1st DRAFT ENVIRONMENTAL MANAGEMENT PROGRAMME

PROPOSED AMANDEL ROAD BRDIGE EXPANSION ACROSS THE BOTTELARY RIVER, KUILSRIVER

DEA&DP REFERENCE NUMBER: 16/3/3/6/7/1/A8/13/3301/17

19 March 2018

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eco impact Environmental Health & Safety Legal Consulting	**Title:** **1st Draft Environmental Management Programme** **Proposed Amandel Roar Bridge Expansion across the Bottelary River, Kuilsriver**	
Eco Impact No: 2-03/2018	**Date:** 19 March 2018	**Report Status:** 1st Draft
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Verification	Capacity	Name	Signature	Date
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COMMITMENT AND DECLARATION OF UNDERSTANDING BY CONTRACTOR AND DEVELOPER FOR THE PROPOSED AMANDEL ROAD BRIDGE EXPANSION OVER THE BOTTELARY RIVER, KUILSRIVER

I, the undersigned ……., as duly authorized by the Contractor, have studied and understand the contents of this document. On behalf of the Contractor, I confirm that the Contractor undertakes to adhere to the conditions as set out herein, unless specifically otherwise agreed to in writing.

Signed at ……. on this …….. Day of ……20……

…….
For Contractor

I, the undersigned ……., as duly authorized by the Developer have studied and approve the contents of this document on behalf of the Developer, for implementation by all Contractors involved at the site.

Signed at ……. on this …….. day of ……20…….

…….
Developer's Representative

DEFINITIONS

Auditing:	A systematic and objective assessment of an organization's activities and services conducted and documented on a periodic basis based to a (e.g. ISO 19011:2003) standard.
Biodiversity:	The variety of life in an area, including the number of different species, the genetic wealth within each species, and the natural areas where they are found.
Contractor:	An employer, as defined in section 1 of the Occupational Health and Safety Act 85 of 1993, who performs construction work and includes principal contractors
Environment:	A place where living, non-living and man-made features interact, and where life and diversity is sustained over time.
Evaporation:	The change by which any substance (e.g. water) is converted from a liquid state into and carried off as vapour.
Developer:	One who builds on land or alters the use of an existing building for some new purpose
Independent:	Is independent and has no interest in any business related to the development site, nor will receive any payment or benefit other than fair remuneration for the task undertaken
Groundwater:	Subsurface water in the zone in which permeable rocks, and often the overlaying soil, are saturated under pressure equal to or greater than atmospheric.
Landowner:	Holder of the estate in land with considerable rights of ownership or, simply put, an owner of land
Monitoring:	A systematic and objective observation of an organisation's activities and services conducted and reported on regularly.
Natural vegetation:	All existing vegetation species, indigenous or otherwise, of trees, shrubs, groundcover, grasses and all other plants found growing on a site.
Pollution:	The result of the release into air, water or soil from any process or of any substance, which is capable of causing harm to man or other living organisms supported by the environment.
Protected Plants:	Plant species officially listed under the Threatened or Protected Species regulations as well as on the Protected Plants List (each province has such a list), and which may not be removed or transported without a permit to do so from the relevant provincial authority.
Red Data Species:	Plant and animal species officially listed in the Red Data Lists as being rare, endangered or threatened.
Rehabilitation:	Making the land useful again after a disturbance. It involves the recovery of ecosystem functions and processes in a degraded habitat. Rehabilitation does not necessarily re-establish the pre-disturbance condition, but does involve establishing geological and hydro logically stable landscapes that support the natural ecosystem mosaic.
Site:	Property or area where the proposed development will take place

ACRONYMS

DEA&DP:	Department of Environmental Affairs and Development Planning
DWS:	Department of Water and Sanitation
ECO:	Environmental Control Officer
EA:	Environmental Authorisation
EIA:	Environmental Impact Assessment
EM:	Environmental Manager
EMP:	Environmental Management Programme
EO:	Environmental Officer
ER:	Engineer's Representative
AP:	Interested and Affected Party
IEM:	Integrated Environmental Management
MS:	Method Statement
PM:	Project Manager
SANS:	South African National Standards

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COMPLIANCE OF THIS EMPr WITH THE REQUIREMENTS OUTLINED IN SECTION 24N(2) & (3) OF THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998 (ACT NO 107 OF 1998 AS AMENDED):

(2) The environmental management programme must contain-

(a) information on any proposed management, mitigation, protection or remedial measures that will be undertaken to address the environmental impacts that have been identified in a report contemplated in subsection 24(1A), including environmental impacts or objectives in respect of-

(i) planning and design;
(Refer to Chapter 7 of the EMPr)

(ii) pre-construction and construction activities;
(Refer to Chapter 7 of the EMPr)

(iii) the operation or undertaking of the activity in question;
(Refer to Chapter 7 of the EMPr)

(iv) the rehabilitation of the environment; and
(Refer to Chapter 10 of the EMPr)

(v) closure, if applicable;
(Refer to Chapters 9 and 10 of the EMPr)

(b) details of-

(i) the person who prepared the environmental management programme; and
(Refer to Chapter 1 of the EMPr)

(ii) the expertise of that person to prepare an environmental management programme;
(Refer to Chapter 1 of the EMPr)

(c) a detailed description of the aspects of the activity that are covered by the environmental management programme;
(Refer to Chapter 1 of the EMPr)

(d) information identifying the persons who will be responsible for the implementation of the measures contemplated in paragraph (a);
(Refer to Chapters 2 and 4 of the EMPr)

(e) information in respect of the mechanisms proposed for monitoring compliance with the environmental management programme and for reporting on the compliance;
(Refer to Chapters 2, 4, 7 and 8 of the EMPr)

(f) as far as is reasonably practicable, measures to rehabilitate the environment affected by the undertaking of any listed activity or specified activity to its natural or predetermined state or to a land use which conforms to the generally accepted principle of sustainable development; and
(Refer to Chapters 7 and 10 of the EMPr)

(g) a description of the manner in which it intends to-

(i) modify, remedy, control or stop any action, activity or process that causes pollution or environmental degradation;
(Refer to Chapter 7 of the EMPr)

(ii) remedy the cause of pollution or degradation and migration of pollutants; and
(Refer to Chapter 7 of the EMPr)

(iii) comply with any prescribed environmental management standards or practices.
(Refer to Chapter 3 of the EMPr)

(3) The environmental management programme must, where appropriate-

(a) set out time periods within which the measures contemplated in the environmental management programme must be implemented;
(Refer to Chapters 2, 4 and 7 of the EMPr)

(b) contain measures regulating responsibilities for any environmental damage, pollution, pumping and treatment of extraneous water or ecological degradation as a result of prospecting or mining operations or related mining activities which may occur inside and outside the boundaries of the prospecting area or mining area in question; and
(Not applicable in terms of proposed activities)

(c) develop an environmental awareness plan describing the manner in which-

(i) the applicant intends to inform his or her employees of any environmental risk which may result from their work; and
(Refer to Chapters 7 and 11 of the EMPr)

(ii) risks must be dealt with in order to avoid pollution or the degradation of the environment.
(Refer to Chapter 7 and 11 of the EMPr)

DEVELOPER's COMMITMENT

The City of Cape Town ("CoCT") has committed itself to a set of values that include the maintenance of good relations and transparent communications with all stakeholders, and the dynamic engagement of the larger community.

CoCT undertakes to implement suitable management systems for all the areas and aspects of this operation. This will ensure that development itself and management of the project will comply with legal, technical, environmental and transformation policies and standards.

CoCT, in drafting this EMP for implementation, intends to enable continuous improvement in legal compliance and the sustainable operation of the site.

This EMP intends to further guide the achievement of the strategic objectives of the organization at the project site and seeks to ensure that the basic requirements of ISO 14001: 2015 are satisfactorily met.

The EMP intends to change the way in which the owners, the construction process they have commissioned and the contractor plan for and manage resources to achieve sustainability.

The satisfactory implementation of the EMP on site will require both the full support and commitment of all personnel.

CHAPTER 1

1.1. Executive Summary

This EMP has been prepared principally in compliance with the requirements of Section 24N and Section 34 of the National Environmental Management Act 107 of 1998. This document, together with the conditions in the Environmental Authorisation, must be adhered to.

The EMP must be included as part of all contract documentation for all contractors in the construction phase of the development.

The Author and Eco Impact Legal Consulting (Pty) Ltd ("Eco Impact")

Eco Impact is an independent consulting company and has no interest in any business related to the development site, nor will it receive any payment or benefit other than fair remuneration for the task undertaken, as required in terms of the NEMA Regulations.

This report has been prepared by Johmandie Pienaar, of Eco Impact, an environmental consultancy, engaged in providing professional services in the field of environmental planning, -systems, -auditing and -biodiversity assessment and -management.

Johmandie Pienaar holds a Baccalaureus Technologiae Degree (Cum Laude) in Nature Conservation from the Cape Peninsula University of Technology (2008).

She has completed the following short courses at the Centre for Environmental Management;

- Implementing Environmental Management Systems (ISO 14001)(2009);
- Occupational Health and Safety Law for Managers (2010);
- Implementing an OHS Management System based on OHSAS 18001 (2010)
- Occupational Health and Safety Management System OHSAS 18001 Audit: A Lead Auditor Course Based on ISO 19011 and ISO 17021 (2011).

Johmandie has trained as an Environmental Assessment Practitioner since March 2009 and has been involved in the compilation, coordination and management of Basic Assessment Reports, Environmental Impact Assessments, Environmental Management Programmes, Waste Licence Applications, Water Use Licence Applications and Baseline Biodiversity Surveys for numerous clients.

Johmandie has also been involved in conducting environmental and occupational health and safety legal compliance audits for a number of clients.

The client has appointed Eco Impact to prepare an Environmental Management Programme that meets the technical standards as required by DEA&DP.

1.2. Project Description

This section of the report is included in compliance with Section 24N (2) (e) of the National Environmental Management Act 107 of 1998.

Project - The proposed bridge structure will be positioned adjacent (to the west) of the existing

Amandel Road bridge. The intention is to have the new proposed structure separate from the existing bridge and approximately 1.8 m clearance between the proposed and existing structures. The levels of the proposed bridge will match the existing bridge levels very closely as a natural consequence of the road alignment.

The proposed bridge will be a conventionally reinforced concrete structure and will consist of footings, piers and abutments, deck, and parapets and end blocks that will match the existing bridge to maintain a cohesive appearance for the river crossing as a whole.

There will be a need for some minor retaining walls adjacent to the bridge, away from the river embankments but still within the road reserve, to retain the road fill embankment in areas where existing infrastructure needs to be protected.

The proposed bridge deck has overall dimensions of approximately 24.2 m long (measured from behind the abutment walls along the road centreline) by 14.2 m wide (measured transverse to the road centreline), resulting in a deck footprint at road level of approximately 343 m^2. The road (and by extension, the bridge) crosses the river at an approximate angle of 102 degrees (as opposed to 90 degrees for a road crossing transverse to the direction of flow). The deck therefore has a skew angle of 12 degrees.

The parapets and end blocks to the proposed bridge extends approximately 6 m past the back of the abutment walls, secured to wing walls parallel to the road centreline. Additional retaining walls immediately beyond the end blocks and to the downstream side of the proposed bridge will retain portions of the road fill. On the northern side the wall will act as headwall for the extension of an existing storm water pipe that discharges into a channel joining the river. On the southern side the wall will keep fill material clear of an existing sewer manhole cover.

The extent of the foundations is yet to be determined. A geotechnical investigation will be conducted to confirm founding conditions and allowable soil bearing pressures. The site is expected to be underlain by sand, as is typically the case in the area. Should founding conditions prove to be favourable, conventional pad footings will be employed to support the bridge structure. If founding conditions are found to be poor pile foundations may have to be installed down to suitable rock strata below the sand layers.

The foundation types as described above are not expected to result in significantly different working areas within the river and on the embankments. The expected area that will be disturbed by the proposed bridge construction activities will be directly downstream of the existing bridge structure and will measure approximately 19 m (measured transverse to the existing bridge edge, in the direction of the flow of the river) by 42 m (measured along the road centreline), approximately 800 m^2 in total.

Further to the north of this area, the roof slab to an existing valve chamber will need to be revised due to the road embankment fill material.

It is proposed that the area under the proposed new bridge be lined with reno matresses to facilitate the protection of the bridge foundations against scouring as well as to allow silting up and establishment of natural vegetation in this area.

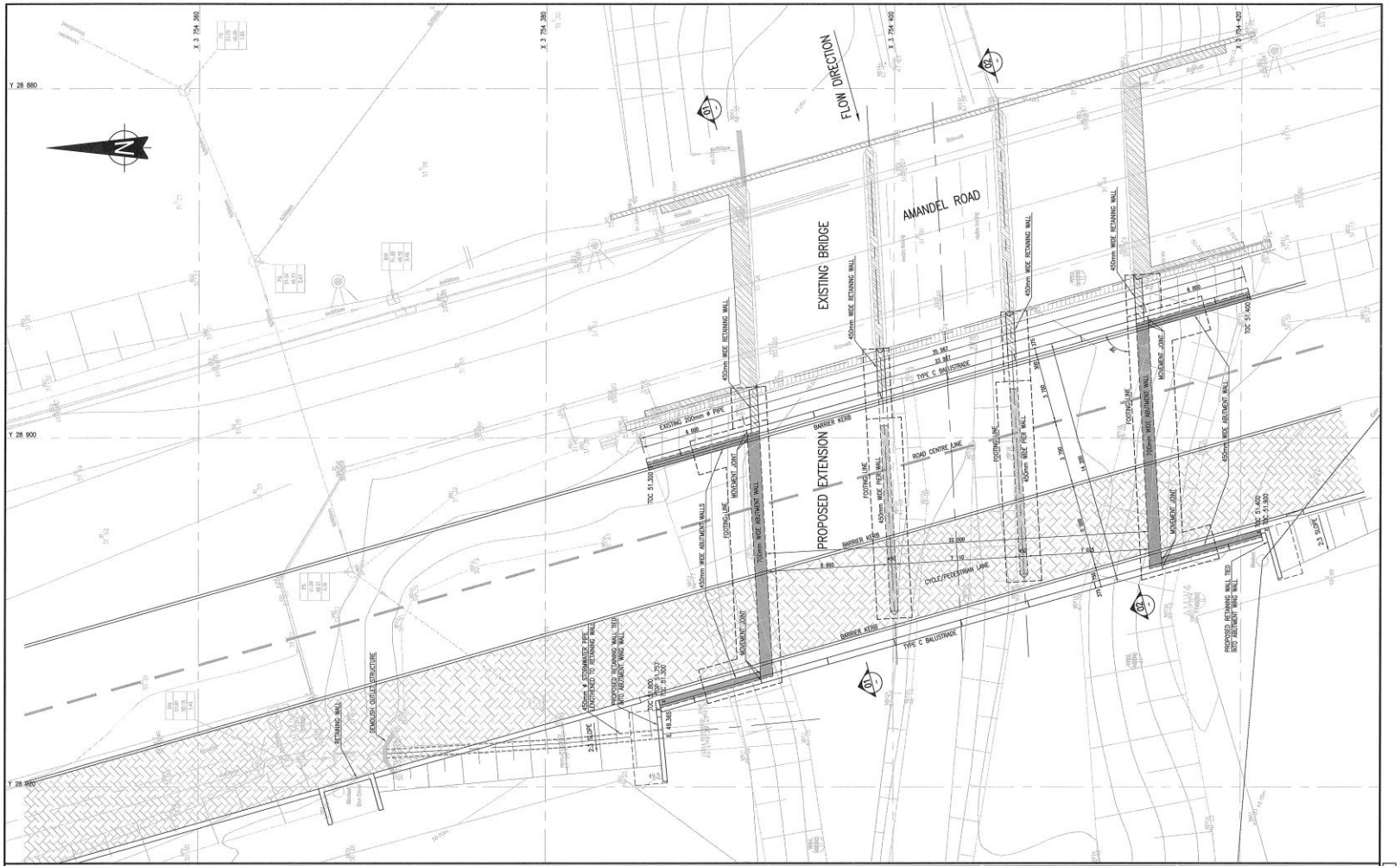
The proposed bridge structure is not a very complex structure to construct (other than dealing with construction activities within an existing riverbed). It is therefore anticipated that the proposed bridge structure can be completed within a period of six months.

Footprint:

The development footprint for the full project is estimated to be approximately 800m².

Site – The site where the additional bridge structure is proposed over the Bottelary River adjacent to an existing bridge structure to allow for dualling of the Amandel road is largely modified perennial riparian habitat. The relevant river section has been transformed due to previous excavations and construction on the site and surrounds. It is located within the Kuils River residential area with residential and undeveloped areas to the North, Bottelary River to the east and west; and school grounds and residential areas to south.

See proposed layout map below:



AS-BUILT RECORD

CONTRACT No.	DESCRIPTION	CERTIFIED BY	DATE

CERTIFIED AS-BUILT FOR CONTRACT :

ENGINEER DATE

VERSION/AMENDMENTS

No.	DATE	DESCRIPTION	AUTHORISED BY

BIGEN AFRICA Services (PTY) LTD
Allan Cormack Street
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PO Box 29 The Innovation Hub Pretoria 0087
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E-mail: pretoria@bigenafrica.com
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PROJECT TITLE: AMANDEL ROAD BRIDGE EXTENSION

DRAWING TITLE: GENERAL ARRANGEMENT 1: BRIDGE LAYOUT

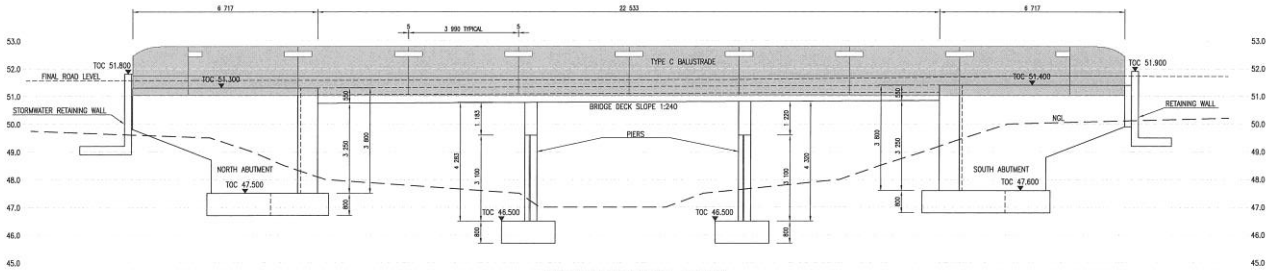
0 50 100
100mm ON ORIGINAL DRAWING

SURVEYED	–	DESIGNED	D Strydom
DRAWN	Z Scott	CHECKED	D Strydom
ORIGINAL DRAWING SCALE:	1 : 100	ORIGINAL DRAWING SHEET SIZE:	A1
CO-ORDINATE SYSTEM:	WG 19	DATE:	November 2017

APPROVED:
CLIENT OR ASSIGNEE: DATE:
CLIENT DRAWING No.: CLIENT REF No.:

APPROVED ON BEHALF OF BIGEN AFRICA: PR. ENG. No. 20130482
ENGINEER: DATE: 10 NOV 2017
DRAWING No.: 3061.00.STA.14.U001
VERSION: A.0

3061.00.STA.14.U001



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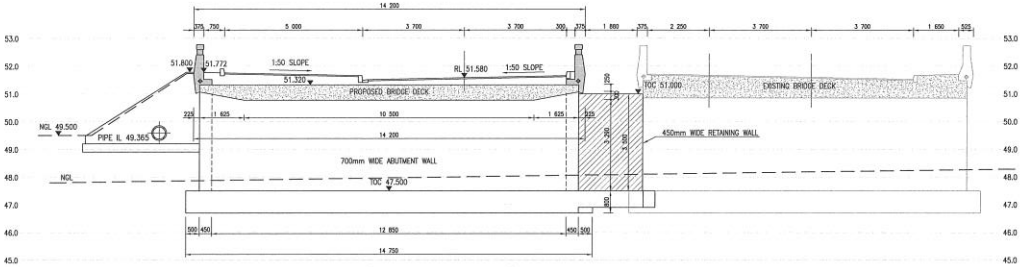

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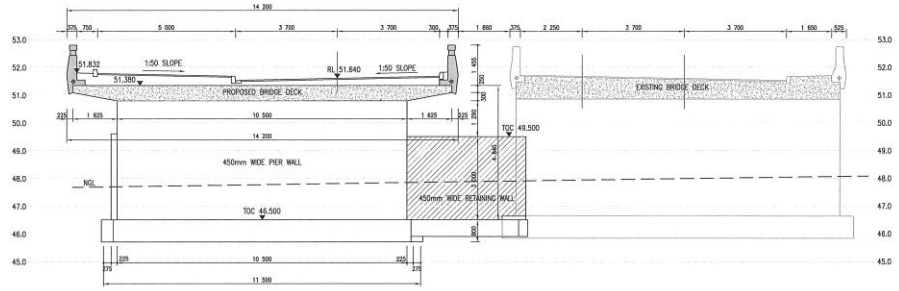

SECTION 02–02 (ON SOUTH PIER)
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AS-BUILT RECORD			
CONTRACT No.	DESCRIPTION	CERTIFIED BY	DATE

CERTIFIED AS-BUILT FOR CONTRACT :

ENGINEER DATE

VERSION/AMENDMENTS			
No.	DATE	DESCRIPTION	AUTHORISED BY

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PROJECT TITLE: AMANDEL ROAD BRIDGE EXTENSION

DRAWING TITLE: GENERAL ARRANGEMENT 2: BRIDGE ELEVATION AND SECTIONS

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ORIGINAL DRAWING SCALE:	AS SHOWN	ORIGINAL DRAWING SHEET SIZE:	A1
APPROVED:			
CLIENT OR ASSIGNEE:	DATE:		
CLIENT DRAWING No.:	CLIENT REF No.:		

SURVEYED	–	DESIGNED	D Strydom
DRAWN	Z Scott	CHECKED	D Strydom
CO-ORDINATE SYSTEM:	WG 19	DATE:	November 2017
APPROVED ON BEHALF OF BIGEN AFRICA:		PR. ENG. No: 20130462	
ENGINEER:		DATE: 30 NOV 2017	
DRAWING No.:	3061.00.STA.14.D001	VERSION:	A.0

3061.00.STA.14.D001

CHAPTER 2

This section of the report is included in compliance with Section 24N (2) (d) of the National Environmental Management Act 107 of 1998.

It deals with issues relating to the implementation of the EMP.

2.1 Organizational Structure

The organizational structure identifies and defines the responsibilities and authority of the various persons and organizations involved in the project. All instructions and official communications regarding environmental matters must follow the organizational structure.

The EMP must be an agenda item at the monthly site and operations meetings and the responsible client representative(s) may attend these meetings in order to provide input with respect to compliance with the EMP.

In some instances, an Environmental Consultant may be appointed to provide this input.

2.2 Responsibilities and Functions of the Environmental Control Officer

The ECO will be responsible for monitoring, reviewing and verifying compliance with the EMP and/or EA by all contractors and site management during site visits.

The ECO duties in this regard will include the following:

With the assistance, where necessary of the ER, to ensure all necessary environmental authorizations and permits have been obtained and are available and visible on site at the ER offices.

- monitor and verify that the EMP and/or EA is adhered to at all times and by taking action if the specifications are not followed;
- monitor and verify that environmental impacts are kept to a minimum;
- review and approve construction method statements, with input as appropriate from the ER;
- assist the contractor in finding environmentally responsible solutions to problems;
- report on the environmental issues at the site meetings and other meetings that may be called regarding environmental matters, if requested by ER;
- inspect the site and surrounding areas regularly with regard to compliance with the EMP and/or EA;
- monitor that environmental awareness training have been provided to all new personnel coming onto site;
- advise management on the removal of person(s) and/or equipment not complying with the specifications, after collaboration with the ER. Recommendations must be recorded by the ER in a Site Instruction Book.
- ensure that activities on site comply with known legislation of relevance to the environment;
- recommend the issuing of penalties via the developer for contraventions of the EMP and/or EA;
- keep a photographic record of progress on site from an environmental perspective; and
- undertake a continual internal review of the EMP and/or EA and submit a report to the developer and the responsible DEA&DP Environmental Official as according to EA conditions.

2.3 Agreed Work Plan and Site Visit Schedule of ECO

After initial construction start-up site visit it is recommended that an ECO site visit be conducted once a month during construction.

Information recording activity on site, and any guidelines or instructions emanating there from will be routinely made available electronically to the developer and applicable contractors and a copy of the report must be available at the site office.

Clearly matters of urgency or immediate action may be channelled appropriately on an urgent basis.

2.4 Site Manager

The site manager will have the following environmental control responsibilities:

- In conjunction with the ECO will present the environmental education programs to all persons employed on site.
- Consult with the ECO, landowner, developer and any contractor to resolve all environmental issues.
- Issue any instructions from the ECO to the management team via a formal site instruction book or appropriate management tool used for the purpose.
- Take responsibility for the penalty system. The ECO and developer recommendations must be considered when deciding whether or not to impose a penalty.
- The engineer will, via the ECO actions, be accountable for the overall implementation of the Environmental Management Programme.
- Keep a site diary and complaints register.

2.5 Contractors

As part of any tender, the tendering contractor must submit a first draft of a contractor's programme, to the developer that must include the environmental considerations to be followed prior to appointment.

The appointed Contractor's representative will have the following responsibilities:

- Ensure that all staff is familiar with the Environmental Management Programme, which explains the environmental policy for the project.
- Allow for sufficient time between surveying the exact locations where services will be intended and actual construction, for the ECO to facilitate and instruct for the removal of plants, seeds and cuttings if necessary.
- The contractor must keep his personnel fully aware of environmental issues and ensure they show adequate consideration to all environmental aspects.
- Establish environmental signs to be erected on the construction site at locations identified by the ECO and approved by the engineer.
- Be responsible for the cost of the restoration of any damage caused, in environmentally sensitive areas, as a result of contractor responsibility regarding negligence. This must be done in accordance with the engineer / ECO's specifications.
- Take responsibility and active steps to avoid any increase in the fire hazard.
- The contractor must take responsibility for implementing all the relevant provisions of the EMP, or if he encounters difficulties with the specifications, he must discuss alternative approaches with the ECO and engineer prior to proceeding.

Failure to comply with the EMP may result in the application of fines as set out, and any reported non-compliance may result in the suspension of work or termination of a contract.

2.6. Record keeping of activities, inclusive of recording of non-compliances and corrective actions

The site manager must keep a record of all activities relating to environmental matters on site, including:

- meetings attended;
- method statements;
- issues arising on site;
- cases of non-compliance with the EMP;
- corrective action taken and penalties issued.

This information will be recorded in an appropriate manner in a site diary, registers, issues/warning book, etc.

2.7 Compliance with other legislation

It is important that all on site staff are aware of other relevant legislation that may relate to the activities taking place on site, especially local authority required compliances.

CHAPTER 3

APPLICABLE LEGISLATION, POLICY AND ENVIRONMENTAL PRINCIPLES

Take Note: the list below is by no means a comprehensive list, but a list of the most applicable Acts. It does not identify the specific applicable sections and regulations. The Developer is ultimately responsible to identify and ensure that compliance with all relevant legislation, policies etc. is taking place on site at all times.

3.1. Potential Applicable Legislation/Policies/Guidelines/By-laws Identified

1. ADVERTISING ON ROADS AND RIBBON DEVELOPMENT ACT, 21 OF 1940
2. BASIC CONDITIONS OF EMPLOYMENT ACT 75 OF 1997
3. COMPENSATION FOR OCCUPATIONAL INJURIES AND DISEASES ACT 130 OF 1993
4. CONSERVATION OF AGRICULTURAL RESOURCES ACT, 43 OF 1983
5. CONSTITUTION OF THE REPUBLIC OF SOUTH AFRICA, 1996
6. ENVIRONMENT CONSERVATION ACT, 73 OF 1989, WESTERN CAPE NOISE CONTROL REGULATIONS
7. EMPLOYMENT EQUITY ACT, 55 OF 1998
8. ENVIRONMENT CONSERVATION ACT, 73 OF 1989
9. FENCING ACT, 31 OF 1963
10. HAZARDOUS SUBSTANCES ACT, 15 OF 1973
11. LABOUR RELATIONS ACT 66 OF 1995
12. NATIONAL BUILDING REGULATIONS AND BUILDING STANDARDS ACT, 103 OF 1977
13. NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 107 OF 1998
14. NATIONAL ENVIRONMENTAL MANAGEMENT: AIR QUALITY ACT 39 OF 2004
15. NATIONAL ENVIRONMENTAL MANAGEMENT: BIODIVERSITY ACT, 10 OF 2004
16. NATIONAL ENVIRONMENTAL MANAGEMENT: WASTE ACT, 59 OF 2008

17. NATIONAL FORESTS ACT, 84 OF 1998
18. NATIONAL HERITAGE RESOURCES ACT, 25 OF 1999
19. NATIONAL VELD AND FOREST FIRE ACT, 101 OF 1998
20. NATIONAL WATER ACT 36 OF 1998
21. OCCUPATIONAL HEALTH AND SAFETY ACT 85 OF 1993
22. TOBACCO PRODUCTS CONTROL ACT 83 OF 1993
23. WATER SERVICES ACT 108 OF 1997
24. CITY OF CAPE TOWN LOCAL MUNICIPALITY BY LAWS

CHAPTER 4

COMPLIANCE

This section of the report is included in compliance with Section 24N (2) I of the National Environmental Management Act 107 of 1998.

4.1. Monitoring and Auditing

4.1.1 Introduction

In keeping with current environmental and associated legislation, all environmental management procedures and actions must be reviewed and refined on an ongoing basis.

This is in accordance with the dynamic nature of environmental management and allows for the timeous identification and mitigation of issues as they come to light.

The process of review and refinement, built into the requirements of the EMP, is known as monitoring and auditing.

4.1.2. Roles and responsibilities

Efficient implementation of the performance specifications, effective monitoring and auditing, as well as clear responsibility and accountability allocation requires that various role-players be defined for the construction implementation project.

Depending on the nature and scale of a project, implementing teams could be composed of any number of role-players, each with their own specified responsibilities.

Therefore, for the purpose of this document, the following role-players are defined, based purely on responsibility and accountability allocation. The actual designation of role-players may vary, but the responsibilities will largely remain as stated.

4.1.2.1. Developer/landowner or custodian of the land

The developer/landowner or custodian of the land is the person or organization with decision-making capacity for the land in question, and thus ultimately accountable for what takes place on that land.

4.1.2.2. Contractor

Contractors are appointed to undertake the works as specified in the contract. It is the responsibility of the contractor to do whatever is necessary from their side to ensure that he or an appointed

advisor is well versed in environmental studies, so that they may accurately and efficiently carry out the requirements of the environmental specification.

The contractor is liable for any and all remedial work required in terms of the environmental specification, resulting from his environmental negligence, mismanagement and / or non-compliance.

4.1.2.3. Environmental Control Officer

An environmental control officer will manage and undertake monthly environmental inspections for the duration of the construction phase of the project as required.

The contractors or line management are answerable to the ECO for non-compliance with the performance specifications. Issues of non-compliance raised by the ECO/EO must be taken up by the project manager, and resolved as per the conditions of his contract.

Decisions regarding environmental procedures, specifications and requirements which have a cost implication (i.e. those that are deemed to be a variation and not allowed for in the performance specification) must be endorsed by the project manager.

4.2. The Monitoring Procedure

Environmental monitoring is the continuous evaluation of the status and condition of environmental elements. Its purpose is to detect change that takes place in the environment over time and involves the measuring and recording of physical, social and economic variables associated with development impacts.

Many techniques for environmental monitoring have been proposed, each detailing a specific protocol. Regardless of which technique is used, the ultimate aim is that each environmental management specification be checked by means of a system in which a score may be allocated for:

- Full compliance
- Satisfactory performance
- Unsatisfactory performance and
- No action taken

Completed monitoring reports will be submitted to the project engineer, developer/landowner and the contractor, who will attend to issues. These reports must be kept on file and be made available upon request by any environmental authority requesting such.

All persons employed, the contractor or his sub-contractors, must abide by the requirements of these performance specifications as they apply to the works. Any employees, the contractor or his sub-contractors found to be in breach of any of the environmental specifications, may be ordered to vacate the site forthwith and/or be subject to a disciplinary process.

The order may be given orally or in writing by the ECO. Confirmation of an oral order will be given as soon as practicable, but lack of confirmation in writing must not be a cause for the offender to remain on site, or not be subject to a disciplinary process. Supervisory staff, the contractor or his sub-contractor may not direct any person to undertake any activities that would place such person in contravention of the EMP, legislation and specifications.

The contractor and staff are deemed not to have complied with the performance specifications if:

- There is evidence of wilful or accidental contravention of any specification included in the specification;
- There is evidence of the contractor carrying out activities not permitted in terms of the EMP, contract and / or the specification;
- There is evidence of environmental negligence and / or mismanagement resulting in negative impacts on the environment;
- Has failed to meet with the requirements of the approved schedule.

The contractor and developer/landowner will be informed via ECO monthly reports, as well as by means of direct instruction (if necessary) as to what corrective actions are required in terms of environmental compliance.

Disregard for an instruction, and failure to respond adequately to complaints from the public will be construed as non-compliance. Non-compliance may lead to parties being penalised.
In more serious cases, the ECO may give notice, and halt operations until such a time that the corrective action is taken and the site complies with the performance specifications.

In more serious cases, the ECO may give notice, and halt operations until such a time that the corrective action is taken and the site complies with the performance specifications.

In cases of persistent non-compliance, the contractor or staff may be evicted from site after disciplinary process is followed. Only the developer/landowner may issue such instruction, retaining any costs required to remedy situations perpetuated by environmental negligence, mismanagement and / or non-compliance.

4.3. The Auditing Procedure

Environmental auditing is the process of comparing the impacts predicted with those that have actually occurred during implementation.

An environmental performance audit examines and assesses practices and procedures that, in the event of failure, would cause an environmental impact or result in an environmental risk. During each of the lifecycle phases, various issues will be monitored. The performance audit will ensure that the monitoring was correctly undertaken and that compliance was best achieved.

To these ends the project will be audited versus this EMP for effectiveness. ISO/SANS 19011:2013 auditing standards will be applied.

Audits will be undertaken at completion of the construction phases. Audit reports will be submitted to management, who will attend to all noted issues.

These reports must be kept on record and be made available upon request by the developer/landowner/custodian of the land and any environmental authority or I&AP requesting such.

4.4. Compliance Auditing and Monitoring Schedule/s

Construction Phase	**Submission of Audit Report To**
Once-off Pre-construction ECO compliance	Construction Site Manager and Municipality

monitoring	
Monthly ECO compliance monitoring	Construction Site Manager and Municipality
Annual ECO compliance monitoring	Construction Site Manager, Municipality and DEA&DP
Completion of Construction Phase ECO compliance monitoring (at the end of each construction phase completion)	Construction Site Manager, Municipality and DEA&DP
Operational Phase	
Annual external audit report to be compiled by ECO	Municipality and DEA&DP

4.5 Retentions and Penalties

It is recommended that a penalty retention system be combined with the penalty system to both motivate and compel the contractor to adhere to the EMP for the duration of the contract.

In this way incentives may be created to perform (i.e. in the form of the retention amounts that will only be paid to the contractor at the end of the contract), without creating the misunderstanding that adherence to the EMP is optional.

Persistent non-compliance will not only result in the contractor forfeiting any retention amount, but he will also be fined.

Of importance is that the contract specifies exactly how the penalty and retention system will operate, as well as how any funds resultant from retentions and penalties will be utilised.

All such funds must be used to improve environmental conditions on the site in general..

4.5.1. The retention system

For this system, a percentage value for each of the sections priced for in the environmental bill of quantities is retained until the full completion of the contract works.

If the monitoring process reveals persistent and/or wilful non-compliance with any aspect of the environmental performance specifications, then the full retention associated with that particular item will be withheld.

The project may then apply these retained funds to rectify the problem on site possibly making use of other or alternate resources at his disposal.

At the end of the contract or action, all remaining environmental retention amounts will be paid out to the contractor or staff pending approval by the ECO, after having confirmed full compliance with the relevant performance and rehabilitation specifications.

4.5.2. Penalty System

A system of penalties will be introduced to reinforce environmentally sensitive and prudent behaviour. The maximum penalties that will be fined per incident that may be enforced are listed below. The penalty amount will be determined (inter alia) by the severity of the offence.

Any defacing or cutting down trees, existing infrastructure, not	R5000 each

specified to be removed	
Disturbance to natural veld and wetlands outside of approved development area	R1000 / m^2
Catching or harming wild animals	R3000 plus charges at SAPS
Litter resulting from operation	R250 / offence / day
Entering a no-go area on foot	R500
Entering a no-go area in a vehicle	R5000
Making a fire outside an approved fireplace	R20 000
Disposal of any litter or construction material in a no-go or non-specified area	R1000 / m^2
Dumping of cement, concrete, fuel or oil in an area or other than that authorised and suitable	R10 000
Any damage to plant life in a no-go area	R1000
Failure to use portable / toilets	R100 / observed incident or evidence of human excrement in the veld
Any actions contrary to the Environmental Policy which continue after an initial penalty	Termination of contract.

In addition to the above, all costs incurred by the client/developer to remedy any damage will be the responsibility of the offender.

Should the monitoring process reveal acts of persistent and / or wilful non-compliance with the environmental performance specifications, then the contractor or staff member will be fined according to the specified value of that item.

4.6. Method Statements

Upon request from the ECO the contractors must provide written statements for discussion with the ECO on environmentally sensitive aspects of the contract. Environmentally sensitive aspects include by example excavations, work close to sensitive areas, collection and storage of top soil and vegetation, erosion control, wash water control, waste control, etc.

Methods Statement (MS) Content

It is important to note that the ECO may request further methods specification, if it be deemed necessary in his view.

- MS to specify the fire drill procedure to be followed in the event of a fire.
- MS to state how pollution will be prevented from entering any environmental system. To include the methods of filtering out pollution such as oil, petrol and waste from any working areas or roads.
- MS to specify special measures that will be needed in the event of large pollution spills.
- MS to indicate the timing and sequence of events to follow in sensitive areas to give sufficient time for the ECO to survey these areas and remove plants.

The Method Statement must include a site plan, preparatory steps, materials, and supervision details.

Example of Environmental Method Statement Form:

METHOD STATEMENT

CONTRACT:…….. **DATE:**……..

PROPOSED ACTIVITY (give title of method statement and reference number from the EMP):

WHAT WORK IS TO BE UNDERTAKEN (give a brief description of the works):

WHERE ARE THE WORKS TO BE UNDERTAKEN (where possible, provide an annotated plan and a full description of the extent of the works):

START AND END DATE OF THE WORKS FOR WHICH THE METHOD STATEMENT IS REQUIRED:

Start Date:	End Date:

HOW ARE THE WORKS TO BE UNDERTAKEN (provide as much detail as possible, including annotated maps and plans where possible):

Note: please attach extra pages if more space is required

DECLARATIONS

1) ENVIRONMENTAL SITE OFFICER/ ENGINEERS REPRESENTATIVE [select correct term]

The work described in this method statement, if carried out according to the methodology described, is satisfactorily mitigated to prevent avoidable environmental harm:

_____ _____
(signed) (print name)

Dated: _____

2) PERSON UNDERTAKING THE WORKS

I understand the contents of this method statement and the scope of the works required of me. I further understand that this method statement may be amended on application to other signatories and that the ECO / EO and ER will audit my compliance with the contents of this method statement

_____ _____
(signed) (print name)

Dated: _____

3) APPROVING AUTHORITY (Engineer)

The works described in this method statement are approved.

_____ _____ _____
(signed) (print name) (designation)

Dated: _____

CHAPTER 5

This section of the report is included in compliance with Section 24N (2) I of the National Environmental Management Act 107 of 1998.

5.1. Good Housekeeping

The developer/landowner will ensure the maintenance of "good housekeeping" practices during operations.

This will help avoid several disputes regarding responsibility and will allow for the smooth running of the operation as a whole.

Good housekeeping extends beyond the environmentally sensitive construction methods to include the care for and preservation of the surrounding environment.

5.2. Record Keeping

The developer/landowner will ensure that a filing system, identifying all documentation related to the EMP, is established.

A list of reports likely to be generated during the project is set out below.

All applicable documentation must be included in the environmental filing system catalogue or document retrieval index.

- Approved EMP, authorizations, licenses or permits;
- Final design documents and diagrams issued;
- All communications detailing changes of design/scope that may have environmental implications;
- Daily, weekly and monthly site monitoring reports (where applicable);
- Complaints register;
- Environmental training manual;
- Environmental training attendance registers;
- Incident and accident reports;
- Evidence of all disposed contaminated products, waste or residues, which have been generated during construction;
- Emergency preparedness and response plans;
- Copies of all relevant environmental legislation;
- Permits and legal documents as part of emergency preparedness teams e.g. fire teams, etc.;
- Crisis communication manual;
- Disciplinary procedures;
- Monthly site meeting minutes during construction;
- All method statements for all phases of the project.

All documentation should be kept on site, must be readily available at all times and made available to any person on request.

5.3 Document Control

The developer/landowner will be responsible for establishing a procedure for document control.

The document control procedure must comply with the following requirements:

- Documents must be identifiable by organisation, division, function, activity and contact person;
- Every document must identify the person and their positions, responsible for drafting and compiling the document, for reviewing and recommending approval, and final approval of the document for distribution;
- All documents must be dated, provided with a version number and reference number, filed systematically, and retained for a specified period.

The owner will ensure that documents are periodically reviewed and revised where necessary, and that current versions are available at all locations where operations essential to the functioning of the EMP are performed. All documents will be made available to the external auditor.

5.4 Reporting Requirements

All advice and recommendations made by the ECO must with the project engineer/engineers compliance be recorded on site in the site instruction book/suitable register for his attention.

All spills will need to be documented and reported to DWS and other relevant authorities.

CHAPTER 6

6.1. Public Communication Protocols

This section of the report is included in compliance with Section 24N (2) I of the National Environmental Management Act 107 of 1998.

The developer/landowner must be responsible for regulating public access to information and compliance reporting.

The developer/landowner must respond to third party or public queries and complaints.

The developer/landowner must also be responsible for maintaining the compliance register to record complaints received and action taken.

CHAPTER 7

This section of the report is included in compliance with Section 24 N 2 (d – g) and 3 (a – b) of the National Environmental Management Act 107 of 1998.

Specialist Recommendations to be adhered to before and During Commencement of Construction, Operational and Decommissioning Phases

Summary of Specialist/s Conclusions and Recommendations:

Freshwater Ecological Impact Assessment, September 2017, Eco Impact:

POTENTIAL IMPACTS ON THE BOTTELARY RIVER

The proposed activities are to take place within a riparian zone already moderately to largely modified by previous urban developments and water use activities. It can therefore be expected that the likely impacts of the proposed expansion works would be primarily of limited intensity and of a short term nature, mostly taking place during the construction phase.

This section provides an assessment of the potential impacts to freshwater ecosystems that are likely to be associated with the proposed additional bridge and road widening.

NATURE OF IMPACT - LOSS OF RIPARIAN HABITAT AND BED/BANK MODIFICATION
As the proposed project includes the clearing and reshaping of the river banks and channel, loss of riparian habitat as well as bed and bank modifications could be expected.

Significance of impacts without mitigation: A low localised negative impact with localised loss of aquatic habitat integrity and vegetation as well as bed/bank modification could be expected during the construction phase. At the proposed site the aquatic and vegetation integrity has already been severely modified but further disturbance could create more opportunity for alien invasive species to invade. Taking the current state of the river into account as well as the fact that little indigenous riparian vegetation remains, therefore this impact would be of low negative significance.

Proposed mitigation:

Construction phase:

- Construction activities must be controlled and restricted to the development footprint only.
- The construction activities must be monitored by an Environmental Control Officer.
- The construction activities must be restricted to the existing disturbed area downstream of the existing bridge and may not impact on the CESA area further downstream or OESA area upstream.
- All disturbed areas to be rehabilitated i.e. river banks should receive ongoing monitoring and management of erosion and invasive plant growth.
- The pillars of the adjacent bridge must be in line with the existing bridge pillars in order to not affect or impact on the existing hydrology or river flow.
- Any rubble or built-up material accumulated in the riverbed that may result from the construction activities should be removed as soon as possible during the construction phase to ensure that river flow/hydrology is not impeded.

Operational phase:

- Should any disturbance i.e. erosion occur within the site or surround these areas should immediately be rehabilitated and prevention measures must be put in place to ensure that the disturbance does not happen again.
- All alien invasive plant species must be removed and managed on an ongoing basis within the riparian habitat and surrounds. Removal of alien invasive plant species must take place according to CapeNature approved methods, having the least negative impact on the environment.

Significance of impacts after mitigation: The significance of the impact on the aquatic ecosystems with mitigation is expected to be low.

NATURE OF IMPACT: ALTERED FLOW / HYDRAULICS
Significance of impacts without mitigation: Low due to the fact that the river is already impeded by existing adjacent infrastructure.

Proposed mitigation:

Construction phase:

- Construction work (i.e. site clearance and construction of drainage line crossing) must be carried out and completed in the low flow and low rainfall season (mid to late summer) to minimise the impact on the flow in the drainage line.
- The new drainage line crossing must allow free flow and be able to accommodate at least the 1:50 year flood event and must not erode or cause erosion of the site and surrounds.
- All rubble and waste debris that has resulted from construction activities within and along river channel should be removed out of the river channel, its banks and the riparian buffer zone.

Operational phase:

- The drainage line flow must not be impeded and should be kept clean of woody debris or rubble and where necessary nuisance plant growth should it occur.
- Monitoring and clearing of blockages within the stream channel will need to be undertaken on an ongoing basis. Clearing of debris and nuisance growth of plants within the channel if necessary should also be undertaken by hand during the low/no flow period.
- Current stormwater runoff flow to wetland areas may not be impeded by the proposed orchards and adequate stormwater channels must be constructed and maintained throughout the proposed development areas to maintain current runoff conditions without leading to erosion.

Significance of impacts after mitigation: The significance of the impact on the aquatic ecosystems with mitigation is expected to be low.

NATURE OF IMPACT: EROSION

Disturbance to soil which is caused during the construction of the bridge and lining of riverbed may lead to erosion of the site and surrounds

Significance of impacts without mitigation: Medium to high negative impact on the receiving environment if not mitigated.

Proposed mitigation:

Construction phase:

- The riparian vegetation cover should be disturbed as little as possible during the construction of the drainage line crossing and may not be disturbed at all within the areas outside of the proposed development footprint area.
- Access to roads and other areas must be controlled to avoid disturbance of areas outside the development footprint. Personnel should be restricted to the immediate construction areas only.
- Monitor construction areas frequently for signs of erosion and if signs of erosion are detected implement repair and preventative measures immediately.

Operational phase:

- Only use one existing access road to the sites for operational purposes and avoid disturbance of "new" areas outside the existing access road and infrastructure footprint.
- Rehabilitate or stabilise eroded areas immediately to prevent increase in erosion.

Significance of impacts after mitigation: The significance of the impact on the aquatic ecosystems with mitigation is expected to be low.

NATURE OF IMPACT: FACILITATION OF INVASION BY ALIEN PLANT SPECIES

Disturbance to soil which is caused during the construction of the drainage line crossing may lead to the establishment of weeds and other alien plant species on the site and surrounds.

Significance of impacts without mitigation: Medium to low negative impact on the receiving environment if not mitigated due to the to the existing extensive encroachment of alien plant vegetation along the river bed and bank.

Proposed mitigation:

Construction phase:

- Care should be taken that any soil used for construction or rehabilitation purposes that is brought onto the site does not contain the seeds of alien invasive plants.

Operational phase:

- During the early establishment phase of the drainage line crossing ongoing monitoring and control of the growth of invasive alien plants will be necessary as it will be easier to remove the young invasive alien plants.
- Monitoring and clearing of alien invasive plants along the banks will need to be undertaken on an ongoing basis according to the applicable recognised CapeNature approved methods for clearing of alien invasive plant growth.

Significance of impacts after mitigation: The significance of the impact on the aquatic ecosystems with mitigation is expected to be low.

NATURE OF IMPACT: POLLUTION OF WATER RESOURCES WATER QUALITY

During construction and operational activities waste produced or products/materials used on site may lead to pollution of surface and underground water resources.

Significance of impacts without mitigation: Medium to high negative impact on the receiving environment if not mitigated.

Proposed mitigation:

Construction phase:

- Ablution facilities should be available for construction workers, should be located outside the riparian zones and should be regularly serviced.
- Proper on-site management for the storage and use of materials and waste to prevent any potential pollution of the drainage lines should be addressed in the Environmental Management Plan for the project.
- The proposed construction works in and adjacent to the river should preferably take place in the dry season when flow in the river as well as runoff to the river from the construction site would be minimal.
- Should the construction works adjacent to the river take place during the rainfall period, any contaminated runoff from the construction site or activities should be prevented from entering the stream.

Operational phase:

- Proper storm water management should be in place to minimize the impact of contaminated storm water runoff to the river.
- The riverbed, banks and infrastructure should be cleaned regularly, at least once a month and

after heavy rains and runoff to ensure that all waste is removed and not washed further downstream.

Significance of impacts after mitigation: The significance of the impact on the aquatic ecosystems with mitigation is expected to be low.

RECOMMENDATIONS AND CONCLUDING REMARKS

The Bottelary River flows through the proposed Amandel Road dualling from east to west. The features on the site have been moderately to largely modified by upstream activities such as treated wastewater and storm water discharges, canalization and piping. On the site, surrounding land use and the existing constructed bridge have resulted in much of the indigenous riparian vegetation being removed from the section to be affected within the river.

The riparian zones have been invaded by *P. clandestinum.* The instream habitat of the Bottelary River is considered to be moderately modified while the riparian habitat is largely to seriously modified.

In terms of the importance and sensitivity of the features, the numerous impacts have greatly reduced species richness and diversity. Overall the Bottelary River is of moderate ecological importance. In order to maintain what remains of the ecological functioning of the systems on the site, it is recommended that should the proposed activity be authorised the civil contractor must provide the/a freshwater ecologist with the up to date proposed construction methodology for inputs and approval before construction commences to ensure that the construction activities are mitigated to prevent any further degradation of the Bottelary River.

With the successful implementation of the proposed mitigation measures as listed within this report it is expected that the proposed additional bridge and widening of existing road along the relevant river section will have overall **low negative impact significance.**

GOALS FOR PLANNING AND DESIGN PHASE

Overall Goal for Planning and Design Phase: Undertake the planning and design phase of the development in a way that:

- Ensures that the design of the development responds to the identified environmental constraints and opportunities.
- Ensures that pre-construction activities are undertaken in accordance with all relevant legislative requirements.
- Ensures that adequate regard has been taken of any landowner concerns and that these are appropriately addressed through design and planning (where appropriate).
- Ensures that the best environmental options are selected for the project.
- Enables the development construction activities to be undertaken without significant disruption to other land uses in the area.
- In order to meet this goal, the following objectives have been identified, together with necessary actions and monitoring requirements.

OBJECTIVE PD1: ENSURE THE DESIGN OF THE DEVELOPMENT RESPONDS TO THE IDENTIFIED ENVIRONMENTAL CONSTRAINTS AND OPPORTUNITIES

The most sensitive landscape features for planning purposes in the study area is the surrounding medium botanical sensitivity area, wetlands and sandy soil of the development sites which could

make certain areas more susceptible to erosion. Access roads and construction camp areas should be placed so as to minimise the impacted area and construction sites should be clearly demarcated and no additional areas outside of the approved development footprint areas may be impacted upon.

Project Component/s	Access roads Construction area Development Layout
Potential Impact	Design fails to respond optimally to the environmental consideration.
Activities/Risk Sources	Poor consideration of the natural landscape features.
Mitigation: Target/Objective	Ensure that the design of the developments responds to the identified environmental constraints and opportunities.

Mitigation: Action/Control	**Responsibility**	**Timeframe**
Design the proposed development taking into account all environmental impacts and aspects as identified during the Basic Assessment process.	Municipality Developer Town planner Engineer EAP	Design Phase
The developer together with the inputs of the engineer, EAP and town planner must determine which technological alternatives will suit the proposed development site the best and which are reasonable and feasible to implement, also taking into account funding available for the development. Some of these technological alternatives to be considered for the proposed development include: • Type of construction materials used. • Reduce hard surfacing as far as possible to encourage rain water to seep back into the ground rather than being carried away into the drainage systems. • Designed paved areas so that water run-off is slowed down and where possible used soak away and permeable paving that allows water to filter into the ground. • Aim for and promote zero waste in planning, operation, management, maintenance and demolition of the structures. I.e. build waste avoidance into the process at a design phase, by specifying products and materials that have less wasteful production processes and don't create wasteful emissions during construction, maintenance and demolition of a structure.	Municipality Developer Town planner Engineer EAP	Design Phase
Access roads to be carefully planned along existing access roads to minimise the impacted area and prevent unnecessary over compaction of soil.	Municipality Developer Town planner Engineer EAP Contractor	Design phase

As far as possible new roads must link with existing roads infrastructure.	Municipality Developer Town planner Engineer EAP Contractor	Design phase
The holder of an environmental authorisation has the responsibility to notify the competent authority of any alienation, transfer and, change of ownership rights in the property on which the activity is to take place.	Municipality Developer	Pre-construction
Fourteen (14) days written notice must be given to the Department that the activity will commence. The notification must include a date on which the activity will commence as well as the reference number.	Municipality Developer	Pre-construction
ECO to be appointed prior to the commencement of any authorised activities. Once appointed the name and contact details of the ECO must be submitted to the DEA&DP.	Municipality Developer	Pre-construction
All safety requirements for the construction and operation of proposed infrastructure must be factored in during the planning phase i.e. traffic management.	Municipality Developer	Pre-construction

Performance indicator	Design meets objectives and does not degrade the environment. Design responds to the mitigation measures and recommendations in the BA report. Minimal impact on the surrounding environment
Monitoring	Ensure that the design implemented meets the objectives and mitigation measures in the BA report through review of the design by the EAP, Project Manager, Developer and the Contractor prior to the commencement of construction.

OBJECTIVE PD2: ENSURE EFFECTIVE COMMUNICATION MECHANISMS WITH THE VARIOUS STAKEHOLDERS

On-going communication with affected and surrounding landowners and key departments is important to maintain during the construction and operational phases of the developments. Any issues and concerns raised should be addressed as far as possible in as short a timeframe as possible.

Project Component/s	Communication protocols
Potential Impact	Communication failure that can lead to a number of detrimental impacts such as failure to comply with EMP requirements due to not receiving correct or any instructions.
Activities/Risk Sources	Communication between all relevant parties
Mitigation: Target/Objective	Effective communication with all relevant parties Addressing of any issues and concerns raised as far as possible in as short a timeframe as possible.

Mitigation: Action/Control	**Responsibility**	**Timeframe**
Compile and implement a grievance mechanism procedure for the public to be implemented during both the construction and operational phases of the	Developer Contractor	Pre-construction Construction phase Operational phase

facility. This procedure should include details of the contact person who will be receiving issues raised by interested and affected parties, and the process that will be followed to address issues.		
Discuss and agree upon communication protocols during pre-construction site meeting	Contractor Developer ECO	Pre-construction Construction phase

Performance indicator	A public complaint register is available at the site office and public complaints recorded in the register and dealt with swiftly. Pre-construction meeting minutes indicates communication protocols were discussed and agreed upon.
Monitoring	An complaint or finding must be recorded, addressed and monitored by the ECO as according to the requirements of the EMP.

OBJECTIVE PD3: PRE-CONDITIONS

The following pre-conditions shall be fully met before any construction activities may commence:

- ECO to be appointed prior to the commencement of any authorised activities. Once appointed the name and contact details of the ECO must be submitted to the DEA&DP.
- Plan and conduct pre-construction activities in an environmentally acceptable manner
- Fourteen (14) days written notice must be given to the Department that the activity will commence. The notification must include a date on which the activity will commence as well as the reference number.

A site meeting between the contractors, representatives of the developer and the ECO must take place at least 5 days prior to commencement of construction work to:

- Demarcate micro construction sites, services routes, access routes, working boundaries and no-go areas. Demarcate no-go areas before any land clearing occurs under the supervision of an ECO. Demarcation must be clearly visible and effective and no-go area must remain demarcated throughout construction phase;
- Discuss methods of stockpiling (vegetation, topsoil, sub-soil, shell-grit, etc.);
- Check required toilets and fire-fighting facilities to be in place;
- Discuss and agree restricted access to construction site and location of construction camp;
- Sign the Declaration of Understanding (Contractors);
- Discuss and agree communication channels/protocols including contact details;
- Discuss and agree areas of responsibility;
- Discuss and agree the demarcation and control of construction and building sites.
- Conduct flora and fauna search and rescue as required
- Discuss and implement adherence to site specific specialist recommendations
- Discuss and agree on site specific method statements to be submitted by the contractor to the ECO for approval before commencement

Minutes of this site meeting must be kept, and are to be distributed to all parties.

The following equipment must be on every micro or sub site before any construction work is due to start:

- Sufficient and suitable chemical toilet facilities.
- Sufficient refuse bins, which are weather and wind proof, with proper lids.
- 1 x type ABC (all purpose) 12.5 kg fire extinguisher

This will be monitored by the ECO during site visits and recorded, reported and proof included in the audit reports to be submitted:

- to the site manager and municipality during the pre-construction ECO site visit.
- to the site manager and municipality monthly during the construction phase (or if construction will be less than a month at least one ECO audit will be conducted)
- to the DEA&DP, site manager and municipality as part of the annual compliance report during the construction phase
- to the DEA&DP, site manager and municipality at the completion of the construction phase

OBJECTIVE PD4: LAYOUT PLAN CONTROLS

The contractor must ensure that a copy of the signed approved layout plan is available at the office on site at all times for inspection by the developer or his representative(s). Any variation to the approved layout plan must be submitted to the developer for signed approval and may only be implemented once the approved variation is available to the contractor and available on site at the office. The variation of changes to the layout must be approved by the competent authority as per the EA conditions.

This will be monitored by the ECO during site visits and recorded, reported and proof included in the audit reports to be submitted:

- to the site manager monthly during the construction phase (or if construction will be less than a month at least one ECO audit will be conducted)
- to the DEA&DP, site manager and municipality as part of the annual compliance report during the construction phase
- to the DEA&DP, site manager and municipality at the completion of the construction phase

OBJECTIVE PD5: ADVERTISING

The contractors may place no advertising material on the property unless prior formal written permission has been obtained from the landowner.

This will be monitored by the ECO during site visits and recorded, reported and proof included in the audit reports to be submitted:

- to the site manager monthly during the construction phase (or if construction will be less than a month at least one ECO audit will be conducted)
- to the DEA&DP, site manager and municipality as part of the annual compliance report during the construction phase to the DEA&DP, site manager and municipality at the completion of the construction phase.

CONSTRUCTION PHASE

Goal for Construction Phase

Overall Goal for Construction:
Undertake construction in a way that:

- ensures that construction activities are properly managed in respect of environmental aspects and impacts;
- enables construction activities to be undertaken without significant disruption to other land uses in the area, in particular concerning noise impacts, dust, farming practices, traffic and road use, and effects on local residents;
- minimises the impact on the surrounding area;
- minimises impacts on avifauna and other fauna using the site; and
- minimises the impact on the heritage and historical value of the site;

- minimises traffic impacts; and
- minimises possible health impacts.

Objectives
In order to meet these goals, the following objectives have been identified, together with the necessary actions and monitoring requirements.

OBJECTIVE C1: WORKING HOURS

Construction Sites	
Mondays to Fridays	06h00 – 19h00
Saturdays & Public Holidays	06h00 – 17h00

Project Component/s	Construction site Access roads		
Potential Impact	Surrounding landowners and residents are exposed to noise generated from the development site.		
Activities/Risk Sources	Activities associated with site construction		
Mitigation: Target/Objective	Effective communication with affected and surrounding landowners; Addressing of any issues and concerns raised as far as possible in as short a timeframe as possible.		
Mitigation: Action/Control		**Responsibility**	**Timeframe**
Contractors may only be present on the site during the standard working time hours.		Contractor	Construction phase
Performance indicator	Construction only taking place during approved working hours.		
Monitoring	This will be monitored by the ECO during site visits and recorded, reported and proof included in the audit reports to be submitted: • to the site manager monthly during the construction phase (or if construction will be less than a month at least one ECO audit will be conducted) • to the DEA&DP, site manager and municipality as part of the annual compliance report during the construction phase • to the DEA&DP, site manager and municipality at the completion of the construction phase.		

OBJECTIVE C2: SECURITY, SAFETY AND EMERGENCIES

Project Component/s	Construction site Access roads Adjacent residential areas		
Potential Impact	Safety of the public, surrounding landowners and residents Safety of personnel working on site Safety of visitors on site		
Activities/Risk Sources	Activities associated with site construction		
Mitigation: Target/Objective	To protect all involved from incidents and injury		
Mitigation: Action/Control		**Responsibility**	**Timeframe**
Access to the construction sites must be controlled. Notices should be displayed at all public entrances to the property, warning visitors that they are entering a		Contractor	Construction phase

construction site and that all visitors must report to the site office.		
Telephone numbers of emergency services, including the local fire-fighting services, must be posted conspicuously in the contractor's office and near the telephone. No firearms are permitted on the construction site, other than those authorised by the developer for the property security service provider if needed.	Contractor	Construction phase
All personnel must wear Personal Protective Equipment during the construction as required.	Contractor	Construction phase
If an environmental emergency such as fire, oil/fuel spills, sewage pipe burst, floods etc. occurs on site during the construction phase immediate actions must be taken to manage and contain the situation by the contractor/s and municipality. Within 24hours of emergency detection the ECO must be informed of the incident, where after ECO will conduct a site visit and recommend further remediation and/or rehabilitation methods to be implemented. Depending on type and extent of emergency that occurred specialists may be contacted to provide specific recommendations. An incident report must be completed and sent to municipal and governmental authorities.	Contractor Municipality ECO	Construction phase
Performance indicator	All required notices posted at public entrances and at the site office. All personnel wearing PPE as required All emergency situations contained and reported as soon as possible and preventative measures put in place.	
Monitoring	This will be monitored by the ECO during site visits and recorded, reported and proof included in the audit reports to be submitted: • to the site manager monthly during the construction phase (or if construction will be less than a month at least one ECO audit will be conducted) • to the DEA&DP, site manager and municipality as part of the annual compliance report during the construction phase • to the DEA&DP, site manager and municipality at the completion of the construction phase.	

OBJECTIVE C3: SPEED LIMIT

Project Component/s	Construction site Access roads		
Potential Impact	Speeding motorists and construction vehicles could injure personnel, members of the public or cause damage to property/infrastructure.		
Activities/Risk Sources	Activities associated with site construction		
Mitigation: Target/Objective	To protect all involved from incidents and injury.		
Mitigation: Action/Control		**Responsibility**	**Timeframe**

For security and safety reasons the speed limit on the property for all contractors' vehicles is 30 km per hour. The contractor is responsible for ensuring that all his employees, sub-contractors and delivery vehicles adhere to this rule. A notices should be displayed at the entrance of the construction sites indicating that the speed limit is 30km/h	Contractor	Construction phase
Performance indicator	Notice boards at site entrance indicating a speed limit of 30km/h. All vehicles entering construction sites adhering to 30km/h speed limit	
Monitoring	This will be monitored by the ECO during site visits and recorded, reported and proof included in the audit reports to be submitted: • to the site manager monthly during the construction phase (or if construction will be less than a month at least one ECO audit will be conducted) • to the DEA&DP, site manager and municipality as part of the annual compliance report during the construction phase • to the DEA&DP, site manager and municipality at the completion of the construction phase.	

OBJECTIVE C4: CONTRACTOR'S CAMP

Project Component/s	Construction camp	
Potential Impact	Degradation of the natural environment inside/outside of the development area.	
Activities/Risk Sources	Activities associated with site construction	
Mitigation: Target/Objective	To protect and mitigate impacts on the environment.	
Mitigation: Action/Control	**Responsibility**	**Timeframe**
The location and extent of the contractor's camp area will be discussed and approved by the developer/landowner and ECO.	Developer Contractor ECO	Construction phase
The contractor's camp is to accommodate the site offices, temporary waste storage area, and bunded concrete/cement mixing area, contractor stores, servicing, parking and refuelling area for vehicles and machinery, as well as adequate ablution and accommodation facilities for employees.	Contractor	Construction phase
The construction camp is not to be established within 32m of a watercourse or within a no-go area	Contractor	Construction phase
Performance indicator	ECO in conjunction with the landowner and contractor will approve construction camp area outside of no-go areas and more than 32m away from the edge of a watercourse. Construction camp to be neatly fenced and to accommodate all facilities as listed above and elsewhere in EMP.	
Monitoring	This will be monitored by the ECO during site visits and recorded, reported and proof included in the audit reports to be submitted: • to the site manager monthly during the construction phase (or if construction will be less than a month at least one ECO audit will be conducted) • to the DEA&DP, site manager and municipality as part of the annual compliance report during the construction phase	

	• to the DEA&DP, site manager and municipality at the completion of the construction phase.

OBJECTIVE C5: DELIVERIES TO CONTRACTORS

Project Component/s	Construction site Construction camp Access roads		
Potential Impact	Increased traffic, congestion and noise for surrounding landowners / residents and other road users. Impact on the natural environment.		
Activities/Risk Sources	Activities associated with site construction		
Mitigation: Target/Objective	To protect and mitigate impacts on the environment, surrounding land uses, landowners, and personnel working on site.		
Mitigation: Action/Control		**Responsibility**	**Timeframe**
Contractors will at all times be responsible for compliance by their delivery service providers as engaged. Delivery times will be limited to working times as defined in this document.		Contractor	Construction phase
Contractors have the responsibility of advising the property security staff of deliveries expected and to be executed.		Contractor	Construction phase
Contractors shall further ensure that drivers of service providers are informed of all procedures and restrictions e.g. which access road to use, speed limits, no-go areas, demarcated construction areas, and maximum allowed vehicle mass etc., as applicable before their first visit to site.		Contractor	Construction phase
Washing of service provider delivery vehicles and equipment will not be allowed on the property and must be carried out elsewhere.		Contractor	Construction phase
Performance indicator	All delivery vehicles and staff adhere to the rules of the site.		
Monitoring	This will be monitored by the ECO during site visits and recorded, reported and proof included in the audit reports to be submitted: • to the site manager monthly during the construction phase (or if construction will be less than a month at least one ECO audit will be conducted) • to the DEA&DP, site manager and municipality as part of the annual compliance report during the construction phase • to the DEA&DP, site manager and municipality at the completion of the construction phase.		

OBJECTIVE C6: DEMARCATION, SITE CLEARANCE AND FENCING

Project Component/s	Construction site Access roads Construction camp No-go areas
Potential Impact	Safety of the public, surrounding landowners and residents Safety of personnel working on site Safety of visitors on site Protection of sensitive environmental features
Activities/Risk	Activities associated with site construction

Sources			
Mitigation: Target/Objective	To protect and mitigate impacts on the environment, surrounding land uses, landowners, and personnel working on site.		
Mitigation: Action/Control		**Responsibility**	**Timeframe**
Demarcate no-go areas before any land clearing occurs under the supervision of an ECO		Contractor ECO	Construction phase
The ECO together with the site manager must indicate each construction site and/or access route to be demarcated and demarcation methods to be used before construction commences and construction personnel will not be allowed beyond the construction perimeter of the site. Physical demarcation of construction sites should at the very least be via colour coded posts at least 1,5m high. Relatively small construction areas can be fenced with wooden or metal post at 3m centres with 1 plain wire strand tensioned horizontally at 900mm from ground level. Commercially available danger tape may also be wrapped around the wire strand. For large areas, like fairways, these posts are to be at 15m centres with 5 equidistant easily visible lime spot markings in between.		Contractor ECO	Construction phase
Demarcation must be clearly visible and effective and no-go area must remain demarcated throughout construction phase		Contractor	Construction phase
Site clearance along the border of the no-go areas must be done under the supervision of an ECO.		Contractor ECO	Construction phase
Personnel should be restricted to the construction camp site and immediate construction areas only.		Contractor	Construction phase
Construction areas and access routes must be clearly demarcated to restrict access/egress across such demarcated lines and minimise environmental impact.		Contractor ECO	Construction phase
All activities including stockpiling must occur within this demarcated area.		Contractor	Construction phase
The Contractor responsible for impacting on areas outside of the demarcated construction areas must fund reinstatement or rehabilitation of damaged areas and features.		Contractor	Construction phase
The onus here will fall on the contractors to ensure all respect these no-go lines.		Contractor	Construction phase
Failure to ensure discipline will lead to the immediate erection of more physically challenging structures.		Contractor	Construction phase
No run-off oil, cement, or any other building material is to be permitted, or allowed to enter the no-go areas		Contractor	Construction phase
In the event that sensitive features outside of demarcated development areas are threatened by construction activities, the temporary fencing off of these areas or the construction area, when working in a mainly natural environment, is recommended and will be determined by the ECO.		Contractor ECO	Construction phase
Remove and conserve topsoil layer and overburden		Contractor	Construction phase

material for rehabilitation after construction activities have ceased.			Rehabilitation
Performance indicator	Demarcated construction areas and/or no-go areas remain demarcated and undisturbed throughout construction phase.		
Monitoring	This will be monitored by the ECO during site visits and recorded, reported and proof included in the audit reports to be submitted: • to the site manager monthly during the construction phase (or if construction will be less than a month at least one ECO audit will be conducted) • to the DEA&DP, site manager and municipality as part of the annual compliance report during the construction phase • to the DEA&DP, site manager and municipality at the completion of the construction phase.		

OBJECTIVE C7: INDIGENOUS FAUNA AND FLORA

Project Component/s	Construction site Access roads Construction camp No-go areas		
Potential Impact	Impact on indigenous fauna and flora.		
Activities/Risk Sources	Activities associated with site construction		
Mitigation: Target/Objective	To protect and mitigate impacts on the indigenous fauna and flora.		
Mitigation: Action/Control		**Responsibility**	**Timeframe**
Indigenous plants or wild animals including reptiles, amphibians, birds, etc. may not be damaged or harmed or interfered with. Vegetation removed as part of the legitimate development requirements is excluded.		Contractor	Construction phase
Trapping, poisoning and/or killing of animals is specifically and strictly forbidden.		Contractor	Construction phase
All indigenous vegetation and soil materials must be stockpiled and stored (at site identified by ECO), and used for rehabilitation of the disturbed areas upon construction completion.		Contractor ECO	Construction phase
Performance indicator	No indigenous fauna and flora and their habitats outside of approved development footprint areas are impacted upon. All vegetation and materials removed from site during excavations stockpiled and re-used for rehabilitation of disturbed sites.		
Monitoring	This will be monitored by the ECO during site visits and recorded, reported and proof included in the audit reports to be submitted: • to the site manager monthly during the construction phase (or if construction will be less than a month at least one ECO audit will be conducted) • to the DEA&DP, site manager and municipality as part of the annual compliance report during the construction phase • to the DEA&DP, site manager and municipality at the completion of the construction phase.		

OBJECTIVE C8: ALIEN INVASIVE PLANTS

Project Component/s	Construction site Access roads Construction camp		
Potential Impact	Alien/invasive plant species spread into natural/indigenous vegetation areas.		
Activities/Risk Sources	Activities associated with site construction and associated disturbance of natural areas		
Mitigation: Target/Objective	To protect and mitigate impacts on the environment.		
Mitigation: Action/Control		**Responsibility**	**Timeframe**
The contractor must clear all weeds and alien invasive plant from the proposed development sites, access routes and construction camp.		Contractor	Construction phase
No on-site burying, dumping or stockpiling of any weeds		Contractor	Construction phase

or invasive species must occur. They should be removed from the site and dumped at a suitable dumping site from which seed cannot escape.		
The contractor must make sure of and implement all legal requirements regarding herbicide application procedures if herbicide is to be used to control weeds/invasive plants. The instructions on the herbicide labels must be strictly followed throughout application. .	Contractor	Construction phase
The contractor shall take all necessary precautions to prevent overspray of herbicides outside of the demarcated construction areas and onto natural veld.	Contractor	Construction phase
All personnel working with any herbicide, pesticide or fertilizer must be registered and comply with the requirements set in these registrations.	Contractor	Construction phase
All equipment associated to herbicides and pesticides must be maintained in accordance to the set standards.	Contractor	Construction phase
The disposal of all redundant and empty containers of herbicides and pesticides must be controlled and disposed of at a waste management facility licensed to do so under the National Environmental Management: Waste Act.	Contractor	Construction phase
Performance indicator	All possible introduction and spreading of alien invasive plant species are controlled.	
Monitoring	This will be monitored by the ECO during site visits and recorded, reported and proof included in the audit reports to be submitted: • to the site manager monthly during the construction phase (or if construction will be less than a month at least one ECO audit will be conducted) • to the DEA&DP, site manager and municipality as part of the annual compliance report during the construction phase • to the DEA&DP, site manager and municipality at the completion of the construction phase	

OBJECTIVE C9: STORM WATER MANAGEMENT

Project Component/s	Construction site Access roads Construction camp No-go areas		
Potential Impact	Erosion due to poor storm water management. Pooling of water / flooding in portions of the development site due to poor storm water management.		
Activities/Risk Sources	Activities associated with site construction		
Mitigation: Target/Objective	To protect and mitigate impacts on the environment.		
Mitigation: Action/Control		**Responsibility**	**Timeframe**
To minimise or prevent erosion and overflowing/flooding the work must be done as far as possible during the dry season.		Contractor	Construction phase
Areas disturbed during construction must be re-shaped		Contractor	Construction

as according to surrounding contours and stabilised as soon as possible.		phase
All roads need to be maintained and monitored and visible signs of possible erosion immediately rehabilitated.	Contractor	Construction phase
All areas impacted during construction must be maintained and monitored and visible signs of possible erosion immediately rehabilitated and prevention measures put in place.	Contractor Municipality	Construction phase
It will be the responsibility of the developer to ensure contractors apply erosion control measures throughout the period of risk and that the works are protected from damage that may be caused by rainwater runoff.	Contractor Municipality	Construction phase
Stormwater discharge flow must be managed and restricted in such a manner that it does not cause erosion.	Contractor Municipality	Construction phase
Adequate provisions of stormwater management including inter alia channels, litter traps etc. must be used to divert stormwater away from the activities that could lead to its contamination.	Contractor Municipality	Construction phase
Performance indicator	All signs of erosion are controlled and affected areas rehabilitated.	
Monitoring	This will be monitored by the ECO during site visits and recorded, reported and proof included in the audit reports to be submitted: • to the site manager monthly during the construction phase (or if construction will be less than a month at least one ECO audit will be conducted) • to the DEA&DP, site manager and municipality as part of the annual compliance report during the construction phase • to the DEA&DP, site manager and municipality at the completion of the construction phase	

OBJECTIVE C10: ARCHAEOLOGY AND PALAEONTOLOGY MANAGEMENT

Project Component/s	Construction site Access roads Construction camp		
Potential Impact	The loss of cultural or heritage resources.		
Activities/Risk Sources	Activities associated with site construction		
Mitigation: Target/Objective	To protect and mitigate the potential loss of cultural and heritage resources.		
Mitigation: Action/Control		**Responsibility**	**Timeframe**
Should any heritage or fossil remains be exposed during any excavation or related activities, activities on the relevant site must stop immediately and these finding must be reported to the provincial heritage resource authority of the Western Cape, Heritage Western Cape (in terms of the National Heritage Resources Act, 1999 (Act No.25 of 1999) via the ECO.		Contractor ECO	Construction phase
Heritage remains uncovered or disturbed during earthworks must not be further disturbed until inspection and verification by a professional has been conducted.		Contractor Heritage Professional	Construction phase

Performance indicator	Protection of heritage resources
Monitoring	This will be monitored by the ECO during site visits and recorded, reported and proof included in the audit reports to be submitted: • to the site manager monthly during the construction phase (or if construction will be less than a month at least one ECO audit will be conducted) • to the DEA&DP, site manager and municipality as part of the annual compliance report during the construction phase • to the DEA&DP, site manager and municipality at the completion of the construction phase

OBJECTIVE C11: DIESEL FUEL AND LUBRICANT HANDLING PROGRAMME

Project Component/s	Construction site Access roads Construction camp No-go areas	
Potential Impact	Contamination of soil, storm and ground water resources as a result of an oil/diesel/lubricant spill/leak.	
Activities/Risk Sources	Activities associated with site construction	
Mitigation: Target/Objective	To protect and mitigate impacts of contaminants on the environment and hydrological features.	
Mitigation: Action/Control	**Responsibility**	**Timeframe**
Servicing of construction vehicles and machinery to take place off site at a vehicle workshop.	Contractor	Construction phase
All vehicles must be in a good condition and inspected on a daily basis with no leakages leading to possible contamination of soil or water supplies.	Contractor	Construction phase
All waste oils, fuels and lubricants are considered hazardous waste to be stored separately in bunded areas and disposed of at a licensed hazardous waste handling facility and for which safe disposal certificates must be kept.	Contractor	Construction phase
It is the responsibility of each landowner, lease holder or developer to ensure that they are aware of and adhere to the requirements of the NEM:WA as it pertains to their operations.	Contractor/landowner/ lease owner/developer	Construction phase
The following conditions related to the temporary fuel tanks must be implemented: • The fuel tanks must be designed and installed in accordance with relevant Oil Industry standards and SANS codes where applicable for the aboveground storage tanks. The tanks must be located within a bund (110 % of the tanks capacity) in order to contain potential spills. • During fuel tanker delivery, the tanker driver must be present at all times during product offloading. Should an incident occur the supply vehicle emergency cut-off switch must be activated to immediately stop fuel	Contractor	Construction phase

delivery. Flexible hoses with dry-break couplings and emergency isolation must be used. All spillage incidences and actions taken consequent thereto must be reported to the ECO and recorded in the site register. • All fuel and flammable liquids should be stored under secure and fenced conditions and in a bunded site with the volume of the bunding capable of holding 110% of the liquid. • The applicant must ensure that effective stock inventory monitoring and regular auditing take place for the early identification of possible leaks. • The requirements of the Occupational Health and Safety Act, 1993 (Act No. 85 of 1993), must be adhered to. Within three months of the tanks ceasing to be used the tanks must be removed at the expense of the applicant, and the site, including all associated infrastructure must be rehabilitated to the satisfaction of the relevant authority.		
Refuelling: • Refuelling of equipment must be conducted from the bunded fuel tank and pump at the contractor's camp. • Fuel tanks must be bunded and supplied with a concrete apron. Any spills on the concrete apron or floor below the tank are to be treated with OT8 or Spillsolve or equivalent as per the product instructions. • A 500 litre drawn trailer to convey diesel to the equipment for re-fuelling may also be used. Such trailer will be drawn by a specified vehicle and driver, with alternate nominated as approved by the Site Manager. Such tow vehicle may travel at 20kms per hour maximum at any time, be clearly identifiable as such, and may only tow the diesel cart should the pre requisite drip trays and emergency equipment be on the vehicle at the time. • Staff will require instruction in the identification of diesel and oil leaks and the use of Spillsolve (or equivalent) products.	Contractor	Construction phase
On-Site emergency repairs: • Only small mobile plant and emergency repairs are to take place on site. These will require the provision of drip trays and funnels to ensure that no oil or fuel leakages	Contractor	Construction phase

occur onto the ground. Should such spill take place, then the oil saturated soil is to be placed in suitable containers and disposed of at a hazardous waste disposal site. • Any contamination of soil is to be treated with Spillsolve or similar product. Contaminated water as a result of an oil or fuel spillage on the area should similarly be treated in appropriate way, and the polluted water should be specifically removed and not allowed to merge with run-off water collected in the trap collecting all run offs from the slab.		
Collection of contaminated spares and waste oils: • Contaminated spares, oil filters, gaskets, water, etc. must be collected in separate holders at the designated storage facility for disposal at a licensed H:h (hazardous waste handling) site. • Staff will require instruction in: -Deleterious effects of oil / fuel on the environment -Identification of oil leaks -Handling of oil / fuel leaks into soil -Location and method in storage of contaminated spares -Fire prevention and emergency drills in case of an accident	Contractor	Construction phase
Any oil or diesel spills etc. must be reported to the site manager and rehabilitation measures must be taken immediately and contaminated soil disposed of at a licensed hazardous waste handling facility.	Contractor	Construction phase
Performance indicator	Ensure that fuel storage, re-fuelling, emergency repairs, collection of contaminated spares and waste oils takes place as according to requirements and that no spillages occur and if it does occur that it is handled and cleaned up accordingly.	
Monitoring	This will be monitored by the ECO during site visits and recorded, reported and proof included in the audit reports to be submitted: • to the site manager monthly during the construction phase (or if construction will be less than a month at least one ECO audit will be conducted) • to the DEA&DP, site manager and municipality as part of the annual compliance report during the construction phase • to the DEA&DP, site manager and municipality at the completion of the construction phase	

OBJECTIVE C12: SERVICES

Project Component/s	Construction site Bulk services and network services Sewerage network

	Power supply Access roads		
Potential Impact	Damage/loss of services infrastructure or supply.		
Activities/Risk Sources	Activities associated with site construction		
Mitigation: Target/Objective	To protect and mitigate impacts on existing services infrastructure and surrounding land users; landowners and residents.		
Mitigation: Action/Control		**Responsibility**	**Timeframe**
Care and due cognisance must be taken of existing services, service routes and services restrictions. The contractor shall be held liable for damages, expenses or costs incurred for any interruption in supply, variation, frequency, or failure of any utility provider to supply service if the contractor is found to be responsible for unplanned service interruptions.		Contractor	Construction phase
All relevant sections and regulations of the National Water Act, 1998 (Act 36 of 1998) regarding water use must be adhered to.		Contractor	Construction phase
Performance indicator	Protection of existing services and infrastructure.		
Monitoring	This will be monitored by the ECO during site visits and recorded, reported and proof included in the audit reports to be submitted: • to the site manager monthly during the construction phase (or if construction will be less than a month at least one ECO audit will be conducted) • to the DEA&DP, site manager and municipality as part of the annual compliance report during the construction phase • to the DEA&DP, site manager and municipality at the completion of the construction phase		

OBJECTIVE C13: ROADS

Project Component/s	Access and internal roads		
Potential Impact	Increased traffic/congestion. Construction vehicles pose a potential risk to other road uses and the natural environment if they do not use designated routes.		
Activities/Risk Sources	Activities associated with site construction		
Mitigation: Target/Objective	Designation of specific routes for construction vehicles to reduce impact on the environment and other road users.		
Mitigation: Action/Control		**Responsibility**	**Timeframe**
Only existing access routes to the property will be used during construction work, so as to control the movement of construction vehicles. Traffic safety measures shall be considered in determining entry or exit points to public roads.		Contractor	Construction phase
The contractor shall ensure that access to construction sites and associated infrastructure and equipment is designated off-limits to the public at all times during construction.		Contractor	Construction phase
Traffic safety measures shall be considered in determining entry or exit points to public roads.		Contractor	Construction phase
Performance indicator	Necessary no entry signs and speed limit signs etc. posted at all		

	entrances and only one designated access route to the development site is used.
Monitoring	This will be monitored by the ECO during site visits and recorded, reported and proof included in the audit reports to be submitted: • to the site manager monthly during the construction phase (or if construction will be less than a month at least one ECO audit will be conducted) • to the DEA&DP, site manager and municipality as part of the annual compliance report during the construction phase • to the DEA&DP, site manager and municipality at the completion of the construction phase

OBJECTIVE C14: DUST, ODOUR, NOISE AND VISUAL IMPACT CONTROL

Project Component/s	Constructions site Access roads Construction camp
Potential Impact	Excessive dust and noise production and visual impacts on surrounding land users
Activities/Risk Sources	Activities associated with site construction
Mitigation: Target/Objective	Minisation of dust and noise production and visual impacts on surrounding land users

Mitigation: Action/Control	**Responsibility**	**Timeframe**
The contractor is to take appropriate measures to minimise the generation of dust as a result of construction works, to the satisfaction of the affected surrounding land users.	Contractor	Construction phase
Dust, odour and noise must be controlled appropriately and must not cause any nuisance conditions during hours of operation of the facilities and/or infrastructure.	Contractor	Construction phase
Vegetation must be stripped from demarcated construction sites only shortly before commencing with the construction process.	Contractor	Construction phase
During high velocity wind conditions, the contractor or his representative to evaluate the situation and make recommendations as to whether dust suppression measures are adequate, or whether to suspend work until wind speeds drop to an acceptable level.	Contractor	Construction phase
The use of potable water for dust suppression is discouraged and alternative sources of water should be considered and discussed with municipality if required.	Contractor	Construction phase
Construction noise levels must not pose a nuisance to the surrounding communities and all construction working hours must be limited to normal working hours unless arranged with municipality.	Contractor	Construction phase
All machinery and construction vehicles must be serviced regularly and be in a good working condition to prevent excessive noise generation.	Contractor	Construction phase
Only work in approved development areas to ensure that visual footprint is kept to a minimum and ensures	Contractor	Construction phase

that construction camp and area are neat and kept clear of windblown construction waste.		
Construction material will be stored at the contractor's camp, as well as on the construction site within the demarcated working areas at each construction point. Special permission may be obtained from the ECO to store material on suitable substitute or ancillary locations should the need arise, and as communicated by the project engineer	Contractor	Construction phase
Performance indicator	No excessive dust or noises are produced at the construction sites and no visual impact outside of approved development areas is observed.	
Monitoring	This will be monitored by the ECO during site visits and recorded, reported and proof included in the audit reports to be submitted: • to the site manager monthly during the construction phase (or if construction will be less than a month at least one ECO audit will be conducted) • to the DEA&DP, site manager and municipality as part of the annual compliance report during the construction phase • to the DEA&DP, site manager and municipality at the completion of the construction phase	

OBJECTIVE C15: TOPSOIL AND MATERIAL REMOVAL AND STOCKPILING

Project Component/s	Construction site	
Potential Impact	Loss of topsoil and refill materials	
Activities/Risk Sources	Activities associated with site construction - excavation	
Mitigation: Target/Objective	Conserve topsoil and excavated materials to be used for rehabilitation after construction completion	
Mitigation: Action/Control	**Responsibility**	**Timeframe**
Depending on type of topsoil available and rehabilitation required after construction completion the ECO will determine if it is required to, prior to construction or earthworks commencing, remove and conserve a minimum of 100 mm topsoil from demarcated construction sites and keep it separately stockpiled (within the demarcated working area or on designated areas).	Contractor ECO	Construction phase
Topsoil stockpiles must be convex and should not exceed 1.8 metre in height, and if required be covered by anchovy net as necessary to prevent wind erosion.	Contractor	Construction phase
Topsoil must not be compacted in any way, especially by vehicles riding over it.	Contractor	Construction phase
Surplus sub-soil that becomes available during construction work and building operations must be used as fill material on site.	Contractor	Construction phase
Plant material stockpiled must be chopped in ± 300 mm pieces and scattered over the disturbed areas to be rehabilitated at construction completion	Contractor	Construction phase
Performance indicator	Topsoil separately stored and safeguarded from erosion at designated areas and re-used on sites to be rehabilitated at construction completion.	

Monitoring	This will be monitored by the ECO during site visits and recorded, reported and proof included in the audit reports to be submitted: • to the site manager monthly during the construction phase (or if construction will be less than a month at least one ECO audit will be conducted) • to the DEA&DP, site manager and municipality as part of the annual compliance report during the construction phase • to the DEA&DP, site manager and municipality at the completion of the construction phase

OBJECTIVE C16: APPROPRIATE USE OF CONSTRUCTION MACHINERY

Project Component/s	Construction site Access roads Construction camp	
Potential Impact	Environmental disturbance due to incorrect use of machinery	
Activities/Risk Sources	Activities associated with site construction	
Mitigation: Target/Objective	Use the correct machinery for the proposed tasks and ensure that machinery is properly operated	
Mitigation: Action/Control	**Responsibility**	**Timeframe**
The contractor must at all times carefully consider what machinery is appropriate to the task to minimise the extent of environmental damage.	Contractor	Construction phase
No machinery is to operate outside of any demarcated working area.	Contractor	Construction phase
Operators of machinery must be suitably qualified.	Contractor	Construction phase
All machinery and heavy vehicles to be parked at night at the defined contractor's camp.	Contractor	Construction phase
Performance indicator	Correct and successful use of construction machinery on site by qualified personnel.	
Monitoring	This will be monitored by the ECO during site visits and recorded, reported and proof included in the audit reports to be submitted: • to the site manager monthly during the construction phase (or if construction will be less than a month at least one ECO audit will be conducted) • to the DEA&DP, site manager and municipality as part of the annual compliance report during the construction phase • to the DEA&DP, site manager and municipality at the completion of the construction phase	

OBJECTIVE C17: ANTI-EROSION MEASURES

Project Component/s	Construction site Access roads Construction camp	
Potential Impact	Wind/water erosion as a result of construction activities.	
Activities/Risk Sources	Activities associated with site construction	
Mitigation: Target/Objective	Reduce the impact of erosion by implementing anti-erosion measures.	
Mitigation: Action/Control	**Responsibility**	**Timeframe**

The contractor shall take all appropriate and active measures to prevent and if prevention is not possible to mitigate erosion, especially wind and water erosion, resulting from activities on site to the satisfaction of the ECO.	Contractor	Construction phase
During construction, the contractor shall protect areas susceptible to wind and water erosion, by installing all the necessary temporary and permanent works if required and indicated by the ECO. Measures can include brush packing, anchovy net stabilisation, etc.	Contractor ECO	Construction phase

Performance indicator	All possible erosion impacts are controlled and rehabilitated.
Monitoring	This will be monitored by the ECO during site visits and recorded, reported and proof included in the audit reports to be submitted: • to the site manager monthly during the construction phase (or if construction will be less than a month at least one ECO audit will be conducted) • to the DEA&DP, site manager and municipality as part of the annual compliance report during the construction phase • to the DEA&DP, site manager and municipality at the completion of the construction phase

OBJECTIVE C18: LIGHTS

Project Component/s	Construction site Access roads Construction camp	
Potential Impact	Light pollution at night	
Activities/Risk Sources	Activities associated with site construction	
Mitigation: Target/Objective	No significant light pollution must be caused during the construction activities	
Mitigation: Action/Control	**Responsibility**	**Timeframe**
The Contractor must ensure that any lighting installed on the site for his activities or security purposes does not interfere with road traffic or cause a direct disturbance to nearby residents, the surrounding community or other users of the area.	Contractor	Construction phase

Performance indicator	Non-intrusive lighting to be installed at construction areas.
Monitoring	This will be monitored by the ECO during site visits and recorded, reported and proof included in the audit reports to be submitted: • to the site manager monthly during the construction phase (or if construction will be less than a month at least one ECO audit will be conducted) • to the DEA&DP, site manager and municipality as part of the annual compliance report during the construction phase • to the DEA&DP, site manager and municipality at the completion of the construction phase

OBJECTIVE C19: EATING, WASHING, REST AND ABLUTION FACILITIES

Project Component/s	Construction site Construction camp
Potential Impact	Environmental pollution

Activities/Risk Sources	Activities associated with site construction		
Mitigation: Target/Objective	Prevent potential environmental pollution and disturbance outside designated areas.		
Mitigation: Action/Control		**Responsibility**	**Timeframe**
The contractor must designate restricted places for personnel to eat, wash and rest, within the specified working areas.		Contractor	Construction phase
The contractor must provide adequate weather proof refuse bins at the designated areas that are emptied on a weekly basis and not overflowing at any time.		Contractor	Construction phase
The feeding of, or leaving food for, animals is strictly prohibited		Contractor	Construction phase
The contractor is responsible for the provision of sufficient and suitably placed chemical toilets.		Contractor	Construction phase
Toilets must be of a neat construction and must be provided with doors and locks and must be secure to prevent wind damage.		Contractor	Construction phase
The contractor must ensure that toilets are serviced and emptied by the service provider when full/required.		Contractor	Construction phase
Waste must be disposed of at a registered/licenced waste disposal site.		Contractor	Construction phase
Performance indicator	Weather proof waste bins provided at designated eating, washing, rest and construction areas. Secure ablution facilities. Waste bins and ablution facilities not overfull and emptied on a regular basis.		
Monitoring	This will be monitored by the ECO during site visits and recorded, reported and proof included in the audit reports to be submitted: • to the site manager monthly during the construction phase (or if construction will be less than a month at least one ECO audit will be conducted) • to the DEA&DP, site manager and municipality as part of the annual compliance report during the construction phase • to the DEA&DP, site manager and municipality at the completion of the construction phase		

OBJECTIVE C20: INTEGRATED WASTE AND HAZARDOUS MATERIALS MANAGEMENT PLAN

Project Component/s	Access roads Construction camp Storage areas Construction site Adjacent land and environmental systems
Potential Impact	Incorrect storage, handling, transporting and disposing of hazardous substances resulting in the contamination of soil, storm and ground water resources. Incorrect storage, handling, transporting and disposing of general solid waste resulting in litter, storm water pollution, and creating a nuisance to adjacent landowners/residents. Incorrect storage, handling, transporting and disposing of effluent/liquid

	waste resulting in the contamination of the storm water system, adjacent property, or hydrological systems. Incorrect storage, handling, transporting and disposing of garden waste, alien vegetation or natural vegetation during the clearing phase of the development site. Poor waste management practices, resulting in waste not being reduced, re-used or recycled.		
Activities/Risk Sources	Activities associated with site construction		
Mitigation: Target/Objective	Protect and mitigate impacts on the environment and hydrological features Ensure that the storage and handling of chemicals and hydrocarbons on-site does not cause pollution to the environment or harm to persons Ensure that the storage and maintenance of machinery on-site does not cause pollution of the environment or harm to persons Comply with waste management guidelines Minimise production of waste Ensure appropriate waste storage and disposal		
Mitigation: Action/Control		**Responsibility**	**Timeframe**
Specific areas must be designated on-site for the temporary management of various waste streams, i.e. general refuse, construction waste (wood and metal scrap) and contaminated waste as required. Location of such areas must seek to minimise the potential for impact on the surrounding environment, including prevention of contaminated runoff, seepage and vermin control.		Contractor	Construction phase
Spillage of oils and fuels must be minimized with the use of drip trays in the garage/workshop areas.		Contractor	Construction phase
An integrated waste management approach that is based on waste minimisation must be used and must incorporate reduction, recycling, re-use and disposal where appropriate. Where practically possible, construction and general wastes on-site must be reused or recycled. Bins and skips must be available on-site for collection, separation, and storage of waste streams (such as wood, metals, general refuse etc.).		Contractor	Construction phase
Please note that section 28 (1) of the National Environmental Management Act, 1998 (Act No 107 of 1998) as amended (NEMA) states: “Every person who causes, has caused or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring, or, in so far as such harm to the environment is authorized by law or cannot reasonable be avoided or stopped, to minimize and rectify such pollution or degradation of the		Contractor	Construction phase

environment". Failure to adhere to section 28(1) of NEMA is an offence and thus particular care of the environment must be taken.		
Disposal of waste must be in accordance with relevant legislative requirements, including the use of licensed contractors and disposal at appropriately licensed waste disposal sites	Contractor	Construction phase
The National Information Systems Regulation must be adhered to in terms of registering and reporting of hazardous waste generated on site via the Integrated Pollutant Waste Information System (IPWIS).	Contractor	Construction phase
All stored fuels to be maintained within a sealed bund and on a sealed surface. The bund must be at least 110% of the volume of the total containers adhering to the requirements of SABS 089:1999 Part 1	Contractor	Construction phase
Fuelling areas situated around fuel tanks must be provided with an impervious layer or drip trays must be used during refuelling;	Contractor	Construction phase
Fuel storage areas must be inspected regularly to ensure bund stability, integrity, and function	Contractor	Construction phase
Oily water from bunds at the substations must be removed from site by licensed contractors	Contractor	Construction phase
The storage of any flammable and combustible liquids such as oils will be in designated areas which are appropriately bunded, and stored in compliance with MSDS files	Contractor	Construction phase
Any storage and disposal permits/approvals which may be required for hazardous substances must be obtained, and the conditions attached to such permits and approvals will be compiled with and copies kept on site in the environmental file	Contractor	Construction phase
Transport, storage and disposal of all hazardous substances must be in accordance with the relevant legislation and regulations	Contractor	Construction phase
Washing of construction vehicles and equipment will only be allowed at the construction camp in bunded areas.	Contractor	Construction phase
Spill kits must be made available on-site for the clean-up of spills and leaks of contaminants. Corrective action must be undertaken immediately if a complaint is received, or potential/actual leak or spill of polluting substance identified. This includes stopping the contaminant from further escaping, cleaning up the affected environment as much as practically possible and implementing preventive measures.	Contractor	Construction phase
Implement an effective monitoring system to detect any leakage or spillage of all hazardous substances during their transportation, handling, use and	Contractor	Construction phase

storage. This must include precautionary measures to limit the possibility of oil and other toxic liquids from entering the soil or storm water systems. Leakage of fuels must be avoided at all times and if spillage occurs, it must be remediated immediately.		
In the event of a major spill or leak of contaminants, the relevant administering authority must be immediately notified as per the notification of emergencies/incidents Spilled cement, fly ash and concrete must be cleaned up as soon as possible and disposed of at a suitably licensed waste disposal site. Any contaminated/polluted soil removed from the site must be disposed of at a licensed hazardous waste disposal facility.	Contractor	Construction phase
Hydrocarbon waste must be contained and stored in sealed containers within an appropriately bunded area. Waste and surplus dangerous goods must be kept to a minimum and must be transported by approved waste transporters to sites designated for their disposal and copies of the safe disposal slips must be kept in the environment file on site.	Contractor	Construction phase
Documentation (waste manifest) must be maintained detailing the quantity, nature, and fate of any regulated waste. Waste disposal records must be available for review at any time.	Contractor	Construction phase
An incident/complaints register must be established and maintained on-site.	Contractor	Construction phase
The sediment control and water quality structures used on-site must be monitored and maintained in a fully operational state at all times	Contractor	Construction phase
Upon the completion of construction, the area must be cleared of potentially polluting materials	Contractor	Construction phase
Dispose of all solid waste collected at an appropriately registered waste disposal site. Waste disposal shall be in accordance with all relevant legislation and under no circumstances may waste be burnt on site	Contractor	Construction phase
Where a registered waste site is not available close to the construction site, provide a method statement with regard to waste management.	Contractor	Construction phase
The storage of waste must comply with the National Environmental Management: Waste Act, (Act No. 59 of 2008) National Norms and Standards for Storage of Waste, 2013	Contractor	Construction phase
Waste may not be stored for a period exceeding 90 days during construction and operations of the proposed development without adherence to the National Norms and Standards for the Storage of Waste in terms of Government Notice (GN) No.926 of 29 November 2013, if the volumes stored exceed	Contractor	Construction phase

80m3 of hazardous waste or 100m3 of general waste. If these thresholds are triggered, the Facility must also be registered on the Department's Integrated Pollutant and Waste Information System (http://ipwis.pgwc.gov.za/ipwis3/public) and the information must be updated regularly thereafter.		
Vegetation removed during the construction phase must be chipped for composting or be disposed of appropriately and may not be disposed of on the adjacent land.	Contractor	Construction phase
All waste oils, fuels and lubricants are considered hazardous waste to be stored separately in bunded areas and disposed of at a licensed hazardous waste handling facility and for which safe disposal certificates must be kept.	Contractor	Construction phase
It is the responsibility of each landowner, lease holder or developer to ensure that they are aware of and adhere to the requirements of the NEM:WA as it pertains to their operations.	Contractor/landowner/ lease owner/developer	Construction phase
The disposal of waste should be considered as a last resort after having considered waste minimization, such as avoidance, reuse and recycling of waste.	Contractor	Construction phase

Performance indicator	Limited chemical spills outside of designated storage areas No water or soil contamination by spills No complaints received regarding waste on site or indiscriminate dumping Provision of all appropriate waste manifests for all waste streams. No construction waste outside of designated waste storage areas. No overflowing waste storage areas
Monitoring	This will be monitored by the ECO during site visits and recorded, reported and proof included in the audit reports to be submitted: • to the site manager monthly during the construction phase (or if construction will be less than a month at least one ECO audit will be conducted) • to the DEA&DP, site manager and municipality as part of the annual compliance report during the construction phase • to the DEA&DP, site manager and municipality at the completion of the construction phase

OBJECTIVE C21: FIRES

Project Component/s	Construction site Construction camp
Potential Impact	Uncontrolled fire on/off site, resulting in damage to the environment, property, injuries/death to personnel on site, or injuries/death to the public.
Activities/Risk Sources	Activities associated with site construction
Mitigation: Target/Objective	To protect and mitigate the safety of people, property, and the environment on and off site.

Mitigation: Action/Control	**Responsibility**	**Timeframe**
No open fires will be allowed on site and adequate	Contractor	Construction phase

firefighting equipment should be available on site in good working order at all times as prescribed by the fire management protocols.		
Performance indicator	No fire occurred due to construction activities and no fires allowed. Management actions are in place should a fire occur.	
Monitoring	This will be monitored by the ECO during site visits and recorded, reported and proof included in the audit reports to be submitted: • to the site manager monthly during the construction phase (or if construction will be less than a month at least one ECO audit will be conducted) • to the DEA&DP, site manager and municipality as part of the annual compliance report during the construction phase • to the DEA&DP, site manager and municipality at the completion of the construction phase	

OBJECTIVE C22: MEASURES TO PROTECT HYDROLOGICAL FEATURES SUCH AS WATERCOURSES/ WETLANDS

Project Component/s	Construction site Construction camp Adjacent natural environments/features	
Potential Impact	Destruction of natural hydrological systems and the pollution of ground water resources.	
Activities/Risk Sources	Activities associated with site construction	
Mitigation: Target/Objective	To protect and mitigate impacts on the environment and hydrological features.	
Mitigation: Action/Control	**Responsibility**	**Timeframe**
All relevant sections and regulations of the National Water Act, 1998 (Act 36 of 1998) regarding water use must be adhered to.	Contractor	Construction phase
No pollution of surface water or ground water resources may occur due to any activity on the property.	Contractor	Construction phase
Runoff must not be polluted and allowed to pool in construction areas, as this could cause contamination to the ground water resources.	Contractor	Construction phase
No activities, including swimming, washing, recreation, ablution, vehicle washing, etc. will be permitted in any of the watercourses. Water is to be protected and conserved at all times.	Contractor	Construction phase
The disturbed areas should receive ongoing monitoring and management of erosion and invasive plant growth	Contractor Municipality	Construction phase
All potential hazardous materials i.e. fuels, cement etc. should be properly stored and contained within the construction camp.	Contractor	Construction phase
Disposal of waste from the site should also be properly managed.	Contractor	Construction phase
Construction workers should be given ablution facilities at the construction site and regularly serviced.	Contractor	Construction phase
All construction activities and personnel on site to stay within demarcated construction areas	Contractor	Construction phase

Proper waste bins to be provided to construction staff and all waste to be regularly removed to municipal landfill site	Contractor	Construction phase
Any oil or diesel spills etc. must be reported to the site manager and rehabilitation measures must be taken immediately and contaminated soil disposed of at a licensed landfill site	Contractor	Construction phase
Construction vehicles must be checked for leakages on a daily basis and repaired before allowed to work within watercourses if a leakage is detected	Contractor	Construction phase
Control access to roads and construction areas to avoid disturbance of areas outside the development footprint	Contractor	Construction phase
Undertake storm water management measures as required	Contractor Municipality	Construction phase
Rehabilitate or stabilise eroded areas immediately to prevent increase in erosion.	Contractor Municipality	Construction phase
Monitor construction areas frequently for sign of erosion and if signs of erosion are detected implement repair and preventative measures immediately	Contractor	Construction phase
All infrastructure areas should be kept free of debris, intrusive growth of invasive alien plants and sediment build-up.	Contractor Municipality	Construction phase
All concrete mixing to be contained within a suitably bunded area preventing any runoff from the concrete mixing area.	Contractor	Construction phase
Ground water contamination must be prevented. Wastewater from the construction and the associated operational activities must be on par with the quality standards of the relevant authority.	Contractor	Construction phase
The construction disturbance zone must be limited to 10m up- and downstream of the end of the new development footprint and this edge must be demarcated on site.	Contractor	Construction phase
No work camps or construction phase stockpiling may be located within 50m of the channel of the River or such that construction associated material or waste will flow, blow or leach into the channel.	Contractor	Construction phase
Any activities involving cement must be tightly controlled to prevent its passage into the river – uncured cement will increase pH and thus potentially affect ammonia toxicity.	Contractor	Construction phase
All refuelling areas must be adequately bunded.	Contractor	Construction phase
Litter must be collected from the abutting wetlands on a daily basis and by foot. All litter must be stored in suitable containers and disposed of at a licensed landfill site on at least a weekly basis.	Contractor	Construction phase
No vehicles may be refuelled within 30m of the mapped wetland edges, and any refuelling areas must be appropriately bunded.	Contractor	Construction phase
Site camps and areas for the storage of construction equipment and / or waste may not be located within	Contractor	Construction phase

31m of the edge of any demarcated watercourse.		
Performance indicator	Impacts on hydrological features minimized and mitigated.	
Monitoring	This will be monitored by the ECO during site visits and recorded, reported and proof included in the audit reports to be submitted: • to the site manager monthly during the construction phase (or if construction will be less than a month at least one ECO audit will be conducted) • to the DEA&DP, site manager and municipality as part of the annual compliance report during the construction phase • to the DEA&DP, site manager and municipality at the completion of the construction phase	

OBJECTIVE C23: CONCRETE/CEMENT MIXING

Project Component/s	Concrete/cement mixing	
Potential Impact	Environmental pollution	
Activities/Risk Sources	Contaminated runoff from concrete mixing area	
Mitigation: Target/Objective	To protect and mitigate impacts on the environment and surrounding land users.	
Mitigation: Action/Control	**Responsibility**	**Timeframe**
Concrete mixing to be sited at least 32m away from the edge of any watercourses and such that impacts on the environment are minimised.	Contractor	Construction phase
The concrete mixing areas should demonstrate good maintenance practices, including regular sweeping to prevent dust build-up.	Contractor	Construction phase
The concrete mixing area should be designed and constructed such that clean storm water is diverted away from contaminated areas	Contractor	Construction phase
The concrete mixing area should be bunded and lined with an impervious liner capable of containing all contaminants found within the water they are designed to collect.	Contractor	Construction phase
Where possible, waste concrete should be used for construction purposes at the project site	Contractor	Construction phase
Performance indicator	No concrete/cement mixing taking place within 32m of the edge of a watercourse or on un-bunded and permeable surfaces. No runoff escaping from bunded concrete mixing area.	
Monitoring	This will be monitored by the ECO during site visits and recorded, reported and proof included in the audit reports to be submitted: • to the site manager monthly during the construction phase (or if construction will be less than a month at least one ECO audit will be conducted) • to the DEA&DP, site manager and municipality as part of the annual compliance report during the construction phase • to the DEA&DP, site manager and municipality at the completion of the construction phase	

OBJECTIVE C24: REHABILITATION AND SITE CLEAN UP AFTER CONSTRUCTION

Project Component/s	All areas affected during construction

Potential Impact	Un-stabilised disturbed areas, environmental pollution due to construction waste, unfinished construction sites		
Activities/Risk Sources	Activities associated with construction completion		
Mitigation: Target/Objective	To protect and mitigate the safety of people, property, and the environment on and off site.		
Mitigation: Action/Control		**Responsibility**	**Timeframe**
Stabilisation and rehabilitation of disturbed sites must take place immediately after construction operations have been completed.		Contractor Municipality	Construction phase
No construction equipment, vehicles or unauthorised personnel must be allowed onto areas that have been stabilised/rehabilitated.		Contractor	Construction phase
The contractors must ensure that all temporary structures, equipment, waste, materials and facilities used or created on site for, or during construction activities, are removed once the project has been completed.		Contractor	Construction phase
Only indigenous vegetation must be used to rehabilitate disturbed areas.		Contractor Municipality	Construction phase
The disturbed areas should receive ongoing monitoring and management of erosion and invasive plant growth.		Contractor Municipality	Construction and rehabilitation phase
Performance indicator	Constructions site are cleared of any temporary works forming part of the construction phase and disturbed areas have been rehabilitated to the satisfaction of the ECO and freshwater ecologist		
Monitoring	This will be monitored by the ECO during site visits and recorded, reported and proof included in the audit reports to be submitted: • to the site manager monthly during the construction phase (or if construction will be less than a month at least one ECO audit will be conducted) • to the DEA&DP, site manager and municipality as part of the annual compliance report during the construction phase • to the DEA&DP, site manager and municipality at the completion of the construction phase		

OPERATIONAL PHASE

This following section defines the management programme for each of the identified goals during the operational phase. The programme is presented in the form of a table, which includes the components described. This programme consists of the following components:

Goals

Over-arching environmental goals for the management phase of the development

Objectives

The objectives are in place in order to meet these goals. These take into account the findings from existing studies and monitoring programmes.

Management Actions

The actions needed to achieve the objectives, taking into consideration factors such as responsibility, methods, frequency, resources required and prioritisation.

Monitoring

Key actions to verify that objectives are being achieved, taking into consideration responsibility, frequency, methods, and reporting.

Criteria/ Targets

The criteria or targets indicate the efficacy of the management programme. The targets should be readily measurable, understandable to the layperson, cost-effective to monitor, and meet legal requirements.

Remedial Actions

Specifies actions needed to be taken if the targets are not met; or if there is an unforeseen event.

The following 6 are specified goals:

Goal 1: Waste Management and Pollution Control
Goal 2: Water Quality and Storm Water Management
Goal 3: Erosion Control
Goal 4: Emergency Procedures
Goal 5: Vegetation Management, inclusive of Alien management
Goal 6: Freshwater Ecosystems Management
Goal 7: Infrastructure Maintenance Management

Goal 1: Waste Management and Pollution Control

Objectives	Risks	Actions	Monitoring	Criteria/Targets	Remedial Actions
Ensure allocation of sufficient resources for on-going Integrated Waste Management e.g. staff, equipment, budget.	Pollution and odours	1. The waste accumulated at the infrastructure and surrounds needs to be managed in terms of the National Environmental Management Waste Act, 2008 (Act 59 of 2008) by the municipality and the final disposal of the waste must take place at the appropriate licensed waste disposal site or recycling facility. 2. Solid waste may only be disposed of at an authorised solid waste facility in terms of abovementioned legislation. 3. Waste accumulation to be monitored and removed from the sites and surrounds on a monthly basis by the municipality. 4. Waste accumulated at stormwater outlets/discharge points must be removed by the municipality at least monthly and after heavy rains. 5. All vehicles transporting waste must be closed to avoid possible pollution of waste on transport routes. 6. Waste needs to be sorted and recycled as far as possible. The minimising of waste must be promoted and alternative methods of waste management must be investigated. 7. All waste types to be handled, stored, transported and disposed of	Annual audits of operations vs EMP to identify those requirements that are not being met. **Responsibility:** Municipality to implement actions and appoint an ECO to conduct annual compliance audit.	No accumulated waste or pollution within watercourses and at development sites.	If pollution on site is detected immediate actions must be taken to contain the pollution. Within 24hours of detection the applicant must be informed of the incident, where after a site visit will be conducted and recommend further rehabilitation methods to be implemented. Depending on type and extent of pollution occurred specialists may be contacted to provide specific recommendations. An incident report to be compiled and sent to relevant government authorities.

		according to relevant legislature. 8. Squatting and rubble dumping adjacent to the new development is not allowed and must be controlled by the municipality and regular inspections conducted to ensure control. 9. An integrated waste management approach must be implemented, based on waste minimisation, reduction, recycling, re-use and disposal where possible. 10. Waste may not be stored for a period exceeding 90 days without adherence to the National Norms and Standards for the Storage of Waste in terms of Government Notice (GN) No.926 of 29 November 2013, if the volumes stored exceed 80m3 of hazardous waste or 100m3 of general waste. If these thresholds are triggered, the Facility must also be registered on the Department's Integrated Pollutant and Waste Information System (http://ipwis.pgwc.gov.za/ipwis3/public) and the information must be updated regularly thereafter. 11. During the event of environmental pollution the relevant authorities including the Directorate Pollution Management must be informed within 14 days as per Section 30(10) of NEMA, and the necessary step must be implemented as soon as			

		possible to rehabilitate polluted areas and prevent re-occurrence of environmental pollution. 12. Dust, odour and noise must be controlled appropriately and must not cause any nuisance conditions during hours of operation of the facilities and/or infrastructure. 13. Ground water contamination must be prevented. Wastewater from the associated operational activities must be on par with the quality standards of the relevant authority. 14. Please note that section 28 (1) of the National Environmental Management Act, 1998 (Act No 107 of 1998) as amended (NEMA) states: "Every person who causes, has caused or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring, or, in so far as such harm to the environment is authorized by law or cannot reasonable be avoided or stopped, to minimize and rectify such pollution or degradation of the environment". Failure to adhere to section 28(1) of NEMA is an offence and thus particular care of the environment must be taken.			

Goal 2: Water Quality and Storm Water Management Measures

Objectives	Risks	Actions	Monitoring	Criteria/Targets	Remedial Actions
Ensure allocation of sufficient resources for on-going Water Quality and Storm Water Management e.g. staff, equipment, budget.	Pollution, odours and erosion	1. All relevant sections and regulations of the National Water Act, 1998 (Act 36 of 1998) regarding water use must be adhered to. 2. No storm water runoff from any premises containing waste, or water containing waste emanating from infrastructure may be discharged into a water resource. Polluted storm water must be contained. 3. Storm water infrastructure should be monitored at least on a 3 monthly basis and any degradation or faults attended to immediately. 4. Ensure no pollution of any water resources, including surface water, storm water and groundwater takes place as a result of any activities on the site. 5. Ensure that no water other than storm water be discharged in the storm water system. 6. Storm water should be directed away from the roads and into the existing natural flow paths/drainage lines on site. 7. All waste within the storm water channels must be removed on a monthly base and after heavy rains. 8. If any erosion and/or degradation of the channel are noticed immediate action must be taken by	Annual audits of operations vs EMP to identify those requirements that are not being met. **Responsibility:** Municipality to implement actions and appoint an ECO to conduct annual compliance audit.	No accumulated waste or signs of erosion or pollution within watercourses at development sites.	If pollution on site is detected immediate actions must be taken to contain the pollution. Within 24hours of detection the applicant must be informed of the incident, where after a site visit will be conducted and recommend further rehabilitation methods to be implemented. Depending on type and extent of pollution occurred specialists may be contacted to provide specific recommendations. An incident report to be compiled and sent to relevant government authorities

		the municipality to rectify the situation. (Corrective and preventative measures taken will depend upon type and extent of erosion and/or degradation occurring).			

Goal 3: Erosion Control

Objectives	Risks	Actions	Monitoring	Criteria/Targets	Remedial Actions
Ensure allocation of sufficient resources) for on-going erosion control management (e.g. staff, equipment, budget)	Erosion, sink-holes and or blocking of storm water systems. Damage to Infrastructure.	1. On-going monthly monitoring and management of roads, roadways and areas susceptible to erosion. 2. Ensure suitable vegetation cover or surface on non-hardened surfaces. 3. Control runoff of storm water to prevent soil erosion. 4. Avoid the formation of sink-holes on sensitive soils. 5. Management and control of erosion within and along watercourses, infrastructure, rehabilitated areas and housing areas.	Annual audits of operations vs EMP to identify those requirements that are not being met. **Responsibility:** Municipality to implement actions and appoint an ECO to conduct annual compliance audit.	No signs of erosion within watercourses at development sites.	If erosion is detected immediate actions must be taken to contain the erosion. Depending on type and extent of erosion occurred specialists may be contacted to provide specific recommendations.

Goal 4: Emergency Procedures

Objectives	Risks	Actions	Monitoring	Criteria/Targets	Remedial Actions
Ensure allocation of sufficient resources for on-going safety, security and emergency procedures. e.g. staff, equipment,	Pollution, floods, fire and health risks.	1. Emergency plans in case of flooding, fires, pollution to be compiled and implemented by the municipality. Local community members to be informed and made aware of emergency protocols to be	Annual audits of operations vs EMP to identify those requirements that are not being met. **Responsibility:** Municipality to implement actions	Necessary emergency plans in place and available to the public	Emergency response procedures to be followed as required. An incident report to be compiled and sent to

budget.		followed. 2. Sufficient Fire Fighting equipment to be available at nearest fire station. 3. Yearly pre-season testing and servicing of firefighting equipment.	and appoint an ECO to conduct annual compliance audit.		relevant government authorities

Goal 5: Vegetation Management, inclusive of Alien Vegetation.

Objectives	Risks	Actions	Monitoring	Criteria/Targets	Remedial Actions
Ensure allocations of sufficient resources e.g. staff, equipment, budget,) for On-going alien and vegetation management	Degradation and replacement of indigenous ecosystem characteristics i.e. indigenous flora and fauna habitat.	1. Any alien and invasive vegetation that occur on property owned by the CoCT should be controlled or removed as prescribed by the Alien and Invasive Species Regulations of 2014. 2. All disturbed areas should be cleared and kept clear of weeds and alien invasive plants. 3. Implement an on-going alien vegetation management plan, clearing the site and surrounds of all alien invasive plants. 4. Rehabilitate disturbed areas with locally indigenous vegetation species within one year of disturbance and monitor successful rehabilitation of disturbed sites.	Annual audits of operations vs EMP to identify those requirements that are not being met. **Responsibility:** Municipality to implement actions and appoint an ECO to conduct annual compliance audit.	On-going removal of weeds and alien invasive plants at disturbed sites.	No remedial actions required, only on-going alien vegetation clearing and monitoring as indicated.

Goal 6: Freshwater Ecosystems Management

Objectives	Risks	Actions	Monitoring	Criteria/Targets	Remedial Actions
Ensure allocation of sufficient resources e.g. staff, equipment, budgets, for on-going freshwater ecosystems management	Degradation/ destruction of freshwater ecosystems such as wetlands and tributaries	1. Rehabilitate impacted wetland/watercourse areas immediately after construction completion and monitor that successful rehabilitation has taken place. 2. Prevent any further degradation of freshwater ecosystems due to the infrastructure built i.e. erosion due to increased stormwater runoff, water quality pollution due to contaminated stormwater runoff etc. 3. Establish and maintain indigenous aquatic vegetation within impacted and remaining surrounding aquatic areas and implement ongoing alien vegetation management measures. 4. Freshwater Ecosystems Management and associated monitoring measures to be implemented under the guidance of a freshwater ecologist.	Annual audits of operations vs EMP to identify those requirements that are not being met. **Responsibility:** Municipality to implement actions and appoint a freshwater ecologist to provide inputs concerning the required rehabilitation and management of remaining wetland areas and the ECO to conduct annual compliance audit.	1. Adequate annual Budgets 2. On-going employment of ECO and maintenance staff	To be determined

Goal 7: Infrastructure Maintenance Management

Objectives	Risks	Actions	Monitoring	Criteria/Targets	Remedial Actions
Ensure allocation of sufficient resources e.g. staff, equipment, budgets, for on-going	Degradation of built infrastructure leading to	1. No pollution of surface water or ground water resources may occur due to any activity. 2. The infrastructure must be	Annual audits of operations vs EMP to identify those requirements that are	1. Adequate annual Budgets 2. On-going employment of	To be determined

infrastructure maintenance management	additional impacts such as traffic congestion, environmental degradation etc.	monitored and kept free of silt/sediment, waste or debris built-up and intrusive growth of invasive alien plants at least annually before the main rainfall season and all excess silt built-up, waste or debris must be removed immediately. 3. Existing access roads to the sites must be used to gain access. No new access roads may be cleared. 4. All of the sites must be constantly monitored for any sign of erosion and if erosion is detected immediate action must be taken to rehabilitate the impacted area and prevent any further erosion. 5. Undertake storm water management measures as required. 6. Selective removal and/or trimming of reeds and invasive trees within the wetland areas should also take place if it is obstructing flow and/or causing erosion or sediment build-up. This should be done with the advice and guidance of an aquatic ecologist, by hand-cutting or pulling *Phragmites* reeds and alien trees during the late summer months. Cutting at other times may increase stand density. *Phragmites* stems should be cut leaving at least 50cm stump. Hand-held cutters and gas-powered	not being met. **Responsibility:** Municipality to implement actions and appoint an ECO to conduct annual compliance audit.	ECO and maintenance staff	

		hedge trimmers work well. Weed whackers with a circular blade is also sufficient. Cut material should be removed from the site and composted or allowed to decay at a licensed landfill site. Care must be taken to remove all cut shoots to prevent their sprouting and forming stolons. Note: the reeds serve an important purpose to stabilise the unstable sandy riverbed therefore the reeds must only be hand-cut and not completely removed or pulled from the riverbed. 7. The infrastructure and an area 100m upstream should be inspected following large storms and annually before winter. Large debris which may impede water flow should be removed – this refers to large logs and trees and not small twigs and leaves as removal of this minor debris will result in sterilisation of the watercourses. 8. Should infilling be required within or along the relevant watercourses during maintenance activities the area to be infilled, method and materials to be used must first be approved by the ECO and/or freshwater ecologist before infilling is conducted. Planting of the infilled area with indigenous			

		vegetation may also be required and will be determined by the ECO and/or freshwater ecologist. 9. No water may be abstracted from any water resource without the appropriate prior authorisation from the delegated authority and all relevant sections and regulations of the National Water Act, 1998 (Act 36 of 1998) regarding water use must be adhered to.			

CHAPTER 8

ENVIRONMENTAL REPORTING

The facility must ensure that "Any emergency incident, originating at the facility, which falls within the definition of section 30(1) a of the National Environmental Management Act (NEMA), Act of 1998, must be dealt with by the facility in accordance with Section 30 of NEMA". In the event of any incident the facility must ensure containment by the responsible person and notify the Sub-Directorate: pollution information and chemicals management section at (021) 483 2760 / 2968.

In order to ensure that the necessary environmental issues are adequately addressed and recorded, the following environmental reporting shall be undertaken:

- Incident reporting; and
- Compliance reporting

See below for a template of an Incident Report to serve as a guideline for the recording and addressing of emergency incidents as and when they occur.

ENVIRONMENTAL INCIDENT REPORT

DATE:	**File Ref:**
NAME:	**Copy to:**
EXACT LOCATION OF INCIDENT:	

SECTION 1 : DESCRIPTION OF INCIDENT

SECTION 2 : REMEDIAL ACTION REQUIRED

Remedial Action Due Date:
Confirmation of implementation: **Name:** **Date:**

SECTION 3 : RELEVANT DOCUMENTATION

SECTION 4 : SIGNATURES

Municipal Engineer:

.....

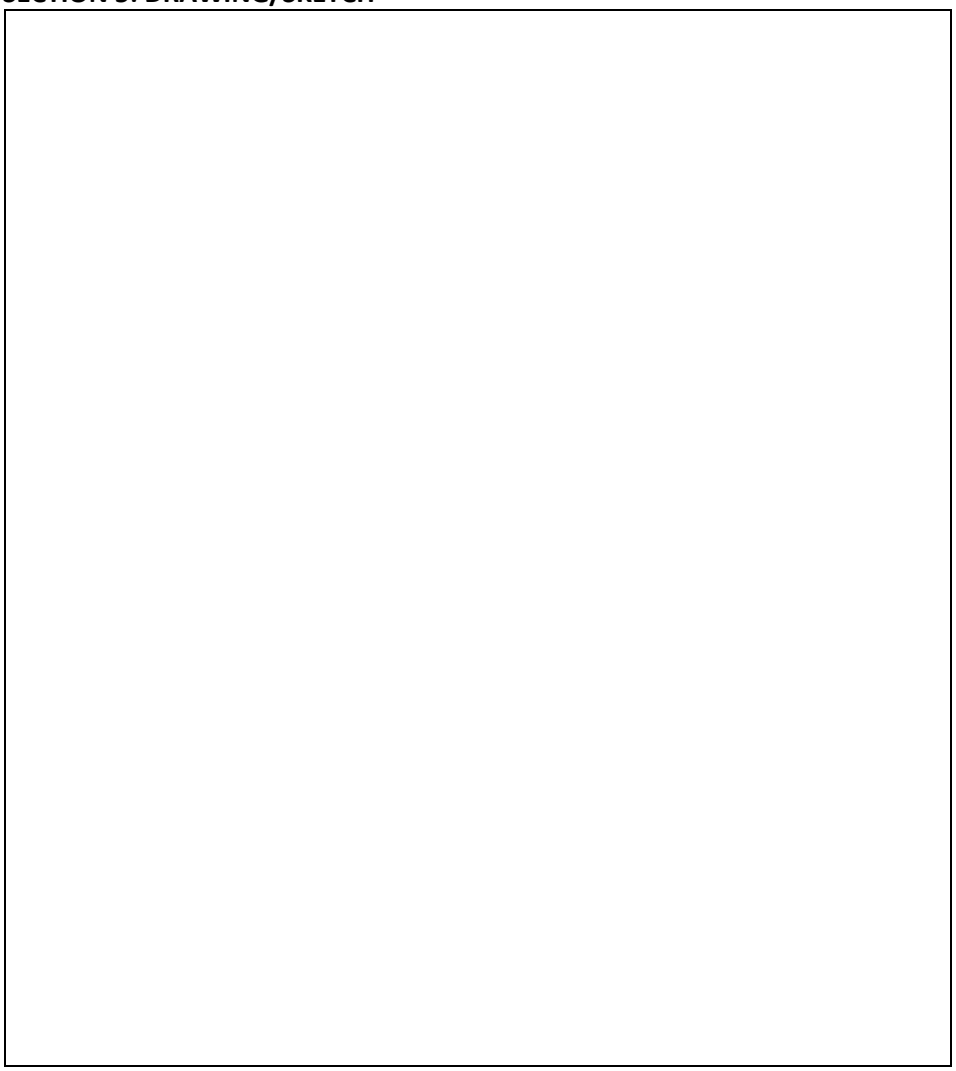
Name:
Date:

ECO:

.....

Name:
Date:

SECTION 5: DRAWING/SKETCH



CHAPTER 9

DECOMMISSIONING PHASE

As the final phase in the project cycle, decommissioning may present positive environmental opportunities associated with the return of the land for alternative use and the cessation of impacts associated with operational activities. However, depending on the nature of the operational activity, the need to manage risks and potential residual impacts may remain well after operations have ceased.

Examples of potential residual impacts and risks include contamination of soil and groundwater, stock that has been abandoned (e.g. oil drums, scrap equipment, old chemicals) and old (unserviceable) structures.

Closure and decommissioning impacts are likely to be similar to the construction phase impacts. The management actions and control under the Construction Phase need to be implemented to mitigate the negative impacts on the environment and to restore the property to its natural state. It is however highly unlikely that the development will be decommissioned and closed in the near future.

A decommissioning phase is where a structure is removed or otherwise modified to make it incapable for re use for the original design purpose.

The results of environmental monitoring during the decommissioning phase will be used to assess the impact of the decommissioning on the surrounding environment and demonstrate compliance with regulatory requirements.

The actual scope of the decommissioning environmental monitoring will be established following consultation with the regulatory authorities. The format of decommission management strategy will probably be similar to that of earlier development phases and consist of the following:

- Management Principles
    - Develop monitoring procedures in accordance with standard protocols and the requirements of the environmental legislation.
    - Undertake environmental monitoring during the decommissioning phase as shown below.

Environmental monitoring during the decommissioning phase will include terrestrial and aquatic indigenous habitat rehabilitation monitoring.

CHAPTER 10

REHABILITATIONS AND SITE CLEAN-UP

The contractors must ensure that all temporary structures, equipment, materials and facilities used or created on site for, or during construction, operational and decommissioning activities, are removed once the phase has been completed.

Stabilisation and rehabilitation must take place immediately after the construction/decommissioning operations have been completed. No vehicles or unauthorised personnel must be allowed onto areas that have been rehabilitated.

The areas impacted must be stabilised and shaped according to the natural surrounding contours. If topsoil was removed the topsoil must be used to stabilise the impacted areas.

Rehabilitated areas must be irrigated as and if required to ensure successful establishment of planted indigenous vegetation.

Erosion and Alien vegetation monitoring of the rehabilitated areas and surrounds must be conducted on an annual basis and if sign of erosion or alien vegetation return is detected it must be managed as according to the requirements of the EMP.

CHAPTER 11

ENVIRONMENTAL AWARENESS INDUCTION COURSE MATERIAL

This section of the report is included in compliance with Section 24N (3) (c) of the National Environmental Management Act 107 of 1998.

WHAT IS THE ENVIRONMENT?

- Soil
- Water
- Plants
- People
- Animals
- Air we breathe

WHY MUST WE LOOK AFTER THE ENVIRONMENT?

- It affects us all as well as future generations
- We have a right to a healthy environment
- A Policy and System will be signed

HOW DO WE LOOK AFTER THE ENVIRONMENT?

- Report problems to your supervisor/ foreman
- Team work
- Follow the rules in the EMP

WORKING AREAS

Workers & equipment must stay inside the site boundaries at all times

RIVERS & STREAMS

- Do not swim in or drink from streams
- Do not throw oil, petrol, diesel, concrete or rubbish in the stream
- Do not work in the stream without direct instruction
- Do not damage the banks or vegetation of the stream

ANIMALS

- Do not injure or kill any animals on the site
- Ask your supervisor or Contract's Manager to remove animals found on site

TREES AND FLOWERS

- Do not damage or cut down any trees or plants without permission
- Do not pick flowers

SMOKING AND FIRE

- Put cigarette butts in a rubbish bin
- Do not smoke near gas, paints or petrol
- Do not light any fires without permission
- Know the positions of fire fighting equipment
- Report all fires
- Do not burn rubbish or vegetation without permission

PETROL, OIL AND DIESEL

- Work with petrol, oil & diesel in marked areas
- Report any petrol, oil & diesel leaks or spills to your supervisor
- Use a drip tray under vehicles & machinery
- Empty drip trays after rain & throw away where instructed

DUST

Try to avoid producing dust

NOISE

- Do not make loud noises around the site, especially near schools and homes
- Report or repair noisy vehicles

TOILETS

- Use the toilets provided
- Report full or leaking toilets

EATING

- Only eat in demarcated eating areas
- Never eat near a river or stream
- Put packaging & leftover food into rubbish bins

RUBBISH

- Do not litter – put all rubbish (especially cement bags) into the bins provided
- Report full bins to your supervisor
- The responsible person should empty bins regularly

TRUCKS AND DRIVING

- Always keep to the speed limit
- Drivers – check & report leaks and vehicles that belch smoke
- Ensure loads are secure & do not spill

EMERGENCY PHONE NUMBERS

Know all the emergency phone numbers:

- Ambulance:
- Fire:
- Police: 10111

FINES AND PENALTIES

- Spot fines of between R20 and R2000
- Your company may be fined
- Removal from site
- Construction may be stopped

PROBLEMS - WHAT TO DO!

- Report any breaks, floods, fires, leaks and injuries to your supervisor
- Ask questions!

ATTENDANCE REGISTER FOR ……	
PLACE …….	TRAINER……..
NAME & SURNAME	SIGNED
SIGNED ……	DATE & TIME ……

CHAPTER 12

COMPLIANCE WITH THE ENVIRONMENTAL AUTHORISATION

All conditions of the Environmental Authorisation must be adhered to onsite during the construction-, operational-, decommissioning- and rehabilitation phases of the proposed project. A copy of the Environmental Authorisation (and all other relevant license, permits, legislation etc.) must be available on site together with the EMP and all contractors on site must sign the Declaration of Understanding as proof of awareness and understanding of all the conditions to be adhered to on site in terms of the EA and EMP.

CHAPTER 13

UPDATING/ADAPTING THE EMP

Although care has been taken to address all known relevant environmental issues for the development, it might become necessary to add or amend certain procedures or instructions to improve the efficiency of the EMP. Only those additions to, or amendments of, this EMP that will either improve environmental protection or can be proven not to have any negative effects would be considered to be included, and any amendments to the EMP must first be approved by the ECO and competent authority/ies i.e. DEA&DP before the EMP can be amended and implemented as such.

The name, address and contact phone number of the site supervisor/s must be included in the EMP once appointed by the applicant.

REFERENCES

City of Cape Town (2002) Environmental Management Programme (Version 5) for Civil Engineering Construction Activities.

DEA&DP: ENVIRONMENTAL MANAGEMENT PROGRAMME. VER 5 (04/2002). Guideline Document for the ECO / ESO and the ER

Department of Water Affairs and Forestry, February 2005. Environmental Best Practice Specifications: Construction Integrated Environmental Management Sub-Series No. IEMS 1.6. Third Edition. Pretoria.