



**GENERIC ENVIRONMENTAL MAINTENANCE MANAGEMENT PLAN  
FOR THE REHABILITATION, REPAIR AND UPGRADE OF EXISTING  
STORMWATER INFRASTRUCTURE WITHIN SENSITIVE  
ENVIRONMENTAL AREAS**

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IN ASSOCIATION WITH **INKANYEZI YETHU**

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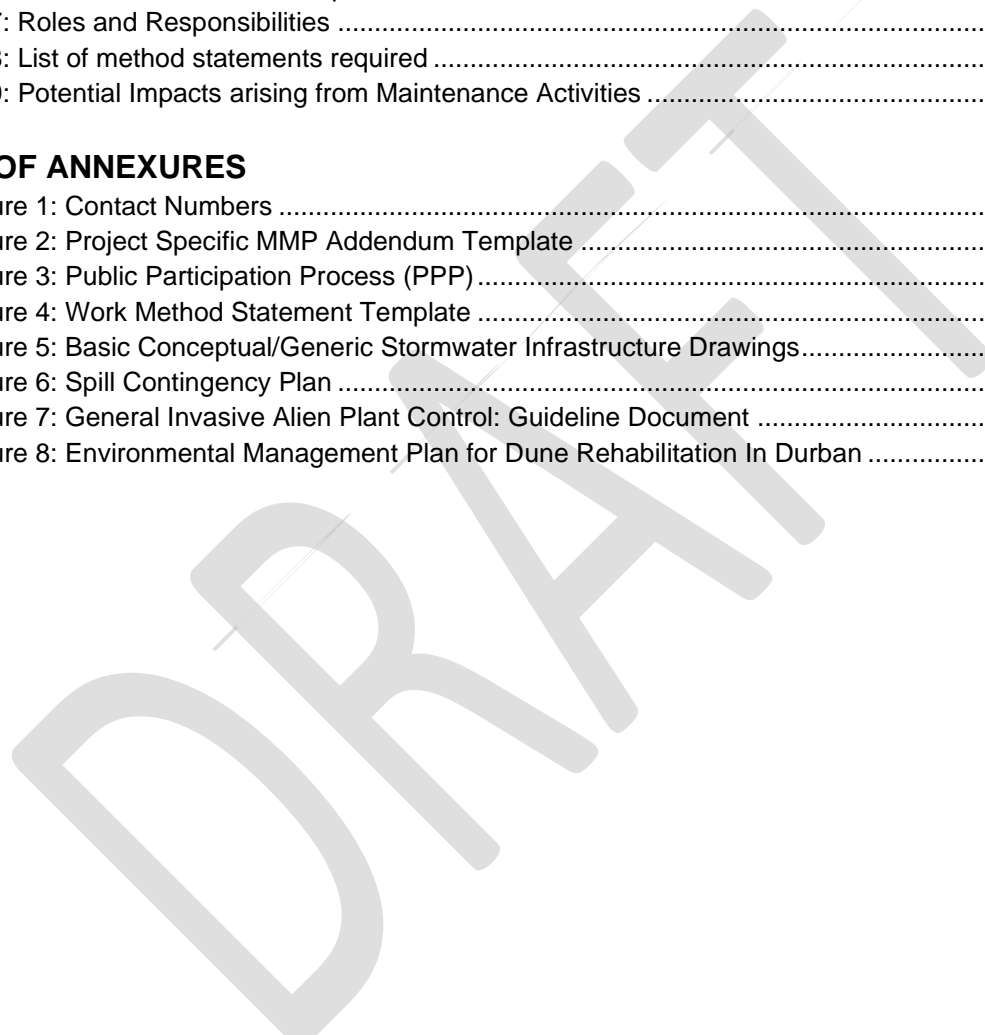
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## ACRONYMS

BID	background Information Document
BMD	Biodiversity Management Department
CSCM	eThekweni Coastal Engineering Stormwater Catchment Management
DAFF	Department of Agriculture, Forestry and Fisheries
DEA	Department of Environmental Affairs (National)
DFFE	Department of Forestry, Fisheries and the Environment
DWS	Department of Water and Sanitation
DMOSS	Durban Metropolitan Open Space System
DMRE	The Department of Mineral Resource and Energy
ECO	Environmental Control Officer
EDTEA	Department of Economic Development, Tourism and Environmental Affairs (Provincial)
EKZNW	Ezemvelo KZN Wildlife
EMA	eThekweni Municipal Area
EMPr	Environmental Management Programme
GA	General Authorisation
KZN	KwaZulu-Natal
LDV	Light Duty Vehicles
MMP	Maintenance Management Plan
NEMA	National Environmental Management Act (Act No. 107 of 1998)
NEMPAA	The National Environmental Management: Protected Areas Act (Act No. 57 of 2003)
PLC	Parks, Leisure and Cemeteries
PM	Project Manager
PPP	Public Participation Process
SA	South African
SABS	South African Bureau of Standards
SAHRA	South African Heritage Resources Agency
SANBI	South African National Biodiversity Institute
SHE	Safety, Health and Environment
SOP	Standard Operating Procedure
WUA	Water Use Authorisation
WULA	Water Use License Application
WUL	Water Use Licence

## **DEFINITIONS:**

### Alien Species:

- (a) A species that is not an indigenous species.
- (b) An indigenous species trans-located or intended to be trans-located to a place outside its natural distribution range in nature, but not an indigenous species, that has extended its natural distribution range by natural means of migration or dispersal without human intervention.

### Contractor:

This is a person/company in the employment of the Employer, acting for the Employer or has a written agreement with the Employer. This applies to both principal and sub-contractors.

### Durban Metropolitan Open Space System (DMOSS):

DMOSS is a system of open spaces of land and water within eThekweni Municipality that incorporates areas of high biodiversity value linked together in a viable network of open spaces.

### Employer:

Employer means the client line department which is the Coastal, Stormwater, and Catchment Management Department of the eThekweni Municipality.

### Engineer:

Engineer means the engineering company acting through a Director, a Partner or an official authorised thereto in writing responsible for design and project management. (The Engineer is also sometimes referred to as the Project Manager). For certain projects, this role is undertaken by another professional person responsible for the design and/or management of the contract/s, referred to as the Principal Agent.

### Engineer's Site Representative:

An on-site representative of the Engineer, who is responsible for day-to-day management of the project.

### Environmental Control Officer (ECO):

An independent Environmental Consultant assigned to the project. The independent Environmental Control Officer shall be a member of the environmental representative team and shall advise the Principal Agent/Engineer on all environmental matters relating to the development in consultation with Biodiversity Management Department (BMD).

### Environment:

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

- (a) The land, water and atmosphere of the earth.
- (b) Micro-organisms, plant and animal life.
- (c) Any part or combination of (a) and (b) and the interrelationships among and between them.
- (d) The physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human
- (e) health and well-being.

### Forest:

Includes:

- (a) A natural forest, woodland and a plantation.
- (b) The forest produces in it.
- (c) The ecosystems which it makes up.

### Environmental Representatives:

Line Department Environmental representative responsible for environmental management as required by the Environmental Consultant (ECO) and BMD.

Estuary:

Estuary means a body of surface water:

- (a) that is permanently or periodically open to the sea;
- (b) in which a rise and fall of the water level as a result of the tides is measurable at spring tides when the body of surface water is open to the sea; or
- (c) in respect of which the salinity is higher than fresh water as a result of the influence of the sea, and where there is a salinity gradient between the tidal reach and the mouth of the body of surface water.

Indigenous Vegetation:

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

Interested and Affected Parties (I&APs):

All persons who may be affected by the project either directly or indirectly, or who have an interest or stake in the area to be affected by the project. I&APs include landowners, tribal or local authorities, local residents, tourists, public interest groups, etc.

Invasive Species

Invasive species means any species whose establishment and spread outside of its natural distribution range:

- (a) threaten ecosystems, habitats or other species or have demonstrable potential to threaten ecosystems, habitats or other species; and
- (b) may result in economic or environmental harm or harm to human health.

Littoral Active Zone:

Littoral active zone means any land forming part of, or adjacent to, the seashore that is unstable and dynamic as a result of natural processes; and characterised by dunes, beaches, sand bars and other landforms composed of unconsolidated sand, pebbles or other such material which is either unvegetated or only partially vegetated.

Maintenance:

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

Maintenance Management Plan:

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

Natural Forest:

Natural forest means a group of indigenous trees

- (a) Which have crowns that are largely contiguous; or
- (b) Which have been declared by the Minister to be a natural forest under section 7 (2) of the National Forests Act (No 84 of 1998)

Principal Agent:

Principal Agent means the company acting through a Director, a Partner or an official authorised thereto in writing responsible for the administration of the project on behalf of the Employer. (The Principal Agent is also sometimes referred to as the Project Manager).

Principal Agent's Site Representative:

An on-site representative of the Principal Agent responsible for day-to-day management of the project.

Progressive Reinstatement:

Reinstatement of disturbed areas to topsoil profile on an on-going basis immediately after selected maintenance activities (e.g., backfilling of a trench) are completed. This allows for passive rehabilitation (i.e., natural re-colonisation by vegetation) to commence.

Rehabilitation:

Rehabilitation measures are taken to rehabilitate degraded ecosystems or restore cleared ecosystems following exposure to impacts that cannot be completely avoided and/ or minimised. Rehabilitation emphasizes the reparation of ecosystem processes, productivity and services, whereas the goals of restoration also include the re-establishment of the pre-existing biotic integrity in terms of species composition and community structure.

Riparian Vegetation:

Vegetation occurring on the banks of a river or stream (i.e., vegetation fringing a water body). In this specification, riparian vegetation in terms of removal, storage and replacement is only applied to sedge, grass, groundcover, reed, bulrush, or herbaceous component of riparian vegetation and excludes the woody component.

Solid Waste:

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

Subsoil:

Subsoil is the soil horizons between the topsoil horizon and the underlying parent rock. Subsoil often has more clay-like material than the topsoil. Subsoil is of less value to plants, in terms of nutrient (food) and oxygen supply, than topsoil. When subsoil is exposed it tends to erode fairly easily.

Tree:

Tree includes any tree seedling, sapling, transplant or coppice shoot of any age and any root, branch or other part of it.

Topsoil:

This is defined as the A horizon of the soil profile. Topsoil is the upper layer of soil from which plants obtain their nutrients for growth. It is often darker in colour, due to the organic (humus) fraction. Topsoil is deemed for the purposes of this specification as the layer of soil from the surface to the specified depth required for excavation. Where topsoil is referred to, it is deemed to be both the soil and grass/ground cover fraction.

Water Body:

Any open body of water including streams, dams, rivers, lakes, and the sea.

Watercourse:

Watercourse means

- (a) a river or spring,
- (b) a natural channel in which water flows regularly or intermittently,
- (c) wetland, lake or dam into which, or from which, water flows, and any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse; and

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

Wetland Vegetation:

Vegetation that is indicative of a wetland environment, e.g., sedges, *Barrentonia*, rushes, reeds, hydrophilic grasses and ground-covers, but for the purposes of this specification excludes woody species.



Wetland:

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

Woodland:

A group of indigenous trees which are not a natural forest, but whose crowns cover more than five per cent of the area bounded by the trees forming the perimeter of the group.

DRAFT

## APPLICATION OF THIS OVERARCHING MAINTENANCE MANAGEMENT PLAN

**BEFORE PROCEEDING WITH INSPECTION AND MAINTENANCE ACTIVITIES WITHIN SENSITIVE ENVIRONMENTAL AREAS, PLEASE PERFORM THE CHECK BELOW**

### MAINTENANCE OF EXISTING STRUCTURES

For the purpose of this MMP all maintenance activities on existing structures must conform to the definitions below:

- **"Maintenance"** means actions performed to keep a structure or system functioning or in service on the same location, capacity and footprint.
- **Existing structures** include any previously constructed infrastructure which are used to manage stormwater i.e. stormwater pipes, discharge points, etc.

Maintenance as referred to above excludes all activities which require development and expansion according to the below definitions provided in the National Environmental Management Act (NEMA) Environmental Impact Assessment Regulations (2014 as amended).

- **"Development"** means the building, erection, construction or establishment of a facility, structure or infrastructure, including associated earthworks or borrow pits, that is necessary for the undertaking of a listed or specified activity, but excludes any modification, alteration or expansion of such a facility, structure or infrastructure, including associated earthworks or borrow pits, and excluding the redevelopment of the same facility in the same location, with the same capacity and footprint.
- **"Expansion"** means the modification, extension, alteration or upgrading of a facility, structure or infrastructure at which an activity takes place in such a manner that the capacity of the facility or the footprint of the activity is increased.

This MMP is applicable to the rehabilitation, repair and upgrade requirements for municipal infrastructure used to manage stormwater within sensitive environmental areas. Environmentally sensitive areas have been defined as follows:

- Formally Protected Areas, including Nature Reserves;
- Durban Metropolitan Open Space System (DMOSS);
- Natural vegetated areas of indigenous vegetation (not within DMOSS);
- Public Open Space as per the approved eThekweni Municipalities approved zoning schemes;
- Watercourses (as per definition of watercourses in the National Water Act, 1998);
- 1:100 year flood lines;
- Riparian habitats;
- Estuary (as per definition of littoral active zones in the National Environmental Management: Integrated Coastal Management Act, 2008); and
- Littoral active zones (as per definition of littoral active zones in the National Environmental Management: Integrated Coastal Management Act, 2008).

**NOTE: SITE SPECIFIC APPLICATIONS AND MMPS MUST STILL BE PREPARED AND SUBMITTED TO THE DEPARTMENT OF ECONOMIC DEVELOPMENT, TOURISM AND ENVIRONMENTAL AFFAIRS FOR EACH INDIVIDUAL PROJECT.**

## WHAT ACTIVITIES ARE INCLUDED

Activities included in this MMP pertain to the rehabilitation, repair and upgrade activities of existing stormwater infrastructure. This may include the *in-situ* inspections and testing activities on the existing infrastructure.

**THIS MMP CAN ONLY TO BE IMPLEMENTED WITHIN THE ETHEKWINI MUNICIPAL AREA.**

## WHAT ACTIVITIES ARE EXCLUDED

The activities excluded from the MMP pertain to:

- *The development<sup>1</sup> of new structures within environmentally sensitive areas.*
- *The expansion<sup>2</sup> of existing structures within environmentally sensitive areas.*
- *The relocation of any existing infrastructure within environmentally sensitive areas.*
- *Site-specific management criteria – refer to the site/project-specific MMP.*

Only activities documented in this MMP are allowed to proceed without an application for Environmental Authorisation from the Department of Economic Development, Tourism and Environmental Affairs (EDTEA). The MMP may be amended to include appropriate additional maintenance activities as detailed below.

## PROCESS OF MMP AUTHORISATION AMENDMENT – Inclusion of a New Maintenance Activity or Amendment to the Approved MMP

Should a new activity need to be undertaken that has not been covered in an authorised MMP pertaining to rehabilitation, repair and upgrade of existing stormwater infrastructure, or if the processes or activities in the MMP need to be corrected, the following approval process must be followed:

1. The Responsible Line Department must engage with eThekweni Biodiversity Management Department (BDM) to confirm that the activity has not been covered in an authorised MMP and propose the recommended changes to the MMP.
2. The MMP must be amended to include the new maintenance activity including additional detailed method statements as to what process and procedures will be carried out for the new maintenance activity. Changes to the Approved MMP must be reflected in bold and underline.
3. The amended MMP must be reviewed by BDM.
4. The amended MMP must be submitted to EDTEA for approval.
5. EDTEA will review and approve the amended authorised MMP.

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<sup>1</sup> **"Development"** means the building, erection, construction or establishment of a facility, structure or infrastructure, including associated earthworks or borrow pits, that is necessary for the undertaking of a listed or specified activity, but excludes any modification, alteration or expansion of such a facility, structure or infrastructure, including associated earthworks or borrow pits, and excluding the redevelopment of the same facility in the same location, with the same capacity and footprint.

<sup>2</sup> **"Expansion"** means the modification, extension, alteration or upgrading of a facility, structure or infrastructure at which an activity takes place in such a manner that the capacity of the facility or the footprint of the activity is increased.

## MMP APPLICATION CHECKLIST

*If the answer is “YES” to any of the questions below then DO NOT proceed with maintenance activities as Environmental Authorisation may be required from the Department of Economic Development, Tourism and Environmental Affairs (EDTEA). Contact: Ms Natasha Brijlal (031) 366 7317 for more information.*

### Activities - Does any maintenance work require the:

1. Planting of vegetation or placing of any material on dunes or exposed sand surfaces of more than 10 square metres, within the littoral active zone, for the purpose of preventing the free movement of sand, erosion or accretion?
2. Infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse?
3. Infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 5 cubic metres from—
4. The seashore; the littoral active zone, an estuary or a distance of 100 metres inland of the high-water mark of the sea or an estuary, whichever distance is the greater; or the sea?
5. The clearance of an area of 1-20 hectares or more of indigenous vegetation?
6. The extraction or removal of peat or peat soils? or
7. The clearance of an area of 300 square metres or more of indigenous vegetation within a protected area (Defined in Table 1, NEMA Listed Activities, LN12)?

*If the answer is “YES” to any of the questions below then DO NOT proceed with maintenance as a Water Use Authorisation may be required from the Department of Water and Sanitation (DWS) Contact: Hassina Aboobaker (031) 336 2764 or lodge a query on eWULAAS for more information, (<http://www.dwa.gov.za/ewulaasprod>)*

**\*\*Please note that a full Water Use License is required for any and all activities associated with the maintenance of sewage infrastructure.**

### Activities - Will any maintenance activities:

1. Be in the 1:100 year flood line or the riparian edge of a watercourse (whichever is greatest), within 100m from the edge of a watercourse (where there is no determined flood line or riparian edge) or within 500m of a wetland?
2. Involve impedance or diversion of the flow of water in a watercourse?
3. Involve altering the bed, banks, characteristics or course of a watercourse?
4. Involve abstraction of water from a water resource?

## 1. INTRODUCTION

### 1.1. Background

EnviroPro Environmental Consulting was appointed by the eThekweni Coastal Engineering Stormwater Catchment Management (CSCM) to compile a generic and overarching Environmental Maintenance Management Plan (MMP) for the routine maintenance, repairs and upgrades of municipal stormwater infrastructure within environmentally sensitive areas within the eThekweni Municipal Area (EMA) as identified below.

Environmentally sensitive areas include but are not limited to the following:

- Watercourses (Wetlands, Springs, Natural Channels, and dams)
- Littoral Zones (the sea, seashore, dunes, estuaries, 100m inland from the high tide mark)
- Conservation/ protected areas (both Provincially and Nationally)
- Endangered or Critically Endangered ecosystem types, as defined by SANBI
- 1:100m flood lines

If you are not sure if the area is environmentally sensitive, please contact BMD for clarification

### 1.2. Environmental Principles

The principle of sustainable development that guides environmental management in South Africa requires consideration of the following aspects, for all maintenance activities covered in this MMP:

- That the disturbance of ecosystems and loss of biological diversity are avoided, where they cannot be altogether avoided, are minimised and remedied;
- Take active measures to minimise soil loss due to both wind and water action from the repair/maintenance area;
- That pollution and degradation of the environment are avoided, where they cannot be altogether avoided, are minimised and remedied;
- That the disturbance of landscapes and sites that constitute the nation's cultural heritage is avoided, where it cannot be altogether avoided, is minimised and remedied;
- That waste generation is be avoided, or where it cannot be altogether avoided, is minimised and reused or recycled where possible and otherwise disposed of in a responsible manner; and
- That negative impacts on the environment and on people's environmental rights be anticipated and prevented, and where they cannot be altogether prevented, are minimised and remedied.

### 1.3. Purpose

The purpose of this Environmental MMP is to provide practical environmental management measures to minimise negative environmental impacts that can potentially arise during routine inspections and maintenance/rehabilitation work in sensitive environmental areas within the eThekweni Municipal Area (EMA). This MMP also sets out alien plant control and rehabilitation measures where applicable.

The MMP is intended to be used as a stand-alone document that translates mitigation measures into actions that can be practically implemented during routine inspections and maintenance/rehabilitation of existing stormwater infrastructure (i.e. pipes, discharge points, etc.) within sensitive environmental areas. The MMP also aims to assign responsibilities to specific personnel during routine inspections and maintenance/rehabilitation activities, develop mitigation measures that can translate into action plans and provide for regular auditing of the mitigation measures.

This MMP is the overarching document which documents all the basic stormwater infrastructure maintenance activities which are implemented across the city and provides generic mitigation responses. Individual sites will require site specific MMPs which provide additional site specific measures which need to be applied.

The objectives of the MMP are as follows:

1. Ensure compliance with local, provincial, national and/or international regulations, standards and guidelines, relating to the protection of the environment.
2. Document the maintenance activities covered under the MMP.
3. Clarify the roles and responsibilities of the team members.
4. Detail the process/procedure to be followed that will avoid conflict within sensitive areas under Ezemvelo KwaZulu-Natal Wildlife (EKZNW) management.
5. Identify and provide practical environmental management measures to minimise negative environmental impacts that can potentially arise during maintenance activities.
6. Provide detail on specific actions required for minimising negative impacts and provide tools or methods for monitoring the effectiveness of mitigation measures.
7. Optimise positive impacts to maximise the benefit thereof.
8. Provide monitoring and auditing processes during maintenance activities.
9. Provide methods of compliance monitoring and reporting of the monitoring.
10. Provide waste management, recycling and re-use strategies.

#### 1.4. Sensitive and Protected Environmental Areas

This MMP has been prepared to allow inspection, maintenance/rehabilitation, repair and upgrade work to be undertaken by CSCM within sensitive environmental areas. These areas include the following, but are not limited to:

- Formally Protected Areas, including Nature Reserves;
- Durban Metropolitan Open Space System (DMOSS);
- Natural vegetated areas of indigenous vegetation (not within DMOSS);
- Public Open Space as per the approved eThekweni Municipalities approved zoning schemes;
- Watercourses (as per definition of watercourses in the National Water Act, 1998);
- 1:100 year flood lines;
- Riparian habitats;
- Estuary (as per definition of littoral active zones in the National Environmental Management: Integrated Coastal Management Act, 2008; and
- Littoral active zones (as per definition of littoral active zones in the National Environmental Management: Integrated Coastal Management Act, 2008).

#### 1.5. Legislative Context

A number of listed activities provided in the National Environmental Management Act (NEMA) Environmental Impact Assessment (EIA) Regulations of 2014 as amended, contain an exclusion clause that allows maintenance work to be undertaken without applying for Environmental Authorisation through an EIA Process provided the work is undertaken under an authorised MMP. The NEMA listed activities that are currently included under the MMP clauses include the following:

**Table 1: Listed activities applicable to Maintenance Management Plans**

NEMA LISTING NOTICE 1 of 2014 as amended (Would normally require a Basic Assessment for Environmental Authorisation)		
Activity Number	Listed Activity description	Aspect
18	The planting of vegetation or placing of any material on dunes or exposed sand surfaces of more than 10 square metres, within the littoral active zone, for the	Beaches and dunes

	purpose of preventing the free movement of sand, erosion or accretion, excluding where — (i) the planting of vegetation or placement of material relates to restoration and maintenance of indigenous coastal vegetation undertaken <b>in accordance with a maintenance management plan</b>	
19	The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse;  but excluding where such infilling, depositing, dredging, excavation, removal or moving— b) is for maintenance purposes undertaken <b>in accordance with a maintenance management plan</b> ;	Watercourses
19A	The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 5 cubic metres from— (i) the seashore; (ii) the littoral active zone, an estuary or a distance of 100 metres inland of the high-water mark of the sea or an estuary, whichever distance is the greater; or (iii) the sea; — but excluding where such infilling, depositing, dredging, excavation, removal or moving— g) is for maintenance purposes undertaken <b>in accordance with a maintenance management plan</b> ;	Beaches, dunes, and estuaries
27	The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for— (i) the undertaking of a linear activity; (ii) or maintenance purposes undertaken <b>in accordance with a maintenance management plan</b> .	Vegetation Clearing
<b>NEMA LISTING NOTICE 2 of 2014</b> <b>(Would normally require a Scoping EIA Process for Environmental Authorisation)</b>		
15	The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for— (i) the undertaking of a linear activity; (ii) or maintenance purposes undertaken <b>in accordance with a maintenance management plan</b> .	Vegetation Clearing
24	The extraction or removal of peat or peat soils, including the disturbance of vegetation or soils in anticipation of the extraction or removal of peat or peat soils, but excluding where such extraction or removal is for the rehabilitation of wetlands <b>in accordance with a maintenance management plan</b> .	Wetland Soil
<b>NEMA LISTING NOTICE 3 of 2014</b> <b>(Would normally require a Basic Assessment for Environmental Authorisation)</b>		
12	The clearance of an area of 300 square metres or more of indigenous vegetation within KwaZulu-Natal: i. Trans-frontier protected areas managed under international conventions; ii. Community Conservation Areas; iii. Biodiversity Stewardship Programme Biodiversity Agreement areas; iv. Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004; v. Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; vi. Within the littoral active zone or 100 metres inland from high water mark of the sea or an estuarine functional zone, whichever distance is the	Vegetation Clearing within protected and sensitive areas

	<p>greater, excluding where such removal will occur behind the development setback line on erven in urban areas;</p> <p>vii. On land, where, at the time of the coming into effect of this Notice or thereafter such land was zoned open space, conservation or had an equivalent zoning;</p> <p>viii. A protected area identified in terms of NEMPAA, excluding conservancies;</p> <p>ix. World Heritage Sites;</p> <p>x. Sites or areas identified in terms of an international convention;</p> <p>xi. Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority or zoned for a conservation purpose;</p> <p>xii. Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority;</p> <p>xiii. or In an estuarine functional zone.</p> <p>except where such clearance of indigenous vegetation is required for maintenance purposes undertaken <b>in accordance with a maintenance management plan</b>.</p>	
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**IMPORTANT TO NOTE:** Where a watercourse is impacted by the maintenance or upgrade activities, a Water Use Authorisation (WUA) in terms of the National Water Act will be required from DWS. A WUA would be authorised through DWS, independent of the MMP authorisation process. The WUA may either follow a General Authorisation (GA) or a Water Use Licence (WUL) process. The selected process will need to be decided by DWS.

## 1.6. Applicable Legislation

It is the responsibility of the Project Manager (PM; eThekweni), Engineer and/or the Contractor performing the maintenance to ensure that the following applicable pieces of legislation relevant to the maintenance activities are applied and adhered to.

**Table 2: List of applicable legislation**

Title of legislation, policy or guideline:	Administering authority	Date
Environment Conservation Act (73 of 1989)	DFFE and EDTEA	1989
National Environmental Management Act (107 of 1998)	DFFE and EDTEA	1998
National Environmental Management Act (107 of 1998): 2014 EIA Regulations (as amended 2017)	DFFE and EDTEA	2017
Mineral and Petroleum Resources Act (28 of 2002)	DMRE	2002
National Heritage Resources Act (25 of 1999)	SAHRA / AMAFA	1999
National Environmental Management: Biodiversity Act (10 of 2004)	DFFE and EDTEA	2004
National Environmental Management: Waste Act (59 of 2008)	DFFE and EDTEA	2008
Conservation of Agricultural Resources Act (43 of 1983)	DFFE	1983
National Forests Act 1998	DFFE	1998
National Water Act (Act 36 of 1998)	DWS	1998
National Water Resources Strategy 2004	DWS	2004
National Forests Act (84 of 1998)	DFFE	1998
National Environmental Management: Protected Areas Act (Act 57 of 2003)	DEA	2003
Water Act 1956	DWS	1956
Occupational Health and Safety Act	Department of Labour	1993
Hazardous Chemical Substance regulations	Department of Labour	1995
Environmental Regulations for Workplaces	Department of Labour	1987
General Administrative Regulations	Department of Labour	2003



Title of legislation, policy or guideline:	Administering authority	Date
Construction Regulations	Department of Labour	2003
National Standards (SANS)	SABS	2003
Noise Induced Hearing Loss Regulations	Department of Labour	2003
eThekwini Municipality by-laws	eThekwini Municipality	2008

### 1.7. MMP Authorisation Process

In KwaZulu-Natal (KZN), all MMPs must be approved / authorised by the Department of Economic Development, Tourism and Environmental Affairs (EDTEA) before being implemented. This MMP has been approved through the following engagement process to date:

1. An EDTEA Application for Approval of a Maintenance Management Plan was submitted to EDTEA Head Office to register the MMP with the Department<sup>3</sup>.
2. EDTEA registered the MMP application and returned a Reference Number.
3. The Draft MMP was compiled and has been through an extensive review process to:
  - a. Identify the standard maintenance activities applicable across the eThekwini Municipality.
  - b. Assess the potential environmental impacts related to these standard activities.
  - c. Mitigate the identified potential environmental impacts.
  - d. Compile this document as an overarching MMP as the base reference document for all site specific MMPs which details the process for implementation and application to individual maintenance projects.

Future engagement activities include:

1. EDTEA may require that the Draft MMP be circulated for a 30-day comment period to give other authorised licensing authorities the opportunity to comment and provide input on the MMP.
2. Following the 30-day comment period, all comments will be integrated within the Final MMP (and included within Annexure 3) which will then be submitted to EDTEA for consideration and authorisation.
3. The EDTEA will authorise the MMP and may issue conditions that may need to be incorporated into the MMP in a revised version.
4. The MMP may then be applied to maintenance projects.
- 5.

### 1.8. Implementing a Maintenance Project

1. Should CSCM wish to undertake a new maintenance project, the PM must check if the activity is covered under the MMP. If the PM has any doubt, the PM is to contact the appropriate BMD officials (see Table 4 below)
2. If so, the PM must prepare a Project Specific MMP Addendum Application (see template under Annexure 2) for submission to the EDTEA which:
  - References the approved MMP as guiding document;
  - Provides project-specific information;
  - Details site-specific environmental attributes;
  - Provides relevant Method Statements for project-specific work to be carried out; and
  - Reflects on potential impacts and mitigation measures NOT detailed in the MMP.
3. The EDTEA will acknowledge the addendum application and instruct CSCM to continue.
4. The maintenance activity must proceed in accordance with the MMP requirements.
5. The PM must ensure this Generic MMP and the site specific MMP are included in the contractual documents prepared for each outsourced maintenance project.
6. CSCM must ensure that staff and /or the appointed contractor are made aware of the MMP and the

<sup>3</sup> Note: EDTEA has the right to determine whether or not an MMP or Environmental Authorisation through a BA or EIA is required.

- significance of its implementation during the maintenance project.
7. The PM and Contractor must sign the site specific MMP as acknowledgement of the document and commitment to its implementation.
  8. Where appropriate, CSCM must engage and obtain permission from the relevant Ezemvelo Protected Area Managers prior to any work starting on site.

**NB: It is important to note that this Overarching MMP covers environmental mitigation measures that are common to storm water infrastructure maintenance activities within the CSCM Unit. If applicable, additional site specific or project specific mitigation measures relevant to a particular activity or development must be stipulated in an Addendum to this Overarching MMP (Appendix 2). This includes provision of the site-specific sub-plans, as applicable and relevant to each specific project. However, should the MMP need further revision based on information, impacts and mitigation measures not contained in this report, CSCM will be responsible for revision of the MMP Report and further review by EPCPD will be necessary prior to any approval of the revised MMP**

### 1.9. Amendment of this MMP

Should a new activity need to be undertaken that has not been covered in an authorised MMP pertaining to rehabilitation, repair and upgrade of existing stormwater infrastructure, the following process must be followed prior to the maintenance taking place:

1. The Responsible Line Department must engage with eThekweni Biodiversity Management Department (BMD) to confirm that the activity has not been covered in an authorised MMP and propose the recommended changes to the MMP.
2. The MMP must be amended to include the new maintenance activity including additional detailed method statements as to what process and procedures will be carried out for the new maintenance activity.
3. The amended MMP must be reviewed by BMD.
4. The amended MMP must be submitted to EDTEA for approval.
5. EDTEA will approve the amended authorised MMP.

### 1.10. The Applicant

The contact details of the Applicant are provided in Table 3 below:

**Table 3: Applicant Details**

Name of Applicant:	Physical Address:	Contact number:	Contact email:
Coastal, Stormwater & Catchment Management Department (CSCM)	CSCM, 5 <sup>th</sup> Floor, City Engineers Building, 166 K.E Masinga Road	031 311 7960 082 321 1121	<a href="mailto:Gregory.Williams@durban.gov.za">Gregory.Williams@durban.gov.za</a>

### 1.11. Key Stakeholders

#### 1.11.1. eThekweni Municipality Line Departments

The BMD in conjunction with the Parks, Leisure and Cemeteries (PLC) Department are the custodians of the Municipality's biodiversity and natural resources incorporated into the Durban Metropolitan Open Space System (DMOSS), Public Open Spaces and Municipal Protected Areas (e.g., Roosfontein Nature Reserve). As such, both departments are key stakeholders in all CSCM infrastructure maintenance projects within stormwater infrastructure in sensitive and/or protected environmental areas.

When infrastructure maintenance projects are being planned, both BMD and PLC should be engaged to ensure the MMP is applicable to the maintenance activity when the proposed activities are within municipal open spaces and protected areas. BMD contacts are provided in Table 4 below.

**Table 4: BMD Contact Details**

Name	Telephone No.	Email Address
Russell Stow	083 633 7636	<a href="mailto:russell.stow@durban.gov.za">russell.stow@durban.gov.za</a>
Greg Mullins	031 322 4560	<a href="mailto:greg.mullins@durban.gov.za">greg.mullins@durban.gov.za</a>
Shoni Makhwedzha	031 311 7919	<a href="mailto:shoni.makhwedzha@durban.gov.za">shoni.makhwedzha@durban.gov.za</a>
Sibongile Dlamini	031 3117 296	<a href="mailto:Sibongile.dlamini2@durban.gov.za">Sibongile.dlamini2@durban.gov.za</a>

### 1.11.2. Ezemvelo KZN Wildlife (EKZNW)

Ezemvelo KZN Wildlife's (Ezemvelo) are the key stakeholder in the MMP as a number of the sensitive environments (particularly protected areas) to which the MMP would be applied fall under their jurisdiction and management. Ezemvelo's mandate is derived from the KwaZulu-Natal Nature Conservation Management Act (Act No.9 of 1997), which is to direct the management of nature conservation within the KZN province including protected areas. They are the leader in sustainable biodiversity conservation, to ensure effective conservation and sustainable use of KwaZulu-Natal's biodiversity in collaboration with stakeholders for the benefit of present and future generations. Therefore, their involvement, management, support and instruction are imperative to the success of this MMP in protected areas. All mitigation measures detailed in the planning, maintenance and rehabilitation phases of the MMP have required engagement with, and approval from Ezemvelo.

CSCM is thus also obligated to continuously engage with Ezemvelo officials, particularly when planning and implementing stormwater infrastructure maintenance projects in protected areas under their control, to ensure compliance within their minimum standards for sustainable biodiversity conservation.

**Table 5: EKZNW Contact Details**

Name	Telephone No.	Email Address
Irene Hatton	033 845 1452 / 082 894 6684	<a href="mailto:irene.hatton@kznrwildlife.com">irene.hatton@kznrwildlife.com</a>

### 1.11.3. Provincial and National Departments

There are a number of other provincial and national Departments that should be included as key stakeholders in all CSCM infrastructure maintenance projects within sensitive environmental areas. These provincial and national Departments have been listed below together with the description of their functioning and associated sensitive environmental areas.

Department of Forestry, Fisheries and the Environment (DFFE): Oceans and Coasts and KZN Department of Economic Development, Tourism and Environmental Affairs (EDTEA): Coastal and Biodiversity Unit

These Departments deals with the promotion, management and strategic leadership on oceans and coastal conservation in South Africa and KwaZulu-Natal. CSCM is thus also obligated to engage with these Departments, particularly when planning stormwater infrastructure maintenance projects in coastal areas.

Department of Water and Sanitation

This Department of Water and Sanitation is the custodian of South Africa's water resources. It is primarily responsible for the formulation and implementation of policy governing this sector. CSCM is thus also obligated to engage with this Department, particularly when planning stormwater infrastructure maintenance projects which impact water resources.

Department of Forestry, Fisheries and the Environment (DFFE): Forestry Management

This Department deals with the promotion of the sustainable management, use and protection of forests and natural resources in South Africa to achieve social and economic benefits and to promote development. CSCM is thus also obligated to engage with these Departments, particularly when planning stormwater infrastructure maintenance projects which impact natural forests and protected trees.

**Table 6: Provincial and National Department Contact Details**

<b>Name</b>	<b>Telephone No.</b>	<b>Email Address</b>
Judy Beaumont	021 819 2493	<a href="mailto:jbeaumont@environment.gov.za">jbeaumont@environment.gov.za</a>
Omar Parak	033 264 2648	<a href="mailto:omar.parak@kznedtea.gov.za">omar.parak@kznedtea.gov.za</a>
Hassina Aboobaker	031 336 2764	<a href="mailto:AboobakerH@dws.gov.za">AboobakerH@dws.gov.za</a>
Nandipha Sontangane	033 092 7733	<a href="mailto:nsontangane@environment.gov.za">nsontangane@environment.gov.za</a>

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## 2. ROLES AND RESPONSIBILITIES

Please note that all the contact details for the representatives of the parties tabulated below must be populated PRIOR to the implementation of the maintenance activities being commissioned.

**Table 7: Roles and Responsibilities**

ORGANISATION	RESPONSIBILITIES
<p><b>A. CSCM - eThekweni Coastal Engineering Stormwater Catchment Management</b> The Project Manager (PM) from eThekweni Coastal Engineering Stormwater Catchment Management undertaking the maintenance project or activity.</p> <p>Branch: Name: Title: Contact details: Tel: Cell: Email:</p>	<ul style="list-style-type: none"> <li>• Ensure that the maintenance team or Contractors comply with the approved MMP.</li> <li>• Ensure compliance with the provisions for duty of care and remediation of damage in accordance with section 28 of the National Environmental Management Act (NEMA), (No. 107 of 1998) and its obligations regarding the control of emergency incidents in terms of Section 30 of NEMA.</li> <li>• Notify EDTEA of any incident as defined in subsection 30(1)(a) of NEMA<sup>4</sup>.</li> <li>• Where construction or operation activities are contracted out (e.g. to Contractors and Subcontractors), the liability associated with non-compliance still rests with CSCM (unless otherwise agreed upon between the authorities, CSCM and the contracting parties).</li> </ul>
<p><b>B. Maintenance Team Manager</b> The allocated manager responsible for managing the maintenance staff on the ground and for ensuring that the environmental management requirements are met.</p> <p>Branch: Name: Title: Contact details: Tel: Cell: Email:</p>	<ul style="list-style-type: none"> <li>• Ensuring the on-site implementation of the MMP.</li> <li>• Managing the maintenance team.</li> <li>• Ensuring that the work undertaken is properly and competently directed, guided and executed at appointed stages of the project.</li> <li>• Ensuring the adherence to statutory safety, health and environment (SHE) standards.</li> <li>• Ensuring the inspection and maintenance activities comply with the MMP.</li> <li>• Monitoring the site regularly to ensure compliance.</li> <li>• Avoiding and/or mitigate adverse impacts on the environment.</li> <li>• Ensuring that the maintenance staff is aware of the MMP and all agreed Method Statements.</li> </ul>
<p><b>C. Maintenance Staff</b></p>	<ul style="list-style-type: none"> <li>• The worker staff allocated by the PM or Team Manager to undertake the inspection or maintenance work.</li> </ul>
<p><b>D. Contractor</b> At times a Contractor may be appointed to assist with maintenance if the Municipality is limited by capacity constraints. The Contractor, like the Maintenance Team Manager, reports to the Project Manager.</p> <p>Company: Name: Title: Contact details: Tel: Cell: Email:</p>	<ul style="list-style-type: none"> <li>• Implement and adhere to the MMP in all respects.</li> <li>• Ensure compliance with the MMP by contractor staff with non-compliances recorded by the contractor for audit purposes.</li> <li>• Be familiar with all conditions of the MMP.</li> <li>• Supply method statements for implementation of the MMP where relevant, which includes mitigation measures.</li> <li>• Ensure the Contractor and all site workers attend environmental awareness training provided by CSCM and relay training to all new sub-contractors when necessary. Proof of training must be kept on record.</li> <li>• Maintain an environmental file.</li> </ul>

<sup>4</sup> An incident” is defined as “an unexpected, sudden and uncontrolled release of a hazardous substance, including from a major emission, fire or explosion, that causes, has caused or may cause significant harm to the environment, human life or property”.

ORGANISATION	RESPONSIBILITIES
	<ul style="list-style-type: none"> <li>• Maintain environmental complaints register that must have carbon copies and numbered pages, to record all incidents that occur on-site during construction. Incidents include but may not be limited to:               <ul style="list-style-type: none"> <li>- Public involvement/complaints.</li> <li>- Occupational health and safety incidents.</li> <li>- Incidents involving hazardous materials and/or equipment on site.</li> <li>- Non-compliance incidents.</li> <li>- Spills into or around watercourses.</li> <li>- Encountering fauna of interest and a record of all Flora and Fauna identified within the study area.</li> </ul> </li> </ul>
<p><b>E. Regional Ecologist (if applicable)</b> The regional ecologist is a suitably qualified ecologist at EKZNW, the relevant Nature Reserve or appointed by the CSCM.</p> <p>Name: Title: Contact details: Tel: Cell: Email:</p>	<ul style="list-style-type: none"> <li>• Provide advice and guidance on environmental controls on-site and as stipulated in the MMP.</li> </ul>
<p><b>F. Reserve Manager (if applicable)</b> The Reserve Manager is in charge of the nature reserve management.</p> <p>Name: Title: Contact details: Tel: Cell: Email:</p>	<ul style="list-style-type: none"> <li>• Ensure that maintenance activities in the Nature Reserve are undertaken in a controlled manner and in accordance with operational rules and environmental principles of the nature reserve.</li> </ul>
<p><b>G. eThekweni Biodiversity Management Department (BMD)</b> BMD is the advisor to the CSCM on all environmental matters related to the compilation, implementation and updating of the MMP.</p> <p>Name: Title: Contact details: Tel: Cell: Email:</p>	<ul style="list-style-type: none"> <li>• Provide advice and guidance on the environmental controls documented in the MMP,</li> <li>• Advise and monitor compliance of the activities with the MMP providing corrective action support where required.</li> </ul>

### 3. COMPLIANCE AND MONITORING

#### 3.1. Compliance with the MMP

The MMP specifies the requirements to be implemented by the contractor/maintenance staff in order to minimise and manage any potential environmental impacts that could arise from maintenance activities within sensitive areas. The provisions of this MMP must be considered legally binding to the contractor and/or maintenance staff to whom responsibility has been delegated for the proposed activities for the duration of the maintenance phase. As such, a copy of the approved MMP must be kept on-site during maintenance activities.

In terms of the National Environmental Management Act (Act No. 107 of 1998) (as amended), those parties responsible for damage to the environment must pay the costs to repair and compensate for environmental and/or human health as well as for preventative measures to avoid or reduce further damage. In terms of Section 28 of NEMA, *“every person who causes or has caused or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring, or, in so far as such harm to the environment is authorised by law or cannot reasonably be avoided or stopped”*.

CSCM, therefore, have a responsibility to take measures to prevent any pollution or degradation to the environment where maintenance/rehabilitation of existing stormwater infrastructure is required. The following measures must be applied when dealing with a maintenance issue:

1. Investigate, assess and evaluate the impacts effectively in the cases where projects are in protected areas and formally contact the relevant Reserve Manager / landowner to inform them of the upcoming maintenance/rehabilitation work that is required;
2. Inform and educate employees about the environmental risks of their work and the manner in which their tasks must be performed in order to avoid causing significant pollution or degradation of the environment;
3. Cease, modify or control any act, activity or process causing the pollution or degradation;
4. Contain or prevent the movement of pollutants or the causing of degradation;
5. Eliminate any source of pollution or degradation; and
6. Remedy the effects of pollution or degradation.

The potential impacts of maintenance activities have been identified and mitigation measures are proposed in section 6 of this MMP. The measures discussed in sections 6.1 and 6.2 are intended to prevent pollution and/or degradation to the receiving environment. However, should any major pollution or degradation occur (see definition of an *incident*<sup>4</sup> in Section 1.7 above), it is the responsibility of CSCM to cease all activities and undertake the necessary remediation and rehabilitation measures where required.

#### 3.2. Method and Frequency of Monitoring

Prior to the commencement of maintenance activities (listed under section 4), staff and contractors undertaking these maintenance activities must be educated/ trained in the content and implementation of this document.

All maintenance activities as covered by this MMP must be monitored daily according to this MMP (Sections 6 and 7) by the appointed maintenance staff and/or Maintenance Manager for the duration of the maintenance job as well as for 1-week post maintenance. Monitoring records are to be kept by the Maintenance Manager. If a concern arises from a non-related maintenance activity in a nature reserve (e.g. poaching, setting fires etc.) then the Reserve Manager will take appropriate action in terms of the nature conservation legislation. Non-related maintenance activities will otherwise be dealt with by the CSCM Deputy Head of Department.

### 3.3. Auditing Process

- Compliance audits against the MMP must be undertaken when the maintenance activity takes over 2 weeks to complete. An audit must be carried out by the designated maintenance personnel, preferably by the Maintenance Manager or responsible senior staff.
- Where non-compliances are noted, these must be communicated to the site staff that are undertaking the maintenance activities by the Maintenance Team Manager with a memo/report submitted to the Project Manager.
- Corrective actions must be immediately given for non-compliances noted.
- A close-out audit in the form of a memo/short report is to be carried out after the maintenance activity is complete and retained for record-keeping purposes.

The BMD Compliance Officer must conduct regular monitoring during which concerns and/or recommendations must be communicated to CSCM PM / Maintenance Manager. Significant concerns that fail to be addressed should be reported to the Reserve Management / CSCM Deputy HOD.

### 3.4. Recording of Environmental Incidents

In the context of this MMP, given the nature of the sensitive environments within which maintenance will occur, an environmental incident is an unintentional or intentional non-compliance with the environmental legal requirements in terms of NEMA or NWA, the requirements of this MMP, or reserve rules, that causes, has caused or may cause significant harm to the environment, human life or property.

An environmental incident can include (but is not limited to) raw sewage leak directly into the surrounding environment/watercourses, spillage of hazardous materials, removal of indigenous vegetation without prior approval, fires, erosion leading to sedimentation, etc.

In the event of any incident, the Reserve Manager (in the case of protect areas) and the CSCM Deputy HOD must be immediately notified. An Environmental Incident Record must be completed and kept on file by CSCM/Maintenance Manager. The following details must be included when recording environmental incidents:

1. Date of the Incident
2. Description of the nature of the incident
3. Supporting photographs of the incident
4. Description of corrective actions taken
5. Comments from relevant authorities, if applicable. Environmental Incidents must be reported by the CSCM/maintenance manager, where applicable, to BMD Officials, the Reserve Manager, DWS, or EDTEA.



#### 4. STANDARD MAINTENANCE ACTIVITIES ON EXISTING STORMWATER INFRASTRUCTURE IN ENVIRONMENTALLY SENSITIVE AREAS

This MMP covers standard maintenance and re-establishment of infrastructure within protected / sensitive environmental including wetlands (as defined in Section 1.4). The following work is typically carried out by CSCM department contractors during projects and comprises of the following activities:

**NOTE:** *The project-specific criteria associated with maintenance work within a sensitive area will need to be detailed in the project-specific MMP.*

The below activities are associated with work typically carried out on stormwater infrastructure by maintenance teams. The standard specifications as included in Annexure 8 must be used in conjunction to the drawings produced by the engineer and amended where indicated.

- A) Infrastructure Evaluation and Inspection:** This is a visual and physical conditional inspection of the infrastructure. Some areas may only be accessible on foot. There are a number of different types of inspections which include:
- Initial inspection - This is the first inspection of any infrastructure. It's done to determine baseline structural conditions and to collect baseline data about the infrastructure.
  - Fracture-critical member inspection - A hands-on inspection of parts of the infrastructure that, if they become fractured, could lead to serious consequences.
  - Hands-on inspection - Visual and hands-on inspection of any part of the infrastructure.
  - In-depth inspection - A close-up inspection of one or more parts of the infrastructure. This type of inspection is done to identify any issues that are not easy to detect using more routine inspection procedures. This is usually a very hands-on process.
  - Routine inspection - This is a regularly scheduled periodic inspection. It generally includes both observations and hands-on measurements. A routine inspection is used to determine the physical and functional condition of the infrastructure, identify changes in the infrastructure from the last time it was inspected and to make certain that the infrastructure is safe and meets service requirements.
  - Damage inspection - An unscheduled inspection that assesses environmental or accident-caused damage.
- B) Repair and Replacement of Protection Work:** The infrastructure used to protect exposed or susceptible surfaces and embankments from stormwater damages may be in the form of wire mesh gabion structures, brick walls, fencing or relevant geosynthetic protection products. Damage to the protection works results from corrosion, fatigue, and impacts. If the damage from any of these is extensive, either a portion of the protection feature or the entire feature may need to be replaced.
- C) Refurbishment and/or Replacement of Pipes:** A number of outside factors may lead to the complete failure of a stormwater pipe. The method of repair for the most part requires the full replacement of either portions or the entire pipeline.
- D) Refurbishment and/or Replacement of Discharge Points:** The infrastructure used to ensure stormwater is discharged in a manner that does not result in damages to the receiving environment may be in the form of headwalls, debris walls, apron slabs and splitter blocks. Damage to the discharge points often results from fatigue and impacts. If the damage from any of these is extensive, either a specific feature of the discharge point or the entire discharge point may need to be replaced.

- E) Repair of Open Erosion Gullies:** Uncontrolled stormwater flow often results in erosion gullies. Uncontrolled stormwater flow can be a result of the failure of an existing stormwater feature or due to the lack of any stormwater infrastructure. Erosion gullies are often repaired by means of infilling the cavities with fill material to ensure the natural slope is maintained.
- F) Repair of Concrete Portal / Rectangular / Pipe Culverts:** Blockages of the portal/rectangular/pipe culverts as well as the undermining of the structure due to erosion are the most common cause of failures. The method of repair depends on the extent of or the potential for future damage, but it usually involves removing the blockages and repairing the erosion damage.
- G) In-situ Cast Concrete Culverts:** In instances where the existing concrete portal / rectangular / pipe culverts are damaged to a point that repair works are not feasible the entire structure may need to be replaced. In these cases, in-situ cast concrete culverts shall be established on top of either new or existing concrete bases. Either concrete will be mixed on-site or ready-mixed concrete will be brought to the site.
- H) Check Weirs:** Check weirs are used to mitigate against increased erosion potential of the stream caused by upstream development by using gabion baskets, stones, geofabrics and/ or geosynthetic materials. Damage to these weirs often results from fatigue and impacts. If the damage from any of these is extensive, either a specific feature of the weir or the entire weir may need to be replaced.
- I) Precast and in-situ Cast Canal Walls and Bases:** A number of outside factors may lead to the complete or partial failure of existing canal walls and bases. The method of repair for the most part requires the construction, reinstatement or maintenance of pre-cast or in situ cast canal walls and bases.
- J) Temporary Excavation and Backfilling of Material:** Temporary excavation of material may be required to acquire working access for the infrastructure to be laid. Upon completion of the installation of infrastructure, the excavations will be required to be backfilled and compacted accordingly.
- K) Removal of Silt and Waste from Pipes / Manholes:** Siltation and the accumulation of waste within stormwater pipes and manholes are regular occurrences due to stormwater containing a high sediment load as well as poor waste management.
- L) Repair Of Coastal Outfalls:** Piers and groynes are often used to support stormwater outfalls. Piers can be extended or reduced in length according to the variations in beach width and structural integrity of the pier. Outfalls and piers are supported by piles that can move from extended periods of erosion, which will need to be repaired or replaced to prevent the structure from collapsing. Brackets to hold in HDPE pipes cradled in coastal outfalls can also break off, which also need to be maintained or replaced. Other maintenance activities include repairing or replacing handrails, lighting, walkway surfaces and painting. Failure to undergo regular maintenance for any of the above-mentioned activities can result in increased exposure to infrastructure on the coast.
- M) Vegetation Clearing:** In order to be able to carry out the required maintenance and repairs, vegetation may need to be cleared. The width is dependent on the nature of the infrastructure and the available access. Tools required are brush-cutters, spades, and small hand-held bow saws. Tree removal is not part of general maintenance and will be handled separately as specifically agreed upon with the relevant BMD Manager. Where a tree or thick indigenous clearing is required, clearance from the Reserve manager, eThekweni Environmental Manager or Environmental Officer (if applicable) is required prior to clearing.

- N) Temporary Access for the Public:** Provision for temporary access for the public whilst construction is taking place shall be incorporated. The access created will need to be safe for commuters and/ or pedestrians and also mitigate against the destruction of the environment.

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## 5. METHOD STATEMENT

Before a maintenance activity commences, the Principal-Agent / Engineer, BMD and/or Regional Ecologist / Reserve Manager must agree which activities require a method statement. A method statement is a document detailing how a particular process will be carried out. It should detail the possible dangers/risks associated with the particular part of the project and the methods of control to be established and to show how the work will be managed in a safe and environmentally responsible manner. In such cases, the Contractor must submit a written method statement, which should include the following:

- The type of activity;
- Timing and location of the activity;
- Implementation procedures;
- Materials and equipment to be used;
- Transportation of the equipment to and from the site;
- How the equipment/material will be moved while on-site;
- Location and extent of site office and storage areas;
- Identification of impacts that might result from the activity;
- Methodology and/or specifications for impact prevention or containment and for environmental monitoring;
- Emergency/disaster incident and reaction procedures (required to be demonstrated); and
- Rehabilitation procedures and continued maintenance of the impacted environment.

The Contractor may provide such information in advance of any or all maintenance activities provided that new submissions shall be given to the Principal-Agent / Engineer whenever there is a change or variation to the original. The Principal-Agent / Engineer, BMD and/or Regional Ecologist / Reserve Manager must review and approve the maintenance method statements which must be attached to the Project Specific MMP Addendum Application to the EDTEA. Method statements that may be required depending on the type of activity and sensitive environmental area, are listed in Table 8.

**Table 8: List of method statements required**

Method Statement	Objective
Access	Institute adequate access agreements and measures to ensure the safety of landowners and the integrity of the gates/fences.
Aesthetics	Reduce construction impacts upon the aesthetics of the surrounding environment.
Bundling	Contain and manage all hazardous substances released into the environment.
Cement Mixing / Concrete Batching	Provide measures to contain cementitious products impacting upon the surrounding environment.
Contaminated Water	Ensure no contamination or pollution of water impacted upon by construction-related activities.
Dust	Reduce construction-related dust impacts on the surrounding environment. Prevent dust nuisance and health impacts on people and animals in the area.
Environmental Monitoring	Implement a programme whereby impacts upon the surrounding can be monitored and implement measures to mitigate such impacts.
Erosion control	Prevent erosion and reduce potential impacts upon the surrounding environment.
Fire, Hazardous and Poisonous Substances	Impose a "no fire" rule on the entire project. Reduce potential impacts in the event of a fire incident.
Flora and Fauna	Preserve fauna and flora through control of construction activities. Reduce the impact of the project on the surrounding vegetation during construction. Prevent infestation of alien species during construction.
Fuels and Fuel Spills	Manage and contain all refuelling activities to prevent and mitigate potential impacts.
Heritage	Limit and mitigate potential heritage impacts on chance findings should they occur.
Noise	Reduce construction-related surrounding environment.

Method Statement	Objective
Watercourse Diversions	Prevent hydrological impacts and reduce potential impacts upon the surrounding environment.
Solid and Liquid Waste Management	Implement measures to reduce, monitor and manage waste generation, whilst maximising recycling efficiency.
Social	Maximise social impacts benefits and minimise negative.
Sources of Materials	Source materials that have been legally mined or manufactured.
Topsoil and Subsoil Management	Manage the removal and stockpiling of topsoil and subsoil during construction for use during rehabilitation.
Traffic	Minimise the impacts and extent of construction-related traffic on the surrounding road network and environment, whilst maximising road user safety.
Training	Foster construction-related skills transfer, environmental awareness, health and safety awareness, and materials and equipment skills.

**NOTE:** All site-specific method statements must be approved by BMD and included in the site-specific MMP (see template under Annexure 2) prior to maintenance activity taking place on-site.

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## 6. SUMMARY OF POTENTIAL MAINTENANCE ACTIVITIES AND IMPACTS

Table 9 provides a summary of the potential inspection and/or maintenance activities that may take place together with the expected impacts that could arise from the maintenance activities as discussed in the section above. As the MMP is designed to manage these impacts, the relevant section of the MMP has been referenced.

**PLEASE NOTE:** The construction methodologies for the standard maintenance activities B-I result in very similar impacts and such Table 9 below has grouped the identified impacts for these standard maintenance activities

**Table 9: Potential Impacts arising from Maintenance Activities**

	Nature of Impact	Impact Management Outcomes
<b>A</b>	<b>Infrastructure Evaluation and Inspection</b>	
1	Disturbance and/or removal of indigenous vegetation.	<ul style="list-style-type: none"> <li>▪ Minimise or avoid negative impacts on fauna and flora as a result of maintenance activities.</li> </ul>
2	New access routes created by vehicles causing disturbance to the environment.	
<b>B</b>	<b>Repair of Concrete Portal / Rectangular / Pipe Culverts</b>	
1	Environmental damage due to inadequate site establishment	<ul style="list-style-type: none"> <li>▪ Minimise and or reduce any potential environmental impacts linked to the establishment of the relevant site camp.</li> </ul>
2	Spillage of cement and contaminated runoff from cement into the sensitive environmental areas.	<ul style="list-style-type: none"> <li>▪ Avoid contamination of the surrounding natural area.</li> </ul>
3	Poor management of construction rubble and/or waste.	<ul style="list-style-type: none"> <li>▪ To ensure waste is appropriately stored, handled and safely disposed of at a recognised waste facility.</li> </ul>
4	Leaking equipment resulting in pollution of the surrounding environment.	<ul style="list-style-type: none"> <li>▪ Minimise or prevent pollution of the surrounding environment due to leaking maintenance vehicles/equipment.</li> </ul>
5	Improper storage of hazardous fuel/substances on site.	
6	Noise generated during maintenance activities.	<ul style="list-style-type: none"> <li>▪ To prevent excessive noise pollution from the maintenance activities.</li> </ul>
7	Damage to indigenous vegetation.	<ul style="list-style-type: none"> <li>▪ Limit damage/ clearing of indigenous vegetation</li> </ul>
8	Erosion of stockpiles leading to sedimentation of the surrounding environment.	<ul style="list-style-type: none"> <li>▪ Avoidance of physical damage to surrounding natural areas by erosion and sedimentation.</li> </ul>
9	Damaging riverine/wetland/estuary sensitive areas through maintenance activities.	<ul style="list-style-type: none"> <li>▪ Avoid any damage to areas outside of the immediate construction footprint.</li> <li>▪ Ensure that the watercourse/estuary banks and coastal areas are protected from potential erosion post maintenance.</li> </ul>
10	Damage to coastal areas due to maintenance activity.	
11	Diverting flow within a watercourse /estuary during maintenance activities changes system hydraulics and flow paths	<ul style="list-style-type: none"> <li>▪ Prevent total blockages of the watercourse/estuary</li> <li>▪ Ensure the hydraulics and flow paths within the watercourse/estuary are not permanently altered.</li> </ul>

		<ul style="list-style-type: none"> <li>▪ Ensure river diversions are only constructed where absolutely necessary.</li> <li>▪ Only implement diversions at the appropriate sections of the watercourse/estuary.</li> <li>▪ Ensure all diversions take place within the macro channel of the watercourse/estuary</li> </ul>
<b>C Refurbishment and/or Replacement of Pipes</b>		
1	<i>All Impacts as identified under Item B.</i>	<ul style="list-style-type: none"> <li>▪ <i>All Impact Management Outcomes as identified under Item B.</i></li> </ul>
2	Inappropriate disposal of concrete pipes leading to contamination and excess waste.	<ul style="list-style-type: none"> <li>▪ To ensure waste is appropriately stored, handled and safely disposed of at a recognised waste facility.</li> </ul>
<b>D Refurbishment and/or Replacement of Discharge Points</b>		
1	<i>All Impacts as identified under Item B.</i>	<ul style="list-style-type: none"> <li>▪ <i>All Impact Management Outcomes as identified under Item B.</i></li> </ul>
2	Poor management of general waste which has accumulated in and around the outlet structures leading to downstream contamination.	<ul style="list-style-type: none"> <li>▪ To ensure waste is appropriately stored, handled and safely disposed of at a recognised waste facility.</li> </ul>
<b>E Repair of Open Erosion Gullies</b>		
1	<i>All Impacts as identified under Item B.</i>	<ul style="list-style-type: none"> <li>▪ <i>All Impact Management Outcomes as identified under Item B.</i></li> </ul>
2	Further expansion of the erosion gullies due to bank collapse leading to downstream sedimentation.	<ul style="list-style-type: none"> <li>▪ To ensure there is minimal water intrusion into the existing erosion gullies during infilling.</li> <li>▪ To prevent further downstream sedimentation.</li> </ul>
<b>F Repair and Replacement of Protection Works</b>		
1	<i>All Impacts as identified under Item B.</i>	<ul style="list-style-type: none"> <li>▪ <i>All Impact Management Outcomes as identified under Item B.</i></li> </ul>
2	Poor management / stockpiling of materials i.e., gabion rock and aggregate.	<ul style="list-style-type: none"> <li>▪ Avoidance of physical damage to surrounding natural areas by erosion and sedimentation.</li> </ul>
<b>G In-situ Cast Concrete Culverts</b>		
1	<i>All Impacts as identified under Item B.</i>	<i>All Impact Management Outcomes as identified under Item B.</i>
<b>H Check Weirs</b>		
1	<i>All Impacts as identified under Item B.</i>	<i>All Impact Management Outcomes as identified under Item B.</i>
2	Poor management of general waste which has accumulated in and around the weir leading to downstream contamination.	To ensure waste is appropriately stored, handled and safely disposed of at a recognised waste facility.
<b>I Precast and in-situ Cast Canal Walls and Bases</b>		
1	<i>All Impacts as identified under Item B.</i>	<i>All Impact Management Outcomes as identified under Item B.</i>
<b>J Temporary Excavation and Backfilling of Material</b>		
1	New Access Routes Created by Vehicles Causing Disturbance to the Environment	<ul style="list-style-type: none"> <li>▪ Minimise or avoid negative impacts on fauna and flora as a result of maintenance activities.</li> </ul>

2	Diverting flow within a watercourse /estuary during maintenance activities changes system hydraulics and flow paths	<ul style="list-style-type: none"> <li>▪ Prevent total blockages of the watercourse/estuary</li> <li>▪ Ensure the hydraulics and flow paths within the watercourse/estuary are not permanently altered.</li> <li>▪ Ensure river diversions are only constructed where absolutely necessary.</li> <li>▪ Only implement diversions at the appropriate sections of the watercourse/estuary.</li> <li>▪ Ensure all diversions take place within the macro channel of the watercourse/estuary</li> </ul>
3	Damaging riverine/wetland/estuary sensitive areas through maintenance activities.	<ul style="list-style-type: none"> <li>▪ Avoid any damage to areas outside of the immediate construction footprint.</li> <li>▪ Ensure that the river/estuary banks are protected from potential erosion post maintenance.</li> </ul>
4	Erosion of temporary structures/access roads leading to sedimentation of the surrounding environment.	<ul style="list-style-type: none"> <li>▪ Avoidance of physical damage to surrounding natural areas by erosion and sedimentation of nearby watercourses.</li> </ul>
5	Stockpiling of materials in close proximity to sensitive areas	
<b>K Removal Of Silt, Debris and Waste from Pipes/Manholes</b>		
1	Poor management of construction rubble, flood debris and/or waste.	<ul style="list-style-type: none"> <li>▪ To ensure waste is appropriately stored, handled and safely disposed of at a recognised waste facility.</li> </ul>
2	Noise generated during maintenance activities.	<ul style="list-style-type: none"> <li>▪ To prevent excessive noise pollution from the maintenance activities.</li> </ul>
<b>L Repair Of Coastal Outfalls</b>		
1	Environmental damage due to inadequate site establishment	<ul style="list-style-type: none"> <li>▪ Minimise and or reduce any potential environmental impacts linked to the establishment of the relevant site camp.</li> </ul>
2	Damage to coastal areas due to maintenance activity.	<ul style="list-style-type: none"> <li>▪ Ensure that the coastal areas are protected from potential erosion post maintenance.</li> </ul>
3	Damage/disturbance to marine life.	<ul style="list-style-type: none"> <li>▪ To avoid unnecessary damage/disturbance to marine life due to maintenance activities near and within marine sensitive environmental areas.</li> </ul>
4	Spillage of building materials, debris and concrete to the surrounding water.	<ul style="list-style-type: none"> <li>▪ Avoid contamination of the surrounding natural area.</li> </ul>
5	Poor management of construction rubble and/or waste.	<ul style="list-style-type: none"> <li>▪ To ensure waste is appropriately stored, handled and safely disposed of at a recognised waste facility.</li> </ul>
6	Leaking equipment resulting in pollution of the surrounding environment.	<ul style="list-style-type: none"> <li>▪ Minimise or prevent pollution of the surrounding environment due to leaking maintenance vehicles/equipment.</li> </ul>
7	Noise generated during maintenance activities.	<ul style="list-style-type: none"> <li>▪ To prevent excessive noise pollution from the maintenance activities</li> </ul>
<b>M Vegetation Clearing</b>		



1	Clearing of indigenous vegetation.	<ul style="list-style-type: none"> <li>▪ Protection of indigenous and/or protected vegetation</li> </ul>
2	Emissions, smoke, nuisance, safety issues when burning plant material.	<ul style="list-style-type: none"> <li>▪ Avoid/minimise air quality, nuisance and safety issues associated with the burning of vegetation.</li> </ul>
3	Potential proliferation of alien invasive vegetation.	<ul style="list-style-type: none"> <li>▪ Minimise/avoid the proliferation of Invasive Alien Plants as a result of maintenance activities.</li> </ul>
<b>N</b>	<b>Temporary Access for the Public</b>	
1	Disturbance and/or removal of indigenous vegetation.	<ul style="list-style-type: none"> <li>▪ Minimise or avoid negative impacts on fauna and flora as a result of maintenance activities.</li> </ul>
2	New access routes created by vehicles causing disturbance to the environment.	

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## 7. MAINTENANCE ACTIVITIES - ENVIRONMENTAL IMPACTS MANAGEMENT

This section details the mitigations for each of the environmental impacts identified in Section 6 as identified A to N.

### A. Infrastructure Evaluation and Inspection

#### 1. Disturbance and/or removal of indigenous vegetation

- a) Areas for maintenance activities must be agreed upon by the Regional Ecologist, Reserve Management and/or BMD where applicable, and demarcated off from the surrounding, undisturbed environments.
- b) The disturbance footprint must be kept to a minimum, including the areas traversed by trucks and machinery and limited to a specific operational area.
- c) Contractors and maintenance staff may in no way interfere with the natural vegetation, animals or surroundings. Any components of the natural environment that may be disturbed for maintenance-related purposes must be specified and agreed to by the Regional Ecologist, Reserve Management and/or BMD where applicable.
- d) Plants within the designated maintenance area can only be moved or removed as authorised by the Regional Ecologist, Reserve Management and/or BMD where applicable, and these must be set out in a schedule for reference. Any shrubs or trees of significant size must be protected and permission must be obtained to cut or remove these as above. Ideally, these should also be marked with danger tape.
- e) The Regional Ecologist, Reserve Management and/or BMD where applicable, must be requested to advise if vegetation clearing is required.
- f) Indigenous and/or protected vegetation must be identified and must not be removed unless permission has been obtained from the relevant authority (contact DFFE/EKZNW).
- g) Animals residing within or moving through the designated area must not be killed nor unnecessarily disturbed. Should contractors or maintenance staff notice any sensitive species on-site, the Regional Ecologist, Reserve Management and/or BMD where applicable, must be alerted and the appropriate action taken on advisement.

#### 2. New access routes created by vehicles causing disturbance to the environment

- a) Routes for maintenance access and haul roads must be existing paths and routes where possible.
- b) No vehicle or plant may enter areas that are not 'working areas'. All contractors and maintenance staff, vehicles and materials movement must be confined to these paths and roads.
- c) Where new routes are required, the haulage or access route must be demarcated prior to clearing. The Regional Ecologist, Reserve Management and/or BMD where applicable, must give clearance prior to clearing activity.
- d) There must be no clearance<sup>5</sup> of indigenous vegetation in excess of 1ha or 300m<sup>2</sup> (depending on the location of the works) for the establishment of any new access routes. The Regional Ecologist, Reserve Management and/or BMD where applicable, must provide clarity on the applicable threshold.
- e) Clearing must take place by hand as far as possible.

<sup>5</sup> "Clearance" means the ploughing of land, bulldozing of an area, eradication or removal of vegetation cover with chemicals, amongst others, constitutes clearance of vegetation, provided that this will result in the vegetation being eliminated, removed or eradicated.

Burning of vegetation (e.g. fire-breaks), mowing grass or pruning does not constitute vegetation clearance, unless such burning, mowing or pruning would result in the vegetation being permanently eliminated, removed or eradicated. Eradication of weeds or plant types not occurring naturally within the specific area by means of selective chemical application would not constitute clearance of indigenous vegetation. The pruning of shrubs under a power line would not constitute clearance, unless the pruning is done in such a way that the shrubs are permanently removed.

## B. Repair of Concrete Portal / Rectangular / Pipe Culverts

### 1. Environmental damage due to inadequate site establishment

#### i. Construction camp

The following criteria must apply to the selection of a site for Contractors' camps:

- a) Landowner permission is required;
- b) Select an area that requires the least amount of removal of indigenous vegetation and large trees.
- c) There must be no clearance<sup>5</sup> of indigenous vegetation in excess of 1ha or 300m<sup>2</sup> (depending on the location of the works). BMD must provide clarity on the applicable threshold.
- d) Select an area that is at least 32m from the edge of a watercourse. If no location is available an approval from the Regional Ecologist, Reserve Management and/or BMD where applicable must be given for the establishment of a site within the 32m buffer.
- e) Select a location that has easy access and which has already been cleared or disturbed by previous human activity (e.g. old fields, abandoned tracks or yards, previous construction camps or stockpile areas);
- f) Select a site that minimises nuisance impacts on neighbours or tourists (e.g. visual intrusion, lights at night, noise, dust, movement of people and vehicles, and safety and security risks);
- g) Select a level site that does not require any excavation or terracing;
- h) Select a site with good drainage and implement additional drainage management measures where necessary;
- i) Stay out of river flood plains and drainage lines, and at least more than 100 m away from the edge or banks of water bodies (e.g. streams, wetlands, pans, dams, lakes, etc.); and
- j) Check the area for nests of birds or large burrows of animals and avoid these areas where possible.

#### ii. Site layout and design

The Contractor is to adhere to the following, in terms of site layout and design:

- a) Limit the size of the site to a minimum;
- b) Provide drainage to prevent soil erosion from stormwater runoff;
- c) Locate materials and soil stockpile areas, fuels and chemical storage areas and batching areas away from environmentally sensitive areas and protected from stormwater runoff, fire and access by unauthorised persons;
- d) Locate and clearly indicate convenient access routes, temporary loading and parking areas, and turning circles so that vehicle movement can be confined to these areas;
- e) Locate chemical toilets so that they are easily accessible for servicing and 100m away from any watercourses;
- f) Locate temporary waste bins and skips so that they are easily accessible for emptying and removal;
- g) Design the layout to control and reduce noise from source;
- h) Position components and equipment to limit visual intrusion; and
- i) Direct lights so that they do not pose a nuisance to neighbours.

#### iii. Plant, animal and heritage resources

The Contractor is to adhere to the following:

- a) The presence of protected plants and trees must be determined by the Environmental representative during the design stage and marked off for protection or translocation well before maintenance activities commence;
- b) The ECO must be responsible for ensuring that any required demarcation, removal, relocation and/or rescue of plants, animals and/or heritage resources are undertaken prior to maintenance activities commencing; and
- c) The Principal-Agent / Engineer is responsible for timeously notifying the ECO of maintenance schedules and dates so this can be timeously affected.

**2. Spillage of concrete into the natural area and watercourses**

- a) Concrete must be transported in a manner that avoids environmental contamination i.e. spillages must be avoided. Trucks transporting concrete must be completely enclosed. Washing of chutes is only permitted in an enclosed bunded area within the construction camp.
- b) Any polluted water or cement sediments must be collected and disposed of as instructed by the Regional Ecologist, Reserve Management and/or BMD where applicable.
- c) Concrete mixing to be undertaken on a lined, bunded surface within the construction camp. Empty cement bags to be disposed of immediately off-site and to be treated as hazardous waste.
- d) Concrete mixing must take place away from any watercourse, wet areas or steep banks. This is to reduce the risk of contamination of stormwater run-off or nearby watercourses in the event of an accidental spill.

**3. Management of construction rubble and / or waste**

- a) A formal waste area must be designated and demarcated within the construction camp.
- b) Solid waste must be stored in covered, tip-proof metal drums and skips to be collected and disposed of by a certified waste contractor.
- c) The contractor must provide litter bins throughout the site for use by all staff on site.
- d) Waste accumulated on-site must be removed weekly. The waste must be moved to a licenced waste disposal facility.
- e) Proof of safe disposal of solid waste must be documented, and these records must be maintained on-site for review.
- f) A register of all waste generated and disposed of must be maintained.
- g) No waste may be buried or burned on-site or dumped on surrounding properties under any circumstances. The contractor is liable to a fine should there be any evidence of illegal dumping.

**4. Leaking equipment resulting in pollution of the surrounding environment**

- a) All vehicles or equipment must be checked before being brought onto the site.
- b) No vehicle or plant equipment maintenance is allowed on site.
- c) Only emergency maintenance of equipment and vehicles may be performed with permission of the PM, but in such a manner so as to avoid any environmental contamination (e.g. use of drip trays) and must only take place within an area designated by the PM, where possible.
- d) Drip trays must be provided for the equipment that could leak oil, stationary plant and for the "parked" plant.
- e) All vehicles and equipment will be kept in good working order and serviced regularly. Leaking equipment must be removed from the site.

**5. Improper storage of hazardous fuel/substances on-site**

- a) Ensure that all hazardous fuels and oil substances are kept on drip trays on-site at least 10m away from watercourses.
- b) No fuel or hazardous material may be placed on bare soil.
- c) Any hydrocarbon spill must be removed from the site and disposed of as hazardous waste. The cleared area must be rehabilitated as per the Spill Contingency Plan within Annexure 9.

**6. Noise generated during maintenance activities**

- a) Directional and intensity settings aimed at minimising noise emitted from the maintenance site must be maintained on hooters and sirens while adhering to safety standards. Silencer units on plant and vehicles must be maintained in good working order.
- b) Contractors and maintenance staff must not unnecessarily make other noise (such as loud music or shouting).

**7. Damage to indigenous vegetation**

- a) The eThekweni Municipal Ecologists from BMD, the Regional Ecologist or the Reserve Management must be requested to advise if vegetation clearing is required.

- b) Indigenous and/or protected vegetation must be identified and must not be removed unless permission has been obtained from the relevant authority (contact DFFE/EKZNW).
- c) Plants within the designated maintenance area can only be moved or removed as authorised by the Regional Ecologist, Reserve Management and/or BMD where applicable, these should be set out in a schedule for reference. The following items must be followed during any plant rescue activities:
  - Mark footprint of the proposed construction area. The footprint of the proposed development must be marked out prior to breaking ground.
  - Location and rescue of all plants to be rescued that may occur within marked out areas (within the footprint of proposed infrastructure). The marked-out area must be walked and required species rescued.
  - For all plants that are rescued, relevant information must be collected, as is determined by the Regional Ecologist, Reserve Management and/or BMD where applicable, as being adequate for reporting and monitoring. This information could include the number of individuals/clumps and dates collected, as well as where they came from.
  - Nursery facilities must be established within either the proposed site office area or in a construction laydown area.
  - Permits to collect, relocate and propagate plant material and to collect seed or cuttings for the contract must be obtained from the relevant authorities. This should be a single permit application that covers all components of the project.
  - Appoint an experienced horticulturalist or landscaping contractor to undertake the rescue operation, manage the rescued plant material and operate the nursery.
- d) Any shrubs or trees of significant size must be protected and permission must be obtained from the Regional Ecologist, Reserve Management and/or BMD where applicable, to cut or remove these as above. Ideally, these should also be marked with danger tape.
- e) Removal, damage or disturbance of any vegetation outside the designated area is not permitted.

**8. Erosion of stockpiles leading to sedimentation of the surrounding environment**

- a) If a stockpile of material e.g., soil or stone chips is required, the position of the stockpile must be agreed to by the PM, Regional Ecologist, Reserve Management and/or BMD where applicable.
- b) Stockpiles not to exceed 1.5m and should be banded to prevent collapse outside the footprint.
- c) Stockpiles should not be positioned within 15m of a watercourse / estuary.
- d) Fine aggregate which has the potential to contaminate the surrounding environment must be enclosed in a sandbag wall and must be covered with a tarpaulin.

**9. Damaging riverine / wetland / estuary sensitive areas through maintenance activities**

- a) The eThekweni Municipal Ecologists from BMD, the Regional Ecologist or the Reserve Management must be requested to advise if vegetation clearing is required.
- b) All activities must be restricted to the maintenance footprint area.
- c) The vehicles and machinery must make use of existing access routes as much as possible before adjacent areas are considered for access.
- d) Erosion and sedimentation into the channel must be minimised through the implementation of erosion control measure i.e. sandbags.
- e) All waste generated on-site during maintenance must be removed to the designated waste storage areas and disposed of at a registered waste disposal facility.
- f) All small machinery used on site must be situated on a drip tray (i.e. pumps, generators, compressors etc.).
- g) Where the banks of a riparian area / wetland / estuary have been damaged due to maintenance activity, the disturbed area must be rehabilitated before leaving the site.
- h) This would normally require ripping of any compacted soil in the working area, top soiling the disturbed areas if topsoil was removed.
- i) The banks of the riparian area / wetland / estuary must be shaped to be uniform with those either side of the site.
- j) Replanting of the working area must take place to root and protect the soil from erosion.

**10. Damage to coastal areas due to maintenance activity**

- a) Any construction at or near the water edge where debris can be washed or blown into the water must be surrounded by silt screens.
- b) All storage areas for sand and soil must be at least 20 meters away from the high-water mark and construction equipment must not be cleaned or washed within 50 meters of the high watermark.
- c) Construction activities within any coastal zone must be limited to the absolute minimum.
- d) All construction workers must not be allowed to access areas outside of the construction footprint.
- e) Only material removed from the construction footprint will be allowed for sandbags. No imported material (i.e topsoil and subsoil from another location) will be permitted.
- f) The entire working footprint must be demarcated and approved by the BMD prior to any work commencing on site.
- g) Where the existing infrastructure is above the high watermark there must be no disturbance below the high watermark.
- h) Access below the high-water mark must be restricted and must make use of existing tracks.
- i) All access routes must be planned and approved by BMD prior to any work commencing on site.
- j) No access routes should be created on an ad-hoc basis.
- k) Care must be exercised so as not to endanger the safety and well-being of other persons in the coastal zone.
- l) Temporary access routes must be rehabilitated after usage as per prior approval from the BDM.
- m) All-access routes when no longer required must be immediately rehabilitated.
- n) Pedestrian access through the construction area must be limited.
- o) In areas where vegetation has been cleared from dunes the measures stipulated within the *Environmental Management Plan for Dune Rehabilitation in Durban* must be implemented (Annexure 11).

**11. Diverting flow within a watercourse / estuary during maintenance activities changes system hydraulics and flow paths**

- a) Selection and design of temporary diversion methods must consider many factors, including:
  - Size of stream, tributary watershed area and anticipated flow rates during construction. Special consideration must be given to large streams with large tributary areas with higher flow rates. Any special water quality or aquatic life conditions the waterway;
  - Nature of surrounding land use, property ownership, and easements in the project area are important considerations in determining feasibility and methods for temporary diversions. For example, in a highly urbanized setting or an area with the limited right-of-way, there may not be adequate space to construct a diversion channel;
  - Weather (storm runoff): If diversions are constructed in summer months when thunderstorms and flash flooding can occur, contractors will need to track weather forecasts closely and provide additional protection when higher flows from runoff are anticipated; and
  - Probability of flood flow exceeding diversion capacity and/or diversion failure.
  - The selection of the appropriate diversion type is largely site-specific. The best choice represents the most efficient method while keeping flora and fauna disturbance to a minimum.
- b) All detailed river diversion methodologies are to be approved by the Regional Ecologist, Reserve Management and/or BMD where applicable.
- c) Photographs of the channel prior to the diversion must be maintained on file to assist in final rehabilitation.
- d) Sites that require diversions must plan to undertake such activities during the dry season.
- e) During the river diversion, the flow of the river must not be or blocked. Temporary diversions must allow for the free flow of water at all times.
- f) No damming may occur.
- g) Erosion protection measures (sandbags) must be put in place in a channel to prevent sedimentation and erosion from taking place within the river.
- h) Damaged construction materials must not enter or block the river.

- i) Only earth material with a containment barrier i.e., sandbags, are permitted to be used to divert the flow within the watercourse / estuary.
- j) Loose sand material and soil must not be placed directly within the watercourse / estuary as this will lead to downstream sedimentation.
- k) Should any sediment or foreign materials disperse into surrounding areas around the working area, this material must be removed by hand immediately,
- l) Upon completion of the division, all material must be removed. For in-stream diversions, the channel bed must be shaped to match the gradient prior to the disturbance. For out of stream diversions the channel must be completely infilled to ensure the flows take place within the natural channel.

### C. Refurbishment and/or Replacement of Pipes

1. **Please refer to mitigation measures as identified under Item B**
2. **Inappropriate disposal of concrete pipes leading to contamination and excess waste.**
  - a) All waste pipes must be stored in a designated and demarcated area within the construction camp.
  - b) The contractor must provide litter bins throughout the site for use by all staff on site.
  - c) All waste pipes must not be allowed to accumulate on-site for more than a month.
  - d) Proof of safe disposal of solid waste must be documented, and these records must be maintained on-site for review.
  - e) A register of all waste generated and disposed of must be maintained.
  - f) No waste pipes may be buried or crushed on site under any circumstances. The contractor is liable to a fine should there be any evidence of illegal dumping.

### D. Refurbishment and/or Replacement of Discharge Points

1. **Please refer to mitigation measures as identified under Item B**
2. **Poor management of general waste which has accumulated in and around the outlet structures leading to downstream contamination.**
  - a) A formal waste area must be designated and demarcated within the construction camp.
  - b) Solid waste must be stored in covered, tip-proof metal drums and skips to be collected and disposed of by a certified waste contractor.
  - c) Waste accumulated on-site must be removed weekly. The waste must be moved to a licenced waste disposal facility.
  - d) Proof of safe disposal of solid waste must be documented, and these records must be maintained on-site for review.
  - e) A register of all waste generated and disposed of must be maintained.
  - f) No waste may be buried or burned on-site or dumped on surrounding properties under any circumstances. The contractor is liable to a fine should there be any evidence of illegal dumping.

### E. Repair of Open Erosion Gullies

1. **Please refer to mitigation measures as identified under Item B**
2. **Further expansion of the erosion gullies due to bank collapse leading to downstream sedimentation.**
  - a) Surface water flow must be directed around the erosion gully by means of erosion control measures i.e. sandbags.
  - b) Where significant stormwater flow is generated, earth stormwater drainage channels must be excavated to divert stormwater around the erosion gully.
  - c) Limited vegetation clearing must take place to ensure any existing natural protection against erosion is maintained.

- d) Construction vehicles i.e. TLBs etc. must operate with care around the existing erosion gully embankments to prevent further bank failure.

## **F. Repair and Replacement of Protection Works**

1. **Please refer to mitigation measures as identified under Item B**
2. **Poor management / stockpiling of materials i.e., gabion rock and aggregate.**
  - a) If a stockpile of material e.g., soil or stone chips is required, the position of the stockpile must be agreed to by the PM, Regional Ecologist, Reserve Management and/or BMD where applicable.
  - b) Stockpiles not to exceed 1.5m and should be bunded to prevent collapse outside the footprint.
  - c) Stockpiles should not be positioned within 15m of a watercourse / estuary.
  - d) Fine aggregate which has the potential to contaminate the surrounding environment must be enclosed in a sandbag wall and must be covered with a tarpaulin.

## **G. In-situ Cast Concrete Culverts**

1. **Please refer to mitigation measures as identified under Item B**

## **H. Check Weirs**

1. **Please refer to mitigation measures as identified under Item B**
2. **Poor management of general waste which has accumulated in and around the weir leading to downstream contamination.**
  - a) A formal waste area must be designated and demarcated within the construction camp.
  - b) Solid waste must be stored in covered, tip-proof metal drums and skips to be collected and disposed of by a certified waste contractor.
  - c) Waste accumulated on-site must be removed weekly. The waste must be moved to a licenced waste disposal facility.
  - d) Proof of safe disposal of solid waste must be documented, and these records must be maintained on-site for review.
  - e) A register of all waste generated and disposed of must be maintained.
  - f) No waste may be buried or burned on-site or dumped on surrounding properties under any circumstances. The contractor is liable to a fine should there be any evidence of illegal dumping.

## **I. Precast and in-situ Cast Canal Walls and Bases**

1. **Please refer to mitigation measures as identified under Item B**

## **J. Temporary Excavation and Backfilling of Material**

1. **New access routes created by vehicles causing disturbance to the environment**
  - a) Routes for maintenance access and haul roads must be existing paths and routes where possible.
  - b) No vehicle or plant may enter areas that are not 'working areas'. All contractors and maintenance staff, vehicles and materials movement must be confined to these paths and roads.
  - c) Where new routes are required, the haulage or access route must be demarcated prior to clearing. The Regional Ecologist, Reserve Management and/or BMD where applicable, must give clearance prior to clearing activity.
  - d) There must be no clearance<sup>5</sup> of indigenous vegetation in excess of 1ha or 300m<sup>2</sup> (depending on the location of the works) for the establishment of any new access routes. The Regional Ecologist, Reserve Management and/or BMD where applicable must provide clarity on the applicable threshold.



- e) Clearing must take place by hand as far as possible. The use of mechanical machinery such as bobcats, excavators and TLBs must be approved by the Regional Ecologist, Reserve Management and/or BMD where applicable.
- f) Temporary access routes must be rehabilitated after usage as per prior approval from the Regional Ecologist, Reserve Management and/or BMD where applicable.

## **2. Diverting flow within a watercourse / estuary during maintenance activities changes system hydraulics and flow paths**

- a) Selection and design of temporary diversion methods must consider many factors, including:
  - Size of stream, tributary watershed area and anticipated flow rates during construction. Special consideration must be given to large streams with large tributary areas with higher flow rates. Any special water quality or aquatic life conditions the waterway;
  - Nature of surrounding land use, property ownership, and easements in the project area are important considerations in determining feasibility and methods for temporary diversions. For example, in a highly urbanized setting or an area with limited right-of-way, there may not be adequate space to construct a diversion channel;
  - Weather (storm runoff): If diversions are constructed in summer months when thunderstorms and flash flooding can occur, contractors will need to track weather forecasts closely and provide additional protection when higher flows from runoff are anticipated; and
  - Probability of flood flow exceeding diversion capacity and/or diversion failure.
  - The selection of the appropriate diversion type is largely site-specific. The best choice represents the most efficient method while keeping flora and fauna disturbance to a minimum.
- b) All detailed river diversion methodologies are to be approved by the Regional Ecologist, Reserve Management and/or BMD where applicable.
- c) Photographs of the channel prior to the diversion must be maintained on file to assist in final rehabilitation.
- d) Sites that require diversions must plan to undertake such activities during the dry season.
- e) During the river diversion the flow of the river must not be or blocked. Temporary diversions must allow for the free flow of water at all times.
- f) No damming may occur.
- g) Erosion protection measures (sandbags) must be put in place in a channel to prevent sedimentation and erosion from taking place within the river.
- h) Damaged construction materials must not enter or block the river.
- i) Only earth material with a containment barrier i.e., sandbags, are permitted to be used to divert the flow within the watercourse / estuary.
- j) Loose sand material and soil must not be placed directly within the watercourse / estuary as this will lead to downstream sedimentation.
- k) Should any sediment or foreign materials disperse into surrounding areas around the working area, this material must be removed by hand immediately,
- l) Upon completion of the division all material must be removed. For in-stream diversions the channel bed must be shaped to match the gradient prior to the disturbance. For out of stream diversions the channel must be completely infilled to ensure the flows take place within the natural channel.

## **3. Damaging riverine / wetland / estuary sensitive areas through maintenance activities**

- e) The eThekweni Municipal Ecologists from BMD, the Regional Ecologist or the Reserve Management must be requested to advise if vegetation clearing is required.
- f) All activities must be restricted to the maintenance footprint area.
- g) The vehicles and machinery must make use of existing access routes as much as possible before adjacent areas are considered for access.
- h) Erosion and sedimentation into the channel must be minimised through the implementation of erosion control measures i.e. sandbags.
- i) All waste generated on-site during maintenance must be removed to the designated waste storage areas and disposed of at a registered waste disposal facility.

- j) All small machinery used on site must be situated on a drip tray (i.e. pumps, generators, compressors etc.).
- k) Where the banks of a riparian area / wetland / estuary have been damaged due to maintenance activity, the disturbed area must be rehabilitated before leaving the site.
- l) This would normally require ripping of any compacted soil in the working area, top soiling the disturbed areas if topsoil was removed.
- m) The banks of the riparian area / wetland / estuary must be shaped to be uniform with those on either side of the site.
- n) Replanting of the working area must take place to root and protect the soil from erosion.

#### **4. Erosion of temporary structures/access roads leading to sedimentation of the surrounding environment**

- a) Ensure that the watercourse/estuary is never blocked. The water must always be able to flow through the construction area.
- b) Erosion protection measures must be put in place in a channel to prevent sedimentation and erosion from taking place. These would normally be sandbags, sized according to the size of the channel they are being placed in, i.e. larger sandbags are required for larger watercourses/estuaries with stronger flow.
- c) Any fill material that is pushed into the watercourse/estuary for the maintenance activity must be removed after implementation is complete.

#### **5. Stockpiling of materials in close proximity to sensitive areas**

- a) If a stockpile of material e.g., soil or stone chips is required, the position of the stockpile must be agreed to by the PM, Regional Ecologist, Reserve Management and/or BMD where applicable.
- b) Stockpiles not to exceed 1.5m and should be bunded to prevent collapse outside the footprint.
- c) Stockpiles should not be positioned within 15m of a watercourse / estuary.
- d) Fine aggregate which has the potential to contaminate the surrounding environment must be enclosed in a sandbag wall and must be covered with a tarpaulin.

### **K. Removal of Silt, Debris and Waste from Pipes/Manholes**

#### **1. Poor management of construction rubble, flood debris and/or waste**

- a) A formal waste area must be designated and demarcated within the construction camp.
- b) Solid waste must be stored in covered, tip-proof metal drums and skips to be collected and disposed of by a certified waste contractor.
- c) The contractor must provide litter bins throughout the site for use by all staff on site.
- d) Waste accumulated on-site must be removed when containment has reached 80%. The waste must be moved to a licenced waste disposal facility.
- e) Proof of safe disposal of solid waste must be documented, and these records must be maintained on-site for review.
- f) A register of all waste collected and disposed of must be maintained.
- g) No waste may be buried or burned on-site or dumped on surrounding properties. All waste must be disposed of at a licenced waste disposal facility.
- h) No dumping is permitted. The contractor is liable to a fine should there be any evidence of illegal dumping.

#### **2. Noise generated during maintenance activities.**

- a) Directional and intensity settings aimed at minimising noise emitted from the maintenance site must be maintained on hooters and sirens while adhering to safety standards. Silencer units on plants and vehicles must be maintained in good working order.
- b) Contractors and maintenance staff must not unnecessarily make other noise (such as loud music or shouting).

## L. Repair of Coastal Outfalls

### 1. Environmental damage due to inappropriate site establishment

#### i. Construction camp

The following criteria must apply to the selection of a site for Contractors' camps:

- a) Landowner permission is required;
- b) Select an area that requires the least amount of removal of indigenous vegetation and large trees.
- c) There must be no clearance<sup>5</sup> of indigenous vegetation in excess of 1ha or 300m<sup>2</sup> (depending on the location of the works). BMD must provide clarity on the applicable threshold.
- d) Select an area which is at least 32m from the edge of a watercourse. If no location is available an approval from the Regional Ecologist, Reserve Management and/or BMD where applicable, must be given for the establishment of a site within the 32m buffer.
- e) Select a location that has easy access and which has already been cleared or disturbed by previous human activity (e.g. old fields, abandoned tracks or yards, previous construction camps or stockpile areas);
- f) Select a site that minimises nuisance impacts on neighbours or tourists (e.g. visual intrusion, lights at night, noise, dust, movement of people and vehicles, and safety and security risks);
- g) Select a level site that does not require any excavation or terracing;
- h) Select a site with good drainage and implement additional drainage management measures where necessary;
- i) Stay out of river flood plains and drainage lines, and at least more than 100 m away from the edge or banks of water bodies (e.g. streams, wetlands, pans, dams, lakes, etc.); and
- j) Check the area for nests of birds or large burrows of animals and avoid these areas where possible.

#### ii. Site layout and design

The Contractor is to adhere to the following, in terms of site layout and design:

- a) Limit the size of the site to a minimum;
- b) Provide drainage to prevent soil erosion from stormwater runoff;
- c) Locate materials and soil stockpile areas, fuels and chemical storage areas and batching areas away from environmentally sensitive areas and protected from stormwater runoff, fire and access by unauthorised persons;
- d) Locate and clearly indicate convenient access routes, temporary loading and parking areas, and turning circles so that vehicle movement can be confined to these areas;
- e) Locate chemical toilets so that they are easily accessible for servicing and 100m away from any watercourses;
- f) Locate temporary waste bins and skips so that they are easily accessible for emptying and removal;
- g) Design the layout to control and reduce noise from source;
- h) Position components and equipment to limit visual intrusion; and
- i) Direct lights so that they do not pose a nuisance to neighbours.

#### iii. Plant, animal and heritage resources

- a) The presence of protected plants and trees must be determined by the Environmental representative during the design stage and marked off for protection or translocation well before maintenance activities commence;
- b) The ECO must be responsible for ensuring that any required demarcation, removal, relocation and/or rescue of plants, animals and/or heritage resources are undertaken prior to maintenance activities commencing; and
- c) The Principal-Agent / Engineer is responsible for timeously notifying the ECO of maintenance schedules and dates so this can be timeously affected.

### 2. Damage to coastal areas due to maintenance activity

- a) Any construction at or near the water edge where debris can be washed or blown into the water must be surrounded by silt screens.

- b) All storage areas for sand and soil must be at least 20 meters away from the high-water mark and construction equipment must not be cleaned or washed within 50 meters of the high watermark.
- c) Construction activities within any coastal zone must be limited to the absolute minimum.
- d) All construction workers must not be allowed to access areas outside of the construction footprint.
- e) Only material removed from the construction footprint will be allowed for sandbags. No imported material (i.e topsoil and subsoil from another location) will be permitted.
- f) The entire working footprint must be demarcated and approved by the BMD prior to any work commencing on site.
- g) Where the existing infrastructure is above the high watermark there must be no disturbance below the high watermark.
- h) Access below the high-water mark must be restricted and must make use of existing tracks.
- i) All-access routes must be planned and approved by BMD prior to any work commencing on site.
- j) No access routes should be created on an ad-hoc basis.
- k) Care must be exercised so as not to endanger the safety and well-being of other persons in the coastal zone.
- l) Temporary access routes must be rehabilitated after usage as per prior approval from the BDM.
- m) All-access routes when no longer required must be immediately rehabilitated.
- n) Pedestrian access through the construction area must be limited.
- o) In areas where vegetation has been cleared from dunes the measures stipulated within the *Environmental Management Plan for Dune Rehabilitation in Durban* must be implemented (Annexure 11).

### **3. Damage/disturbance to marine life**

- a) Under no circumstances is sea reclamation to support maintenance activities is permitted.
- b) Any wastewater generated through piling works must not be discharged into the sea but must be discharged offsite at a licenced wastewater treatment facility.
- c) The use of prefabricated concrete members must be the preferred construction methodology.
- d) On-site concrete casting activities must be avoided where possible.
- e) The Spill Contingency Plan must be established during the construction phase as a precautionary measure so that actions to prevent or reduce risks to sensitive receivers in the vicinity can be undertaken in the event of accidental spillage. The Spill Contingency Plan has been provided in Annexure 9 and must be updated where required.
- f) Dumping of wastes, chemicals, oil, trash, plastics, or any other substance that would potentially be harmful to marine habitats is strictly prohibited.
- g) The construction footprint must be demarcated and should consider utilising buoys if necessary (deep water).

### **4. Spillage of concrete into the natural area and watercourses**

- a) Concrete must be transported in a manner that avoids environmental contamination i.e. spillages must be avoided. Trucks transporting concrete must be completely enclosed. Washing of chutes is only permitted in an enclosed bunded area.
- b) Any polluted water or cement sediments must be collected and disposed of as instructed by the Regional Ecologist, Reserve Management and/or BMD where applicable.
- c) Concrete mixing to be undertaken on a lined, bunded surface within the construction camp. Empty cement bags to be disposed of immediately off-site and to be treated as hazardous waste.
- d) Concrete mixing must take place away from any watercourse, wet areas or steep banks. This is to reduce the risk of contamination of stormwater run-off or nearby watercourses in the event of an accidental spill.

### **5. Management of construction rubble and/or waste**

- a) A formal waste area must be designated and demarcated within the construction camp.
- b) Solid waste must be stored in covered, tip-proof metal drums and skips to be collected and disposed of by a certified waste contractor.

- c) The contractor must provide litter bins throughout the site for use by all staff on site.
- d) Waste accumulated on-site must be removed weekly. The waste must be moved to a licenced waste disposal facility.
- e) Proof of safe disposal of solid waste must be documented, and these records must be maintained on-site for review.
- f) A register of all waste generated and disposed of must be maintained.
- g) No waste may be buried or burned on-site or dumped on surrounding properties. All waste must be disposed of at a licenced waste disposal facility.
- h) No dumping is permitted. There must be no dumping on site under any circumstances. The contractor is liable to a fine should there be any evidence of illegal dumping.

#### **6. Leaking equipment resulting in pollution of the surrounding environment**

- a) All vehicles or equipment must be checked before being brought onto the site.
- b) No maintenance onsite will be allowed.
- c) All emergency maintenance of equipment and vehicles must be performed in such a manner so as to avoid any environmental contamination (e.g. use of drip trays) and must only take place within an area designated by the PM, where possible.
- d) Drip trays must be provided for the equipment that could leak oil, stationary plant and for the "parked" plant.
- e) All vehicles and equipment will be kept in good working order and serviced regularly. Leaking equipment must be removed from the site.

#### **7. Noise generated during maintenance activities**

- a) Directional and intensity settings aimed at minimising noise emitted from the maintenance site must be maintained on hooters and sirens while adhering to safety standards. Silencer units on plant and vehicles must be maintained in good working order.
- b) Contractors and maintenance staff must not unnecessarily make other noise (such as loud music or shouting).

### **M. Vegetation Clearing**

#### **1. Clearing of indigenous vegetation**

- a) The eThekweni Municipal Ecologists from BMD, the Regional Ecologist or the Reserve Management must be requested to advise if vegetation clearing is required.
- b) Indigenous and/or protected vegetation must be identified and must not be removed unless permission has been obtained from the relevant authority (contact DFFE/EKZNW).
- c) Plants within the designated maintenance area can only be moved or removed as authorised by the Regional Ecologist, Reserve Management and/or BMD where applicable, and these should be set out in a schedule for reference. The following items must be followed during any plant rescue activities:
  - Mark footprint of the proposed construction area. The footprint of the proposed development must be marked out prior to breaking ground.
  - Location and rescue of all plants to be rescued that may occur within marked out areas (within the footprint of proposed infrastructure). The marked-out area must be walked and required species rescued.
  - For all plants that are rescued, relevant information must be collected, as is determined by the Regional Ecologist, Reserve Management and/or BMD where applicable, as being adequate for reporting and monitoring. This information could include the number of individuals/clumps and dates collected, as well as where they came from.
  - Nursery facilities must be established within either the proposed site office area or in a construction laydown area.
  - Permits to collect, relocate and propagate plant material and to collect seed or cuttings for the contract must be obtained from the relevant authorities. This should be a single permit application that covers all components of the project.

- Appoint an experienced horticulturalist or landscaping contractor to undertake the rescue operation, manage the rescued plant material and operate the nursery.
- d) Any shrubs or trees of significant size must be protected and permission must be obtained from the Regional Ecologist, Reserve Management and/or BMD where applicable, to cut or remove these as above. Ideally, these should also be marked with danger tape.
- e) Removal, damage or disturbance of any vegetation outside the designated area is not permitted.

## **2. Emissions, smoke, nuisance, safety issues when burning plant material**

- a) Burning of vegetation including tree trunks and stumps cut during site clearing and establishment is not be permitted unless specifically authorised by the Regional Ecologist, Reserve Management and/or BMD where applicable.
- b) All cut vegetation must be disposed of at the local landfill sites designated by the Regional Ecologist, Reserve Management and/or BMD where applicable. Smaller, thorny material may be kept and used for brush packing and rehabilitation if appropriate.

## **3. Potential proliferation of alien invasive vegetation**

- a) The General Invasive Alien Plant Control: Guideline Document (attached as Annexure 10) must be affected during all maintenance routines and all alien plants must be removed immediately. This must be a regular and managed programme until such time as natural vegetation has reclaimed previously disturbed areas. Alien plants must not be allowed to become established and build up a seed bank in the soil, which will lead to costlier and longer-term alien plant control programmes being required for the development.
- b) All areas disturbed by maintenance/ construction activity must be kept clear of alien vegetation. Alien vegetation clearing must take place on a monthly basis where projects are longer than 1 month.

## **N. Temporary Access for the Public**

### **1. Disturbance and/or removal of indigenous vegetation**

- h) Areas for maintenance activities must be agreed upon by the Regional Ecologist, Reserve Management and/or BMD where applicable, and demarcated off from the surrounding, undisturbed environments.
- i) The disturbance footprint must be kept to a minimum, including the areas traversed by trucks and machinery and limited to a specific operational area.
- j) Contractors and maintenance staff may in no way interfere with the natural vegetation, animals or surroundings. Any components of the natural environment that may be disturbed for maintenance-related purposes must be specified and agreed to by the Regional Ecologist, Reserve Management and/or BMD where applicable.
- k) Plants within the designated maintenance area can only be moved or removed as authorised by the Regional Ecologist, Reserve Management and/or BMD where applicable, and these must be set out in a schedule for reference. Any shrubs or trees of significant size must be protected and permission must be obtained to cut or remove these as above. Ideally, these should also be marked with danger tape.
- l) The Regional Ecologist, Reserve Management and/or BMD where applicable, must be requested to advise if vegetation clearing is required.
- m) Indigenous and/or protected vegetation must be identified and must not be removed unless permission has been obtained from the relevant authority (contact DFFE/EKZNW).
- n) Animals residing within or moving through the designated area must not be killed nor unnecessarily disturbed. Should contractors or maintenance staff notice any sensitive species on-site, the Regional Ecologist, Reserve Management and/or BMD where applicable, must be alerted and the appropriate action taken on advisement.

**2. New access routes created by vehicles causing disturbance to the environment**

- a) Routes for pedestrian access must be existing paths and routes where possible.
- b) All pedestrian movement must be confined to these paths and roads.
- c) Where new pedestrian routes are required, the route must be demarcated prior to clearing. The Regional Ecologist, Reserve Management and/or BMD where applicable, must give clearance prior to clearing activity.
- d) There must be no clearance<sup>5</sup> of indigenous vegetation in excess of 1ha or 300m<sup>2</sup> (depending on the location of the works) for the establishment of any new access routes. The Regional Ecologist, Reserve Management and/or BMD where applicable must provide clarity on the applicable threshold.
- e) Clearing must take place by hand as far as possible.

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## 8. GENERAL MAINTENANCE MANAGEMENT PROGRAMME SPECIFICATIONS

### 8.1. General rules for work within sensitive environmental areas

- a) Where maintenance work is carried out in a reserve or protected area, the Regional Ecologist, Reserve Management and/or BMD where applicable, must be consulted prior to maintenance. When maintenance is undertaken within a protected area or reserve, all Nature Reserve rules must be adhered to by maintenance staff, contractors, subcontractors and staff (this includes behaviour, disturbance and access). Staff and subcontractors may be refused entrance to the protected area should they fail to comply with the MMP, Reserve Rules or relevant legislation.
- b) The sensitive areas outside of the maintenance footprint area may require snow netting demarcation to keep pedestrian and plant activity out of such areas. The Regional Ecologist, Reserve Management and/or BMD where applicable, to advise accordingly.
- c) CSCM and BMD Manager/lead contractor will be held responsible for subcontractors and their staff when working in sensitive areas.
- d) Fires are not permitted on the site.
- e) Areas disturbed by maintenance activities must be minimised. This will, in turn, reduce many of the maintenance related environmental impacts of the project and will also reduce rehabilitation requirements and costs.
- f) All relevant safety precautions must be taken and emergency plans put in place to prevent damage or injury to humans and animals due to repair/maintenance or related activities or structures.
- g) Repair/maintenance programming and methods should be designed to minimise maintenance impacts on the surrounding environment.

### 8.2. Access routes

- a) Access routes must be demarcated and adhered to. No movement or storage of materials, machinery or personnel shall be permitted in the surrounding natural areas.
- b) Routes for maintenance access and haul roads must be existing paths and routes. All contractors and maintenance staff, vehicles and materials movement must be confined to these paths and roads.
- c) The disturbance footprint must be kept to a minimum, including the areas traversed by trucks and machinery and limited to a specific operational area.
- d) The relevant speed limits must be adhered to and signage must be implemented.
- e) Erosion protective measures must be implemented for access roads should these be on existing dirt roads.
- f) Damage to the existing access roads as a result of maintenance activities must be repaired to the satisfaction of the park manager or relevant environmental authority.
- g) Traffic safety measures (e.g. traffic warning signs, flagmen) must be implemented.

### 8.3. Fauna and flora

- a) Burning of vegetation including, tree trunks and stumps, cut during site clearing and the establishment is not permitted. All cut vegetation must be disposed of at the local licenced landfill sites. Smaller, thorny material may be kept and used for brush packing and rehabilitation if appropriate.
- b) Plants within the designated maintenance area can only be moved or removed as authorised by the the Regional Ecologist, Reserve Management and/or BMD where applicable, and these should be set out in a schedule for reference. Any shrubs or trees of significant size must be protected and permission must be obtained to cut or remove these as above. Ideally, these should also be marked with danger tape.
- c) It is essential that construction staff be educated in indigenous trees and may not remove any for personal use.
- d) A license to cut, trim or damage indigenous vegetation must be obtained from the Department of Forestry, Fisheries and the Environment (DFFE) and EKZNW.



- e) Removal, damage or disturbance of any vegetation outside the designated area is not permitted. The gathering of firewood is not permitted.
- f) Vegetation clearing should preferably be carried out by hand to reduce the disturbance footprint.
- g) The Alien Plant Control Programme (Attached as Annexure 2) must be affected during all maintenance routines and all alien plants must be removed immediately. This must be a regular and managed programme until such time as natural vegetation has reclaimed previously disturbed areas.
- h) Alien plants must not be allowed to become established and build up a seed bank in the soil, which will lead to costlier and longer-term alien plant control programmes being required for the development.
- i) Paintbrushes must not be cleaned on trees/rocks.
- j) Animals residing within or moving through the designated area must not be killed nor unnecessarily disturbed. Should contractors or maintenance staff notice any sensitive species on-site, the Regional Ecologist, Reserve Management and/or BMD where applicable, must be alerted and the action as advised by these specialists must be implemented.

#### **8.4. Soil management**

- a) Topsoil must be conserved from all disturbed sites for use in rehabilitation.
- b) Topsoil stockpiles must not be compacted or allowed to exceed 2m in height. Other stockpiles must also not exceed 2m in height.
- c) At all stages of the contract, erosion of bare soil, excavation surfaces and erosion of stockpiles must be prevented by the application of erosion control measures (such as bitem cloth or berms).
- d) Stormwater drainage measures must be constructed on access routes within the site. Access routes must not result in or contribute to erosion.

#### **8.5. Wastes, pollution and nuisance**

- a) All wastes (including pollutants, spills and spoil) arising from maintenance activities are to be handled, stored, transported and disposed of in accordance with the relevant regulations. All efforts should be made to minimise, reclaim or recycle waste materials and no construction wastes may remain on-site at the end of the contract period.
- b) No waste of a solid, liquid or gaseous nature is allowed to pollute the site or the surrounding environment.
- c) All waste emissions (hazardous, airborne, liquid and solid) from the maintenance activities must be kept within the limits of standards set in terms of the relevant national and local pollution legislation and regulations.
- d) Accidental pollution or spillage incidents must be reported to the Regional Ecologist, Reserve Management and/or BMD where applicable, immediately when they occur and must be cleaned up (to the satisfaction of the Regional Ecologist, Reserve Management and/or BMD where applicable) by Technical Services staff. Expert help or advice may be requested from Reserve Management or the Regional Ecologist. Spills of over 200 litres must be reported to the environmental authorities.
- e) Any fuel, oil, transmission or hydraulic fluid spilt onto the soils on site must be scraped up and placed in a non-permeable waste disposal container and reported to the Regional Ecologist.
- f) All reasonable measures must be taken to reduce air emissions in the form of dust, smoke and noxious gases. These measures may include the dampening of road surfaces to reduce vehicular dust.
- g) Contractors and maintenance staff are not permitted to use any stream, river, wetland or other naturally occurring water body or source adjacent to or within the designated area for the purposes of bathing, washing of clothes, vehicles, the disposal of any type of waste, nor any maintenance-related.
- h) Wastewater of any sort on the maintenance site must not be disposed of directly into drainage lines, streams, rivers, or onto the soils and no polluted water is allowed to enter the natural environment without adequate treatment to purify it to an acceptable standard.
- i) Any polluted water or cement sediments must be collected and disposed of as instructed by the Regional Ecologist, Reserve Management and/or BMD where applicable.

- j) Refuse must be collected and stored in demarcated areas, skips or bins. Waste disposal containers must be placed at a convenient location at the maintenance site. The containers must be designed to prevent refuse being blown out by the wind and must be scavenger-proof. All food wastes must be removed from the site on a daily basis.
- k) Chemical toilets must be provided for maintenance staff and the waste removed from the protected area and disposed of according to legislative requirements. One chemical toilet must be provided for every 15 staff.
- l) All potentially hazardous waste generated at the site must be removed and disposed of by qualified technical staff, in a manner approved by the Regional Ecologist, Reserve Management and/or BMD where applicable.
- m) Directional and intensity settings aimed at minimising noise emitted from the maintenance site must be maintained on hooters and sirens while adhering to safety standards. Silencer units on plant and vehicles must be maintained in good working order.
- n) Contractors and maintenance staff must not unnecessarily make other noise (such as loud music).

#### **8.6. Vehicles / equipment maintenance**

- a) No vehicle or equipment maintenance is allowed on site.
- b) All vehicles or equipment must be checked before being brought onto the site.
- c) The washing of vehicles on site is not allowed.
- d) Drip trays must be provided for the equipment that could leak oil, stationary plant and for the "parked" plant.
- e) All vehicles and equipment will be kept in good working order and serviced regularly off-site. Leaking equipment must be removed from the site.
- f) Any vehicle or equipment not in use must not be removed from the site.
- g) Vehicles/equipment must be removed from the site once maintenance activities are complete.

#### **8.7. Storage and handling of hazardous materials, substances and spillages**

- a) No fuel to be stored on site. Refuelling and machinery repairs must take place off-site.
- b) Storage areas must be clearly indicated and be approved by the Regional Ecologist, Reserve Management and/or BMD where applicable.
- c) No storage of hazardous materials that cumulatively amount to 30m<sup>3</sup> or more.
- d) The hazardous storage area is not permitted within 50m of sensitive environmental areas.
- e) The storage of hazardous waste in the sensitive area must be severely limited and is completely discouraged. Hazardous waste must be removed from the site immediately, where possible.
- f) The relevant MSDS's of hazardous materials or substances that will be stored on-site must be obtained and kept on file prior to storage of that substance or material on site. The Method Statement must be amended to include any new substances. The MSDS must be clearly displayed at the hazardous storage area.
- g) A designated hazardous area must be constructed as part of the base camp and must be bunded, lockable and roofed.
- h) PPE must be available at the hazardous store for maintenance staff to use.
- i) Staff must be trained on how to handle hazardous material or substances, this must be discussed in their toolbox talks.
- j) Drip trays must be placed under maintenance equipment (where applicable) and containers used to store hazardous materials.
- k) Used oils, grease or hydraulic fluids must be considered as hazardous waste and placed in lined and covered waste receptacles; these are to be emptied on a regular basis.
- l) All contaminants, flaking or loose coatings must be removed from the site and not allowed to be blown or washed into the environment. Corrective measures need to be implemented in order to be appropriately disposed of.

- m) No oil, diesel or noxious chemicals, cement, paint, solvents, etc. to be spilt. Where oil, concrete, cement, chemicals or diesel is spilt, clean-up and rehabilitation must be executed.
- n) All material (soil) contaminated by hazardous spills are to be collected and placed in hazardous waste bags and immediately disposed of at an hazardous waste facility. Waybills/safe disposal certificates for hazardous waste disposal must be obtained. The storage of hazardous waste in the sensitive area must be severely limited and is completely discouraged.
- o) All water contaminated by oil spills is to be reported to the Department of Water and Sanitation (DWS), if applicable.
- p) No cement mixing is permitted on bare soil. Cement mixing must take place on an impermeable surface.
- q) Should a spillage of hazardous substances occur, clean-up and disposal measures must be implemented. The following will apply should a spillage occur:
  - r) All contaminated soil must be removed and be placed in containers;
  - s) Contaminated material can be either bio-remediated or disposed of at a hazardous site;
  - t) Smaller spills can be treated on-site, and identified employees must be trained to perform this function;
  - u) A specialist Contractor must be used for the bioremediation of contaminated soil where the required remediation material is not available on site.
- v) All spills of hazardous substances must be recorded and reported immediately to the Regional Ecologist, Reserve Management and/or BMD where applicable, for further remedial action that may require engaging with relevant authorities (e.g. the Department of Water and Sanitation in cases where there is water pollution).
- w) Where required, stored material must to be protected from rain and run-off to avoid environmental contamination.
- x) Materials must be appropriately transported to avoid environmental contamination. Loose loads (e.g. refuse, paper and cement) must be covered.
- y) Once maintenance activities are complete, maintenance staff must ensure that there are no remaining hazardous materials or substances are stored on site.

#### **8.8. General waste management and waste disposal**

- a) Waste receptacles with covers must be provided and conveniently placed. A waste receptacle must be available at all times for general litter.
- b) Separate waste receptacles must be provided for the different waste streams, i.e. paper, plastic, glass, etc. Separation of waste and recycling of paper, glass etc. must be encouraged. Recycling bins must be utilized.
- c) All waste must be disposed at an appropriately licensed disposal facility.
- d) No littering is allowed on site.
- e) The site must be maintained in a clean and tidy condition at all times.
- f) All waste produced on-site must be disposed of at a licensed facility and all waste disposal certificates must be obtained and kept on site.
- g) Waste bins must be emptied daily and removed when maintenance activities are complete.
- h) No dumping of waste must occur in the natural environmental area or watercourses.
- i) All solid waste generated during the maintenance process (including packets, plastic, cut plant material, waste metals etc.) must be placed in a waste collection area and must not be allowed to blow around the site, be accessible by animals, or be placed in piles adjacent the skips/bins. Weatherproof and vermin proof bins must be used at all times.
- j) Large skips must be covered with a tarpaulin at all times or a lid. Hazardous waste such as oils, contaminated rags etc. must be disposed of at a hazardous class landfill. Rubble must not be buried on site.
- k) No burying of rubble on-site or dumping in any of the environmentally sensitive areas.
- l) A separate drum must be available for the storage of contaminated soil.

### **8.9. Education – environmental awareness**

- a) Environmental Awareness training must be undertaken for staff at all levels on the conditions of the MMP.
- b) All staff must be familiar with the MMP.
- c) Workers must be shown areas with sensitive features and must be informed of the importance of ensuring this area is not impacted.
- d) Site workers must be trained in avoiding impacts in areas of potential concern.
- e) CSCM must hold monthly toolbox talks with all their staff and sub-contractors to ensure that they are aware of the environmental and safety and health issues.
- f) Topics should address but not limited to the following:
  - Sensitive Environmental Areas;
  - Waste management;
  - Access roads;
  - Equipment that needs to be worn/carried in the field;
  - Use of drip trays;
  - Storage of hazardous substances;
  - Emergency procedures;
  - Interactions with wild animals;
  - Basic First Aid (snake / spider bites); etc.

### **8.10. Leaking equipment/materials resulting in pollution of the surrounding environment**

- a) All vehicles or equipment must be checked before being brought onto site and after use on site.
- b) Vehicle and plant maintenance must take place off-site and in areas demarcated for that purpose. Should any fuel, oil, transmission or hydraulic fluid be spilt onto the soils on-site, this soil should be scraped up and placed in a non-permeable waste disposal container, provided for that purpose. The Regional Ecologist, Reserve Management and/or BMD where applicable, must be informed immediately and any additional steps to limit the impacts of the spill and protect the natural environment that is advised by him/her must be followed.
- c) Drip trays must be placed under maintenance equipment (where applicable) and containers used to store hazardous materials.

### **8.11. Noise generated during maintenance activities**

- a) Directional and intensity settings aimed at minimising noise emitted from the maintenance site must be maintained on hooters and sirens while adhering to safety standards. Silencer units on plant and vehicles must be maintained in good working order.
- b) Contractors and maintenance staff must not unnecessarily make other noise (such as loud music or shouting).

### **8.12. Paint handling and storage**

- a) The paint storage area is not permitted where there is the potential for spills to contaminate stormwater or for run-off to enter any sensitive environmental areas on or adjacent to the site.
- b) Overnight / long-term storage of paint must be away from any environmentally sensitive areas and within an enclosed area, which is preferably hard-surfaced.
- c) Drip trays to be used when painting. Plastic liners/drop sheets must be placed around the area that is being painted to avoid paint from spilling onto the ground. These liners must be removed after painting and disposed of at a registered landfill site.
- d) Should paint be spilt on-site, all spillages must be removed from the area.

### 8.13. Emergency procedure

- a) All construction staff must be made aware of emergency phone numbers to use in the case of an emergency.
- b) All staff must be trained on how to react in the case of an emergency.
- c) An emergency response team must be set up to manage emergencies.
- d) Major incidents/spillages must be reported to the relevant authorities and the EDTEA emergency incident report must be completed and submitted.
- e) A sewage tanker/vacuum tanker is to be on call if there is the potential for any major spills (> 5l) to occur.
- f) A 50l plastic/steel drum must be available at the maintenance site, in the event of a spill so that it can be easily contained prior to the arrival of the sewage tanker.
- g) Contractor to be aware of the proper emergency response for dealing with fires (communication with the Regional Ecologist, Reserve Management and/or BMD where applicable).
- h) Burning of waste is not permitted.
- i) Precautions must be taken (e.g. suitable fire extinguishers, water bowsers, welding curtains) when working with welding or grinding equipment.
- j) All firefighting equipment must be regularly inspected by a qualified person and where applicable be approved by local fire services.
- k) All staff on site will be made aware of general fire prevention and control methods, and the name of the responsible person to alert to the presence of a fire.
- l) Contractor to develop emergency response procedure for dealing with spills and leaks.
- m) Ensure that the necessary materials and equipment for dealing with spills and leaks are available on-site, where practicable.
- n) In the event of a hydrocarbon spill, the source of the spillage will be isolated and contained. The hazardous waste must be treated in accordance with the waste management requirements, which includes disposal or treatment.

### 8.14. Social public participation and complaints

- a) During the setup phase of the project, the Contractor needs to make contact with those people that are interested or affected by the maintenance activities (I&AP's).
- b) Complaints received from the community and other I&AP's must be registered and recorded and also brought to the attention of the contractor. Both parties will respond accordingly. The following information will be recorded in the case of any complaint/incident:
  - Time, date and nature of the complaint;
  - Response and investigation were undertaken;
  - Corrective and preventative actions taken and by whom;
  - All complaints received will be investigated and a response is to be given to the complainant within 7 days;
  - All environmental incidents occurring on the site will need to be recorded in an Environmental Incident Book. The following information will be provided;

### 8.15. Archaeological sites

- a) If an artefact on-site is uncovered, work in the immediate vicinity will be stopped immediately.
- b) The contractor must take reasonable precautions to prevent any person from removing or damaging any such object and will immediately, upon discovery thereof, inform the site supervisor.
- c) Amafa must be contacted who will appoint an archaeological consultant.
- d) Work may only resume once clearance is given in writing by the Archaeologist.

### 8.16. Paleontological monitoring programme

- a) The monitoring programme for palaeontology must commence once maintenance activities begin.
- b) When excavations begin, the rocks must be given a cursory inspection by the Regional Ecologist, Reserve Management and/or BMD where applicable. Any fossiliferous material (wood, plants, insects, bone, coal) must be put aside in a suitably protected place. This way, the project activities will not be interrupted.
- c) Photographs of similar fossil plants must be provided to the developer to assist in recognising the fossil plants in the shales and mudstones.
- d) Photographs of the putative fossils can be sent to the palaeontologist for a preliminary assessment.
- e) If there is any possible fossil material found, then the qualified palaeontologist must visit the site to inspect the selected material and check the dumps where feasible.
- f) Fossil plants or vertebrates that are considered to be of good quality or scientific interest by the palaeontologist must be removed, catalogued and housed in a suitable institution where they can be made available for further study. Before the fossils are removed from the site, a SAHRA permit must be obtained.
- g) If no good fossil material is recovered, then the site inspections by the palaeontologist will not be necessary.
- h) If no fossils are found and the excavations have finished, then no further monitoring is required.

### 8.17. Alien invasive plant control

- a) All areas disturbed by maintenance activities must be fully rehabilitated before the maintenance is considered complete. This would include alien plant control measures being applied and monitored.
- b) Alien plant control to be undertaken in accordance with the Alien Plant Control Programme attached as Annexure 2 of this MMP.
- c) The Regional Ecologist, Reserve Management and/or BMD where applicable, must approve the use of any specific chemical/herbicide prior to its use in alien plant control (e.g. Roundup has significant side effects on amphibians so may not be permitted in certain sections/areas of the reserve).

### 8.18. Post construction rehabilitation

- a) The contractor must rehabilitate and revegetate sensitive environmental areas as soon as work is complete.
- b) Any spoil material (that is not topsoil) must be removed from the site. No spoil material may be left within or near the sensitive environmental area.
- c) The landscape profile within the working area must be restored, matching as closely as possible to the original lye of the land on either side of the working area.
- d) Where material is hard, dry and/or clayey the material must be broken down by an excavator or TLB to get the desired uniform effect.
- e) The material must be packed firmly, to avoid destabilization. If the disturbed area occurs on a slope, silt curtains or sand bags must be used to prevent erosion.
- f) All reshaped material must be raked and topsoil applied.
- g) Immediately prior to spreading topsoil, the subgrade must be loosened by diking or scarifying to a depth of at least 10 centimetres to ensure bonding of the topsoil and subsoil.
- h) The contractor must ensure that soil horizons are replaced in the same order that they were removed.
- i) The contractor must compact the topsoil enough to ensure good contact with the underlying soil, but avoid excessive compaction, as it increases runoff and inhibits seed germination.
- j) The disturbed area must be seeded and managed according to specifications set out in points below. The use of fast-growing grasses will aid the stabilization of soil and provide an opportunity for natural grasses and ground cover to return.
  - o Area's to be rehabilitated
    - Areas where erosion has occurred;

- Formerly vegetated areas which have been disturbed by construction;
- Disturbed areas within any natural watercourses or estuary
- Disturbed areas within any littoral active zone
- Method
  - Use of seed to be applied manually through mixing with soil and hand broadcasting
  - Local grass seed to be harvested where possible.
  - Use of indigenous plant sods specific to the type of sensitive environmental area i.e., terrestrial, aquatic and or coastal.
- Site Preparation
  - Prior to the commencement of any rehabilitation work, the contractor must ensure that all declared weeds, undesirable invasive species and/or other foreign material are removed off-site to a licensed landfill site. Weed infestation to be attended to with *Glyphosphate* or *triclopyr* with no residual effects.
- For grassing:
  - The site must be scarified or ripped to a depth approximating 100mm but no less than 50mm.
  - Sites must be lightly damped with water
  - Areas where grass and natural vegetation have been retained successfully must be retained.
  - The distance between ripped/scarified rows shall not exceed 50mm.
  - Hand broadcasting utilizing an *Eragrostis tef*; *Digitaria eriantha*; *Chloris gayana*; *Cynodon dactylon* mix to be undertaken and applied to all areas.

Grass species General application rate	Grass species General application rate
<i>Eragrostis tef</i>	5
<i>Cynodon dactylon</i>	10
<i>Chloris gayana</i>	10
<i>Digitaria eriantha</i>	10
Total	35

- The above application rate must be utilized
- Note: this is a general mix known to be hardy and fast growing. Within natural grassland areas such a mix would need to be altered as species such as *Cynodon dactylon* can compete with indigenous species.
- For wetlands:
  - Species must be planted in a single rows (strips). Plants must be spaced at 1m intervals along rows and rows should be 3m apart.
  - Re-vegetation using sods of *Phragmites australis* (Common Reed), *Cyclosorus interruptus* (Marsh Fern), *Cyperus sexangularis* (Star Sedge), *Cyperus prolifer* (Dwarf papyrus) and *Leersia hexandra* (Wild Rice).
  - Wetland edges (outer 5m) to be re-vegetated using sods of *Cyperus dives* (Giant Sedge) and *Cyperus latifolius*.
  - To stimulate germination, water retention in the seed zone is essential and must be aided by the application of light vegetation mulches and/or scattering of light woody debris.
- For coastal areas:
  - The species selected must be endemic to the region.
  - Mixing of seed, saplings and juvenile specimens must be used.
  - A mix of appropriate plant species must be undertaken. Areas to vegetated with the use of graminoid species (the typical dune grass in KZN is *Sporobolus virginicus*; however, commercially available species such as *Digitaria eriantha* may be considered). Mix this with lianas or creepers (*Canavalia rosea* or *Ipomoea pescaprae*), as well as some cover-tolerant shrub species such as *Scaevola plumieri* or *Carpobrotus dimidiatus*.
- Watering and maintenance
  - The soil must be kept moist immediately post the application of seed/plants.
  - A further watering within 24 hrs of application will be required.
  - Watering must be at the rate of 25mm/m<sup>2</sup>

- Due to travel and logistical issues a further watering 14 days after seeding is required.
- Monitoring of site for germination and regrowth is required.
- Weed removal manually or by use of herbicide required.
- Watering must be gentle, so as not to create the development of rill erosion. Any erosion damage as a result of irrigation must be repaired.
- Where there is a possibility of livestock grazing at rehabilitated sites. These animals must, as far as is practicable, be excluded for the first 3 months of re-grassing.
- Alien Plant Control
  - The Contractor shall implement an effective alien plant removal and control programme during the defects and liability period (21 days).
  - Herbicides used must be selective and non-residual in nature and applied only by a licensed operator as per the legal requirements of the Conservation of Agriculture Resources Act, No 43 of 1983 and the Fertilizers, Farm Feeds, Agricultural Remedies and Stock Remedies Act, No 36 of 1947.
  - Manual removal of smaller alien plant material is recommended where applicable. Root must be removed and disturbed soil compacted and replaced. Additional seeding with grass mix may be required.
- k) All waste material generated must be collected and removed from site and disposed of appropriately. No on-site waste disposal will take place. Clearing of indigenous vegetation

*Decommissioning or expansion activities of bulk infrastructure may require a separate Environmental Authorisation and or Water Use Authorisation prior to commencement. The relevant competent authorities (i.e. EDTEA and DWS) must be contacted prior to decommissioning or expansion activities to confirm the need for relevant approvals.*



**Annexure 1: Contact Numbers**

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**Annexure 2: Project Specific MMP Addendum Template**

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**Annexure 3: Public Participation Process (PPP)**

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**Annexure 4: Work Method Statement Template**

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**Annexure 5: Basic Conceptual/Generic Stormwater Infrastructure Drawings**

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**Annexure 6: Spill Contingency Plan**

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**Annexure 7: General Invasive Alien Plant Control: Guideline Document**

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**Annexure 8: Environmental Management Plan for Dune Rehabilitation In Durban**

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