

Steenbras Catchment and Wellfield Environmental Maintenance Management Plan 2023

City of Cape Town

Submission date: 2023/10/06



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Title	Senior Consultant	Title	Senior Consultant

Project Overview and Purpose of the EMMP

New Water Programme: Steenbras Catchment and Wellfield

The Department of Environmental Affairs and Development Planning (DEA&DP) issued the City of Cape Town (CCT) with a Directive on 30 May 2017, in terms of Section 30A of the National Environmental Management Act (NEMA) Regulations, 2014 (as amended), to address the emergency that arose due to severe drought conditions and ensure adequate water supply within the jurisdiction of the CCT. This was supported by the (then) National Department of Environmental Affairs (DEA) [now Department of Forestry, Fisheries, and the Environment (DFFE)], who issued a Section 30A Directive on 12 April 2018. The Directives authorised the CCT to commence with NEMA Listed Activities, for the development of New Water Programme water augmentation projects (e.g., desalinating sea water, water re-use, and ground water abstraction), without the need to undertake an Environmental Impact Assessment (EIA) process. In addition, a local state of disaster was declared by the CCT in March 2017. This local state of disaster was extended monthly up until the end of September 2019 by notice in the Provincial Gazette.

Climate modelling indicates that the CCT and Western Cape Province will be very vulnerable to more frequent and extreme droughts in the future. In response, the CCT has developed a New Water Strategy to guide the provision of water services. The draft Strategy was made available for comment in February 2019, and approved by Council in May 2019.

The emergency measures being developed as part of the New Water Programme comprised *inter alia*, ground water abstraction within the Steenbras Nature Reserve. The Steenbras Wellfield is located within the Water Utility Zone of Steenbras Nature Reserve. The construction of the Steenbras Wellfield commenced under the above-mentioned Section 30A Directive.

Environmental Maintenance Management Plan: DEA&DP Ref: 6/3/3/6/3/A3/20/2129/22

Zutari (Pty) Ltd has been appointed by the applicant, the CCT, to undertake the environmental authorisation process for the repair and maintenance of roads, bridges, boreholes, pipeline and pipe crossings located within the sensitive terrestrial ecosystems, watercourses, and wetlands of the Steenbras Wellfield. Refer to Appendix A.1: Application Form, Section C for the identification of the affected infrastructure, the properties, and the co-ordinates where the repair and maintenance works will take place.

The proposed repair maintenance¹ activities to the existing roads, bridges, boreholes, and pipe crossings triggers Listed Activities in terms of the NEMA, 2014 EIA Regulations (as amended) and approval for such activities must therefore be sought from the Competent Authority i.e., DEA&DP in the Western Cape Province (Delegation from DFFE have been requested and received – refer Appendix F.2 -F.5).

As per the 2014 EIA Regulations (as amended), authorisation for the Listed Activities triggered in this regard can be obtained via an **Environmental Maintenance Management Plan (EMMP) – this document**.

The purpose of the EMMP is to ensure that the environmental impacts of the proposed maintenance activities are managed, mitigated, and kept to acceptable levels.

This EMMP has been compiled with the multi-disciplinary inputs from various specialists: (i) Freshwater (iii) Biodiversity and (iii) Heritage as per Appendix F.5 point 7.7.

¹ **Maintenance** in the context of this document means routine or emergency actions performed to keep a structure or system functioning or in service in the same location, capacity and footprint.

This EMMP document stands as an internal record to guide all future operational maintenance activities pertinent to specific identified locations. The EMMP should be updated / amended as appropriate when new interventions are required. An internal review of the EMMP must take place at least once per 5² years to ensure that the most up to date and environmentally sustainable best practice methods are being employed to achieve the required intervention objectives.

This EMMP is considered a working document which, through monitoring and recommendations made by an Environmental Control Officer (ECO) and, on occasion, the relevant specialist ecologists, must be updated/changed where relevant.

The following overarching management principles have been considered for the development and implementation of this EMMP:

- (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 has explicitly been considered;*
- (b) Avoid and reduce unnecessary maintenance;*
- (c) Maintenance and management of a watercourse have been 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 aim to prevent further deterioration to the condition of affected watercourses or any adjacent terrestrial habitats and were overall guided by a general commitment to improving and maintaining ecological infrastructure for the delivery of ecosystem services;*
- (e) Managers and organs of state identified, addressed and, where feasible, eliminated the factors that necessitate intrusive, environmentally damaging maintenance; and*
- (f) A process of continuous management improvement will be applied, namely Planning; Implementing; Checking (monitoring, auditing, determine corrective action) and Acting (management review).*

This document will be submitted to DEA&DP in electronic format for their records addressed to the case officer.

² Environmental implementation plans and **management plans** (1) Every national department listed in Schedule 1 as exercising functions which may affect the environment and every provincial department responsible for environmental affairs must prepare an environmental implementation plan within five years of the coming into operation of this Act, and at intervals of not more than five years thereafter (NEMLAA: National Environmental Management Laws Amendment Act, 2022, proclaimed).

Using this Document

Sections 1 – 2 of this EMMP provide the background, project description and relevant legislation and policies. Refer to Table 1 for the requirements of an EMMP.

Section 3 provides the location and a summary of the present condition of the system and any applicable environmental or heritage context.

Section 4 contains the tasks of the implementation of the EMMP.

Section 5 provides the environmental management requirements for the maintenance and repair activities associated with the Steenbras Nature Reserve and Steenbras Wellfield

Section 6 provides the environmental and reporting requirements.

Table 1 Requirements of the EMMP

Requirement	Section
The name of the person/proponent who will undertake the maintenance activity (contact person, address, telephone and fax number and e-mail address).	Section 1: Table 3
Details of the EAP who prepared the EMMP; and the expertise of the EAP to prepare an EMMP, including a curriculum vitae.	Section 1: Table 4
A description of the objectives of the EMMP.	Section 1.2
A description of the relevant legislation and policies within which the EMMP is prepared.	Chapter 2
A description of the site and a locality map.	Section 1.3 and Chapter 3
A description of the tasks that will be performed (method statement).	Section 1.3.2 Chapter 5 and Appendix H.1
A description of the potential impacts on the receiving environment and any management and/or mitigation measures to minimise the potential impacts associated with the maintenance activity.	Chapter 3 and Chapter 5
Any specialist inputs that were obtained.	Chapter 3, Chapter 5 And Appendices C.1-C.3, D.1-D.2 and E.1-E.2
The roles and responsibilities of the role players who will be involved in the maintenance activity.	Chapter 4

This EMMP has been reviewed by the following specialists:

Specialist	Signature
Kate Snaddon	
Paul Emms	

	STEENBRAS EMMP
	Proponent  CITY OF CAPE TOWN ISIXEKO SASEKAPA STAD KAAPSTAD <i>Making progress possible. Together.</i>

EMERGENCY CONTACT LIST

	Emergency Response	10111
	Police (SAPS) Steenbras	021 409 6535
	Ambulance – Metro, ER24	10177 (Metro) / 084 124 (ER24)
	Helderberg Government Hospital	021 850 4700
	Mediclinic Vergelegen Hospital	086 133 5566
	Poison Information Helpline of the Western Cape (PIHWC) (Snake Bites)	0861 555 777
	Fire Department	021 859 5525 (Grabouw) 021 444 7600 (Strand)
	Western Cape Disaster Management	021 937 6301
	Cape Town Municipality Switchboard	0860 103 089
	Cape Town Municipality Emergency	021 487 700
	Department of Environmental Affairs and Development Planning (DEA&DP)	021 483 2707
	Senior Superintendent (Steenbras Wellfield): Clarissa Barends	083 304 7580
	Senior Superintendent (Steenbras Catchment): Ricardo Hendricks	071 687 9243
	Biodiversity Management Branch: Owen Wittridge	084 528 0401

Abbreviations

APP	Approved Professional Person
BA	Basic Assessment
BMB	Biodiversity Management Branch
CBA	Critical Biodiversity Area
CMB	Catchment Management Branch
DEA&DP	Department of Environmental Affairs and Development Planning
DWS	Department of Water & Sanitation
EAP	Environmental Assessment Practitioner
EIS	Ecological Importance and Sensitivity
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EMMP	Environmental Maintenance Management Plan
ESA	Ecological Support Areas
DFFE	Department of Forestry, Fisheries, and the Environment
GA	General Authorisation
GN	Government Notice
MAP	Mean Annual Precipitation
MSL	Mean Sea Level
NEMA	National Environmental Management Act (No. 107 of 1998)
NEMBA	National Environmental Management: Biodiversity Act (Act No. 10 of 2004)
NEMPAA	National Environmental Management: Protected Areas Act (Act No. 57 of 2003)
NEMLAA	National Environmental Management Laws Amendment Act (No. 02 of 2022)
NFA	National Forest Act
NFEPA	National Freshwater Ecosystem Priority Areas
NWA	National Water Act
OHSA	Occupational Health and Safety Act (No. 85 of 1998)
PES	Present Ecological State
PPP	Public Participation Process
SE	Site Engineer
WDF	Waste Disposal Facility
WMB	Wellfield Management Branch
WULA	Water Use Licence Authorisation

Definition of Terms

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).

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.

Contractor in the context of this document refers to the external contractor responsible for undertaking maintenance activities included within the scope of this EMMP. The Contractor is responsible for ensuring the day-to-day implementation of the EMMP during the lifecycle of the site activities and is therefore must be well-versed in the contents of this document.

Contractors yard in the context of this document refers to the location and layout of any onsite offices, ablutions, storage containers, fuel storage areas and protection bunds, material lay-down areas, hazardous chemical storage facilities, workshops and plant service and maintenance areas, oil separators and grease traps, first aid facilities, training facilities, central waste storage areas, haul routes and any other facilities associated with the Contractor's yard (as may be applicable).

DEA&DP or Department of Environmental Affairs and Development Planning are the Provincial Authority in the Western Cape responsible for the administration of matters relating to the environment.

Development means the building, erection, construction or establishment of a facility, structure or infrastructure, including associated earthworks or borrow pits, that is necessary for the undertaking of a listed or specified activity, but excludes any modification, alteration or expansion of such a facility, structure or infrastructure, including associated earthworks or borrow pits, and excluding the redevelopment of the same facility in the same location, with the same capacity and footprint

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.

Disciplinary action in the context of this document refers to financial penalties, time penalties, legal action, dismissal and/or any other action taken against the culprit responsible for an incident of non-compliance with the EMMP. The disciplinary action will be determined according to the nature of the non-compliance or crime.

DWS or Department of Water and Sanitation.

Environmental audit and monitoring refer to the structured observation, measurement and evaluation of environmental data over a period of time to assess the efficiency of environmental mitigation and rehabilitation measures. The auditing and monitoring of the site will commence at intervals as determined in this document and will include a site inspection of the reconstruction and maintenance activities. A report of the findings at each compliance visit will be compiled and submitted to the Proponent and/or the Department of Environmental Affairs and Development Planning as necessary.

ECO or Environmental Control Officer in the context of this document refers to the party responsible for the environmental compliance and auditing activities required by the EMMP for the lifecycle of the reconstruction and maintenance activities. The ECO is to understand the detailed environmental issues associated with the project and is to be well versed in the contents of the EMMP and its associated reports.

Environmental incident refers to an accident or unexpected occurrence related to the project, including discharge of effluent, sediment, or water containing cement or fuel etc, into watercourse, fire, spills, pollution events, explosions, major emissions, flood events, or bank collapse leading to or potentially negative environmental impacts.

Environmental management instrument means (i) environmental management framework; (ii) strategic environmental assessment; (iii) spatial tool; (iv) environmental management programme; (v) environmental risk assessment; (vi) environmental feasibility assessment; (vii) norm or standard; (viii) minimum information requirements; or (ix) any other relevant environmental management instrument, as may be developed in time.

EIRF or Environmental Incident Report File refers to a file provided for the recording of all environmental incidents and includes a complaint register for the recording of general public concerns.

EMMP or Maintenance Management Plan in terms of Regulations pursuant to the National Environmental Management Act, No. 107 of 1998 as approved by the Competent Authority (DEA&DP in the Western Cape).

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 (GA) in terms of Section 39 of the National Water Act, Act (No. 36 of 1998) regulating the use of water in South Africa.

Heritage resource refers to any place or object of heritage significance i.e., of archaeological, palaeontological, cultural, aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance.

HWC or Heritage Western Cape (Provincial Heritage Authority)

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.

Invasive vegetation refers to an undesirable alien or indigenous plant growth which shall include, but not be limited to, all declared Category 1 & 2 listed alien invader species as set out in regulations pursuant to the Conservation of Agricultural Resources Act (No. 43 of 1983) (CARA). Other vegetation deemed to be invasive shall be those plant species that show the potential to occupy in number any area within the site area, and which are declared to be undesirable and are generally habitat transformers, germinating rapidly in response to disturbances and capable of out-competing desired indigenous species.

Linear activity means an activity that is arranged in or extending along one or more properties, and which affects the environment or any aspect of the environment along the course of the activity, and includes railways, roads, canals, channels, funiculars, pipelines, conveyor belts, cableways, power lines, fences, runways, aircraft landing strips, firebreaks and telecommunication lines.

Maintenance in the context of this document means routine or emergency actions performed to keep a structure or system functioning or in service in the same location, capacity and footprint.

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

Method Statement is a written submission by the Contractor [or Party responsible (e.g. CCT) for undertaking the maintenance activity], to the Engineer (or Party responsible for approving the method statement) in response to the specification or a request by the Engineer, setting out the plant, materials, labour, timeframe and method the Contractor proposes using to carry out an activity, identified by the relevant Specification or the Engineer when requesting the Method Statement, in such detail that the Engineer is enabled to assess whether the Contractor's proposal is in accordance with the Specifications and/or will produce results in accordance with the Specifications. The Method Statement shall cover applicable details with regard to: construction procedures, materials and equipment to be used, transportation of equipment/materials to and from site, movement of equipment/material on site, storage of materials on site, containment (or action to be taken if containment is not possible) of leaks or spills of any liquid or material that may occur, timing and location of activities, areas of noncompliance with the Specifications, and any other information deemed necessary by the Engineer.

NEMA or National Environmental Management Act (No. 107 of 1998).

Pollution in the context of this document refers to the contamination of air, water, soil or environment by a foreign substance or matter.

Proponent City of Cape Town

Reconstruction in the context of this document includes, but is not limited to, the reinstatement, repair or replacement of a structure or of infrastructure that was damaged or lost to a flood event and may include alterations to the original design to improve the structure's resilience to future high flow events.

SANS or South African National Standards

Scarifying refers to the roughening of the surface of soil as a preparation for re-vegetation.

Spoil material is that originating from the reconstruction or maintenance operations, and which cannot be reused.

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 EMMP

Topsoil is defined as a horizon of the soil profile and refers to the upper layer of soil from which plants obtain their nutrients.

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

Waste is defined in the National Environmental Management: Waste Act (No. 59 of 2008). There are two main types of waste as follows:

General waste means waste that does not pose an immediate hazard or threat to health or to the environment, and includes-

- (a) domestic waste;
- (b) building and demolition waste;
- (c) business waste; and
- (d) inert waste;

Hazardous waste means any waste that contains organic or inorganic elements or compounds that may, owing to the inherent physical, chemical or toxicological characteristics of that waste, have a detrimental impact on health and the environment;

Wastewater in the context of this document refers to water containing pollutants, including chemicals, oils, fuels, soaps, sewerage, or contaminated sediment.

Watercourse/body is defined in the National Water Act (No. 36 of 1998) as:

- (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, 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.

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1 INTRODUCTION

1.1 Background and Strategic Overview

Due to the severe drought of 2017-2018, a National Disaster was declared under section 41(1) of the Disaster Management Act, 2002 (No. 57 of 2002). In response, the City of Cape Town (CCT) initiated an emergency initiative, called the New Water Programme, to fast-track the implementation of alternative water supply to the CCT. As part of the New Water Programme, the CCT implemented initiatives for water supply which would ultimately contribute to the drought resilience of the CCT in future, including groundwater development, wastewater reuse, desalination, and several water demand management initiatives such as clearing of alien vegetation in stressed catchments.

The repair and maintenance of the Steenbras catchment and development of the Steenbras Wellfield was selected as one of these potential water supply sources, where groundwater is abstracted from the Table Mountain Group Aquifer (TMGA) and discharged into the Steenbras Dams. The Steenbras Dams are located within the Steenbras Nature Reserve, which are owned by the CCT, and provide a significant percentage of the CCT's water.

The declaration of a National Disaster allowed the (then) National Department of Environmental Affairs [DEA, now Department of Forestry, Fisheries, and the Environment (DFFE)], and the Provincial Department of Environmental Affairs and Development Planning (DEA&DP) to issue Section 30A Directives in terms of the National Environmental Management Act (NEMA) (No.107 of 1998), to the CCT in April 2018, and May 2017, respectively.

This meant that the conventional Environmental Impact Assessment (EIA) process was not required for specific Listed Activities in terms of the NEMA before the implementation of approved water augmentation schemes, provided that the CCT comply with the conditions of the Section 30A Directive.

Nonetheless, compliance to the Directive conditions and best practices have still been required to be followed, such as sensitivity screening of project areas, the development of detailed environmental method statements, on-site Environmental Control Officers, oversight by specialist ecologists, and stakeholder engagement throughout the project lifecycle.

The DFFE later also issued a verbal directive on 23 June 2020, in terms of Section 30A of the NEMA, read with National Disaster Declaration of 4 March 2020, in terms of section 27(1) of the Disaster Management Act, 2002, regarding the drought affecting various provinces. This is applicable to the development of the Nuweberg Wellfield, located immediately northeast of the Steenbras Wellfield (northwest of Grabouw). Once completed, water from the Nuweberg Wellfield will be treated at the Steenbras Water Treatment Works, prior to discharge into the Steenbras Dam.

This EMMP may then be updated to incorporate the Nuweberg Wellfield, or a separate EMMP may be prepared.

To this end, exploratory drilling has been undertaken within the Utility Zone of the Steenbras Nature Reserve (Refer Figure 1). The Utility Zone's primary purpose is provision of water to the CCT.

Departmental Sub-Region(s) in which the maintenance is to be undertaken:

Table 2 Departmental Sub-Region

REGION 1 (City of Cape Town Metropolitan and West Coast District) ☒	REGION 2 (Cape Winelands District, Overberg District) ☐	REGION 3 (Eden & Central Karoo Districts) ☐
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Details of the person / proponent who will undertake the maintenance activities:

Table 3 Details of the Proponent

Proponent	
Contact person:	Clarissa Barends: Senior Superintendent (Steenbras Wellfield) City of Cape Town
Telephone number:	T: 021 4444790 M: 083 304 7580
Email address:	Clarissa.Barends@capetown.gov.za
Physical address	Steenbras Catchment/Wellfield Offices, Steenbras Nature Reserve, City of Cape Town
Postal address:	Steenbras Catchment Management Branch P.O. Box 91 GRABOUW 7160

Details of the Environmental Assessment Practitioner (EAP) responsible for the preparation of the EMMP:

Table 4 Details of the EAP

Environmental Assessment Practitioner (EAP)	
Contact person:	Corlie Steyn
Telephone number:	044 805 5421
Facsimile number:	044 805 5454
Email address:	Corlie.Steyn@zutari.com
Postal address:	P.O. Box 509, George, 6530
EAP Qualifications	MPhil Environmental Management
EAP registrations/Associations	EAPASA Reg No 2019/999

Details of the EAP's expertise to carry out EMMPs

Corlie is a professional registered (EAPASA) senior environmental practitioner specialising in environmental consulting for various disciplines. She has most recently been involved in renewable, civil, roads and gas power related projects.

Corlie has extensive experience in environmental management and research projects related to climate change. She also has experience in the evaluation and review of environmental impact assessments (EIAs); advising on law enforcement and environmental matters; managing public participation processes (PPPs), including in-depth interviews with stakeholders; chairing workshops and presenting final reports to government departments and civil society stakeholders. Corlie is a registered member of the International Association for Impact Assessment South Africa (IAIASA). Corlie was a part-time lecturer at the Nelson Mandela University's (NMU's) Department of Nature Conservation for 8 years. She holds an MPhil degree in Environmental Management from the University of Stellenbosch, South Africa. She also holds an Honours Degree in Geography, a BA Degree and a Higher Education Diploma, all obtained from the University of Pretoria in South Africa.

Name of landowner(s) on whose behalf the plan has been developed:

Table 5 Details of Landowner

Landowner – Nature Reserve	
Contact person:	City of Cape Town: Owen Wittridge
Telephone number:	021 444 9743
Email address:	Owen.Wittridge@capetown.gov.za
Postal address:	Biodiversity Area Co-ordinator: Steenbras Nature Reserve Verster Ave, Helderberg Nature Reserve CAPE TOWN 7135
Landowner – Utility Zone	
Contact person:	City of Cape Town: Lochan Moodley
Telephone number:	021 444 8031
Email address:	Lochan.Moodley@capetown.gov.za
Postal address:	Bulk Water Scheme Manager Steenbras Water Treatment Plant Marine Drive GORDON'S BAY 7140
Landowner - Catchment	
Contact person:	City of Cape Town: Ricardo Hendricks
Telephone number:	021 444 9684
Email address:	RicardoGlenville.Hendricks@capetown.gov.za
Postal address:	Senior Superintendent: Steenbras Catchment P.O. Box 91 GRABOUW 7160

Municipality:

Table 6 Details of Municipality

Municipality	
Municipality for proposed project:	City of Cape Town
Farm name(s), erf(s) and portion number(s) etc:	Farm 307 Portion 0 (C01300000000030700000) Farm 310 Portion 0 (C01300000000031000000) Farm 310 Portion 1 (C01300000000031000001) Farm 309 Portion 5 (C01300000000030900005)
Magisterial District or Town:	Western Cape: City of Cape Town
Name(s) of watercourse(s) in question:	Steenbras River

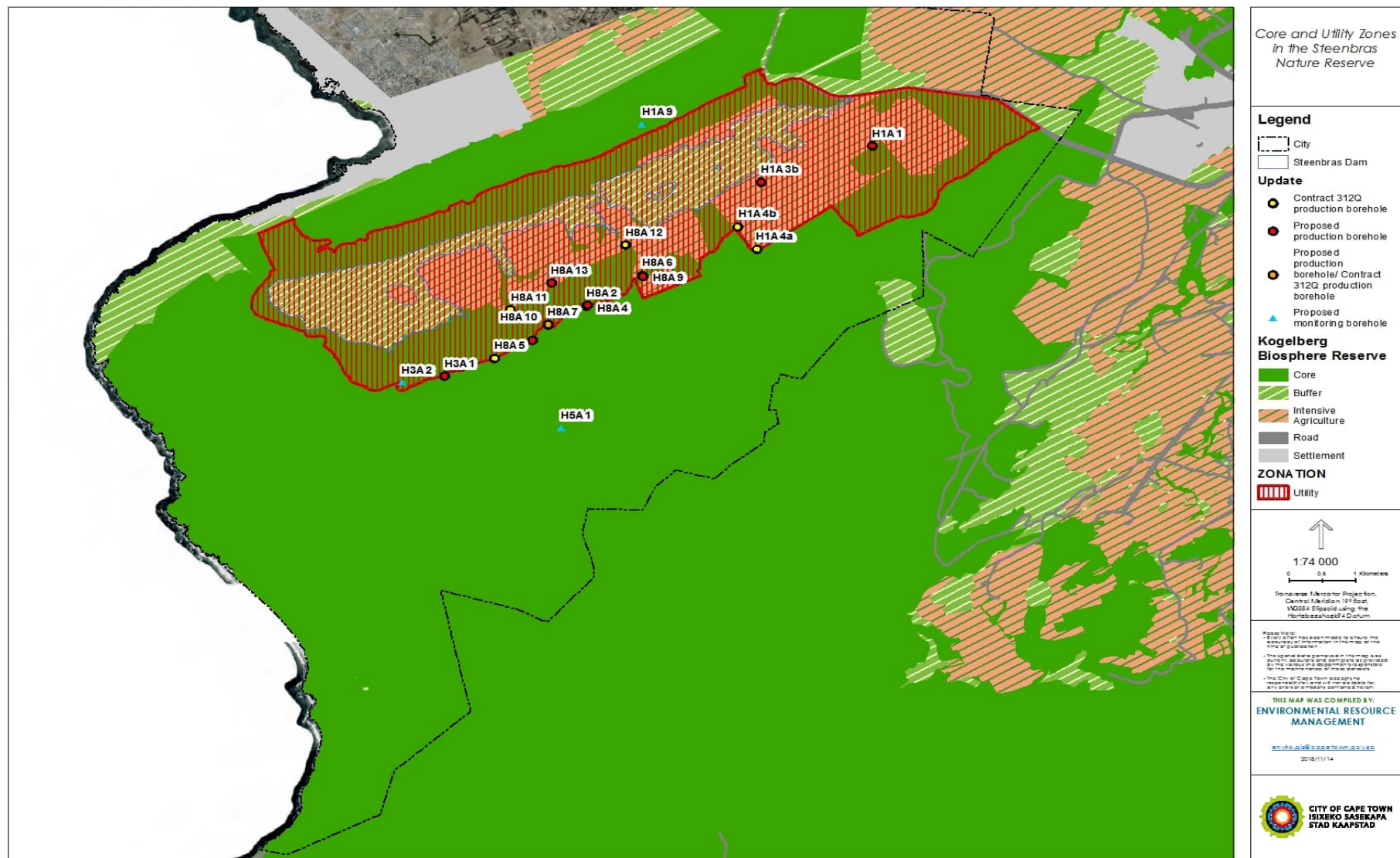


Figure 1: View of the Steenbras Nature Reserve (stippled black line), core and buffer zones of the Kogelberg Biosphere Reserve, the Utility Zone (red hashed polygon), and the borehole locations.

1.2 Objective of the EMMP

The purpose of the EMMP is to maintain both man-made and ecological infrastructure in a manner that improves the current state of, and/or reduces the negative impacts on the affected watercourses to ensure that ecosystem services are preserved/improved and to prevent further deterioration of the watercourses.

The objective of this EMMP is to formulate measures, which will:

1. Mitigate adverse impacts on various environmental components;
2. Protect environmental resources where possible and prevent further deterioration to the condition of affected watercourses;
3. Enhance the value of environmental components where possible;
4. Avoid and reduce unnecessary maintenance; and
5. Meet the requirements of both the DEA&DP as the competent authority (Appendix F.5) 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 EMMP.

1.3 Project Description and Location

The Steenbras Nature Reserve was proclaimed in 2017 in terms of the National Environmental Management: Protected Areas Act (No. 57 of 2003) (NEMPAA). Prior to the proclamation of the area as a nature reserve, it was a proclaimed catchment area for the purpose of water supply to the CCT in terms of the Mountain Catchment Areas Act (No. 63 of 1970). The Steenbras Lower and Upper Dams were constructed in the 1920s and 1970s, respectively, and forestry was established in the areas adjacent to the dams. As a result, a Utility Zone is demarcated in the Steenbras Nature Reserve Management Plan for water supply activities and related infrastructure (Refer Figure 1).

The Steenbras Wellfield comprises 16 production boreholes and 22 monitoring boreholes. Table 7 provides the property detail where the infrastructure occurs. Furthermore 16 above ground pump station chambers forms part of the Wellfield as well as a network of below ground pipelines and below and above ground powerlines.

Table 7 Property detail of the Steenbras Wellfield

	Steenbras Wellfield
Farm name(s), erf(s) and portion number(s):	Farm 307 Portion 0 (C01300000000030700000) Farm 310 Portion 0 (C01300000000031000000) Farm 310 Portion 1 (C01300000000031000001) Farm 309 Portion 5 (C01300000000030900005)

Appendix A.1 contains the Application Form and Section C of the Application Form provides the detail for the identification of the affected infrastructure where the repair and maintenance works will take place (Refer Figure 2 and Figure 3).

The infrastructure includes *inter alia*:

- Roads;

- Bridges;
- Water pipelines going through wetlands and crossing rivers;
- Below ground pipelines;
- Above ground pipelines;
- Production borehole pumphouses;
- Below ground powerlines;
- Above ground powerlines;
- Borehole sites and;
- Stockpile areas

1.3.1 Equipment

Equipment to be used for maintenance and repair may comprise *inter alia* of loaders, excavators, rollers / compactors, tip trucks, compressors & jackhammers, crane truck for the movement of large infrastructure and chainsaws.

1.3.2 Method for Planned Maintenance Activities:

1. Repair of damaged water crossing infrastructure:

This would include the replacement of broken culverts, redirecting of culverts which are located against the natural flow of a river, dredging inside the watercourse to obtain access to infrastructure, removal of flood debris and silt and the infilling of material for stabilisation and support of new infrastructure. This will be a like-for-like repair.

2. Replacement of damaged road and pipeline infrastructure after large storm events:

In most instances after large storm events there is some degree of damage, including erosion of banks, gravel roads and bridge approaches. Some flood debris could also cause damage to the infrastructure itself which would need to be fixed or replaced if damaged extensively. This could entail dredging, excavating and infilling in a stream.

3. Repair of pipeline infrastructure:

Over time some damage could occur to the installed pipeline infrastructure, which would result in machinery needing to access the pipe over / underneath the stream and would entail dredging, excavating and potentially infilling inside a watercourse. More than 300 square metres of indigenous vegetation could be cleared for maintenance of below ground linear infrastructure (e.g. pipelines, powerlines, telemetry etc) where the linear infrastructure would need to be excavated and repaired.

4. Clearing of culverts:

Regular clearing of culverts, especially during the rainy season, would need to take place to avoid damage and flooding along the entire road and pipeline networks where rivers are crossed. The clearing would entail the dredging or excavating of debris, silt and other flooded material from the crossings.

5. Clearing of alien invasive vegetation from watercourses:

Large alien invasives will be cleared using chainsaws. Smaller plants will be removed by hand using hand tools to remove the roots from the beds and banks of watercourses. All plant material will be removed and disposed of at a licenced WDF, with proof thereof retained.

6. Clearing of indigenous vegetation around the borehole sites in case of borehole maintenance or drilling activities:

More than 300 square metres of indigenous vegetation could be cleared during redrilling or maintenance activities needed at any of the borehole sites for the establishment of drill rigs and associated infrastructure.

7. Replacement of eroded stream crossing approaches:

Over time some of the gravel road approaches alongside the stream crossings could erode and cause the need for replacement or installation of erosion control measures. This would entail the infilling of material within close proximity to watercourses or within wetlands.

8. Replacement / installation of erosion control measures:

Where erosion control measures are required or already installed, maintenance would have to be done to ensure these remain in good working order or that areas that become prone to erosion is secured to protect infrastructure and prevent downstream impacts to the aquatic ecosystems. This would entail the potential excavation and infilling of material within watercourses or wetlands and activities such as gabion basket installations.

9. Clearing of silt or flood debris from infrastructure and watercourses:

Over time silt and gravel will accumulate along, under, downstream and behind infrastructure and in rivers and wetlands. In particular, sediment from the erosion of roads in the catchment is frequently deposited in rivers and wetlands, especially after heavy or intense rainfall. These need to be cleared regularly to ensure proper functioning of the infrastructure and ecosystems and prevent flooding and associated damage within these areas.

10. Borehole cleaning:

Removal of installed production pump, set up of rehabilitation rig, drilling & testing, test pumping rig setup, step-drawdown test with water being pumped into the water pipeline, de-establishment of rig and re-installation of production pump and associated equipment.



Figure 2: Layout of the Steenbras Wellfield showing the boreholes, pipeline network and associated infrastructure.



Figure 3: Zoomed out layout of the Steenbras Wellfield to include all monitoring boreholes.

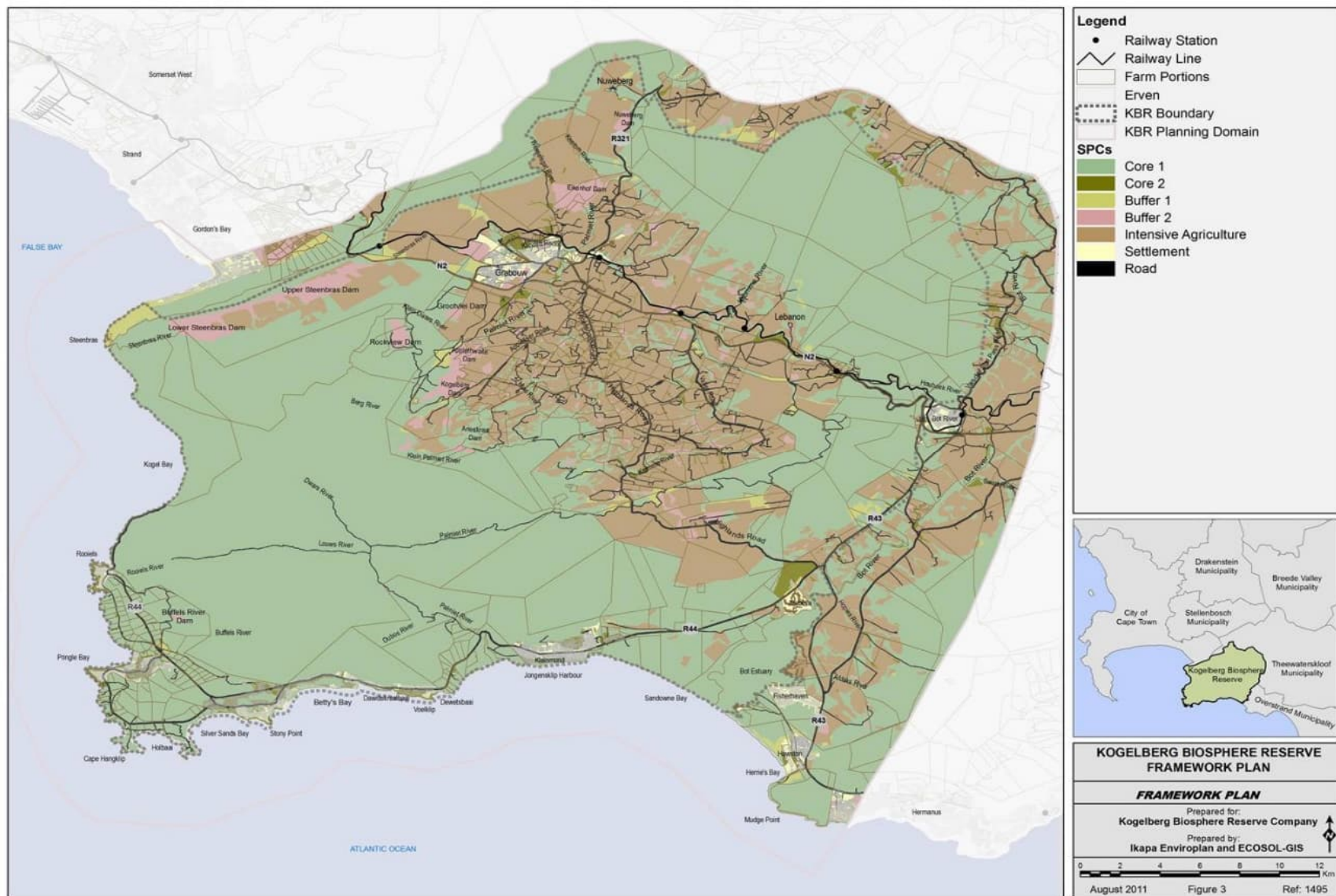


Figure 4: Kogelberg Biosphere Reserve Framework.

2 RELEVANT LEGISLATION AND POLICIES

This EMMP is relevant to the repair and maintenance of roads, bridges, boreholes, linear infrastructure and pipe crossings located within sensitive terrestrial ecosystems, watercourses, and wetlands for the Steenbras Wellfield, located in the Steenbras Nature Reserve in the Western Cape. This EMMP is a working document for, amongst others, the following activities:

- The repair of existing structures, **where work does not require Environmental Authorisation (EA)** in terms of the National Environmental Management Act, No. 107 of 1998 (NEMA) **if undertaken in accordance with an approved EMMP.**
- The routine and emergency *maintenance* activities associated with improving roads, bridges, boreholes, and pipe crossings **where work does not require Environmental Authorisation (EA)** in terms of the NEMA **if undertaken in accordance with an approved EMMP.**

The production boreholes have a diameter of about 55cm at the surface and are up to 1100 m deep, whereas the monitoring boreholes have a diameter of about 5cm and are shallower. Existing roads were used for access purposes and these same roads will be used for maintenance and repair purposes.

The drilling of boreholes themselves does not trigger any NEMA Listed Activities but the installation of the associated infrastructure (pipelines etc.) triggered Listed Activities due to some removal of indigenous critically endangered vegetation and stream crossings. Although parts of the wellfield are situated in the core areas of the Kogelberg Biosphere Reserve, where the NEMA Competent Authority would be the DFFE, such has been delegated to the DEA&DP. The conditions in the NEMA Section 30A Directive issued by the then DEA (now DFFE) included the implementation of the impact mitigation hierarchy, submission of method statements for approval prior to project actions being implemented, and environmental audits at specified intervals.

2.1 National Environmental Management Act (Act No. 107 of 1998)

2.1.1 Listed Activities in terms of NEMA

The NEMA as amended, provides the framework for environmental decision-making in the country and specifically the EIA Regulations (GN No. R982 in the Government Gazette of 8 December 2014, as amended) serve as the instrument through which development decisions are made.

South Africa has rigorous and comprehensive environmental legislation aimed at preventing degradation of the environment. Section 28(1) of NEMA places a “*duty of care and remediation of environmental damage*” on every person who causes, has caused, or may cause, significant environmental degradation. This is a far-reaching obligation, and accordingly, those parties responsible for the degradation of the environment have a legal duty to avoid, minimise or mitigate such impacts.

This has resulted in a set of Listed Activities that can be triggered by developments taking place in sensitive environments, e.g., watercourses. If a development triggers a Listed Activity, it is required to undergo an EIA or Basic Assessment (BA) process in terms of the EIA Regulations (GN R982, as amended).

Due to the nature and location of the proposed works, the EIA Regulations (Listing Notice 1, 2 and 3 of December 2014, as amended) pursuant to the NEMA, as amended, were consulted. Table 8 below provides an extract of the Listing Notices and Listed Activities that were considered in the context of the Steenbras Catchment and Wellfield, as proposed by the Proponent.

Table 8: Listed Activities (GN No. R. 327 as amended) considered as part of the proposed reconstruction & maintenance work at the Steenbras Catchment and Wellfield.

Activity No(s):	Basic Assessment Listed Activity(ies) as set out in the EIA Regulations Listing Notice 1 of 2014 (GN No. R. 327 as amended)	Comment Regarding Applicability
19	The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, 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 – (b) is for maintenance purposes undertaken in accordance with a maintenance management plan	Movement of any material exceeding 10 m³ within a watercourse requires prior Environmental Authorisation unless the activity/ies are for maintenance purposes in accordance with an EMMP. Approval of this EMMP will allow the activities to be carried out without undertaking a Basic Assessment.
27	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 – (ii) maintenance purposes undertaken in accordance with a maintenance management plan.	The clearance of more than 1 ha of indigenous vegetation requires prior Environmental Authorisation unless the activity/ies are for maintenance purposes in accordance with an EMMP. Approval of this EMMP will allow the activities to be carried out without undertaking a Basic Assessment.

Table 9: Listed Activities (GN No. R. 325 as amended) considered as part of the proposed reconstruction & maintenance work at the Steenbras Catchment and Wellfield.

Activity No(s):	Basic Assessment Listed Activity(ies) as set out in the EIA Regulations Listing Notice 2 of 2014 (GN No. R. 325 as amended)	Comment Regarding Applicability
24	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 maintenance management plan.	The extraction or removal of peat or peat soils, including the disturbance of vegetation or soils within a watercourse requires prior Environmental Authorisation unless the activity/ies are for maintenance purposes in accordance with an EMMP. Approval of this EMMP will allow the activities to be carried out without undertaking a Basic Assessment.

Table 10: Listed Activities (GN No. R.324 as amended) considered as part of the proposed reconstruction & maintenance work at the Steenbras Catchment and Wellfield.

Activity No(s):	Basic Assessment Listed Activity(ies) as set out in the EIA Regulations Listing Notice 3 of 2014 (GN No. R. 324 as amended)	Comment Regarding Applicability
12	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 maintenance management plan. 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;	Clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation requires Environmental Authorisation unless the activity/ies are for maintenance purposes in accordance with an EMMP. Approval of this EMMP will allow the activities to be carried out without undertaking a Basic Assessment.

Activity No(s):	Basic Assessment Listed Activity(ies) as set out in the EIA Regulations Listing Notice 3 of 2014 (GN No. R. 324 as amended)	Comment Regarding Applicability
	iii. Within the littoral active zone or 100 metres inland from high water mark of the sea or an estuarine functional zone, whichever distance is the greater, excluding where such removal will occur behind the development setback line on erven in urban areas; 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.	

2.2 DEA&DP Consultation

An EMMP application was submitted to DEA&DP on 28 October 2022. The DEA&DP requested delegation from DFFE to continue with the application. (Refer Appendix F2).

On 20 June 2023 a meeting was held between the DEA&DP, the CCT and Zutari, where it was noted that DEA&DP awaited the delegation from DFFE. (Refer Appendix F.3).

On 31 July 2023 the DEA&DP provided a reference number and case officer to Zutari (Refer Appendix F.4).

On 11 August 2023 Zutari received the acknowledgment of receipt of the request for the adoption of an EMMP (Refer Appendix F.5).

2.3 Public Participation

As requested by DEA&DP in the meeting dated 20 June 2023, the Public Participation Process (PPP) for the Steenbras Catchment and Wellfield must include:

- A 30-day comments and response period;
- Neighbouring landowners, stakeholder monitoring committee and ward councillors will be included in the I&AP list;
- The EMMP will be available on the Zutari website for the duration of the PPP comment period; and
- An Advert will be placed in a local newspaper.

All comments received during this period will be recorded and incorporated into the Draft EMMP which will be converted into to a Final EMMP. The Final EMMP will be submitted to the DEA&DP for decision making. Refer Appendix J.1

2.4 Other Applicable Environmental Legislation

2.4.1 The National Water Act (Act No. 36 of 1998) (NWA)

The Department of Water & Sanitation (DWS) is the custodian of South Africa's water resources and therefore assumes public trusteeship of water resources, which includes watercourses, surface water, estuaries, or aquifers. The National Water Act (No. 36 of 1998) (NWA) aims to protect water resources, through:

- The maintenance of the quality of the water resource to the extent that the water resources may be used in an ecologically sustainable way;
- The prevention of the degradation of the water resource;
- The rehabilitation of the water resource;
- A watercourse means;
 - A river or spring;
 - A natural channel in which water flows regularly or intermittently;
 - 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, and a reference to a watercourse includes, where relevant, its bed and banks.

No activity may take place within a watercourse unless it is authorised by the DWS. According to Section 21 (c) and (i) of the NWA, a WUL is required for any activities that impede or divert the flow of water in a watercourse or alter the bed, banks, course or characteristics of a watercourse. The regulated area of a watercourse for section 21(c) or (i) of the NWA water uses means:

- a. The outer edge of the 1 in 100-year flood line and/or delineated riparian habitat, whichever is the greatest distance, measured from the middle of the watercourse of a river, spring, natural channel, lake or dam;*
- b. In the absence of a determined 1 in 100-year flood line or riparian area the area within 100 m from the edge of a watercourse where the edge of the watercourse is the first identifiable annual bank fill flood bench (subject to compliance to section 144 of the Act); or*
- c. A 500 m radius from the delineated boundary (extent) of any wetland or pan.*

Any water use activities that do occur within the regulated area of a watercourse must therefore be assessed using the DWS Risk Assessment Matrix (GN 509) to determine whether activities may be generally authorised (Low Risk according to the Risk Assessment Matrix) or require a WULA (Medium or High Risk according to the Risk Assessment Matrix).

2.4.1.1 Steenbras Wellfield WUL Status Quo

- A WUL for the abstraction of groundwater was issued on 21 Dec 2017 (Ref: 01/G40A/A/7276). This WUL expired on the 20 December 2022 and a request for extension was sent to DWS (letter sent on the 22 November 2022). The extension was granted for six (6) months in a letter dated 06 January 2023.
- A WUL for the installation of linear infrastructure was issued on 23 Jul 2019 (Ref: 01/G40A/CI/9068). An amendment to the WUL was issued on the 19 May 2021 to include additional watercourse crossings which were not included in the original authorisation.
- A WUL audit was conducted and submitted for the groundwater abstraction (submitted 10 June 2022) and linear infrastructure (submitted 13 June 2022) licences.
- A new WUL has been submitted to the DWS and has been accepted through a letter dated 11 April 2023. Currently awaiting finalisation and decision from DWS.
- The Monitoring Committee meetings for TMGA have been held since 10 December 2018 with the most recent meeting held on 21 April 2023.

Refer to Appendix G.1 for the approved WULA (2021).

2.4.2 The National Heritage Resources Act (Act No. 25 of 1999) (NHRA)

Section 34 of the National Heritage Act (No. 25 of 1999) (NHRA) protects buildings and structures older than 60 years.

Section 38 of the NHRA identified activities that would require a heritage authorization.

- (a) *the construction of a road, wall, powerline, pipeline, canal or other similar form of linear development or barrier exceeding 300 m in length;*
- (b) *the construction of a bridge or similar structure exceeding 50 m in length;*
- (c) *the re-zoning of a site exceeding 10 000 m² in extent; or*
- (d) *any development or other activity which will change the character of a site—*
 - (i) *exceeding 5 000 m² in extent; or*
 - (ii) *involving three or more existing erven or subdivisions thereof; or*
 - (iii) *involving three or more erven or divisions thereof which have been consolidated within the past five years; or*
 - (iv) *(iv) the costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority;*
- (e) *any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority,*

Where a heritage authorisation is required, a heritage specialist would need to submit a Notice of Intent to Develop (NID) to Heritage Western Cape (HWC), who would determine whether a Heritage Impact Assessment must be undertaken.

Refer to Appendix E.1 for the NID and E.2 for the Record of Decision from HWC.

2.4.3 The National Environmental Management: Biodiversity Act (Act No. 10 of 2004) (NEMBA)

The National Environmental Management: Biodiversity Act (Act 10 of 2004) (NEMBA) provides for listing threatened or protected ecosystems, in one of four categories: critically endangered (CR), endangered (EN), vulnerable (VU) or protected. The Draft National List of Threatened Ecosystems (Notice 1477 of 2009, Government Gazette No 32689, 6 November 2009) has been gazetted for public comment.

The list of threatened terrestrial ecosystems supersedes the information regarding terrestrial ecosystem status in the NSBA 2004.

NEMBA also deals with endangered, threatened and otherwise controlled species. The Act provides for listing of species as threatened or protected, under one of the following categories:

- Critically Endangered: any indigenous species facing an extremely high risk of extinction in the wild in the immediate future.
- Endangered: any indigenous species facing a high risk of extinction in the wild in the near future, although it is not a critically endangered species.
- Vulnerable: any indigenous species facing an extremely high risk of extinction in the wild in the medium-term future; although it is not a critically endangered species or an endangered species.
- Protected species: any species which is of such high conservation value or national importance that it requires national protection. Species listed in this category include, among others, species listed in terms of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).

Certain activities, known as Restricted Activities, are regulated by a set of permit regulations published under the Act. These activities may not proceed without environmental authorization.

The vegetation types found along the Estuary Seashore has a conservation status of Endangered. The coastal structures/infrastructure subject to repairs and maintenance all fall within sensitive vegetation types and although for the most part the coastal section is indicated as an Ecological Support Area (ESA), there is not Critical Biodiversity Areas (CBA) affected.

2.4.4 National Environmental Management: Protected Areas Act (Act No 57 of 2003) (NEMPAA)

This act provides for the declaration and management of specifically identified areas in South Africa. The Act must be read in conjunction with the NEMBA. The Steenbras Catchment and Wellfield falls within the Kogelberg Nature Reserve. CCT is the agency responsible for managing the Catchment and the Wellfield.

3 SITE CONTEXT

3.1 Site and Existing Infrastructure

The Steenbras Wellfield is situated in the Steenbras Dams' catchment area in the high ranging Hottentots Holland Mountains, a landscape that supports well-known high altitude rare plant species. The Steenbras Wellfield is located in the Steenbras Nature Reserve, which is situated between Gordon's Bay and Rooi-Els, bordering the Kogelberg Nature Reserve, and stretching back to the N2 Highway, towards Grabouw. The Steenbras Nature Reserve was gazetted as a provincial nature reserve in September 2017, and includes approximately 8,486 ha of land owned by the CCT. Prior to this, the area was proclaimed a protected mountain catchment area on 16 November 1979 and 11 October 1985 in Gazette No. 2569 and 2266, under the Catchment Management Areas Act (No. 63 of 1970). The Steenbras Nature Reserve also forms part of the greater Kogelberg Biosphere Reserve registered in 1998 with the United Nations Educational, Scientific and Cultural Organisation (UNESCO), giving the area international conservation significance, thereby justifying its increased protection.

In the early 20th century, the area was established for water provisioning, and included the construction of the Steenbras Dam and WTWs. Eucalyptus and Pine Plantations were also established for wood production. The Steenbras Upper Dam was later constructed together with the hydroelectric scheme, and link to the Rockview Dam.

Due to severe drought in 2017-2018, the CCT commenced with the construction of the Steenbras Wellfield to abstract groundwater from within the Utility Zone of the Steenbras Nature Reserve (Refer Figure 1). This formed part of the development into the Table Mountain Group Aquifer (TMGA). The Utility Zone, set out in the Integrated Reserve Management Plan of 2011, and then surveyed in 2021 (Refer Figure 1), consists of the Steenbras and Upper Steenbras Dams and surrounds, including the WTWs, Steenbras Catchment Management Branch (CMB) offices and areas historically under plantation. The CCT also committed to clearing all plantation and alien vegetation within the catchment, to increase runoff into the dams.

To date, the Steenbras Wellfield includes 16 production boreholes and 22 monitoring boreholes, 16 above ground pump station chambers as well as a network of above and below ground pipelines and below and above ground powerlines.

3.2 Freshwater

3.2.1 Ecoregional Context, Catchment, and Ecological State

The Steenbras Wellfield site falls within the Southern Folded Mountain Ecoregion described by Kleynhans *et al* (2005). This ecoregion is characterised by closed hills and mountains of moderate and high relief with a high diversity of vegetation types. Rainfall arrives mainly in the autumn and winter months with a varied annual precipitation and a moderate to high Coefficient of Variation of annual precipitation. Rivers within the Steenbras Catchment are characteristically acidic with pH between 3.5 and 5 and low in nutrient concentrations due to the naturally oligotrophic (nutrient poor) substrata typical of the region.

The study area is located within the DWS Quaternary Catchment G40A (Refer Figure 5) which has a Mean Annual Precipitation (MAP) >1050 mm per annum and a Mean Annual Runoff (MAR) of 537.5 million cubic meters.

The habitat along the north-facing slopes of the Hottentots Holland Mountains is characterized as a mosaic of wet and dry habitat underlain by sandy (white acidic sands) or rocky weathered surface material with vegetation communities typical of Sandstone Fynbos along the slopes and Shale Fynbos

close to the dam itself. There are numerous ephemeral or seasonal rivers with a few perennial bedrock rivers that drain northwards off these slopes. Most ephemeral watercourses are associated with seep wetlands while the perennial systems are flanked by riparian fringes that often merge with hillslope seep wetlands. Many of the seeps and perennial watercourses are likely fed by topographically driven interflow through sandy weathered surface material, or via fracture flow within the Skurweberg Formation (Freshwater Consulting Group, 2014). Seasonal systems are likely fed by surface runoff during the wet season although the relative contribution of groundwater versus surface water or interflow is largely unknown. Figure 6 portrays the Section 21 c and i water uses in the catchment, Figure 7 portrays the NFEPA wetlands and rivers and Figure 8 combines the water uses together with the wetlands and rivers.

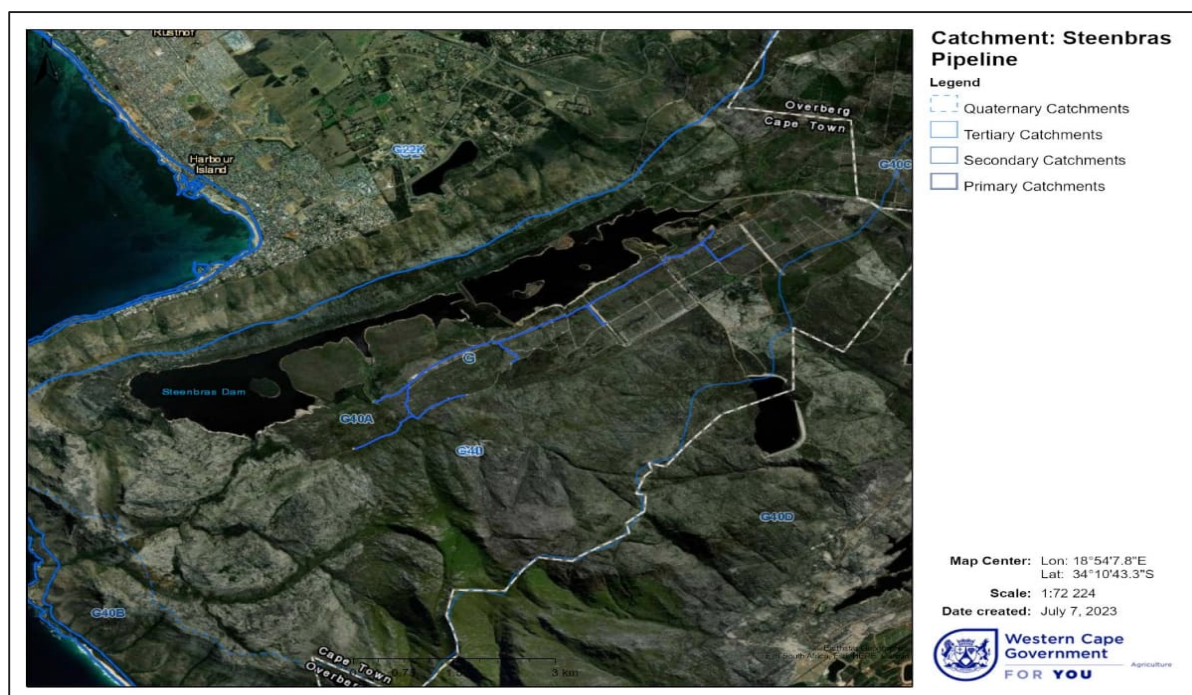


Figure 5: Location of Steenbras Pipeline within quaternary catchment Catchment G40.

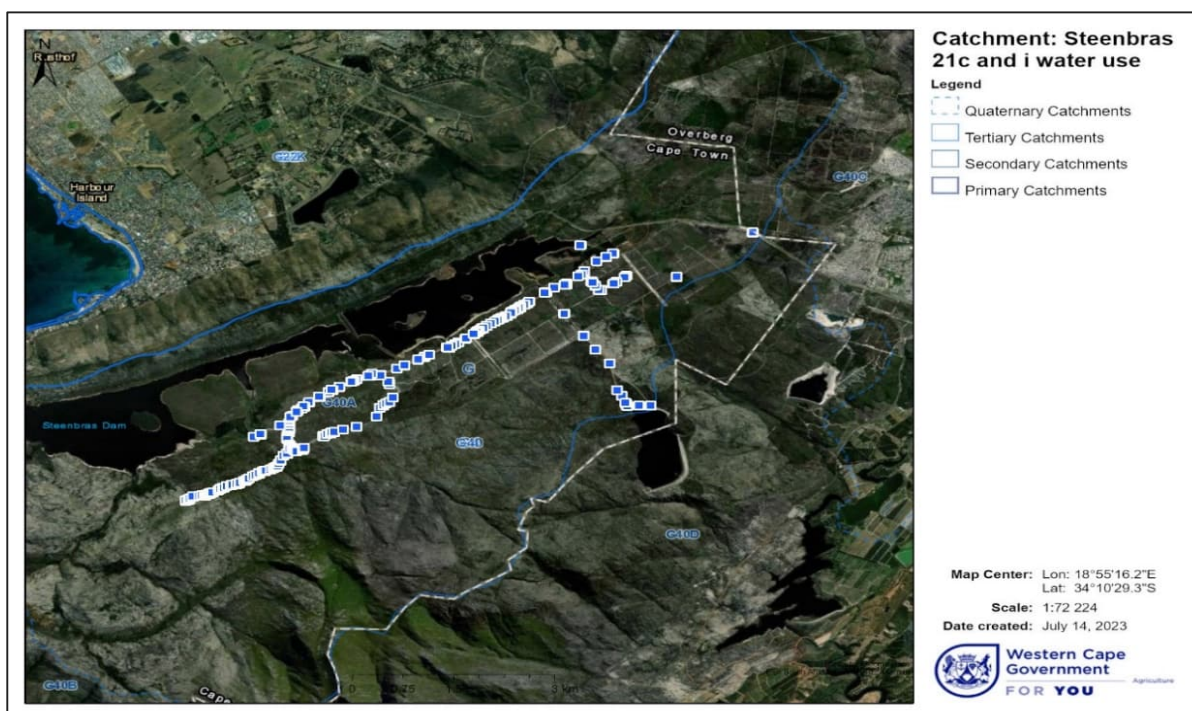


Figure 6: Steenbras Section 21 c and i water uses within Catchment G40.

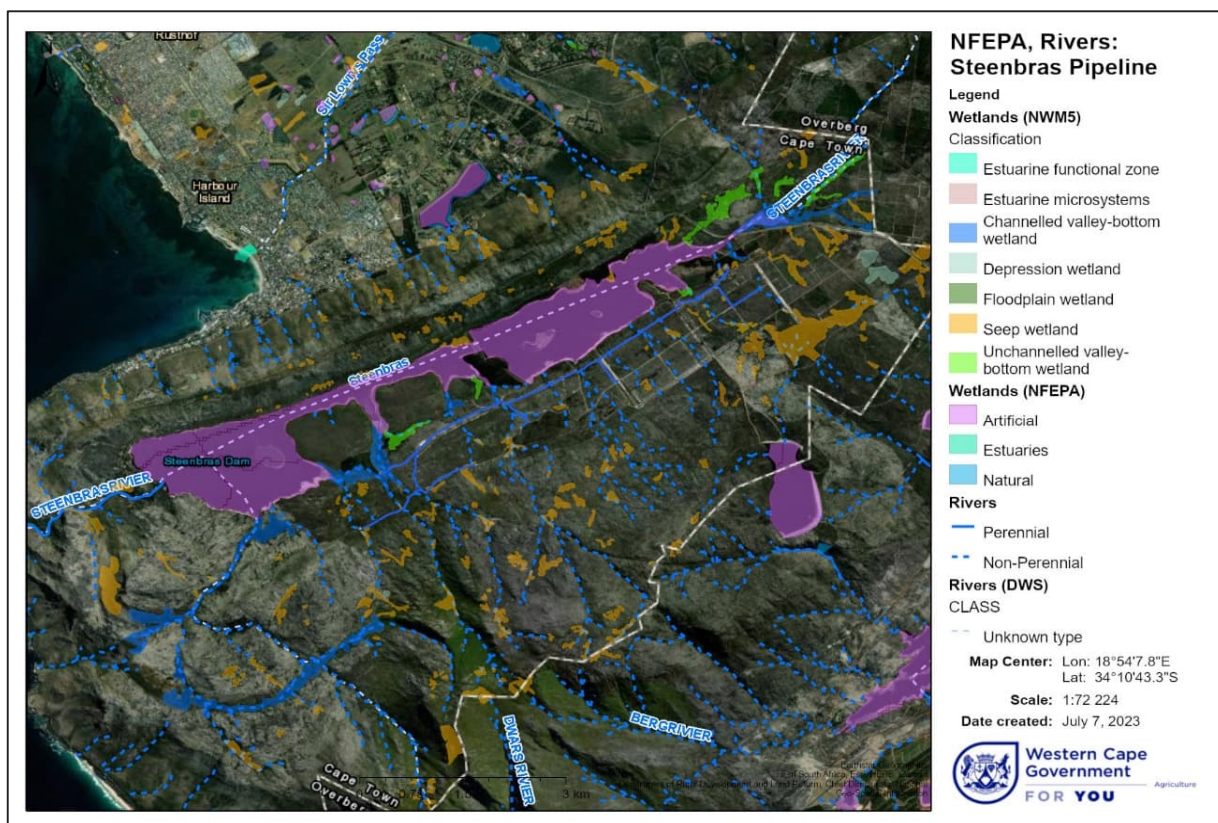


Figure 7: Steenbras Pipeline and NFEPA Wetlands and Rivers.

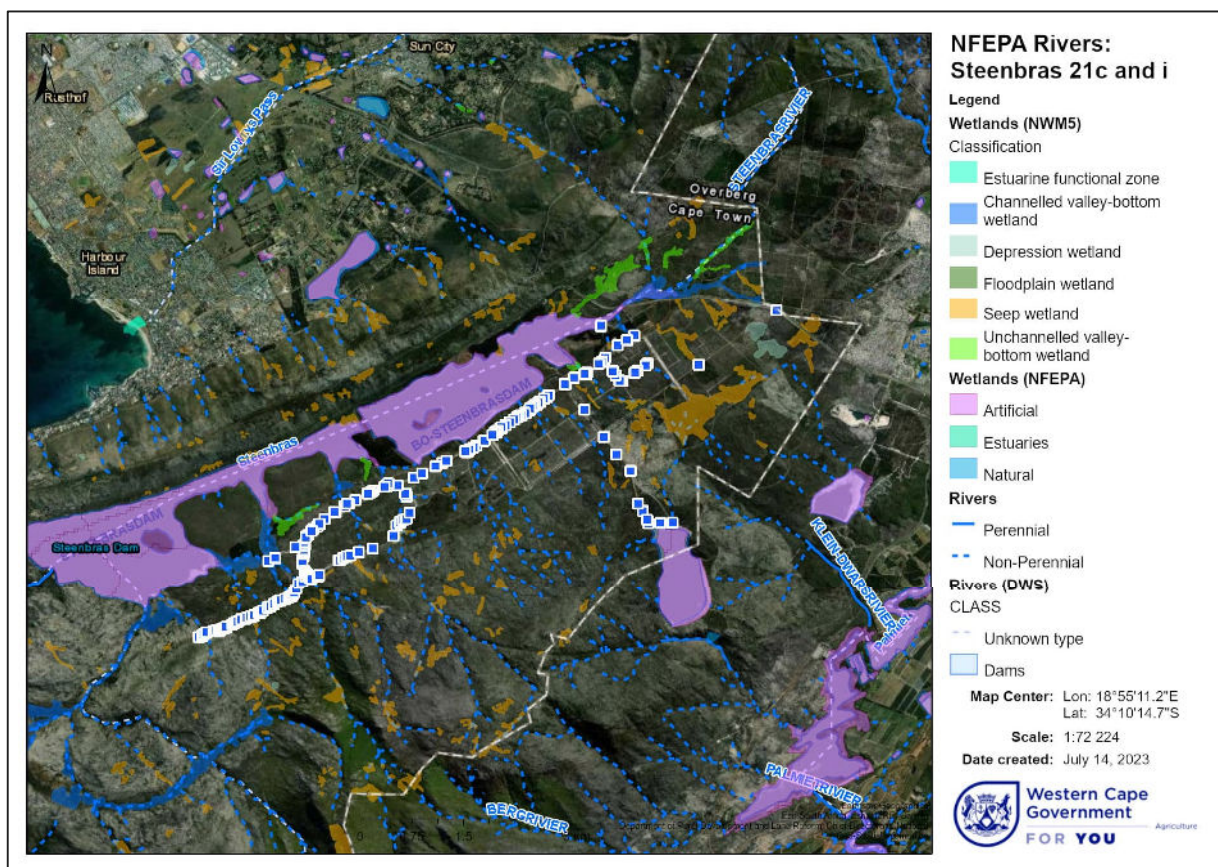


Figure 8: Steenbras Section 21 c and I water uses and NFEPA Wetlands and Rivers.

3.2.2 Wetlands

For the purpose of this EMMP, dryland (Figure 9) and wetland habitat was identified at the broadest scale with wetlands further separated into four categories based on hydroperiod as indicated by terrain and vegetation indicators and to some extent, soil form and wetness characteristics³. These include:

1. Temporary wetlands which are waterlogged for a very limited period (less than 3 months of the year) and are never inundated (Figure 10).
2. Seasonally saturated wetlands which are waterlogged during the wet season but dry for up to 9 months of the year (Figure 11).
3. Permanently saturated, seasonally inundated wetlands are those which are waterlogged throughout the year and have standing water on the surface during the wet season (Figure 12).
4. Permanently saturated wetlands are permanently waterlogged but are rarely or never inundated during the wet season (Figure 13)

Further distinction was made between ephemeral and perennial watercourses within the area. Ephemeral (or in some cases, seasonal) channels are generally narrow (approximately 50 cm-wide channels) with sand, gravel and some small cobbles and pebbles on the channel bed (Figure 13). The riparian fringe is largely absent or ill-defined, although most are flanked by wetland seeps.

A number of perennial rivers are situated within the Steenbras Wellfield. These can be described as either mountain rivers or transitional rivers with bedrock/ boulder active channels supporting a diversity of instream habitat types (Figure 14) and Fynbos Riparian Vegetation. These rivers are characterised by a distinct riparian fringe which is often associated with hillslope seeps.



Figure 9: Typical dry land habitat within the Steenbras Nature Reserve.



Figure 10: Temporary wetland in pine plantations within the Steenbras Nature Reserve.

³ The distinction between wetland types described here is of low confidence due to the limited timeframe of this study and lack of detailed biophysical understanding of the functionality of these systems.

	
Figure 11: Seasonally saturated wetlands within the Steenbras Nature Reserve.	Figure 12: Permanently saturated wetlands within the Steenbras Nature Reserve.
	
Figure 13: Permanently saturated but seasonally inundated wetlands within the Steenbras Nature Reserve.	Figure 14: Seasonal or ephemeral channels within the Steenbras Nature Reserve.
 Figure 15: Perennial Rivers with riparian margins within the Steenbras Nature Reserve.	

Key features of these habitats are summarised in Table 11.

Table 11: Key features of the Habitat Types in the Steenbras Catchment identified within the Steenbras Wellfield area.

Habitat type	Key characteristics
Dryland	Either rocky or sandy sandstone-derived soils which are characteristically low in nutrients (oligotrophic). A mixed vegetation with proteoid, ericoid, asteraceous and restioid elements.

Habitat type	Key characteristics
Temporary wetlands	Sandy sandstone-derived soils with poor nutrients in which ericoid and restioid vegetation is prominent.
Seasonally saturated wetlands	Local patches of vegetation in which single species dominance is conspicuous.
Permanently saturated, seasonally inundated wetlands	Ericoid-restioid vegetation in which <i>Berzelia lanuginosa</i> , <i>Restio occultus</i> , and <i>Restio purpurascens</i> are common.
Permanently saturated wetlands	<i>Elegia mucronata</i> is a common emergent restioid in this vegetation.
Ephemeral or seasonal rivers	Vegetation as below but with a larger component of species found in seasonally saturated wetlands.
Perennial rivers with fringing riparian habitat.	Substratum is dominated by large bed material such as boulders and bedrock that support riffles and cascades separated by cobble and gravel runs and occasion pools. Instream Fynbos Riparian Vegetation includes the sedge, <i>Isolepis digitata</i> with stands of palmiet (<i>Prionium serratum</i>), <i>Disa tripetaloides</i> <i>Juncus lomatophyllus</i> , <i>Metrosideros angustifolius</i> and <i>Osmitopsis asteriscoides</i> along the channel and slower flowing margins.

Besides the high floral diversity and endemism of the area, the habitats support a fauna that is unique to the area. From an aquatic perspective, these range from fish such as the endemic Cape Galaxias, of which the taxonomy is yet to be described, to aquatic macroinvertebrate faunal endemics, such as the amphipod *Paramelita kogelensis*, and a number of amphibian species.

While the list of endemic macroinvertebrate taxa for the region are given in Ewart-Smith (2018) and Grainger (2018), tadpoles of the critically endangered ghost frog (*Heliophryne purchelli*) have been recorded in some rivers (see Mossop *et al* 2018 as an example).

Other species identified by sound within the seep habitats of the area include moss frogs (i.e., *Arthroleptella kogelbergensis* and *A. villiersii*), *Breviceps montanus*, *Poyntonia paludicola*, *Strongylopus bonispei* and *S. greyii*.

Refer to Appendix C.3 for the specialist assessment regarding the relevant Present Ecological Status (PES) of watercourses within the Steenbras Catchment and Wellfield area as well as the management objectives.

3.3 Vegetation

The site is situated within vegetation described by Rebelo *et al.* (2006) as Kogelberg Sandstone Fynbos, identified as a critically endangered vegetation type (Refer Figure 16). Rivers and wetlands within this vegetation type are typically nutrient poor (oligotrophic) with low pH (acidic) and a low mineral content as indicated by low Electrical Conductivity of either standing or flowing waters. These ecosystems typically support threatened biota with high levels of endemism and are generally sensitive to anthropogenic disturbance, particularly with regards to change in water chemistry (including sediments), habitat loss and erosion (FCG, 2019).

As a formally Protected Area, this area was set aside for the protection and maintenance of biodiversity and ecological integrity. The habitats supported within the study area are listed as threatened ecosystem types with both the Kogelberg Sandstone Fynbos as well as the Elgin Shale Fynbos close to the dam rated as Critically Endangered Ecosystems (Refer Figure 17). The Steenbras Dam (also known as Lower Steenbras Dam) and Bo Steenbras Dam (also known as Upper Steenbras Dam) have disrupted the Fynbos Riparian Vegetation lining the Steenbras River. The Kogelberg Sandstone Fynbos supports threatened plant species while the Elgin Shale fynbos is rated as critically endangered because of the

irreversible loss of natural habitat of this type. Surface material of this region is characteristically low in nutrients to which the fynbos is naturally adapted and highly sensitive to enrichment.

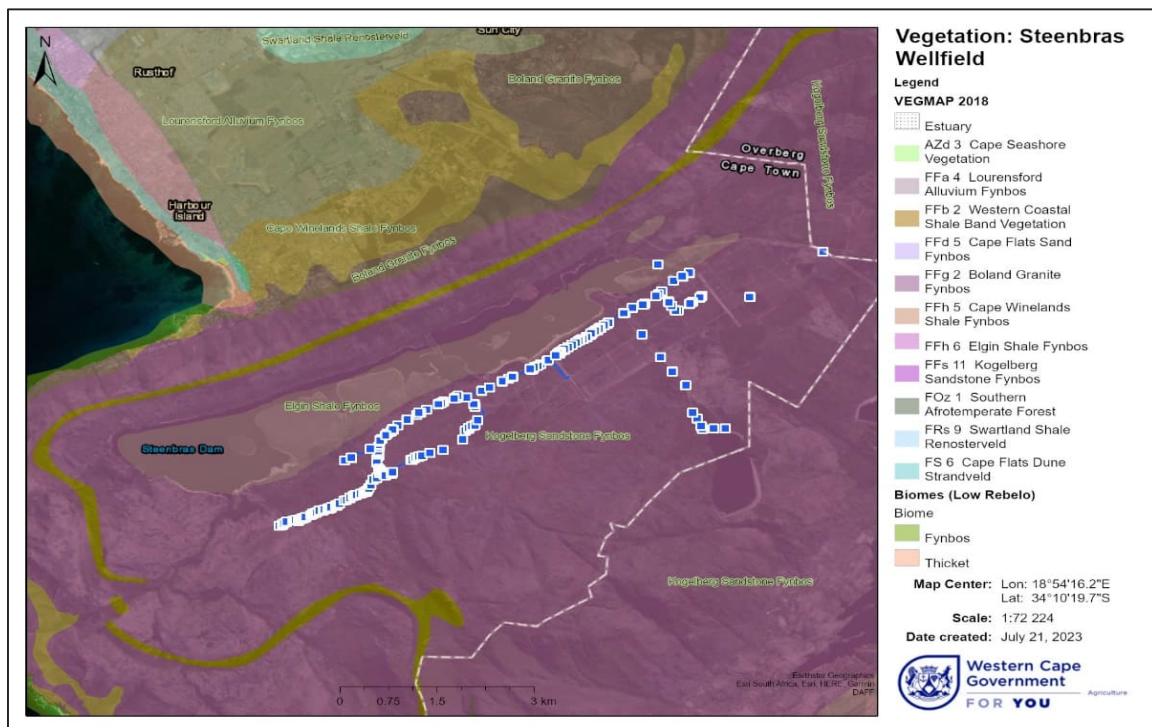


Figure 16: Vegetation and Steenbras Wellfield.

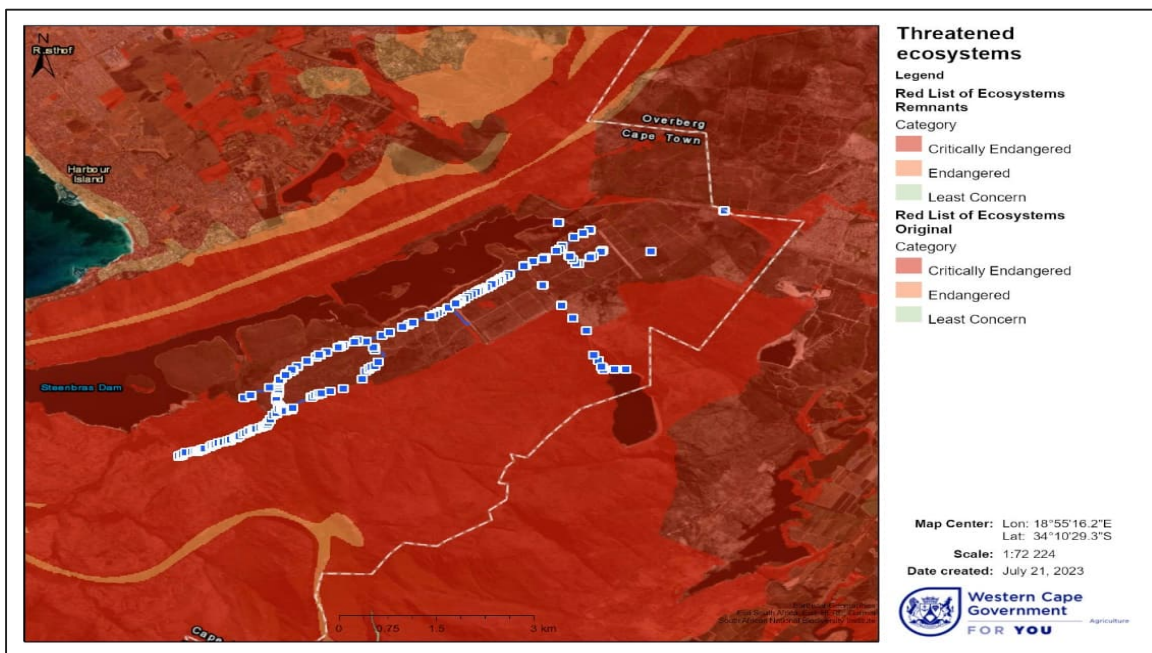


Figure 17: Threatened ecosystems and Steenbras Wellfield.

3.4 Heritage, Culture and Palaeontology

The Steenbras Nature Reserve was proclaimed in 2017 in terms of the NEMPA. Prior to the proclamation of the area as a nature reserve, it was a proclaimed catchment area for the purpose of water supply to the CCT in terms of the Mountain Catchment Areas Act (No. 63 of 1970). The Steenbras Upper and Lower Dams were constructed in the 1920s and 1970s, respectively, and forestry was established in the areas adjacent to the dams. As a result, a Utility Zone has been demarcated in the Steenbras Nature Reserve Management Plan for water supply activities and related infrastructure (Refer Steenbras Catchment and Wellfield EMMP, Revision 0.1, Date 2023/10/06

Figure 2 and Figure 3). Due to the drought of 2017-2018, additional water sources were being developed, one of these being the extraction of groundwater from the Table Mountain Group Aquifer (TMGA). A WUL has been issued to the CCT by the DWS.

The Steenbras groundwater development area is in an area of High palaeontological sensitivity. The pipelines and powerlines were placed approximately 1,5 m underground. The boreholes penetrated various kinds of rock, to significant depths but affected a very small area (~55 cm diameter at the surface and decreasing to about 38 cm diameter at depth).

The heritage impacts associated with the drilling activities and associated infrastructure were occurring in the Utility Zone that has been set aside for water production purposes and are thus not out of character with the existing land use. The Utility Zone is not open to the public and thus no member of the public was affected by the impacts.

There are not expected to be any heritage impacts associated with the operational phase (water abstraction).

No built heritage resources are anticipated to be impacted by the proposed maintenance and repair of the existing Wellfield.

A Notice of Intent to Develop (NID) was completed and submitted to Heritage Western Cape. Not further studies were deemed necessary (Refer Appendix E1- E2).

4 IMPLEMENTATION OF THIS DOCUMENT

The EMMP is intended for use by the Proponent (the CCT), the Contractor, and the Environmental Control Officer (ECO). This document provides the framework for environmental management, where issues, actions and responsibilities associated with the general activities on the site/s are defined. The site-specific requirements relevant to the site in question, as per the site-specific information (Appendix B) of this report, shall be implemented as part of the EMMP. The EMMP is also to be read in conjunction with the relevant health and safety legislation, plans and guidelines. The general principles contained within the EMMP shall apply to lifecycle of the reconstruction and maintenance activities, and all site activities shall be undertaken in such a manner as to minimise impacts on the biophysical and socio-economic environment.

The EMMP is an open-ended document implying that information gained during site activities and/or monitoring of procedures on-site can lead to changes in the EMMP, but these changes or inclusions will need to be approved by DEA&DP before they can be implemented.

The following subsections set out the roles, responsibilities and functions of each role player, staff induction training, and the housing of the EMMP and associated permits/authorisations. Mitigation measures are provided in Table 13 of which relevant sections must be drawn into the Method Statement (Appendix H1).

4.1 Roles and Responsibilities

4.1.1 Names and Details of Role Players

Table 12: Names and detail of role players

Proponent:	City of Cape Town
Contact Person:	Clarissa Barends
Role:	Senior Superintendent (Steenbras Wellfield)
Email:	Clarissa.Barends@capetown.gov.za
Tel.:	T: 021 4444790 M: 083 304 7580
Competent Authority:	Department of Environmental Affairs and Development Planning
Contact Person:	Rondine Isaacs
Role:	Case officer
Email:	Rondine.Isaacs@westerncape.gov.za
Tel.:	021 483 4098

4.2 Responsibilities and Functions of Role Players

4.2.1 The Proponent

The Proponent (the CCT) is the landowner who is responsible for the management of all assets on property owned by the CCT. In the context of this document, the CCT shall be responsible for the planning and funding of the reconstruction and maintenance activities which will be undertaken by the relevant Contractor, or relevant CCT Branch.

The Proponent shall be responsible for ensuring that other role players fulfil their obligations in terms of the requirements of this EMMP:

- The Proponent shall ensure that the Contractor that will undertake the maintenance activities is well versed in the contents of this EMMP and in the conditions of the water use authorisation and shall take such measures that are necessary to bind such persons to conditions.
- The Proponent shall appoint a suitably experienced ECO before commencement of reconstruction or maintenance activities contained herein to ensure compliance with the provisions of the EMMP.
- The Proponent shall obtain and comply with all the necessary approvals, permits, authorisations and requirements set by the relevant National and Provincial Departments, and Local Authority for the reconstruction and maintenance activities before any site preparation activities are undertaken.
- The Proponent shall notify the DEA&DP of intention to perform activities under the approved EMMP.

4.2.2 The Contractor

The Contractor in the context of this document refers to the external contractor or relevant CCT Branch responsible for the reconstruction and maintenance activities, or portion of the activities required for operation to take place. The Contractor shall be responsible for ensuring the day-to-day implementation of the EMMP during the lifecycle of the reconstruction and maintenance activities, and shall be well-versed in the contents of this document:

- The Contractor shall confirm that all the relevant environmental authorisations, permits and/or licenses are in place prior to commencing with any site activities.
 - The conditions of the WUL shall be brought to the attention of all persons (employees, sub-consultants, etc.).
- The Contractor shall liaise closely with the ECO on any environmental management issues, incidents or emergencies.
- The Contractor shall ensure that the works on-site are conducted in an environmentally sensitive manner and in accordance with the requirements of the EMMP at all times. Special care shall be taken by the Contractor to prevent irreversible damage to the environment.
- The Contractor shall ensure all work areas, stockpiles and facility locations are located in a manner that complies with the relevant legislation and the requirements of this EMMP.
- The Contractor shall ensure that all staff are adequately informed of the requirements of the EMMP pertaining to their site role, and that they have attended an environmental induction training session (this session must be in the form of a talk and/or a written code of conduct that is clearly explained to and understood by the team).
- The Contractor shall ensure that any subcontractors or visitors to the site are conversant with the EMMP or relevant chapters of the EMMP pertaining to their role on-site.
- The Contractor shall conduct activities in a manner that will cause the least possible disturbance to the existing amenities, whether natural or man-made, in accordance with all the currently applicable statutory requirements. Disturbance or disruption of the daily lives of local communities shall be avoided as best as practically possible.
- The method statement for the maintenance practices is attached hereto as **Appendix H.1**.
- The Contractor shall allow officials from DEA&DP access to the site/s for the purposes of compliance monitoring in terms of the approved EMMP.
- The Contractor shall ensure that the site/s is/are rehabilitated and reinstated in accordance with the requirements of this EMMP.
- Appendix I.1 contains the Emergency Response Plan that needs to be always adhered to.

- If required, the contractor may establish a site yard at a location agreed on the relevant CCT Branch.

4.2.3 The Environmental Control Officer (ECO)

The ECO in the context of this document refers to the party responsible for the environmental compliance and auditing activities required by the EMMP for the lifecycle of the reconstruction and maintenance activities. The ECO shall be appointed by the Proponent, and the designation shall be reserved for a suitably qualified (National Diploma/Degree in Natural Science or an equivalent qualification), independent person. The ECO shall have adequate environmental knowledge to understand the detailed environmental issues associated with the project, and is to be well versed in the contents of the EMMP and its associated reports:

- The ECO shall undertake all inspection, monitoring and auditing tasks associated with the reconstruction and maintenance activities to ensure compliance with the approved EMMP, as described in the relevant chapters of this report (and dependent on whether reinstatement or routine maintenance activities are being undertaken).
- The ECO shall liaise closely with the Contractor, and shall provide guidance on any environmental management issues, incidents or emergencies that are brought to their attention.
- The ECO shall review and sign off on the construction and maintenance method statement attached hereto as **Appendix H.1**
- The ECO shall assist in providing recommendations for remedial action in the event of any non-compliances.
- The ECO shall liaise with the DEA&DP on all matters requiring such liaison, to the discretion of the ECO.
- The ECO shall ensure compliance with any reporting requirements contained in the department's approval of this EMMP.

4.3 Staff Induction Training

These measures will ensure site staff become familiar with the environmental management requirements for the site and behave in an environmentally conscientious manner:

- The Contractor shall ensure that all site workers, plant operators, drivers and anyone under their employ receive the induction training course prior to commencing with any site activities.
 - The induction training material shall address, but not be limited to the Code of Conduct, basic environmental awareness, basic health and safety awareness, prevention of water, soil, and air pollution, prevention of soil erosion and sedimentation, basic principles of materials handling and storage, fire risks, protection of fauna and flora, emergencies and incident responses, spill response provisions, social responsibility, administrative and reporting procedures.
 - Relevant chapters of the EMMP shall be presented during this course to facilitate compliance.
 - Proof of completing such training shall be provided to the ECO (attendance register or similar).
 - Appropriate supervision shall be provided, dependant on the scale of the operations.

The performance of site staff, in terms of meeting the environmental requirements of this EMMP shall be monitored on an on-going basis. Any shortcomings shall be addressed constructively and proactively through appropriate communication and training.

4.4 Housing the EMMP and Associated Permits / Authorisations

The EMMP and all associated permits/authorisations shall be kept together and be readily available at the Steenbras Catchment and/or Steenbras Wellfield offices. For reconstruction activities, these documents shall accompany the Contractor to site.

5 ENVIRONMENTAL MANAGEMENT REQUIREMENTS FOR MAINTENANCE AND REPAIR ACTIVITIES ASSOCIATED WITH THE STEENBRAS NATURE RESERVE AND STEENBRAS WELLFIELD

Table 13: Method statement that describes immediate proposed tasks, and assessment of their impacts

Actions	Potential impacts of these actions	Severity of impacts	Measures to mitigate the severity of these impacts	Corrective/remedial measures if mitigation measures are not properly implemented
Maintenance and repair in the context of this document means routine or emergency actions performed to keep a structure or system functioning or in service in the same location, capacity, and footprint. The requirements of this Chapter are only relevant to maintenance and repair activities but shall be read in conjunction with Chapters 1 - 3 of the EMMP.				
1.1 Communication Procedures				
1.1.1 Initial Maintenance Project Meeting	N/A	N/A	An initial project meeting shall be held between the ECO and the Contractor to: • Ensure all parties have full sets of this EMMP and any other documentation or plans required. • Discuss the required reconstruction and maintenance work. • Discuss communication channels including contact details for relevant parties.	The Contractor is required to adopt the method statements provided in this EMMP. Should the mitigation measures not be implemented according to this EMMP, the Contractor will be liable for the damages caused due to his negligence. The ECO will also advise and/or

Actions	Potential impacts of these actions	Severity of impacts	Measures to mitigate the severity of these impacts	Corrective/remedial measures if mitigation measures are not properly implemented
				recommend remedial actions should these mitigation measures not be implemented accordingly. This is applicable to all actions regarding the Maintenance Activities.
1.1.2 ECO Monitoring & Reporting	N/A	N/A	The following communication procedures apply to the responsibilities of the ECO during the maintenance activities: - Once the routine maintenance of the entire Wellfield is totally concluded for that maintenance period, the ECO shall inspect the work. - The ECO shall compile a General Progress Report following any routine or emergency maintenance activities, which can be in the form of a checklist and/or diary entries (or similar), but shall include: i) Dated photographic record. ii) A record of any environmental incidents or non-compliances. The compliance chapter of the report shall record the nature of any environmental queries/issues/incidents, the instructions on remedial actions to be undertaken, and the disciplinary actions prescribed. The record shall continue on a monthly	

Actions	Potential impacts of these actions	Severity of impacts	Measures to mitigate the severity of these impacts	Corrective/remedial measures if mitigation measures are not properly implemented
			basis until such time as the incident has been closed out, and the final record on the matter shall reflect on the remedial actions taken and the dates of eventual compliance by the Contractor. iii) Minutes of any site inspections, or of meetings pertaining to the environmental incidents, or of non-compliance with this EMMP. The ECO shall submit all reports on the routine maintenance activities to DEA&DP, the Proponent and to the Contractor.	
1.1.3 Emergency Reporting & Procedures	- Accidental fire - Accidental leaks - Accidental spillage of pollutants	N/A	The following emergency reporting and procedures will minimise the risk associated with emergency events: - The Contractor shall ensure that his employees are aware of the procedure to be followed for dealing with, and reporting emergencies, including accidental fire, which shall include notifying the relevant authorities of the event: i) All site staff shall be briefed regarding the requirements for dealing with potential emergencies including fires, accidental leaks and spillage of pollutants. ii) Education of site staff shall focus not only on the prevention of emergencies but also on proactive and appropriate interventions where such emergencies occur.	

Actions	Potential impacts of these actions	Severity of impacts	Measures to mitigate the severity of these impacts	Corrective/remedial measures if mitigation measures are not properly implemented
			- The contact details of the nearest hospital, police and ambulance services (Refer Contact List Page 6 of the EMMP) shall be made available to staff whilst undertaking any maintenance work on site. - Emergency equipment including spill kits and fire extinguishers shall accompany staff to site for the duration of the maintenance activities.	
1.1.4 Method Statements	N/A	N/A	The Contractor shall review, adopt, and sign off on the provided method statement which are attached hereto as Appendix H.1 . Any deviations from the methods describe herein shall be submitted to the DEA&DP before commencement of the activities.	
1.1.5 Record Keeping	N/A	N/A	All records relating to the implementation of this EMMP, shall be kept together such that they can be retrieved easily. These records shall be made available for scrutiny by any relevant authorities on their request.	
1.1.6 Environmental Awareness	N/A	N/A	The Contractor must ensure that all their employees (including all security staff) are trained on environmental considerations, and contents of this EMMP. The contract managers and supervisors will receive an environmental briefing from the ECO, who can also assist with presenting different environmental topics at the toolbox talks. All training and attendance registers must be kept at the site offices.	

Actions	Potential impacts of these actions	Severity of impacts	Measures to mitigate the severity of these impacts	Corrective/remedial measures if mitigation measures are not properly implemented
Steenbras Catchment and Nature Reserve Maintenance Measures				
1.2 Road Maintenance				
1.2.1 Maintenance of roads and culverts after large storm events: In most instances after large storm events there is some degree of damage, including erosion of banks, gravel roads and bridge approaches. Some flood debris could also cause damage to the infrastructure itself which would need to be fixed or replaced if damaged extensively. This could entail dredging, excavating and infilling in a stream.	<u>Freshwater and Terrestrial Ecology</u> - Destabilisation of slopes, banks and beds of wetlands and rivers, leading to increased mobility of sediments into sensitive areas. - Increased sedimentation in sensitive areas, such as wetlands, riparian areas and channels. - Smothering of cobble, boulder and bedrock habitat in rivers. - Smothering of wetland substrates. - Damage to vegetation when accessing working area	<u>Freshwater</u> Medium <u>Terrestrial Ecology</u> Impacts on terrestrial vegetation likely to be either Low.	Besides efforts to minimise the working width in sensitive habitats, it is recommended that the following measures are implemented during maintenance and repair activities: - Clearing of vegetation must be minimised. - Provision should be made to divert stream flows in the event of a storm event during the upgrade of roads and culvert structures. - The road reserves harbour important remnants of the natural habitat and as such the precautionary principle should be applied to these areas. As much of the natural habitat within the road reserves should be preserved where possible. Implement the Plant and Animal Search and Rescue Plan prior to any construction activities. - Grading may only be undertaken on roads designated to be graded (e.g. no grading of jeep/vegetated tracks). Where grading is permitted, such will assist to prevent or repair the formation of erosion gullies and must promote intermittent run-off by means of berms across the roads created with graded road material. Graded roads and berms must be compacted.	Should a plant search and rescue be required, the ECO or appointed sub-contractor shall record the types of species collected as well as the number of specimens collected, the habitat they were removed from and their general condition.

Actions	Potential impacts of these actions	Severity of impacts	Measures to mitigate the severity of these impacts	Corrective/remedial measures if mitigation measures are not properly implemented
			• No lateral berms of graded materials on the sides of roads or tracks must be created except where specified. • Clearing of vegetation in V-drains on the sides of roads blocking flows should be cleared by brush cutting rather than by grader, except where the V-drain requires shaping. • Areas where the roads exhibit degradation, such as where potholes are evident, should be filled with appropriate local coarse sandstone G5 materials, and compacted to maximise the lifespan of the repair. • Under-road culverts need to be checked regularly to ensure they remain in good working/functional condition. • Eroded areas must be identified and repaired appropriately with sandbags, wood-chip filled socks or appropriate geotextiles etc. • Areas vulnerable to erosion and sedimentation, such as steep, unvegetated slopes, or areas downslope of steep slopes, must be stabilised using appropriate materials. • Temporary stabilisation measures such as sandbags, wood-chip filled socks or appropriate geotextiles should also be placed on vulnerable slopes or around roads, before rainfall events (or as demanded by the situation) to slow the flow of water along or from steep access tracks and to encourage the settling of sediment along steep	

Actions	Potential impacts of these actions	Severity of impacts	Measures to mitigate the severity of these impacts	Corrective/remedial measures if mitigation measures are not properly implemented
			sections to prevent the sedimentation of downstream watercourses.	
1.3 Stormwater Maintenance				
1.3.1 Repair of damaged stormwater infrastructure: Some existing stormwater infrastructure is in need of repair. This would include the replacement of broken culverts, redirecting of culverts which are incorrectly located in relation to the natural direction of flow in a stream, clearing of vegetation, dredging inside the watercourse to obtain access to infrastructure, removal of flood debris and silt and the infilling of material for stabilisation and support of new infrastructure. This will be a like-for-like repair.	<u>Freshwater and Terrestrial Ecology</u> - Destabilisation of slopes, banks and beds of wetlands and rivers, leading to increased mobility of sediments into sensitive areas. - Increased sedimentation in sensitive areas, such as wetlands, riparian areas and channels. - Smothering of cobble, boulder and bedrock habitat in rivers. - Smothering of wetland substrates. - Discharge of construction-related pollutants, such as cement, leading to deterioration in water quality in rivers and wetlands.	<u>Freshwater</u> Medium <u>Terrestrial Ecology</u> Impacts on terrestrial likely to be either Medium, and in rare cases High	- Where required (such as areas where water may accumulate), implement an effective system of stormwater run-off control using berms (raised and compacted, low walls of soil) and ditches. - The system must effectively collect and safely disseminate any run-off water from all hardened surfaces and must prevent any potential down slope erosion. - Site inspection must assess the effectiveness of the run-off control system and specifically record the occurrence (or not) of any erosion on site or downstream. - Where stormwater is channeled off the road down channels to a watercourse, consider the use of grassed or vegetated swales. Only seed or vegetation from within the Steenbras Nature Reserve may be used for such purposes, and BMB must be engaged with for guidance in this regard. - Concrete or cement mixing is not permitted at or in the vicinity (50m) of the watercourse. Any cement mixing cannot take place on bare ground. An impermeable or bunded area must be established in a way that cement slurry will not run off into the surrounding environment.	

Actions	Potential impacts of these actions	Severity of impacts	Measures to mitigate the severity of these impacts	Corrective/remedial measures if mitigation measures are not properly implemented
			- Access to the watercourse can only be for work specifically being conducted to enlarge the crossings and culvert areas. In these areas, access must be limited to essential equipment only. - The existing stormwater drainage (roadside drains and stormwater pipes) along the working areas must be maintained to ensure that they are not blocked and are functioning. This will reduce water run-off from rivers and drainage from entering work areas which could cause erosion or sediment laden water from entering downstream watercourses and wetlands. A functioning stormwater system will also minimise erosion of the road surface, and thus assist in keeping the access roads in good repair. Where existing stormwater infrastructure is damaged and needs repair or replacement, this must be assessed and addressed in consultation with the ECO, and where necessary, BMB.	
1.4 Bridge Crossing Maintenance				
1.4.1 Repair of damaged water crossing infrastructure: This includes the replacement of broken culverts, redirecting of culverts which are incorrectly located in relation to the natural direction of flow in a stream, clearing of vegetation, dredging	<u>Freshwater and Terrestrial Ecology</u> - Damage to indigenous vegetation that has not been identified for maintenance - Disturbance of endangered or protected species	<u>Freshwater</u> Medium <u>Terrestrial Ecology</u> Impacts on terrestrial vegetation likely to be either Low, seldom	- Except to the extent necessary for the maintenance activities to be undertaken, indigenous vegetation shall not be unnecessarily removed, felled, damaged or disturbed: i) Any unauthorised disturbance or damage to indigenous vegetation that has not been identified for maintenance in the	

Actions	Potential impacts of these actions	Severity of impacts	Measures to mitigate the severity of these impacts	Corrective/remedial measures if mitigation measures are not properly implemented
inside the watercourse to obtain access to infrastructure, removal of flood debris and silt and the infilling of material for stabilisation and support of new infrastructure. This will be a like-for-like repair.	• Disturbance to riparian vegetation and stream banks • Negligible harm to the fauna and flora • Disturbance of nesting birds • Destabilisation of slopes, banks and beds of wetlands and rivers, leading to increased mobility of sediments into sensitive areas. • Increased sedimentation in sensitive areas, such as wetlands, riparian areas and channels. • Smothering of cobble, boulder and bedrock habitat in rivers. • Smothering of wetland substrates. • Discharge of construction-related pollutants, such as cement, leading to deterioration in water quality in rivers and wetlands.	Medium, and in rare cases High.	site-specific requirements shall be subject to disciplinary action and reinstatement or rehabilitation to the culprit's cost. ii) Any tracts of indigenous vegetation identified in the site-specific requirements of this EMMP as "no-go" areas for the relevant site in question shall be protected from disturbances, and the demarcation of these sites shall be maintained for the duration of the site maintenance activities. iii) All endangered species or protected species listed in Schedules 3 and 4 respectively, in terms of the Western Cape Nature Conservation Laws Amendment Act, 2000 (No. 3 of 2000) shall not be picked or removed without the relevant permit, which must be obtained from CapeNature. iv) Special attention shall be paid to the protection of vegetation on slopes and riverbanks should ant repair or maintenance of the Wellfield infrastructure take place in these areas. v) Indigenous vegetation which does not interfere with the function of the Wellfield infrastructure shall be left undisturbed.	

Actions	Potential impacts of these actions	Severity of impacts	Measures to mitigate the severity of these impacts	Corrective/remedial measures if mitigation measures are not properly implemented
			vi) Remove all alien invasive vegetation within 40m of maintenance activities. vii) No disturbance of natural vegetation outside footprint. viii) Minimise disturbance to access road. ix) Harvesting of seeds and cuttings of indigenous vegetation may only take place following approval by BMB. This material can then be used to rehabilitate the disturbed areas once maintenance activities have been completed. Mulch may also be applied following approval of the type and source of mulch by BMB (No mulch may be brought into the Steenbras Nature Reserve or contain alien vegetation such as <i>Eucalyptus</i> or <i>Acacia</i> species, due to the risk of containing alien seed). • The method of vegetation clearing (removal or pruning) shall comply with any conditions specified for the site and Wellfield infrastructure in question and listed in the site-specific requirements of this EMMP: x) Wherever possible, manual hand-pulling shall be selected as a method of vegetation clearing instead of using machinery, as this will have far less impact on the stream environment.	

Actions	Potential impacts of these actions	Severity of impacts	Measures to mitigate the severity of these impacts	Corrective/remedial measures if mitigation measures are not properly implemented
			xi) Herbicides shall not be permitted as a method of indigenous vegetation clearing. xii) Wherever possible, manual hand-pulling shall be selected as a method of structure clearing instead of using machinery, as this will have far less impact on the environment. • When undertaking vegetation maintenance, reasonable measures shall be taken to ensure that fauna and flora are not harmed or killed. xiii) Care shall be taken to avoid disturbing nesting birds, and vegetation maintenance activities shall not be undertaken if a known nest is occupied on the site. It is best practice to avoid any vegetation maintenance activities during nesting season. • The disposal of vegetation by burying or burning is prohibited in terms of national legislation, and shall not occur: xiv) Cut plants that will not be removed from site shall be placed well away from the top of the bank and channel to prevent them from rotting and compromising water quality. xv) Surplus indigenous vegetation that has been cleared can either be disposed of at licenced WDF, with proof thereof	

Actions	Potential impacts of these actions	Severity of impacts	Measures to mitigate the severity of these impacts	Corrective/remedial measures if mitigation measures are not properly implemented
			retained, or chipped / stockpiled for use in the rehabilitation of the surrounds. • Over pumping / ponding / diverting the rivers must be done with maximum care and forethought with inputs from the botanical specialist or BMB, and the ECO, and must be implemented accordingly. • Pond and divert the water on the upstream side of the structure by building a wall with sandbags. Dig a sump hole near structure to pump water over the road or dig a sump hole behind the sandbag wall on the upstream side if needed. • No debris, silt or other obstruction must be allowed to enter the stream from the maintenance activities. Scaffolding and/or screens/netting must be erected around the work area to contain any flying debris from the breaking of concrete. Sandbags or culvert extensions must be used to divert river flow away from the work areas to help keep the river from being polluted, as well as to keep the work areas dry. Water pumps must be used to keep the construction area dry and to ensure that the risk of contaminated water spilling into the active channel is minimised. The work area must be assessed daily by the contractor and ECOs to ensure that the river is sufficiently protected from contamination and physical disturbance. • Construction should take place towards mid to late summer when the river discharge is at a	

Actions	Potential impacts of these actions	Severity of impacts	Measures to mitigate the severity of these impacts	Corrective/remedial measures if mitigation measures are not properly implemented
			minimum. This will minimize the impacts associated with loss of connectivity in the system because most biota is confined to pools at this time. Also, the extent and intensity of contamination through spillage into the river is reduced during lower flow conditions. • All plant material that will be disturbed or lost through construction activities must be identified and rescued prior to the onset of construction (i.e. implement search and rescue operations) under the guidance of a botanical specialist, or BMB. • Although it is indicated that measures will be implemented to prevent cement spillage, it is fundamental that these measures are implemented effectively and monitored by the ECO throughout the cement casting process. A slurry tank and dewatering pumps must be onsite and any contaminated water or slurry must be pumped from the system and disposed of immediately at a suitable site outside of the river channel and riparian habitat. • With regards to work site and storage locations, the following measures must be adhered to offset any impacts to the four rivers with proposed new crossings. Work camps should be located well beyond any watercourse or wetland habitat. No vehicles, fuels or construction materials are to be stored such that waste can leak, blow or be washed into any river or wetland	

Actions	Potential impacts of these actions	Severity of impacts	Measures to mitigate the severity of these impacts	Corrective/remedial measures if mitigation measures are not properly implemented
			within the Steenbras Nature Reserve. Stockpiling of construction materials should occur at designed sites that are well beyond (at least 40 m beyond the boundary) of any sensitive wetland or dryland habitat. • With regards to waste management, the following measures must be adhered to in order to offset any construction phase impacts to rivers or wetlands. Adequate provision should be made for the containment of waste associated with the construction site, including provision for toilets and litter management and removal. No tools or other construction materials may be washed in watercourses, and the water used for washing (from a borehole or external source etc.) must be managed such that it does not contaminate any watercourse. All waste generated by construction activities (including rubble, litter etc.) is to be removed from the site and disposed of at licenced WDF, with proof thereof retained. • With regards to minimizing disturbance and noise, the following measures must be adhered to in order to offset any impacts to rivers and wetlands. The construction disturbance area should be minimized, and this minimum practical disturbance area should be demarcated before the start of construction activities. All areas outside of this zone should be regarded as no-go areas during construction.	

Actions	Potential impacts of these actions	Severity of impacts	Measures to mitigate the severity of these impacts	Corrective/remedial measures if mitigation measures are not properly implemented
			Planned closures must be communicated and agreed with all other contractors and the CMB and BMB prior to the works being undertaken.	
1.5 Invasive alien vegetation control				
1.5.1 Clearing of alien invasive vegetation from watercourses: - Large alien invasives will be cleared using chainsaws. Smaller plants will be removed by hand using hand tools to remove the roots from the beds and banks of watercourses. All plant material will be removed and disposed of at licenced WDF. 1.5.2 Clearing of indigenous vegetation around the borehole sites in case of borehole maintenance or drilling activities: - More than 300 square metres of indigenous vegetation could be cleared in redrilling or maintenance is needed at any of the borehole sites for the establishment of drill rigs and associated infrastructure.	<u>Freshwater and Terrestrial Ecology</u> - Damage to environment due to use of machinery to remove alien vegetation. - Damage to fauna (may cause death) and flora due to use of diesel-based pesticides - Poisoning of aquatic systems due to off-target damage from herbicides to riparian areas - Erosion of areas that are cleared of vegetation cover, or that remain bare during times of heavy rainfall.	<u>Freshwater</u> Medium <u>Terrestrial Ecology</u> This is typically a positive impact provided not damage to natural vegetation or stream embankments occurs during the clearing process. If piles of Invasive Alien Plants (IAPs) are not removed these can cause soil hotspots with fire events. Impacts due to pesticides on flora likely to be Low. Impacts to fauna and freshwater likely to be more severe. If no herbicides are allowed as stated above these (herbicides related) impacts are N/A.	These measures will ensure that the legal responsibilities in terms of alien vegetation control are met, and that undesirable invasive plant species do not colonise the disturbed site: - It is recommended that all alien trees within a band of 25m from the footprint be cleared to allow the germination of seed from indigenous vegetation. Where necessary, topsoil and mulch (where approved by BMB) will need to be added and impacted areas revegetated with vegetation approved by BMB. - Prior to the removal of topsoil for trenching and excavations, the need to remove or clear all alien vegetation must be assessed and indicated by the freshwater and botanical ecologists or BMB. If required, the clearance of alien vegetation will be done by the rehabilitation contractor who must remove all alien vegetation within the vicinity of the work areas and control the re-emergence thereof, for the duration of the rehabilitation activities. The removed alien vegetation must be taken off-site and licenced WDF, with proof thereof retained. A 25m buffer should be applied around the working area.	

Actions	Potential impacts of these actions	Severity of impacts	Measures to mitigate the severity of these impacts	Corrective/remedial measures if mitigation measures are not properly implemented
			• Wherever possible, manual methods of alien vegetation removal shall be selected instead of using machinery, as this will have far less impact on the environment. Herbicide use may be considered (e.g. for stump treatments where alien trees are cut down by chainsaw), but may only be used if approved in writing, by BMB. • Should the use of registered herbicides be the most effective option for control of alien invasive vegetation, and agreed to in terms of an approved Method Statement, then this shall be undertaken in compliance with the terms and conditions of the SANS for handling, storage and disposal of pesticides (SANS 10206:2010, Edition 2.2): i) The use of diesel-based herbicides near watercourses shall not be permitted. ii) Only herbicides registered for the particular plant species requiring control shall be used. Where no herbicide has been registered, the least hazardous herbicide registered for a similar plant species (i.e. another species of tree or shrub or grass) may be used. iii) Herbicide operators mixing and applying herbicides shall be appropriately trained and supervised and shall be equipped with the requisite personal protective clothing in accordance with the SANS requirements and the herbicide labels.	

Actions	Potential impacts of these actions	Severity of impacts	Measures to mitigate the severity of these impacts	Corrective/remedial measures if mitigation measures are not properly implemented
			iv) Supervisors shall be literate, shall understand the instructions on the herbicide labels, and shall ensure that the necessary safety protocols are implemented. v) The requisite washing facilities and herbicide mixing area shall comply with the SANS requirements, as shall the transport, handling and storage of herbicides. vi) There is a very high risk of off-target damage from herbicides within riparian areas as many herbicides are toxic to aquatic systems, and only herbicides that are approved for use near a watercourse shall be used. vii) Herbicides shall not be used in windy or rainy conditions, and care shall be taken to avoid drift onto indigenous plants. • The disposal of alien invasive vegetation by burying or burning is prohibited in terms of national legislation, and shall not occur: • Alien vegetation shall be disposed of at licenced WDF, with proof thereof retained. • Follow up clearing should take place at least annually.	

Actions	Potential impacts of these actions	Severity of impacts	Measures to mitigate the severity of these impacts	Corrective/remedial measures if mitigation measures are not properly implemented
Steenbras Wellfield Maintenance Measures				
1.6 Pump testing from boreholes				
1.6.1 Borehole cleaning: Removal of installed production pump, set up of rehabilitation rig, drilling & testing, test pumping rig setup, step-drawdown test with water being pumped into the water pipeline, de-establishment of rig and re-installation of production pump and associated equipment.	<u>Freshwater and Terrestrial Ecology</u> - Erosion of watercourse and wetlands - Hydrological changes and the disruption of natural aquatic ecosystem processes - Change in water chemistry in wetlands and rivers - Effects on dry land flora/fauna	<u>Freshwater</u> Medium to high <u>Terrestrial Ecology</u> Impacts can potentially be Medium or High and long-term if drilled sludge is spilled into adjacent vegetation. Mitigation only possible if sludge/fines layer can be successfully removed. Chemical contamination may be irreversible (i.e High impact)	- Pump test water and effluent from borehole cleaning or rehabilitation may only be discharged to Steenbras Dam via temporary discharge pipes, that are preferably laid in disturbed areas such as roads, or into the main bulkwater pipeline. - Discharge groundwater into the Steenbras Dam via a pipe system to bypass watercourses and wetlands is preferred. - Discharge during mid-winter into perennial, bedrock/boulder rivers when the flows in the systems would be naturally elevated to reduce disruption of flow/water-linked processes. - While the hydrological impacts associated with discharge of groundwater can be mitigated through discharge into perennial rivers during mid-winter, this would not necessarily offset the impacts associated with water quality changes to these systems. This would depend on the actual concentration of metals in groundwater and the ability of the surface water system to dilute these concentrations. Nevertheless, direct discharge of groundwater to the Steenbras Dam will reduce the impacts to sensitive habitats associated with pump testing to very low or negligible with any residual impacts related to the laying of the pipe	

Actions	Potential impacts of these actions	Severity of impacts	Measures to mitigate the severity of these impacts	Corrective/remedial measures if mitigation measures are not properly implemented
			system. These impacts can be avoided through laying of the pipe system within the current road network as far as possible.	
1.7 Above ground pipeline/powerline stream crossings and routine maintenance				
1.7.1 Repair of damaged water crossing infrastructure: - Some existing infrastructure is in need of repair. This would include the replacement of broken culverts, redirecting of culverts which are located against the natural flow of a stream, dredging inside the watercourse to obtain access to infrastructure, removal of flood debris and silt and the infilling of material for stabilisation and support of new infrastructure. This will be a like-for-like repair. 1.7.2 Replacement of damage pipeline infrastructure after large storm events: - In most instances after large storm events there are some degree of damage, including erosion of banks, gravel roads and bridge approaches. Some flood debris could also cause damage to the infrastructure itself which would need to be fixed or replaced if damaged extensively. This could	<u>Freshwater and Terrestrial Ecology</u> Potential impacts associated with above ground crossings include: - Disturbance to channel banks and beds and riparian areas at crossing points; - Potential erosion of the channel margins. - Destabilisation of slopes, banks and beds of wetlands and rivers, leading to increased mobility of sediments into sensitive areas. - Increased sedimentation in sensitive areas, such as wetlands, riparian areas and channels. - Smothering of cobble, boulder and	<u>Freshwater</u> Medium to high <u>Terrestrial Ecology</u> Impacts on terrestrial vegetation likely to be either Low, seldom Medium, and in rare case High due to ongoing or extensive erosion.	Besides efforts to minimise the working width in sensitive habitats, it is recommended that the following measures are implemented during maintenance and repair activities: - Search and Rescue of plant material as well as seed collection must be undertaken within the disturbed areas prior to commencement of maintenance activities. - All alien vegetation within a band of 25m [from the infrastructure route must be cleared prior to trench excavation. This activity is specific to those areas that are currently invaded with alien vegetation and/or plantations. - Trench excavation must take place in short sections with the storage of topsoil adjacent to the excavated trench. - Top material must then be returned to the same habitat from which it was removed following pipe/cable laying, making sure that bed material and topsoil are not compacted more than they are naturally. - Ensure that the profile of the trench once top material is returned has the same cross section profile as it was prior to trench excavation. Thus,	

Actions	Potential impacts of these actions	Severity of impacts	Measures to mitigate the severity of these impacts	Corrective/remedial measures if mitigation measures are not properly implemented
entail dredging, excavating and infilling in a stream. 1.7.3 Repair of pipeline infrastructure: - Over time some damage could occur to the installed pipeline infrastructure, which would result in machinery needing to access the pipe over / underneath the stream and would entail dredging, excavating and potentially infilling inside a watercourse. 1.7.4 Clearing of culverts: - Regular clearing of culverts, especially during the rainy season, would need to take place to avoid damage and flooding along the entire road and pipeline networks where rivers are crossed. The clearing would entail the dredging or excavating of debris, silt and other flooded material from the crossings.	bedrock habitat in rivers. - Smothering of wetland substrates. - Discharge of construction-related pollutants, such as cement, leading to deterioration in water quality in rivers and wetlands.		any excess material would need to be disposed of elsewhere, so that a raised mound is not created along the pipeline. - Following the return of topsoil, it is important that areas affected by the infrastructure route are rehabilitated as far as possible through replanting of indigenous vegetation within the affected areas. This may include a mix of locally indigenous plants that are functional (to stabilise the habitat) as well as replacement of conservation worthy vegetation. - To mitigate against potential hydrological changes to wetlands and watercourse associated with obstructed flow, it is important that during the maintenance activity such as replacing a pipeline/powerline it is placed at least 50 cm below ground level (i.e., top material following construction should be at least 50 cm above the top of the pipe) to reduce or minimise changes in the nature of subsurface flows through wetland habitats. - Trenches will be excavated within the predefined and demarcated working widths in order to install the HDPE pipeline as per the construction design drawings and the working width must include a 2m wide section for the storage of topsoil material. The trenches will be excavated using an excavator or alternative approved excavation methods with an appropriate rock bucket. The trench will be excavated to the depth	

Actions	Potential impacts of these actions	Severity of impacts	Measures to mitigate the severity of these impacts	Corrective/remedial measures if mitigation measures are not properly implemented
			specified on the construction drawings and the excavated materials would be stockpiled at designated stockpile areas. The excavated subsoil material must not be mixed with the topsoil material. Trenching (open cut excavation) is planned for the full length of the pipeline; however, trenching will be undertaken in sections (up to a maximum of 600m of trench will be open at one time) and backfilling will occur as the pipeline is installed. Open excavations would be demarcated, and trenches checked at regular intervals to ensure no fauna has fallen into them. • No stringing of pipeline outside of the demarcated working area will be allowed. The offcuts and shavings created during HDPE pipeline welding must be collected at the end of each weld and stored in appropriate waste containers to be taken to the site camp at the end of the day. A drop sheet to collect the shavings must be used when welding HDPE pipelines. Care must be taken when using the hot plate to melt the HDPE pipe so as to not cause any harm to people or animals, and to not cause any fires. If portable generators are used, they must be equipped with drip trays. • Sandbag and concrete collar location/positions must be marked along the trench. Once the trench is open, the botanical and aquatic ecologists must determine the location of each collar prior to installation, with the aim of	

Actions	Potential impacts of these actions	Severity of impacts	Measures to mitigate the severity of these impacts	Corrective/remedial measures if mitigation measures are not properly implemented
			preserving wet and dry sections along the trench as far as possible. The need for additional collars must be checked with the specialists before pipeline pressure testing. • Compaction of the soil will apply to all trenching, however in wetland and stream areas the <i>in-situ</i> material will be replaced without compaction up to a depth of 500mm unless otherwise stated by freshwater ecologist, who will verify this by a walk-through of the site with the contractor/site engineer. <u>In terms of the impacts associated with above ground watercourse crossings, these can be mitigated by implementation of the following measures:</u> • It is recommended that placement of concrete columns within the active channel for the support of above ground stream crossings is avoided as far as possible. Through onsite discussions with the engineering team, it is evident that this is easily achievable in most instances. Where not possible, concrete and cement must be contained as far as possible to prevent contamination of the aquatic habitat. • Concrete Plinth Repairs: No debris, silt or other obstruction must be allowed to enter the stream from the work activities being conducted at the plinths. Ground plastic sheeting must be laid around the plinth under and over layers of	

Actions	Potential impacts of these actions	Severity of impacts	Measures to mitigate the severity of these impacts	Corrective/remedial measures if mitigation measures are not properly implemented
			sandbags to create a dam to prevent unwanted run-off from the work area. Scaffolding must be erected around the concrete plinth and then completely wrapped in netting to contain any flying debris from the breaking of the plinth. Sediment traps consisting of geofabric- wrapped sandbags, will be installed if and when required. If any erosion occurs, the eroded areas will be prepared or repaired to the satisfaction of the site engineer and ECOs. Sandbags or culvert extensions must be used to divert river flow away from the work areas to help keep the river from being polluted, as well as to keep the work areas dry. Water pumps must be used to keep the construction area dry and to ensure that the risk of contaminated water spilling into the active channel is minimised. The work area must be assessed daily by the contractor and ECOs to ensure that the river is sufficiently protected from contamination and physical disturbance. <u>In the case of maintenance to both below and above ground crossings, it is recommended that construction be undertaken during the dry season as far as possible when risk of contamination is minimised:</u> • Work areas must be confined to minimise the negative effects of trampling.	

Actions	Potential impacts of these actions	Severity of impacts	Measures to mitigate the severity of these impacts	Corrective/remedial measures if mitigation measures are not properly implemented
			• Bank rehabilitation would require the input of a restoration botanist / freshwater ecologist. • The natural flow of water along all existing rivers, wetlands and cross drains and any low points that are exposed during the works must be piped across the trenches so that the natural flow is not impeded. The upstream inlet must be blocked (e.g., using a coffer dam) in order to pump the water over the road or divert by pipe through the culvert, across the trench and into the downstream channel or stream during trench excavations. This will limit the amount of water flowing into the trench, limit the need for dewatering and prevent contamination of water in the water course. • A Site ECO must be present when blocking upstream points and when trenching through an existing stream, wetland, cross-drain or low point. Flow through the culvert or pipes will again be reinstated once the trench has been backfilled and closed. The culvert or pipes must be extended over the buried water pipes. • No canalisation of flow is permitted except under specified conditions, and then, under the supervision of the freshwater ecologist or BMB. Roadside drains are not to be blocked or used for temporary storage – they are always to be kept in good functional condition for the duration of the construction activities. The timing of the	

Actions	Potential impacts of these actions	Severity of impacts	Measures to mitigate the severity of these impacts	Corrective/remedial measures if mitigation measures are not properly implemented
			stream crossings should be prioritized to the drier summer months where possible. <u>In terms of the impacts associated with above ground powerline, these can be mitigated by implementation of the following measures:</u> • The holes for poles for the overhead powerlines should be hand dug. Approximately 0.3m of the topsoil must be kept from the substrate and returned to cover buried concrete supporting the pole. The topsoil must not be mixed with cement. • For poles being replaced on access roads, cement can be mixed at the pole site in pre-demarcated area. For poles being replaced in natural vegetated areas, the cement must be mixed at a nearby access road and then carried to the pole site in buckets, to reduce the footprint in the natural vegetation. The cement for all poles will be made with material excavated from the hole. The mix is then replaced in the hole. The cement is to be mixed on impervious material (e.g., on a metal tray, or wooden boards) so that it does not contaminate the surrounding areas. No waste cement can be discarded into the surrounding areas and cement bags must be collected for disposal. • The overhead powerlines will be pulled into place on the poles using light rope with is carried by hand and placed onto pulleys on the poles. The rope is used to pull the electric cables into place.	

Actions	Potential impacts of these actions	Severity of impacts	Measures to mitigate the severity of these impacts	Corrective/remedial measures if mitigation measures are not properly implemented
			No material should be stockpiled within the area by rather transported into the area when required and any waste must be immediately removed.	
1.8 Below ground pipeline/powerline stream crossings and route maintenance				
1.8.1 Repair of damaged water crossing infrastructure: - Some existing infrastructure is in need of repair. This would include the replacement of broken culverts, redirecting of culverts which are located against the natural flow of a stream, dredging inside the watercourse to obtain access to infrastructure, removal of flood debris and silt and the infilling of material for stabilisation and support of new infrastructure. This will be a like-for-like repair. 1.8.2 Replacement of damage pipeline infrastructure after large storm events: - In most instances after large storm events there are some degree of damage, including erosion of banks, gravel roads and bridge approaches. Some flood debris could also cause damage to the infrastructure itself which would need to be fixed or replaced if damaged extensively. This could	<u>Freshwater and Terrestrial Ecology</u> In terms of the below ground crossings, the likely impacts include: - Disturbance to channel banks and beds at crossing points. - Potential erosion of the channel margins. - Construction-related water quality impacts. - Destabilisation of slopes, banks and beds of wetlands and rivers, leading to increased mobility of sediments into sensitive areas. - Increased sedimentation in sensitive areas, such as wetlands, riparian areas and channels.	<u>Freshwater</u> Medium <u>Terrestrial Ecology</u> All Medium to High impact and clearing of culverts Low impact	Besides efforts to minimise the working width in sensitive habitats, it is recommended that the following measures are implemented during maintenance and repair activities: - Search and Rescue of indigenous vegetation as well as seed collection must be undertaken within the disturbed areas prior to commencement of maintenance activities. - All alien vegetation within a band of 25m from the infrastructure route must be cleared prior to trench excavation. This activity is specific to those areas that are currently invaded with alien vegetation and/or plantations. - Trench excavation must take place in short sections with the storage of topsoil adjacent to the excavated trench. - Top material must then be returned to the same habitat from which it was removed following pipe/cable laying, making sure that bed material and topsoil are not compacted more than they are naturally. - Ensure that the profile of the trench once top material is returned has the same cross section profile as it was prior to trench excavation. Thus,	

Actions	Potential impacts of these actions	Severity of impacts	Measures to mitigate the severity of these impacts	Corrective/remedial measures if mitigation measures are not properly implemented
entail dredging, excavating and infilling in a stream. 1.8.3 Repair of pipeline infrastructure: - Over time some damage could occur to the installed pipeline infrastructure, which would result in machinery needing to access the pipe over / underneath the stream and would entail dredging, excavating and potentially infilling inside a watercourse. 1.8.4 Clearing of culverts: - Regular clearing of culverts, especially during the rainy season, would need to take place to avoid damage and flooding along the entire road and pipeline networks where rivers are crossed. The clearing would entail the dredging or excavating of debris, silt and other flooded material from the crossings.	- Smothering of cobble, boulder and bedrock habitat in rivers. - Smothering of wetland substrates. - Discharge of construction-related pollutants, such as cement, leading to deterioration in water quality in rivers and wetlands.		any excess material would need to be disposed of elsewhere, so that a raised mound is not created along the pipeline. - Following the return of topsoil, it is important that areas affected by the infrastructure route are rehabilitated as far as possible through replanting of indigenous vegetation within the affected areas. This may include a mix of indigenous vegetation that is functional (to stabilise the habitat) as well as replacement of conservation worthy vegetation. - To mitigate against potential hydrological changes to wetlands and watercourse associated with obstructed flow, it is important that during the maintenance activity such as replacing a pipeline/powerline it is placed at least 50 cm below ground level (i.e., top material following construction should be at least 50cm above the top of the pipe) to reduce or minimise changes in the nature of subsurface flows through wetland habitats. - Conduits for the installation of communications must be installed in the same trench as the water pipeline where applicable. <u>In terms of the impacts associated with below ground watercourse crossings, these can be mitigated by implementation of the following measures:</u>	

Actions	Potential impacts of these actions	Severity of impacts	Measures to mitigate the severity of these impacts	Corrective/remedial measures if mitigation measures are not properly implemented
			• Should a pipe need to be replaced (maintenance) the pipe must be placed such that cover material is returned to the natural level of the channel such that flow is not impeded. • The disturbed area must be revegetated to ensure re-establishment and stabilisation of slopes. • No concrete to be used within the active channel. <u>In the case of maintenance to both below and above ground crossings, it is recommended that construction be undertaken during the dry season as far as possible when risk of contamination is minimised:</u> • Work areas must be confined to minimise the negative effects of trampling. • Bank rehabilitation would require the input of a restoration botanist / freshwater ecologist. • The natural flow of water along all existing rivers, wetlands and cross drains and any low points that are exposed during the works must be piped across the trenches so that the natural flow is not impeded. The upstream inlet must be blocked (e.g., using a coffer dam) in order to pump the water over the road or divert by pipe through the culvert, across the trench and into the downstream channel or stream during trench excavations. This will limit the amount of water flowing into the trench, limit the need for	

Actions	Potential impacts of these actions	Severity of impacts	Measures to mitigate the severity of these impacts	Corrective/remedial measures if mitigation measures are not properly implemented
			dewatering and prevent contamination of water in the water course. - A Site ECO must be present when blocking upstream points and when trenching through an existing stream, wetland, cross-drain or low point. Flow through the culvert or pipes will again be reinstated once the trench has been backfilled and closed. The culvert or pipes must be extended over the buried water pipes. - No canalisation of flow is permitted except under specified conditions, and then, under the supervision of the freshwater ecologist or BMB. Roadside drains are not to be blocked or used for temporary storage – they are always to be kept in good functional condition for the duration of the construction activities. The timing of the stream crossings should be prioritized to the drier summer months where possible.	
1.9 Pumpstations and monitoring boreholes				
1.9.1 Replacement / installation of erosion control measures: Where erosion control measures are required or already installed, maintenance would have to be done to ensure these remain in good working order or that areas that become prone to erosion is secured to protect infrastructure and prevent downstream impacts	Freshwater and Terrestrial Ecology - Localized changes in the runoff that may promote erosion and contaminate these systems through increasing sediment loads into natural systems (particularly during maintenance).	Freshwater Medium Terrestrial Ecology Impacts on terrestrial vegetation likely to be either Low, seldom Medium, and in rare cases High due to	- It is recommended that all alien trees within a band of 50m from the footprint be cleared to allow rejuvenation of seed within the topsoil. Where necessary, topsoil and mulch will need to be added and impacted areas revegetated with appropriately specified plants - Prior to the removal of topsoil for trenching and excavations, the need to remove or clear all alien vegetation must be assessed and indicated by the freshwater and botanical ecologists or BMB. If required, the clearance of alien vegetation will be done by the	

Actions	Potential impacts of these actions	Severity of impacts	Measures to mitigate the severity of these impacts	Corrective/remedial measures if mitigation measures are not properly implemented
to the aquatic ecosystems. This would entail the potential excavation and infilling of material within watercourses or wetlands and activities such as gabion basket installations. 1.9.2 Clearing of silt or flood debris from infrastructure and rivers: Over time silt and gravel will accumulate along, under and behind infrastructure in rivers and wetlands. These need to be cleared regularly to ensure proper functioning of the infrastructure and ecosystems and prevent flooding and associated damage within these areas.	- Disturbance of river or wetland habitat during removal of sediment. - Destabilisation of slopes, banks and beds of wetlands and rivers, leading to increased mobility of sediments into sensitive areas. - Increased sedimentation in sensitive areas, such as wetlands, riparian areas and channels. - Smothering of cobble, boulder and bedrock habitat in rivers. - Smothering of wetland substrates. - Discharge of construction-related pollutants, such as cement, leading to deterioration in water quality in rivers and wetlands.	ongoing or extensive erosion.	rehabilitation contractor who must remove all alien vegetation within the vicinity of the work areas and control the re-emergence thereof, for the duration of the rehabilitation activities. The removed alien vegetation must be taken off-site and disposed of at licenced WDF, with proof thereof retained. A 30m should be applied around the working area. - Wherever possible, manual methods of alien vegetation removal shall be selected instead of using machinery, as this will have far less impact on the environment. Herbicide use may be considered (e.g. for stump treatments where alien trees are cut down by chainsaw), but may only be used if approved in writing, by BMB. - Should the use of registered herbicides be the most effective option for control of alien invasive vegetation, and agreed to in terms of an approved Method Statement, then this shall be undertaken in compliance with the terms and conditions of the SANS for handling, storage and disposal of pesticides (SANS 10206:2010, Edition 2.2): - The use of diesel-based herbicides near watercourses shall not be permitted. - Only herbicides registered for the particular plant species requiring control shall be used. Where no herbicide has been registered, the least hazardous herbicide registered for a similar plant species (i.e. another species of tree or shrub or grass) may be used. - Herbicide operators mixing and applying herbicides shall be appropriately trained and supervised and shall be equipped with the requisite personal protective clothing in	

Actions	Potential impacts of these actions	Severity of impacts	Measures to mitigate the severity of these impacts	Corrective/remedial measures if mitigation measures are not properly implemented
			accordance with the SANS requirements and the herbicide labels. - Supervisors shall be literate, shall understand the instructions on the herbicide labels, and shall ensure that the necessary safety protocols are implemented. - The requisite washing facilities and herbicide mixing area shall comply with the SANS requirements, as shall the transport, handling and storage of herbicides. - There is a very high risk of off-target damage from herbicides within riparian areas as many herbicides are toxic to aquatic systems, and only herbicides that are approved for use near a watercourse shall be used. - Herbicides shall not be used in windy or rainy conditions, and care shall be taken to avoid drift onto indigenous plants. - The disposal of alien invasive vegetation by burying or burning is prohibited in terms of national legislation, and shall not occur: - Alien vegetation shall be disposed of at licenced WDF, with proof thereof retained. - Follow up clearing should take place at least annually.	
Generic Mitigation Measures				
1.10 General				
1.10.1 Site Access	<u>Freshwater</u> Destruction of or damage to vegetation and soils as a	<u>Freshwater</u> Medium	Access to the wellfield is via a gravel road off the N2 highway, beyond Sir Lowry's Pass and on the way to Grabouw. Existing internal gravel roads, located in areas of natural vegetation, will be	

Actions	Potential impacts of these actions	Severity of impacts	Measures to mitigate the severity of these impacts	Corrective/remedial measures if mitigation measures are not properly implemented
	result of vehicles driving through sensitive areas. Erosion and sedimentation through creation of preferential flow pathways and concentration of surface flows along tracks		used to access the working areas. Access control to the Steenbras Dams is managed by the CMB, as well as the Biodiversity Management Branch (BMB) Access to site is restricted by the CMB and onsite security, however, it must be considered whether overnight security would be required.	
1.10.2 Site Camp	<u>Freshwater</u> - Trampling of vegetation and soil as a result of movement of workers through sensitive areas. - Disturbance of flora and fauna through noise and light pollution during working hours. - Destruction of or damage to vegetation through fire. - Erosion and sedimentation through creation of preferential flow pathways and concentration of surface flows along pedestrian pathways.	<u>Freshwater</u> Low to medium	- The location of the Contractor's main site camp must be approved by the CMB or Wellfield Management Branches (WMB), the ECO and BMB and will form part of the method statement. - All emergency numbers and the site safety officer's name and telephone numbers will be prominently displayed within the camp site. In addition, posters with environmental "do's and don'ts" will also be displayed. - There will be adequate fire extinguishers within the site to deal with fires. Litter bins will be provided and placed at the site office. These bins will be lockable to prevent baboons from accessing the bins. - All tools and equipment will be stored in the storage container at the site camp. The site camp will be fenced off with fencing panels and all relevant signage displayed.	
1.10.3 Site Demarcation and Access Road	<u>Freshwater</u> Destruction of or damage to vegetation and soils as a	<u>Freshwater</u> Medium	All working areas shall be clearly demarcated with no traffic, access, walking and trampling outside these areas. No walking or driving through the natural veld, rivers or wetlands is	

Actions	Potential impacts of these actions	Severity of impacts	Measures to mitigate the severity of these impacts	Corrective/remedial measures if mitigation measures are not properly implemented
	result of vehicles driving through sensitive areas. Erosion and sedimentation through creation of preferential flow pathways and concentration of surface flows along tracks		allowed. Access roads must be kept in good condition using local coarse sandstone fill where necessary (No other road material such as laterite may be used unless approved by BMB). Access routes off primary roads must be fenced (but allow access by CMB and BMB) and passing bays demarcated before construction activities begin. - No construction/rehabilitation materials are to be stockpiled outside of the demarcated working areas. The no-go areas need to be fenced off with wire to prevent movement into these areas. A 2-strand method is to be used to prevent injury to or capture of animals. Strands are to be placed 300mm above ground and 750mm above ground respectively. - The ECO and Contractor will be present when the demarcation of the site is completed to confirm that the demarcation has been completed. Should an additional working area be required, an approval process must be followed in conjunction with the ecological specialist/s and/or BMB. - The Contractor may be penalised if they encroach outside of the working area.	
1.10.4 Protection of Fauna and Flora	<u>Freshwater and Terrestrial Ecology</u> Drowning of fauna falling into containers or	<u>Freshwater</u> Low <u>Terrestrial Ecology</u>	Where vegetation clearance is required, such will be undertaken by the rehabilitation contractor, appointed to handle Search & Rescue ahead of the rehabilitation schedule. Alternatively, such may be overseen or undertaken by BMB.	

Actions	Potential impacts of these actions	Severity of impacts	Measures to mitigate the severity of these impacts	Corrective/remedial measures if mitigation measures are not properly implemented
	accumulations of surface water. - Poor recovery - Changes to plant community structure - Loss of biodiversity - Undesirable weeds	Medium to High impact.	- In the event of any plants needing removal, care must be taken to remove them without harm, to be transplanted to a suitable facility on-site and returned to the area after rehabilitation has finished. In all cases, no clearance of vegetation may take place in no-go areas without prior approval by BMB and ECO, and amendment to this EMS, where required. - A visual inspection will be done prior to machinery working in the area. It is anticipated that all animals will move away due to the noise and disturbance caused by the rehabilitation activities. However, should any fauna be present within close proximity to the working area, these should be encouraged to move away from the area (by means of noisy gestures) and no fauna should be harmed in the process. - Should any snakes or venomous / dangerous animals be found inside the working areas, the ECO, and if necessary, BMB, should be contacted to advise on correct removal procedures. - Open containers of water must be secured with lids in order to prevent fauna falling into them. - Accumulations of water in pools and in excavated areas must be regularly inspected for fauna that have fallen in.	
1.10.5 Plant Rescue and Revegetation	<u>Terrestrial Ecology</u> - Poor recovery - Changes to plant community structure - Loss of biodiversity	<u>Terrestrial Ecology</u> If implemented properly success is generally good and thus impacts Medium or even Low	- A Search & Rescue contractor will be appointed to undertake Search & Rescue for all areas where the clearance of indigenous vegetation is required. Alternatively, such may be undertaken or overseen by BMB. - The involvement of the S&R contractor or BMB includes the collection of seeds, sods and cuttings	

Actions	Potential impacts of these actions	Severity of impacts	Measures to mitigate the severity of these impacts	Corrective/remedial measures if mitigation measures are not properly implemented
	Undesirable weeds		and storing these until such time as rehabilitation is required. - The civil contractor will be responsible for topsoil clearing (under guidance from the ECO or ecologist) and for returning the topsoil to the construction areas as soon as possible after construction in order for the search & rescue contractor to initiate seeding / revegetation of these areas. - Once rehabilitation is done, no contractors are allowed to disturb the areas again.	
1.10.6 Eating Areas	<u>Freshwater</u> Litter entering sensitive areas.	<u>Freshwater</u> Low	- Provision must be made for employee facilities including for shelter and eating areas. Eating areas shall be provided and kept clean and hygienic. Drinking water facilities will be provided. - No fires will be allowed on site. - Animal-proof bins with lockable lids must be provided in demarcated eating areas. - The bins shall be emptied on a regular basis to avoid attracting baboons, small mammals and rodents. Please note that baboons are present in the area and will be attracted to any open food or bags left lying around. - All bags and food to be secured and locked away at all times, other than lunch/tea times to prevent human-animal conflict	
1.10.7 Topsoil Management	<u>Freshwater and Terrestrial Ecology</u> - Runoff laden with fine sediments from stockpile areas entering surrounding sensitive habitats. - Loss of seed viability.	<u>Freshwater</u> Medium <u>Terrestrial Ecology</u> Impacts likely to be either Low, seldom	- Where topsoil is excavated, such must be stored directly adjacent to the trench or excavated area (as advised by ecologist or BMB) in designated stockpiles adjacent to the works identified and supervised by the botanical ecologist/BMB inside the demarcated route footprint. - Stockpiled topsoil material must be protected from wasting (e.g. UV resistant shade cloth (at least	

Actions	Potential impacts of these actions	Severity of impacts	Measures to mitigate the severity of these impacts	Corrective/remedial measures if mitigation measures are not properly implemented
	- Erosion of topsoil. - Weed contamination	Medium, and in rare cases High.	60%) or hessian netting) through erosion or contamination by other excavated materials. The topsoil must be demarcated from the working area and no persons or machinery should be allowed on the topsoil. - No external soils are to be imported from any other sites (unless authorised by the botanical ecologist, BMB or ECO) in order to prevent alien seed contamination. The stockpiled topsoil is to be left undisturbed until backfilling is finished. Stockpiles of topsoil must not be higher than 2m and may not be removed from the site or used for any purpose other than in the final rehabilitation of the site. - The stockpiles shall not be compacted or disturbed and shall be domed at the top to promote runoff. The period between the stockpiling of topsoil and its utilisation shall be as short as possible, and ideally, the topsoil should be transferred to reinstatement area following the installation of the pipes and cables, or other infrastructure. This would also avoid double handling. Any rocks removed during site establishment should also be stored as advised by the ecologist and returned, facing the same way as when it was found. - Topsoil berms must have gaps for drainage and animal movement, if necessary, and must not block access roads or tracks.	
1.10.8 Dewatering of Trenches and Excavations	<u>Freshwater and Terrestrial Ecology</u> - Pollution or sedimentation of adjacent and/or downstream habitats - Long-term, potentially irreversible changes to soil	<u>Freshwater</u> Low to medium <u>Terrestrial Ecology</u> Impacts on terrestrial vegetation likely to be either Low, seldom Medium, and in rare	No water from any maintenance activities (e.g., dewatering excavations) may be discharged/wasted into the natural environment, or any areas around such activities, or any watercourses (even if deemed to be clean), without approval by BMB. If excess water is entering the activity areas, such must either be pumped into a water truck or discharged directly	

Actions	Potential impacts of these actions	Severity of impacts	Measures to mitigate the severity of these impacts	Corrective/remedial measures if mitigation measures are not properly implemented
	structure and soil chemistry leading to vegetation die-off, changes to plant community structure, favouring weedy species, and possible erosion	case High. Dependent on extent and severity of spill event.	into the Steenbras Dams via a temporary above-ground pipeline (following approval by the CMB). • If an above-ground pipeline is required, then the pipeline must be checked on foot for integrity (i.e., no leaks or damage) and sections needing to be replaced must be manually carried into site. • The ECO must be present on site for any work in natural vegetation. When in use, the above-ground pipeline must be checked on foot, on a regular basis (e.g. daily), to ensure that it is not leaking, with the regularity of the checks to be determined by the ECO. • If a temporary above-ground welded HDPE pipeline is to be used, relevant hot work permissions and waste removal (for removal of HDPE shavings) etc, must be in place, together with approval from BMB, prior to undertaking such. • If the above dewatering methods are not feasible, alternative methods may only be undertaken after written approval by BMB. • Trenches and excavations should remain open for as short a period as possible.	
1.10.9 Hydrostatic Pressure Testing	<u>Freshwater</u> • Pollution or sedimentation of adjacent and/or downstream habitats	<u>Freshwater</u> Low to medium	• Prepacked plastic lined sandbags to be on standby. • Containment “sausages” to be on standby. • The dewatering mitigations must remain in place until the pressure testing is complete.	
1.10.10 Temporary Stockpile Location	<u>Freshwater and Terrestrial Ecology</u> • Runoff of silt-laden water into sensitive areas. • Destruction of vegetation in stockpile areas, which then	<u>Freshwater</u> Medium <u>Terrestrial Ecology</u> If implemented properly success is generally	• Temporary stockpile areas must be identified by the ECO, and approved by BMB, prior to use. These areas would be for bedding materials, pipes, cables, and spoil materials (e.g., rock and soil). The stockpiles areas must be clearly demarcated.	

Actions	Potential impacts of these actions	Severity of impacts	Measures to mitigate the severity of these impacts	Corrective/remedial measures if mitigation measures are not properly implemented
	leads to local erosion and downstream or downslope sedimentation. • Establishment and encroachment of invasive alien plants into the surrounding landscape. • Creation of concentrated surface flowpaths and subsequent erosion. • Poor recovery • Changes to plant community structure • Loss of biodiversity • Undesirable weeds	good and thus impacts Medium or even Low	• Sufficient space must always be designated to allow for truck turning, loading and off-loading, so that vehicles will not drive into the natural areas. • All the sites require pre-utilization control of the alien species present on them and in a 25m wide buffer around the sites. Regrowth of alien seedlings must be controlled throughout site use and rehabilitation. • All the sites that are used will need the top materials present on them stored for rehabilitation purposes. These materials will need to be covered using at least 60% shade cloth. Note that hessian cover, if used, needs to be strong and dense and able to function through environmental rigours for extended periods, as the stockpile areas will be utilized for the duration of the construction activities. • The bermed top materials can form a boundary to the sites. A subsoil berm must be placed along the inner boundary of the topsoil berm, to protect the topsoil. • Natural wash or flow of surface water leading onto the stockpile site must be diverted away from the stockpile site, with input from a freshwater ecologist and / or botanical ecologist. Wash or flow from the stockpile sites will need to be contained. Sandbags, eco-logs and/or sediment fences should be used to prevent erosion of stockpiled materials into the surrounding environment. • The perimeters of the construction stockpile and storage areas will need to be delimited using a fence to avoid ingress into the surrounding veld. • Stockpile locations are to be fully rehabilitated after completion.	

Actions	Potential impacts of these actions	Severity of impacts	Measures to mitigate the severity of these impacts	Corrective/remedial measures if mitigation measures are not properly implemented
1.10.11 Traffic Management	<u>Freshwater</u> • Destruction of vegetation and compaction of soils in sensitive areas where vehicles drive off the roads or create wide turning circles.	<u>Freshwater</u> Low	• All traffic accommodation will be in accordance with the South African Roads and Traffic Signs Manual. Care and planning will be taken to ensure minimum traffic. Appropriate traffic warning signs and flagmen will be placed when required. Proper signage, such as "Truck Crossing" shall be erected where needed. All construction vehicles shall be in a road-worthy condition and shall always maintain traffic safety. • Within the wellfield development area there is a network of existing gravel roads which will be used for all construction and operational vehicle movement. Care must be taken when driving on these roads as pedestrians and fauna may be present. Signs will be placed on the access road after the gate and speed limits will be reduced to 40 km/h. • If an access track is going to be blocked because of rehabilitation activities (e.g., use of cranes), all contractors and any local road using organisations (e.g., CMB and BMB) will be notified and the blocking of roads will only be done once approved by the ECO. Flag persons will be used where possible to indicate access control areas and alternative routes. • Appropriately secure transported materials, to ensure safe passage between destinations. This includes cleaning off loose debris and mud from vehicles prior to leaving the Steenbras Wellfield. If necessary, the ECO may request the Contractor to post an employee at the entrance to the Steenbras Wellfield, to inspect any vehicle before it exits the site onto the N2 highway. The employee will be responsible to ensure that all vehicles exiting the site, are free from any loose material	

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			that may contaminate the road surface of the N2 highway.	
1.10.12 Passing Areas and Turning Areas	<u>Freshwater</u> Destruction of vegetation and compaction of soils in sensitive areas where vehicles drive off the roads or create wide turning circles.	<u>Freshwater</u> Low	Passing areas and turning areas should be located within working areas and the presence of adjoining roads should also be utilised. Where passing areas and turning areas are required outside of the planned working areas then these areas must be assessed in consultation with the ecological specialist/s or rehabilitation contractor or BMB and ECO.	
1.10.13 Heritage Resources	<u>Heritage</u> Should any heritage resources, including evidence of graves and human burials, archaeological material be discovered during the execution of the maintenance activities, a;; works must be stopped immediately and Heritage Western Cape must be notified without delay.	<u>Heritage</u> Very low	If an object of heritage, archaeological or paleontological origin is discovered, the activity in the area must be stopped. The site personnel will then be informed that the area is a no-go area, and the ECO, BMB and Heritage Western Cape (HWC) must be informed, to advise on the way forward.	
1.10.14 Noise and Light Control	<u>Freshwater</u> Disturbance of flora and fauna through noise and light pollution during working hours	<u>Freshwater</u> Negligible	All construction related works shall endeavour be undertaken during normal daylight hours. All reasonable steps must be taken to minimise noise and mechanical vibrations and noise levels must be below 35 dB from 18:00 – 06:00 daily. Prior approval for afterhours work is required from the ECO and BMB, with lighting being directed towards the site footprint (i.e., away from all sensitive areas).	

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1.10.15 Dust Management	<u>Freshwater</u> Discharge of dust suppression water into wetlands and rivers, causing deterioration in water quality, such as through increased turbidity, nutrient loading, introduction of high levels of iron and magnesium in groundwater, etc	<u>Freshwater</u> Low	Mitigations for dust suppression (e.g., using a water truck on access roads) must be used on site to reduce dust generation when required during hot and/or windy conditions. Water for dust suppression must be sourced from boreholes within the Steenbras Wellfield, unless approved otherwise by the ECO. Care must be taken not to wet roads over bridges/watercourse (e.g., not watering for 10 m on either side of such) to limit the volume of groundwater entering terrestrial watercourses.	
1.10.16 Waste Management	<u>Freshwater</u> Litter spreading into sensitive areas, such as riparian areas, wetlands and channels.	<u>Freshwater</u> Low to negligible	- Solid waste shall be stored in animal-proof bins and regularly disposed of and cleaned offsite as necessary. Waste management on site will include regular clean-ups (at least twice daily) around the construction and camp sites, and a record of all waste removal and disposal slips will be maintained. On completion of the construction works, a search for any litter on site and in the immediate surrounds will be conducted. - Colour coded bins (red, yellow, and green), clearly labelled, shall be used for hazardous waste, general waste and recyclable waste respectively. - These bins will be lockable to prevent the Baboons/animals from opening them. No open bins will be allowed in the natural areas. Eating areas will be provided for employees with signs indicating general waste bins. - Rubble will be removed by means of truck from site camp to a licenced WDF before the site waste area reaches ~80% full. Fuel contaminated soil will be stored in clearly marked waterproof containers with lids or in spill bags. If cement is used, cement bags will be kept separately in a designated	

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			enclosed area to prevent contamination of storm water and runoff. - The waste must be disposed of at a licenced WDF (e.g., hazardous waste must be disposed of at a suitable hazardous WDF). No burying/burning of waste will occur on site. Certificates of disposal must be kept on file on site. - Waste recycling must be explained in a toolbox talks to encourage recycling on site, and at home. - The safe disposal slips of all waste disposed must be retained on site for inspection.	
1.10.17 Ablutions	<u>Freshwater</u> - Pollution of wetlands and rivers through leaks or spills from installed toilets. - Pollution of wetlands and rivers as the result of deposition of human waste.	<u>Freshwater</u> Low to negligible	- Chemical toilets shall be available at the site camp and close to the construction sites. The ablutions shall be located outside of wetlands and away from rivers. These facilities will be secured to prevent toppling and spillages into the environment. - Regular removal of chemical toilet content will be done by a registered contractor and disposal slips must be available on site for inspection. - Wild animals must not have access into these facilities.	
1.10.18 Fire Prevention and Management	<u>Freshwater</u> - Destruction of vegetation through accidental fires. - Removal of vegetation cover, leading to erosion and sedimentation.	<u>Freshwater</u> Medium to high	- All employees and site personnel must be informed and made aware of the dangers associated with smoke/fire. No cooking or open fires will be permitted on site. Smoking will only be permitted in designated smoking areas, with cigarette butts collected and disposed of with the general waste stream. Smoking is not allowed in the area where fuel/ refuelling occur. - An appropriate number of serviced fire extinguishers and fire beaters shall be provided in all working areas. Personnel on site must be trained in the operation of the fire equipment in	

Actions	Potential impacts of these actions	Severity of impacts	Measures to mitigate the severity of these impacts	Corrective/remedial measures if mitigation measures are not properly implemented
			order to contain a fire as fast as possible. A designated fire marshal will be tasked with reporting and/or liaising with Incident Command and/or CMB/WMB/BMB should a fire be identified in the area or on site. Should evacuation be called, key escape routes have been mapped, and personnel will be evacuated to the contractor's main site camp, if safe to do so, and roll call will be taken to ensure that all are accounted for and safe. The contractor shall abide by the instructions given by the Incident Command and/or CMB/WMB/BMB and shall only return to site once given permission to do so. No emergency brush cutting for the purposes of fire management are permitted without prior approval of the Incident Command or CMB/WMB/BMB.	
1.10.19 Hazardous Chemical Management	<u>Freshwater and Terrestrial Ecology</u> - Pollution of wetlands and rivers through accidental spills. - Long-term, potentially irreversible changes to soil structure and soil chemistry leading to vegetation die-off, changes to plant community structure, favouring weedy species, and possible erosion.	<u>Freshwater</u> Medium to high <u>Terrestrial Ecology</u> Impacts on terrestrial vegetation likely to be either Low, seldom Medium, and in rare case High. Dependent on extent and severity of spill event.	- The only hazardous materials on site are anticipated to be fuels, oils, paint and cement. All hazardous building materials shall be dealt with in accordance with the relevant Safety and Environmental Legislation. All hazardous chemicals will be stored in contained areas to prevent spills, and spill kits and fire extinguishers will be available wherever hazardous chemicals or fuel are stored or used. All hazardous substances shall be stored in the store container with properly displayed and visible warning signs. - The Material Safety Data Sheets (MSDS) for all hazardous chemicals must be kept on file onsite. Hazardous materials shall be handled as per each product's MSDS. All staff required to handle and use such hazardous substances shall receive adequate training. - Hazardous waste and waste fuels and oils shall be stored in appropriate containers that will not corrode or leak. These containers shall be properly	

Actions	Potential impacts of these actions	Severity of impacts	Measures to mitigate the severity of these impacts	Corrective/remedial measures if mitigation measures are not properly implemented
			marked to indicate contents. Drip trays will be placed under all plants and machinery using hazardous chemicals as well as under containers of hazardous materials being used on site. All hazardous material/waste shall be separated on site and disposed of at a licensed WDF, with proof thereof retained.	
1.10.20 Hydrocarbon Management	<u>Freshwater and Terrestrial Ecology</u> - Pollution of wetlands and rivers through accidental spills. - Long-term, potentially irreversible changes to soil structure and soil chemistry leading to vegetation die-off, changes to plant community structure, favouring weedy species, and possible erosion	<u>Freshwater</u> Medium to high <u>Terrestrial Ecology</u> Impacts on terrestrial vegetation likely to be either Low, seldom Medium, and in rare case High. Dependent on extent and severity of spill event.	- Surfaces, where the possibility of oil spillage exists, shall be prepared in such a way as to mitigate these risks. Drip trays will be placed under all parked or stationary plant. Drip trays to be cleaned out if there is any spill with spill kits, and hazardous waste disposed of licenced WDF, with proof thereof retained. Small quantities of fuel to be stored in the store container at the end of every shift and site securities will be equipped with fire extinguishers. Machinery prone to oil or fuel leakage must be located at least 50 m away from the edge of any watercourse or wetland, and the area adequately bunded in order to contain leakages. - Site plant will be refuelled by mobile diesel bowser (1000 l) which will be brought to the construction site and returned to the site offices upon completion. Mitigation in the form of plastic sheeting in conjunction with large high walled drip trays will be used during refuelling activities. Each refuelling, or storage site shall be in possession of a chemical/hydrocarbon spill kit and fire extinguisher. Signs showing 'NO SMOKING' will be placed where refuelling is taking place. The machine/plant will be parked and switched off when filled from the diesel bowser. The mobile diesel bowser will be parked at the site camp when not in use. The diesel bowser will visit the borehole sites only to fill the machines/plant. Once	

Actions	Potential impacts of these actions	Severity of impacts	Measures to mitigate the severity of these impacts	Corrective/remedial measures if mitigation measures are not properly implemented
			machines are filled, it will return to the site camp where it parks. Small plant to be refuelled using a petrol jerry can. Drip trays, spill kits and fire extinguishers to be in place for small plant re-fuelling. Inspections and check lists will be done on machines and leaks will be reported to the Site Manager/ Site Supervisor.	
1.10.21 Emergency Spill Procedures	<u>Freshwater and Terrestrial Ecology</u> - Pollution of wetlands and rivers through accidental spills. - Long-term, potentially irreversible changes to soil structure and soil chemistry leading to vegetation die-off, changes to plant community structure, favouring weedy species, and possible erosion.	<u>Freshwater</u> Medium to high <u>Terrestrial Ecology</u> Impacts on terrestrial vegetation likely to be either Low, seldom Medium, and in rare case High. Dependent on extent and severity of spill event.	- All employees and site personnel will be informed and made aware of the emergency procedures in the form of a toolbox talk, for handling spills of hydrocarbons, chemicals or contaminated water (including water containing sediment/fines). Telephone numbers of emergency services will be posted at the site office and in all site vehicles. Team leaders will have the emergency services' telephone numbers stored in their cell phones. Materials and equipment necessary for dealing with spills and leaks (such as spill kits and stockpiled sand bags) will be obtained for the site as required. A 200 l spill kit will be kept on site for dealing with a spill of that size. If any spill larger than 200 l occurs, then a specialist contractor (e.g., Spill Tech or EnviroServ) will be contacted to handle the larger spill. The relevant MSDS will be available on site. A drip tray will be placed under the mobile fuel bowser when on site. If a spill should occur, the following will be actioned: - The ECO and BMB must be notified of the incident. - All machinery will be removed immediately from the area, and area will be cleared using absorbent materials. - The contaminated area will be demarcated and kept clear of any traffic.	

Actions	Potential impacts of these actions	Severity of impacts	Measures to mitigate the severity of these impacts	Corrective/remedial measures if mitigation measures are not properly implemented
			- Spillages will be cleaned with a spill kit and the contaminated material will be removed from site and disposed of at licenced WDF, with proof thereof retained. - Proof of legal disposal will be kept on site for inspection. - The contaminated material will be stored on site in the site camp in a clearly demarcated area for contaminated material, until it will be disposed off-site. A record will be kept of all spillages.	
1.10.22 Erosion and Sedimentation Control	<u>Freshwater</u> - Disturbance of river or wetland habitat during removal of sediment. - Destabilisation of slopes, banks and beds of wetlands and rivers, leading to increased mobility of sediments into sensitive areas. - Increased sedimentation in sensitive areas, such as wetlands, riparian areas and channels. - Smothering of cobble, boulder and bedrock habitat in rivers. - Smothering of wetland substrates.	<u>Freshwater</u> Medium	- Access roads used by the Contractor should be inspected daily to identify any risk of erosion concern along the tracks. The access roads will sustain heavy traffic during construction and can be prone to erosion, especially at stream crossings. Should any erosion risk occur, the ECO should be notified, and corrective action approved by the ECO, and if necessary, the Steenbras Catchment and/or BMB as well. Only local sandstone material (e.g., Sandstone G5) may be used for road repairs. - Grading of the roads should be done to prevent erosion gullies and should promote intermittent run-off by means of berms created with graded road material. - Exposed areas will be demarcated with barricading and shade cloth to prevent any sediment from flushing into the surrounding environment during rain events. Sandbags and geotextiles will also be used where appropriate to slow the flow of water along steep access tracks and to encourage the settling of sediment along a steep section to prevent the sedimentation of downstream watercourses.	

Actions	Potential impacts of these actions	Severity of impacts	Measures to mitigate the severity of these impacts	Corrective/remedial measures if mitigation measures are not properly implemented
1.10.23 Concrete Building and Cement Handling	<u>Freshwater</u> Pollution of rivers and wetlands as the result of discharge of construction-related pollutants, such as cement, into these sensitive ecosystems.	<u>Freshwater</u> Medium	- The use of ready-mix concrete instead of batching onsite should be implemented. Trucks delivering concrete will park outside and adjacent to the work areas and deliver concrete by the use of chutes (enough chutes must be brought to site to ensure that there is no spillage). During the construction process, no plant or equipment will be allowed to be washed in, or near, any watercourse or wetland or near any surface water. Trucks are to be cleaned at the supplier's yard. - If small batching is required, this will be done next to the relevant structure after approval from the ECO. If on-site concrete mixing is necessary, plastic must be laid on the ground and a wooden board must be used on which mixing will occur. A berm will be created around the plastic to contain any run-off material. All contained runoff will be controlled and disposed of as builder's rubble once dried. Cement bags will be stored in the site main camp in containers. - The batching of concrete or mortar should not be done on windy days to reduce windblown cement entering the natural environment. Should the batching of concrete or mortar need to be conducted on a windy day then the batching area must be equipped (e.g., fabric shield walls) to prevent any cement dust from blowing away. - Any tools or equipment that requires cleaning will be cleaned at one fixed location at the site camp. This will be agreed with and approved by the ECO. A bunded area that is sloped, lined with 250 micron DPC plastic covered with sand, will be constructed. Any wastage and water runoff that will be a result of this cleaning process must be contained in this wash area. This wash area	

Actions	Potential impacts of these actions	Severity of impacts	Measures to mitigate the severity of these impacts	Corrective/remedial measures if mitigation measures are not properly implemented
			must be cleaned regularly or as required and the waste will be disposed of off-site. - Any visible spillages will be removed immediately from site area. Excess concrete will be stored in a skip provided and disposed of as building rubble. - During temporary closures, the site and all equipment shall be secured with drip trays placed underneath all machinery/vehicles. There should be no excavations or boreholes left open during temporary closures. If an excavation must remain open during temporary closure, then someone must check the open excavation on a regular basis for the presence of animals and for the need to de-water (especially after rainfall). Boreholes may not be left open. The ECO must check the site prior to the sites temporary closure.	
1.10.24 Working Hours and Accommodation	<u>Freshwater and Terrestrial Ecology</u> Disturbance of flora and fauna through noise and light pollution during working hours	<u>Freshwater</u> Low <u>Terrestrial Ecology</u> Low	- Work must take place during daylight hours, unless approved in writing by the ECO and BMB. Site employees must be accommodated off-site and transported by a suitable vehicle every day, with food provided during the day which has been prepared at the staff camp and heated prior to it being taken to site from the site offices at lunchtime. - If lights must be used at night, these must be directed away from wetlands and rivers.	
1.10.25 Site Remediation and Rehabilitation	<u>Freshwater and Terrestrial Ecology</u> Persistence of unvegetated or unstable areas if rehabilitation not done to plan.	<u>Freshwater</u> Low <u>Terrestrial Ecology</u> If implemented properly with reinstatement of topsoil recovery is	If topsoil removal was required during the rehabilitation, then such must be returned under supervision of the rehabilitation contractor and/or BMB. The rehabilitation must be monitored by the ECO and overseen by BMB, as required. The end-product of the construction areas must blend into the adjacent terrain and topography as directed by the rehabilitation contractor.	

Actions	Potential impacts of these actions	Severity of impacts	Measures to mitigate the severity of these impacts	Corrective/remedial measures if mitigation measures are not properly implemented
	- Poor recovery - Undesirable weeds	generally good and thus impacts Medium or even Low	Should the rehabilitation of any areas beyond the demarcated site be necessary because of contractual non-compliances by the contractor (e.g., spill of water/acid from the borehole sites or pipeline etc), these shall be dealt with in terms of the rectification measures deemed necessary by the ecological specialist/s or rehabilitation contractor or BMB and ECO.	

6 ENVIRONMENTAL MONITORING AND REPORTING / AUDITING

The development of an EMMP for a project is an important task that is aimed at assigning responsibilities and mitigation options to a variety of activities. However, it can be an ineffective tool in the absence of auditing or monitoring activities. Auditing or monitoring activities involve the structured observation, measurement, and evaluation of environmental data over a period of time.

- The overall responsibility to ensure that the EMMP is implemented rests with the Proponent, who shall appoint appropriate engineering, environmental and contracting teams to undertake the work.
- The ECO shall inspect the site prior to any site clearing activities commencing in preparation of reconstruction activities; at least once (1) a week during the reconstruction phase; and on completion of the reconstruction work.
- The ECO shall report on the level of compliance with this EMMP to the Proponent and to the relevant authorities.
- Relevant specialists shall be commissioned to undertake a site visit to the Wellfield annually after the winter rains, in order to monitor key areas of concern. A short monitoring report will be prepared for the Table Mountain Group Aquifer Monitoring Committee on an annual basis.

6.1 Disciplinary action

The EMMP is a legally binding document. Non-compliance with the EMMP shall result in disciplinary action being taken against the perpetrator/s. Such action may take the form of (but is not limited to) financial penalties, legal action, fines, stop work and rehabilitate at own cost, and/or dismissal.

A variety of legislation dictates behaviour/action associated with environmental management and identifies suitable action in the event of non-compliance. That which is to be considered in the event of non-compliance or contravention of the EMMP, includes:

- The National Environmental Management Act (No.107 of 1998)
- The National Water Act (No. 36 of 1998)
- The Occupational Health and Safety Act (No. 85 of 1993)

The Contractor shall be deemed to have not complied with the EMMP if:

- Within the boundaries of the site there is evidence of contravention of the EMMP and its associated reports.
- Environmental damage ensues due to negligence.
- The Contractor fails to comply with corrective or other instructions issued by the ECO or DEA&DP within a specified time (maximum two weeks).
- The Contractor fails to respond adequately to complaints from the public.

The disciplinary action shall be determined according to the nature of the non-compliance or crime, and exact penalties determined by the Proponent (on advice by the ECO and/or CCT BMB, CMB and WMB) where penalties are being applied in terms of the Environmental Specification of a contract. If the Contractor is being prosecuted by the DEA&DP or DWS in terms of the NEMA or NWA, then the courts will apply penalties in terms of such legislation, taking into account the severity of the incident.

In diversity there is beauty and there is strength.

MAYA ANGELOU

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