime**Western Cape Province, Vredendal**

Section 24G rectification application and Atmospheric Emissions License Application processes for existing activities at Cape Lime outside Vredendal, Western Cape Province.

Proposed Bloemendal Redevelopment**Western Cape Province, Durbanville**

EIA and public participation process project manager for the proposed redevelopment of the Bloemendal Estate outside Durbanville. Activities performed include managing the EIA process, compiling EIA documentation, and meeting facilitation.

Proposed Mooifontein Mine, Paddy's Pad (Pty) Ltd.**Free State Province, Edenburg**

EIA and public participation process project manager for Paddy's Pad's proposed Mooifontein Uranium Mine near Edenburg in the Southern Free State. Activities performed include managing the EIA process, compiling EIA documentation, and meeting facilitation.

P&B Lime Works, Overberg Agri**Western Cape Province, Bredasdorp**

Basic Assessment, Section 24G rectification application and Atmospheric Emissions License Application processes for existing and proposed activities at P&B Lime Works outside Bredasdorp, Western Cape Province.

Clover Valley Wind Energy Project, Clover Valley Wind Energy**Western Cape Province, Mamre**

EIA and public participation project manager for a wind energy project near Mamre in the Western Cape Province. Activities performed include managing the EIA process, compiling EIA documentation, and meeting facilitation.

Groene Kloof Wind Energy Project, Dassenberg Wind Energy**Western Cape Province, Mamre**

EIA and public participation project manager for a wind energy project near Mamre in the Western Cape Province. Activities performed include managing the EIA process, compiling EIA documentation, and meeting facilitation.

Cisco**Western Cape Province, Kuils River**

Section 24G rectification application process project management for existing activities at Cisco Steel Works in Kuils River, Western Cape Province.

Riviera Tungsten Prospecting, Bongani Minerals (Pty) Ltd.**Western Cape Province, Piketberg**

Compilation of an Environmental Management Plan and management of the public participation process as part of Bongani Minerals (Pty) Ltd.'s Prospecting Right Application.

Alexkor Mine**Northern Cape Province, Alexander Bay**

Compilation of a Consolidated Environmental Management Programme (EMP) of Alexkor's approved sea concession EMP's.

Proposed Salmonsvele Residential Development**Western Cape Province, Paarl**

EIA and public participation project manager for the proposed Salmonsvele Residential Development, Paarl. Activities performed include managing the EIA process, compiling EIA documentation, and meeting facilitation.

Akanani Mine, Lonmin**Limpopo Province, South Africa**

EIA and public participation project manager for Lonmin Akanani's proposed platinum prospecting shaft near Mokopane (Potgietersrus). Activities performed include managing the EIA process, compiling EIA documentation, and meeting facilitation.

Dilokong Chrome Mine, ASA Metals**Limpopo Province, South Africa**

Managing several EIA and Basic Assessment processes for infrastructure expansions at ASA Metals' Dilokong Chrome Mine, near Burgersfort.

Waterberg Gas, Anglo Coal Gas Projects**Limpopo Province, South Africa**

EIA and public participation project manager for Anglo Coal's coal-bed methane gas exploration project near Lephalale (Ellisras). (This was the first project of its kind in Africa.)

Namakwa Sands, Exxaro**Western Cape Province, South Africa**

EIA and public participation project manager for infrastructure expansions at the Namakwa Sands Mineral Separation Plant near Koekenaap. Activities performed include managing the EIA process, compiling EIA documentation, managing the stakeholder engagement process, meeting facilitation, liaison with authorities, land owners and affected parties, and stakeholder issues management.

Matla Coal, Exxaro**Mpumalanga Province, South Africa**

EIA and public participation project manager for the proposed new access shaft at Matla Coal near Kriel. Activities performed include managing the EIA process, compiling EIA documentation, managing the stakeholder engagement processes, meeting facilitation, liaison with authorities, land owners and affected parties, and stakeholder issues management.

Batlhako Mining Limited**North-West Province, South Africa**

EIA process coordinator and public participation task manager for an opencast chrome mine near Rustenburg. Activities performed include coordinating compilation of the EIA documentation, managing the stakeholder engagement process, liaison with authorities, land owners and affected parties, meeting management, facilitation and logistics, and stakeholder issues management.

Harmony Gold**Free State, South Africa**

EIA public participation project manager for Harmony Gold's proposed re-mining of tailings facilities in the Welkom area. Activities performed include managing the stakeholder engagement process, liaison with authorities, land owners and affected parties, meeting management, facilitation and logistics, and stakeholder issues management.

Heidelberg Opencast Coal Mine Anglo Coal**Gauteng, South Africa**

EIA public participation project manager for an opencast coal mine outside Heidelberg. Activities performed include managing the stakeholder engagement process, liaison with authorities, land owners and affected parties, meeting management and logistics, and stakeholder issues management.

Zondagsfontein Coal Mine, Anglo Coal**Mpumalanga, South Africa**

Public participation project manager for opencast and underground coal mining EIA near Ogies. Activities performed include managing the stakeholder engagement process, liaison with authorities, land owners and affected parties, meeting management, facilitation and logistics, and stakeholder issues management.

Zincor, Kumba Resources**Gauteng, South Africa**

Public participation project manager for the Zincor tailings dam rehabilitation and closure study, Springs. Activities performed include managing the stakeholder engagement process, liaison with authorities, meeting management, facilitation and logistics, and stakeholder issues management.

ABILITIES DEVELOPED**Personal, Interpersonal and Leadership Skills**

I developed leadership, planning and organising skills while serving as a line and project manager at Golder Associates Africa, as well as serving as a Principal Environmental Consultant at Withers Environmental Consultants and while serving as the Chairperson of the Western Cape Branch of the IAIA during 2016 to 2019. These skills were also developed when I served as the Chairperson of Golder Associates Africa's Leader Development Programme in 2009. This programme was aimed at developing young leadership within the company, and formed part of the company's succession planning.

My work and other experience furthermore enhanced my abilities to function efficiently as a member of a group, to take responsibility, and to work under pressure.

Project Management

I developed skills in managing large, integrated EIA processes through my work experience.

Public Participation Project Management and Meeting Facilitation Skills

I developed public participation project management skills through my work experience to date. These skills include, amongst others, the facilitation of meetings with individual stakeholders, groups of key stakeholders, authorities, and public meetings.

GHG and Climate Change Management

I successfully completed courses and developed skills in preparing GHG inventories and undertaking greenhouse gas validations and verifications, based on the global standard ISO 14064 Part 1, Part 2, and Part 3, and the GHG protocol. I also developed skills, and acquired knowledge through research, on how to assess and limit proposed projects' impacts on climate change, and on how to assess and limit the potential impacts of climate change on proposed projects.

Computer Literacy

I have excellent computer literacy in the following computer programs: Microsoft Project, Microsoft Word, Microsoft Excel and Microsoft PowerPoint.

Appendix B: Maps & Figures



**SECTION 24G RETROSPECTIVE ENVIRONMENTAL AUTHORISATION
APPLICATION FOR THE DEVELOPMENT OF A WEIR, BERMS, A WALKWAY, AND
DIVERSION OF A WATERCOURSE INTO A DAM ON FARM NO. 1314,
STELLENBOSCH RD, WESTERN CAPE PROVINCE**

Locality Map

Scale: As per Google Image



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SECTION 24G RETROSPECTIVE ENVIRONMENTAL AUTHORISATION APPLICATION FOR THE DEVELOPMENT OF A WEIR, BERMS, A WALKWAY, AND DIVERSION OF A WATERCOURSE INTO A DAM ON FARM NO. 1314, STELLENBOSCH RD, WESTERN CAPE PROVINCE

Site Layout Plan (activities applied for) (Image source: BlueScience, 2019)

Figure a: Walkway, weir and infilling/berm - Google Earth image showing the mapped aquatic features with the yellow ovals indicating where the **walkway** has been constructed within these delineated aquatic feature (Image source: BlueScience, 2019).



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RD, WESTERN CAPE PROVINCE

Site Layout Plan (activities applied for) (Image source: BlueScience, 2019)

Figure b: Flow diversion - Comparison of the Google Earth image for 2005 with the most recent image (2019) with the mapped aquatic features. The **flow diversion** is indicated by the blue arrow (Image source: BlueScience, 2019).



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Appendix C: Environmental Awareness/Induction Training Material

PROTECTION OF THE ENVIRONMENT IS YOUR RESPONSIBILITY / BESKERMING VAN DIE OMGEWING IS JOU VERANTWOORDELIKHEID

REMAIN WITHIN WORKING AREAS BLY BINNE WERKGEBIEDE	PROTECT ANIMALS ON THE SITE BESKERM DIERE OP DIE KONSTRUKSIETERREIN	DO NOT HARM OR DAMAGE PLANTS AND ANIMALS. MOENIE PLANTE EN DIERE BESKADIG NIE.	USE RUBBISH BINS GEBRUIK ASBLIKKE	DO NOT LIGHT ANY FIRES WITHOUT PERMISSION MOENIE SONDER TOESTEMMING ENIGE VURE MAAK NIE	SMOKE CAUTIOUSLY ROOK VERSIGTIG
PREVENT OIL POLLUTION. USE DRIP TRAYS VOORKOM OLIE-BESOEDILING	USE TOILETS GEBRUIK DIE TOILETTE	DON'T SPEED/ SECURE LOADS RY STADIG/ MAAK VRAGTE VAS	CONTROL DUST BEHEER STOF	FINES OF BETWEEN R1000-R10000 BOETES TUSSEN R1000 - R10000	ONLY EAT IN DEMARCATED AREAS EET SLEGS IN GEMERKTE GEBIEDE
			EMERGENCY NUMBERS AMBULANCE 10177 Stellenbosch Municipality 021 808 8160 Department of Water and Sanitation 021 941 6000 Fire Services 0861 265 263		
LIMIT NOISE VERMINDER GERAAS	ASK QUESTIONS VRA VRAE	KNOW THE EMERGENCY NUMBERS KEN DIE NOOD NOMMERS			

Appendix D: Incident Register - Example Template

INCIDENT REGISTER: [Proposed Project Name]					
PERSON REPORTING THE INCIDENT (NAME AND CONTACT DETAILS)	SHORT DESCRIPTION OF INCIDENT	DATE INCIDENT OCCURRED	DATE INCIDENT WAS REPORTED	MANNER IN WHICH INCIDENT WAS ADDRESSED AND DATE INCIDENT WAS RECTIFIED	PERSON RESPONSIBLE FOR RECTIFICATION