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AMENDED MAINTENANCE MANAGEMENT PLAN

FOR

THE EXISTING STORMWATER INFRASTRUCTURE ON ERF 410, ORION DRIVE, GREAT BRAK RIVER, MOSSEL BAY MUNICIPALITY WESTERN CAPE

CLIENT:	Mr. Rudi Minnie Mossel Bay Municipality
ENVIRONMENTAL CONSULTANT:	Sharples Environmental Services cc Author: Carla Swanepoel (Candidate EAPASA #3297) Co-Author and Reviewer: John Sharples (EAPASA# 1485)
DEA & DP PROJECT REFERENCE:	14/1/1/E3/9/10/3/L1250/22
SES REFERENCE NUMBER:	MBM/MMP/20/06/23
DATE:	09 January 2024

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Project Ref. No:	MBM/MMP/20/06/23
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Expertise

Sharples Environmental Services cc Since 1998, SES has been actively engaged in the fields of environmental planning, assessment and management. We advise private, corporate and public enterprises on a variety of differing land use applications ranging from large-scale residential estates and resorts to golf courses, municipal service infrastructure installations and the planning of major arterials. Our consultants have over 40+ years of combined experience and we operate in the Southern, Eastern and Western Cape regions.

CARLA SWANEPOEL (**Candidate Environmental Assessment Practitioner):**
Carla studied at the North West University completing a Bachelor of Science Honours degree in Environmental Sciences majoring in Biodiversity and Conservation Ecology. Carla joined SES in 2022 and have two years of experience in drafting Basic Assessment Reports, Environmental Management Programmes and Rehabilitation Plans.

JOHN SHARPLES (**Managing Director**) - John started Sharples Environmental Services in 1998 and has overseen the company's growth and development since then. John also started the Cape Town office in 2010. John holds a Masters in Environmental Management from the University of the Free State as well as a Bachelor's degree in Conservation. He has consulted for 19 years running a team of highly trained and qualified consultants and prior to this gained 12 years of experience working for environmental organizations. John is registered with EAPASA as a certified Environmental Practitioner.

GLOSSARY AND ABBREVIATIONS

Accretion:	The process where coastal sediment returns to the visible portion of the beach through natural processes.
Aeolian processes:	Processes that are driven by winds, including the ability of the wind to shape the surface of the Earth.
Beach:	The sandy portion of the coastline between the LWM and HWM.
Backshore:	The portion of the beach between the foreshore (between LWM and HWM) and coastline.
Beach berm:	A beach berm is the nearly horizontal portion of a beach formed by the deposition of sediment by receding waves. The berm has a crest (top) and a face - the latter being the slope leading down towards the water from the crest.
Beach maintenance:	Re-profiling of beaches for purposes of preventing the accumulation of sand and subsequent smothering of adjacent infrastructure by wind and tides.
Biodiversity:	The variety of living organisms, their genetic makeup and ecological communities.
CCT:	City of Cape Town Metropolitan Municipality, established in terms of the Local Government: Municipal Structures Act, 1998 read with the Province of the Western Cape: Provincial Gazette 558 dated 22 September 2000.
DEA&DP:	Provincial Department of Environmental Affairs and Development Planning, Western Cape.
Dune:	A dune is a hill or mound of sand built by coastal processes. Dunes occur in different forms and sizes and are formed by interaction of the wind, waves and vegetation.
Dune maintenance:	The process of retaining the dune in a functional state before and after it has been rehabilitated.
Dune rehabilitation:	The process of restoring or reconstructing the dune after it has been damaged due to natural processes or human activities or a combination of both.
ECO:	Environmental Control Officer
EIA:	Environmental Impact Assessment
Foredune:	The first and often prominent ridge of sand behind and parallel to the beach above the HWM, usually vegetated.
HWM:	Refers to the highest line reached by coastal waters, but excluding any line reached as a result of: - exceptional or abnormal weather or sea conditions; or - an estuary being closed to the sea.
Embryo dune:	Small mounds of sand at the top of the beach, above the HWM and usually right in front of the foredune. This dune is the most dynamic dune type, growing upwards and outwards to the sea or can be completely removed by storm waves.
Hummock dunes:	A sand dune that forms around vegetation.
ICM Act:	Integrated Coastal Management Act (Act No. 36 of 2014). CCT Maintenance Management Plan: Dunes and Beaches 6
MBM:	Mossel Bay Municipality
Indigenous species:	Plant species native to Southern Africa.
Invasive plant species:	Are those plant species that do not occur naturally within a region and are able to establish themselves in a natural or semi-natural habitat. They impact destructively upon biodiversity, including degeneration or elimination of indigenous species.
LWM:	Refers to the lowest line to which coastal waters recede during spring tide.
Maintenance:	Actions performed to keep a structure or system functioning or in service on the same location, capacity and footprint.
MMP:	Maintenance Management Plan for maintenance purposes defined or adopted

	by the competent authority.
NEMA:	National Environmental Management Act (Act No.107 of 1998).
ORV:	Off-road vehicle
Primary dunes:	The first dunes above the intertidal zone

1. INTRODUCTION AND BACKGROUND

Sharples Environmental Services cc (SES) has been appointed to compile a Maintenance Management Plan(MMP) for the existing stormwater infrastructure located along Orion Road, Suiderkruis, Grootbrak Rivier. This MMP has been prepared to enable the immediate and on-going management that is required which resulted from historically land use and planning decisions as well as from cumulative and/or extreme coastal storm events. The CCT (City of Cape Town) Maintenance Management Plan: Dunes and Beaches, 2017 was used as a guide in compiling this MMP.

ERF 410 is located on Orion Road, Suiderkruis, Grootbrak Rivier (Figure 1). The Mossel Bay Municipality established stormwater infrastructure from Suiderkruis, which included two stormwater sumps located along the dune corridor, south of Orion Drive. Maintenance activities are required when the existing stormwater drains become congested, and no drainage is possible from Orion Drive. The Mossel Bay Municipality (MBM) originally had a Maintenance Management Plan for Erf 410 or Erf 305 Great Brak River (DEA&DP Ref: EG 12/2/4/7-D6/27-GJ0036/12) issued by DEA&DP: Land Management (Region 1) on 22 May 2012, which only had a validity period of 2 years from date of issue and therefore lapsed on 22 May 2014.

2. LEGISLATIVE REQUIREMENTS

2.1 NATIONAL ENVIRONMENTAL MANAGEMENT ACT, NO. 107 OF 1998, AS AMENDED AND THE ENVIRONMENTAL IMPACT ASSESSMENT REGULATIONS, 2014 (AS AMENDED)

The following listed activities contained in the National Environmental Management Act (NEMA) Environmental Impact Assessment (EIA) Regulations, 2014 (as amended 2017), defined in Government Notice (GN) No. R. 327 and 324(as amended) are identified as falling within the ambit of rehabilitation, management and maintenance of dunes and beaches.

Listing Notice 1:
Activity 18 of GN No. R. 327 (as amended):
"The planting of vegetation or placing of any material on dunes or exposed sand surfaces of more than 10 square meters, within the littoral active zone, for the 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 in accordance with a maintenance management plan; or
(ii) such planting of vegetation or placing of material will occur behind a development setback".

Listing Notice 1:
Activity 19A of GN No. R. 327 (as amended):
"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—

(a) will occur behind a development setback;
(b) is for maintenance purposes undertaken in accordance with a maintenance management plan;
(c) falls within the ambit of activity 21 in this Notice, in which case that activity applies;
(d) occurs within existing ports or harbours that will not increase the development footprint of the port or harbour; or

where such development is related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies."

Listing Notice 3
Activity 12 of GN No. R. 324 (as amended)
The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan.

a. Western Cape

i) Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004;
ii) Within critical biodiversity areas identified in bioregional plans;
iii) Within the littoral active zone or 100 metres inland from high water mark of the sea or an estuarine functional zone, whichever distance is the greater, excluding where such removal will occur behind the development setback line on erven in urban areas;
iv) On land, where, at the time of the coming into effect of this Notice or thereafter such land was zoned open space, conservation or had an equivalent zoning; or
v) On land designated for protection or conservation purposes in an Environmental Management Framework adopted in the prescribed manner, or a Spatial Development Framework adopted by the MEC or Minister.

Any activities planned to be undertaken, that may trigger additional listed activities as defined in the aforementioned legislation, or any future amendments, must be addressed by an appropriately qualified and registered environmental assessment practitioner/auditor, to determine if an environmental authorization is required, prior to commencing with the relevant activities.

2.1.1 Section 28 of the National Environmental Management Act, 1998 (Act 107 of 1998)

Section 28 relates to the Duty of Care and remediation of environmental damage. Section 28 states, "(1) Every person who causes, has caused or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring, or, in so far as such harm to the environment is authorised by law or cannot reasonably be avoided or stopped, to minimise and rectify such pollution or degradation of the environment."

2.2 THE CONSTITUTION OF THE REPUBLIC OF SOUTH AFRICA (ACT NO. 108 OF 1996)

Section 24 of the Constitution of The Republic of South Africa, 1996, states that:
Everyone has the right—

a) to an environment that is not harmful to their health or wellbeing; and
b) to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that—
   (i) prevent pollution and ecological degradation;
   (ii) promote conservation; and
   (iii) secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.

2.3 INTEGRATED COASTAL MANAGEMENT ACT (ACT NO. 36 OF 2014)

The Integrated Coastal Management Act (Act No. 36 of 2014 provides guidance on the conservation and management of the marine ecosystem for long-term planning.

Chapter 2 – Coastal Zones
Part 2 - Coastal public property
Section 15. Measures affecting erosion and accretion
(2) No person may construct, maintain or extend any structure, or take other measures on coastal public property to prevent or promote erosion or accretion of the seashore except as provided for in this Act, the National Environmental Management Act or any other specific environmental management Act.

2.3.1 Control of the Use of Vehicles in the Coastal Area Regulations

According to the National Environmental Management Integrated Coastal Management Act, 2008 (Act No. 24 Of 2008) pertaining to the Control of Use of Vehicles in the Coastal Area (2014), Regulation 4, point (11) states:

a) A permit may be issued for maintenance or maintenance in terms of sub regulation 4(1)(h) if-
   (i) the applicant pays the application fee if prescribed;
   (ii) the applicant provides a copy of an environmental authorisation if required;
   (iii) an environmental authorisation is not required, a letter from the competent authority confirming this;
   (iv) the applicant provides an environmental management plan if required in the environmental authorisation; and
   (v) a detailed description of the maintenance or maintenance activity and the extent of the use of a vehicle including the time periods and number of vehicles which may be used.

b) Such a permit may be issued for a maximum period of five years

If maintenance vehicles are to be utilized for maintenance activities and will be required to enter the dune or beach, a permit must be obtained.

Alternatively, an exemption would need to be applied for in line with Regulation 16 of the National Environmental Management Integrated Coastal Management Act, 2008 (Act No. 24 Of 2008) pertaining to the Control of Use of Vehicles in the Coastal Area (2014).

2.4 WESTERN CAPE CLIMATE CHANGE RESPONSE STRATEGY: 3RD BIENNIAL MONITORING & EVALUATION REPORT 2019/20

According to the Western Cape Climate Change Response Strategy: 3rd Biennial Monitoring & Evaluation Report 2019/20, one of the current Western Cape Climate Change Response Strategy 2014 priority areas for preserving coastal specific biodiversity and ecosystem goods and services in the Western Cape in a changing climate includes:

- Protecting and rehabilitating existing dune fields as coastal buffers / ecological infrastructure;

2.5 MOSSEL BAY LOCAL MUNICIPALITY SPATIAL DEVELOPMENT FRAMEWORK/ENVIRONMENTAL MANAGEMENT FRAMEWORK, MAY 2022

According to the MBLM SDF/EMF, 2022, Policy 1B pertains to the management and protection of the coastline, rivers and estuaries, and the following guidelines are applicable:

- All applicable planning decisions must take coastal sensitivities and coastal risks into account, in order to protect existing and future properties, infrastructure and ecosystems, to ensure that only responsible and sustainable development takes place in areas with a high risk of inundation, coastal erosion and destructive storm surges.
- Natural defences in the form of primary dune systems, estuarine mudflats and sand dunes must be safeguarded from further conversion through urban development or agricultural practices.
- The planning and design of new infrastructure, in particular stormwater systems, should consider the higher frequency of flooding associated with extreme weather conditions.

According to the Mossel Bay SDF Status Quo Report, Oct. 2016 and the IDP 2017-2022 the following was concluded with regard to climate change, in relation to the coastal environment:

- A 2017 estimate shows that in the medium term (10years) coastal erosion is likely to impact the coastal areas. It is advised that recent study data needs to be consulted in the evaluation of all applications in the coastal/floodline vicinities.

2.6 MOSSEL BAY LOCAL MUNICIPALITY BY-LAWS

All relevant Mossel Bay Municipal by-laws must be adhered to during maintenance activities, this may include compliance with:

- By-Law Relating to the Control of the Sea Shore and Sea, 3 June 2011.
- By-Law Relating to Stormwater, 18 January 2010.
- By-Law Relating to Streets, 18 January 2010.

All other relevant by-laws, or amendments of the aforementioned by-laws, must be adhered to.

3. PURPOSE AND SCOPE OF THE MMP

The aim of this maintenance management plan is to define the parameters required to up-keep the existing stormwater infrastructure established within ERF 410, including obtaining access to the infrastructure, using various equipment and vehicles. This MMP further aims to manage and maintain the structure, function and diversity of the dune ecosystem by providing guidance on dune rehabilitation activities in accordance with applicable legislation (CCT, 2017).

This maintenance plan provides guidelines, which set out steps and actions and when taken, will ensure that the environmental degradation is kept to an absolute minimum if not completely mitigated. This will ensure that sustainable management of the environment, whilst avoiding and/or mitigating any environmental damage during the operational phase.

Any repair and maintenance activities on any other infrastructure, outside of ERF 410, must be applied for and authorised prior to commencement of any repair and / or maintenance activities if any of those activities trigger a listed activity in terms of the amended EIA Regulations, 2014 (as amended).

4. TERMS OF REFERENCE

The following Terms of Reference (ToR) have been set for the compilation of the MMP:

- Consideration of existing and historic approvals
- Ensure compliance with relevant NEMA legislation, policies and guidelines;
- Provide a methodology for compliance with the environmental constraints for working on a beach near the ocean;
- Detail potential impacts to ensure that the MMP covers future maintenance activities of the repairs;
- Address potential current and future impacts associated with future maintenance activities through appropriate management measures;
- Identify areas within the project envelope that may require future maintenance and detail the type of remedial work that may be required
- Detail the responsibilities of the various parties who will do the monitoring; and
- Detail any reporting and monitoring that needs to be done.

5. LOCATION

ERF 410 is located on Orion Road, Suiderkruis, Grootbrak Rivier (Figure 1).

There are two stormwater sumps identified within ERF 410, as depicted in Figure 2, located amongst the coastal dune and dune vegetation.

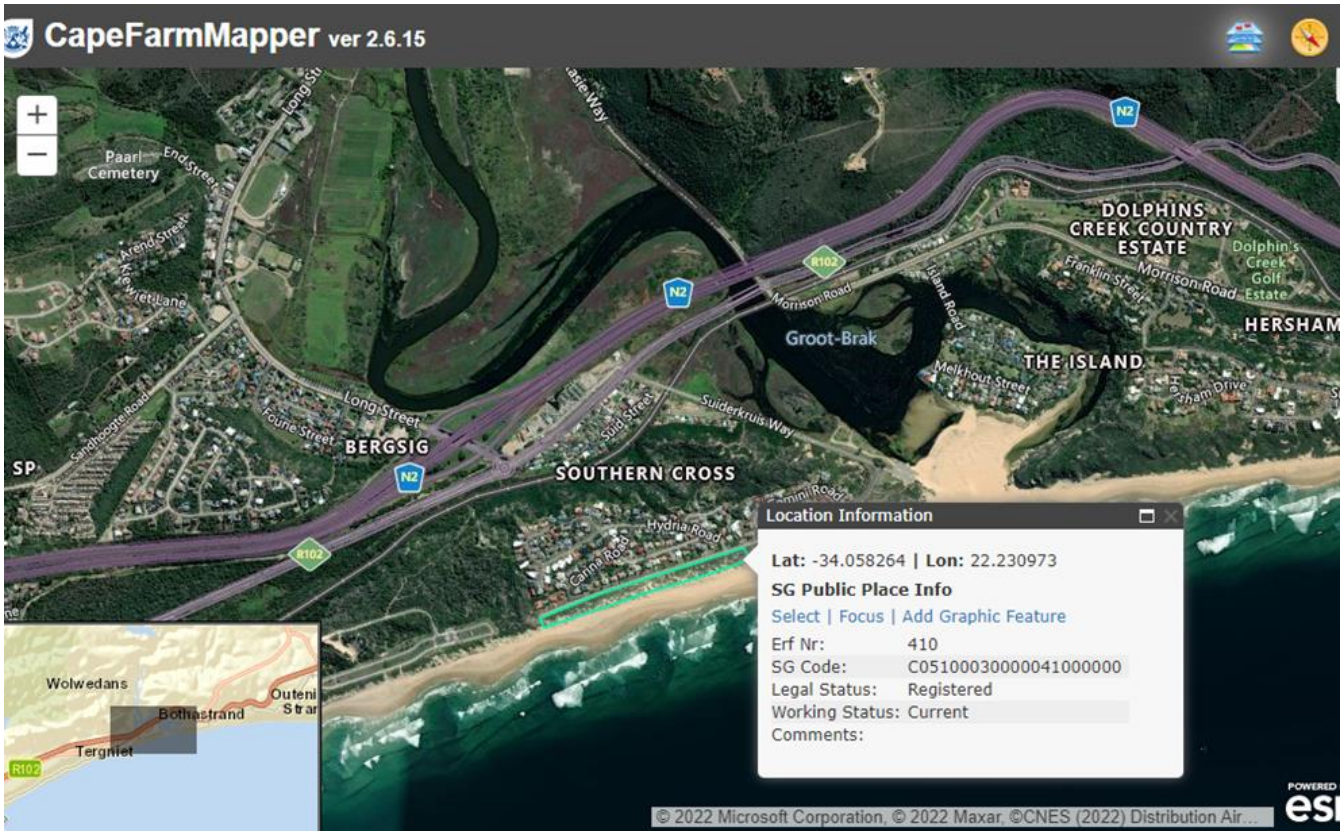


Figure 1: The location of ERF 410 in relation to, the R102 Road and the Great Brak River.

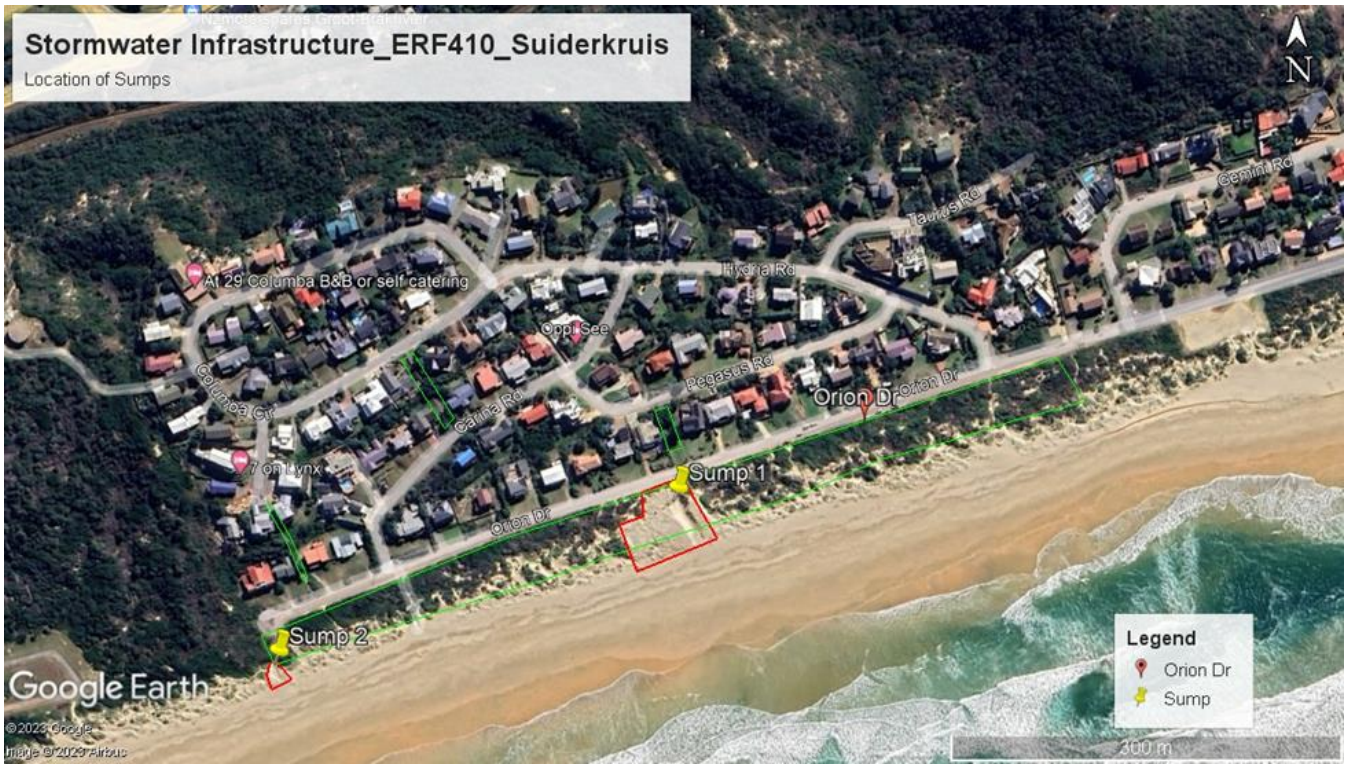


Figure 2: Stormwater sump sites along ERF 410.

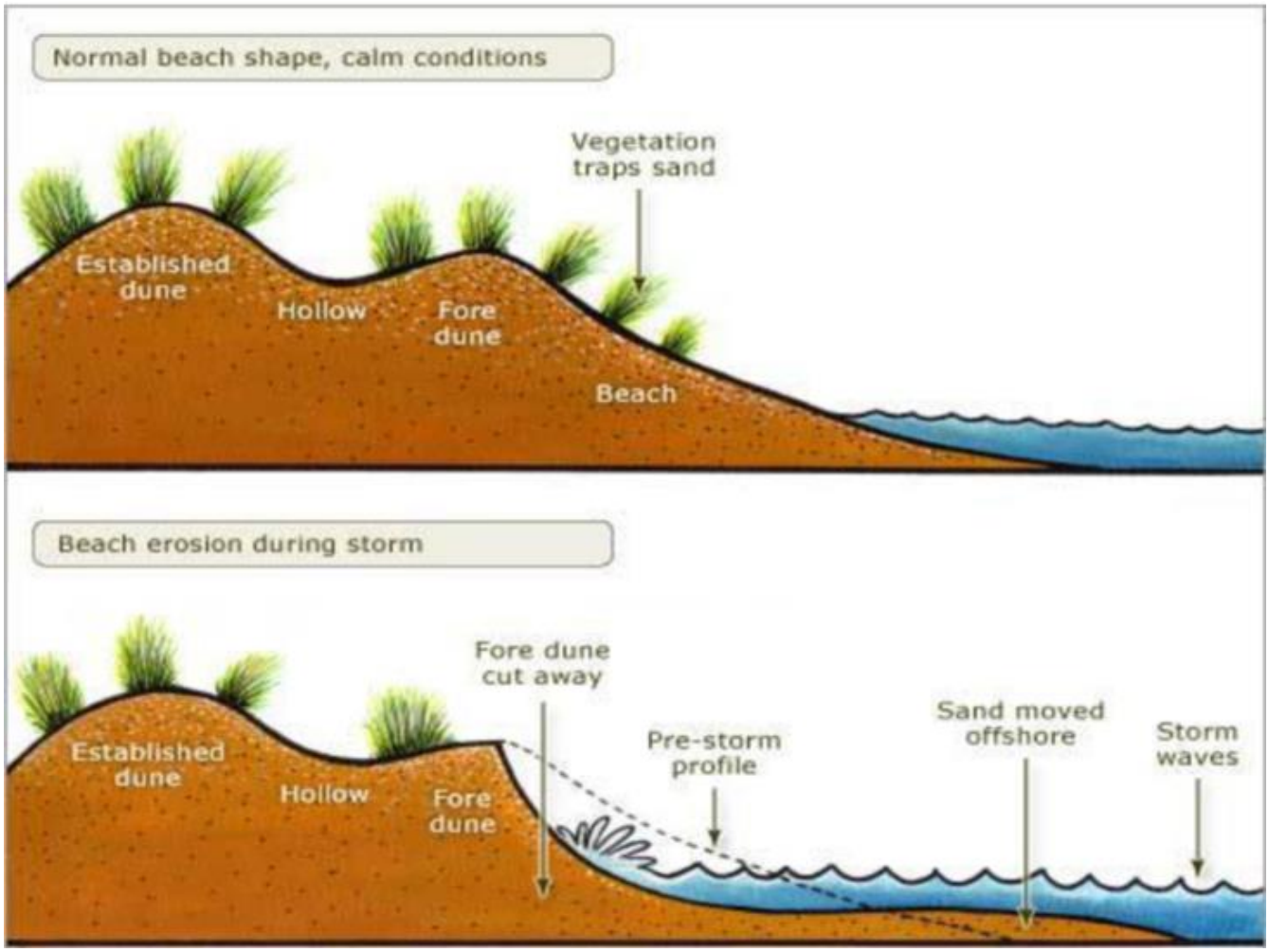
6. DESCRIPTION OF THE RECEIVING ENVIRONMENT

6.1 GENERAL DUNE ENVIRONMENT

The City of Cape Town compiled an MMP for their maintenance work and we have used some of their general background as a background to our report. According to the CCT Maintenance Management Plan: Dunes and Beaches, 2017, coastal dunes are formed by aeolian and tidal processes which result in the accumulation of sand above and around the HWM. These dune systems may either be highly dynamic and mobile systems, or relatively sedentary if they are well vegetated.

According to the CCT Maintenance Management Plan: Dunes and Beaches, 2017, naturally occurring beach ecosystems consist of tidal zones, embryo dunes and hind dune areas. Well established and functional dune systems act as buffers which play an important role in protecting many aspects of the coastline (including property, infrastructure, recreational areas, and biodiversity) against accretion, erosion, wave damage during storms, flooding, wind-stress and over wash (CCT, 2017). Dune systems act as a reservoir of sand to replenish and maintain the integrity of the beach during and post erosion events (CCT, 2017). The sand barrier provided by dune systems also allows for the development of more complex plant communities to establish by preventing saltwater inundation and protection from sea spray and strong winds (CCT, 2017).

According to the CCT Maintenance Management Plan: Dunes and Beaches, 2017, given their locations within the transitional space between land and sea masses, dune systems are therefore exposed to harsh environmental conditions. Vegetation cover plays a crucial role in the evolution of dune landscapes, acting as a windbreak and trapping the deposited sand particles by reducing wind energy (CCT, 2017). The ability of dunes to act as effective coastal barriers can be lost if anthropogenic factors coupled with natural events disturb the system, and no form of rehabilitation is undertaken timeously. Furthermore, when they become unstable, they begin to migrate landward which results in an excess amount of sand in areas where it is undesired.



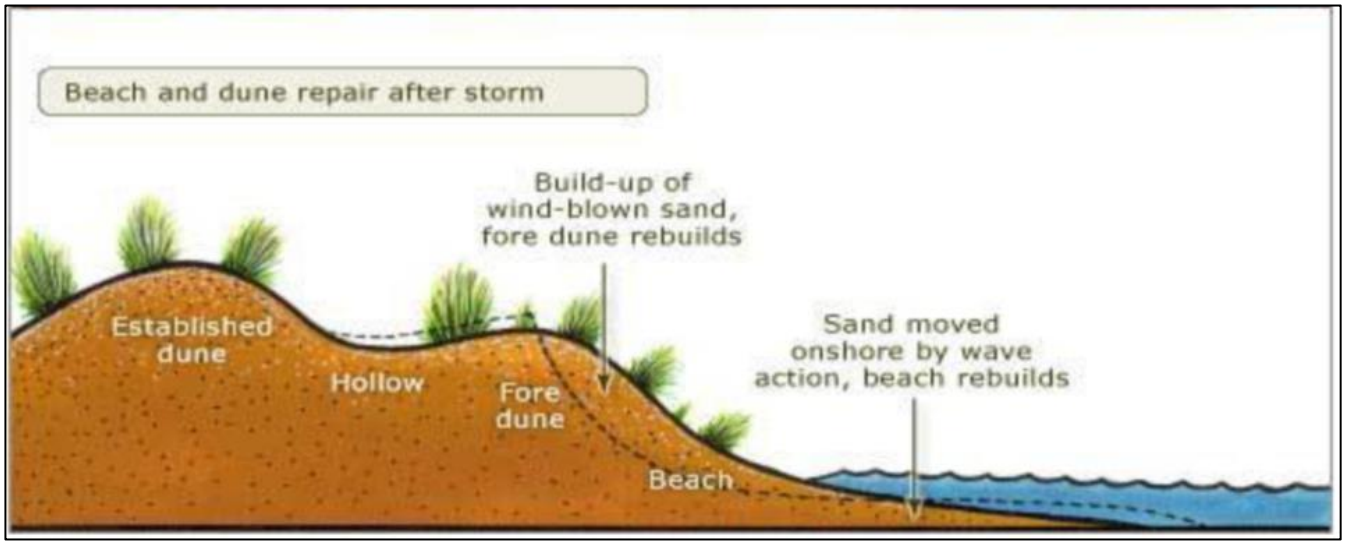


Figure 3: Dune and beach profile extracted from CCT Maintenance Management Plan: Dunes and Beaches (2017).

6.2 CLIMATE, TEMPERATURE AND RAINFALL FOR MOSSEL BAY

	January	February	March	April	May	June	July	August	September	October	November	December
Avg. Temperature °C (°F)	21 °C (69.7) °F	21.1 °C (70) °F	20 °C (68) °F	17.9 °C (64.2) °F	15.8 °C (60.5) °F	13.4 °C (56.2) °F	12.8 °C (55.1) °F	13.4 °C (56.1) °F	14.5 °C (58.2) °F	16.5 °C (61.7) °F	17.8 °C (64.1) °F	19.9 °C (67.8) °F
Min. Temperature °C (°F)	17 °C (62.6) °F	17.2 °C (63) °F	16.1 °C (61) °F	13.7 °C (56.7) °F	11.5 °C (52.7) °F	8.7 °C (47.7) °F	8.1 °C (46.6) °F	8.6 °C (47.5) °F	9.9 °C (49.8) °F	12.1 °C (53.9) °F	13.6 °C (56.5) °F	15.8 °C (60.4) °F
Max. Temperature °C (°F)	25.8 °C (78.4) °F	26 °C (78.8) °F	24.9 °C (76.9) °F	22.9 °C (73.2) °F	21.1 °C (70) °F	18.8 °C (65.9) °F	18.4 °C (65) °F	19 °C (66.1) °F	19.9 °C (67.8) °F	21.6 °C (70.8) °F	22.7 °C (72.9) °F	24.8 °C (76.6) °F
Precipitation / Rainfall mm (in)	42 (1)	36 (1)	47 (1)	50 (1)	43 (1)	41 (1)	42 (1)	51 (2)	37 (1)	48 (1)	56 (2)	41 (1)
Humidity(%)	70%	72%	72%	73%	70%	68%	68%	68%	69%	70%	69%	69%
Rainy days (d)	6	6	6	6	5	5	6	6	6	6	6	6
avg. Sun hours (hours)	8.9	8.3	8.0	7.8	7.8	7.6	7.6	7.9	8.3	8.7	9.4	9.5

Figure 4: Data: 1991 - 2021 Min. Temperature °C (°F), Max. Temperature °C (°F), Precipitation / Rainfall mm (in), Humidity, Rainy days. Data: 1999 - 2019: avg. Sun hours (extracted from Climate Data, 2023 for Mossel Bay, South Africa).

6.3 ENVIRONMENTAL SENSITIVITIES

The following information was obtained from Cape Farm Mapper with regards to sites and area:

- No CBA's or Protected Areas or were mapped within the area only Terrestrial ESA's (see figure 5).
- The conservation status of the area was mapped as Least Concern (see figure 6).
- According to the National Vegetation Map 2018, Hartenbos Dune Thicket and Cape Seashore Vegetation are mapped within the sites (see figure 7.).
- The height of the site above sea level is 5 m, the slope degree of the site varies from 5.22 – 7.57, the slope percentage of the site varies from 9.14 to 13.30 and the slope classification is between 10 - 30% (see figure 8).

Figure 5: The conservation overlay map of the site.

Figure 6: Ecosystem Threat Status overlay map.

Figure 7: Vegetation type overlay map.

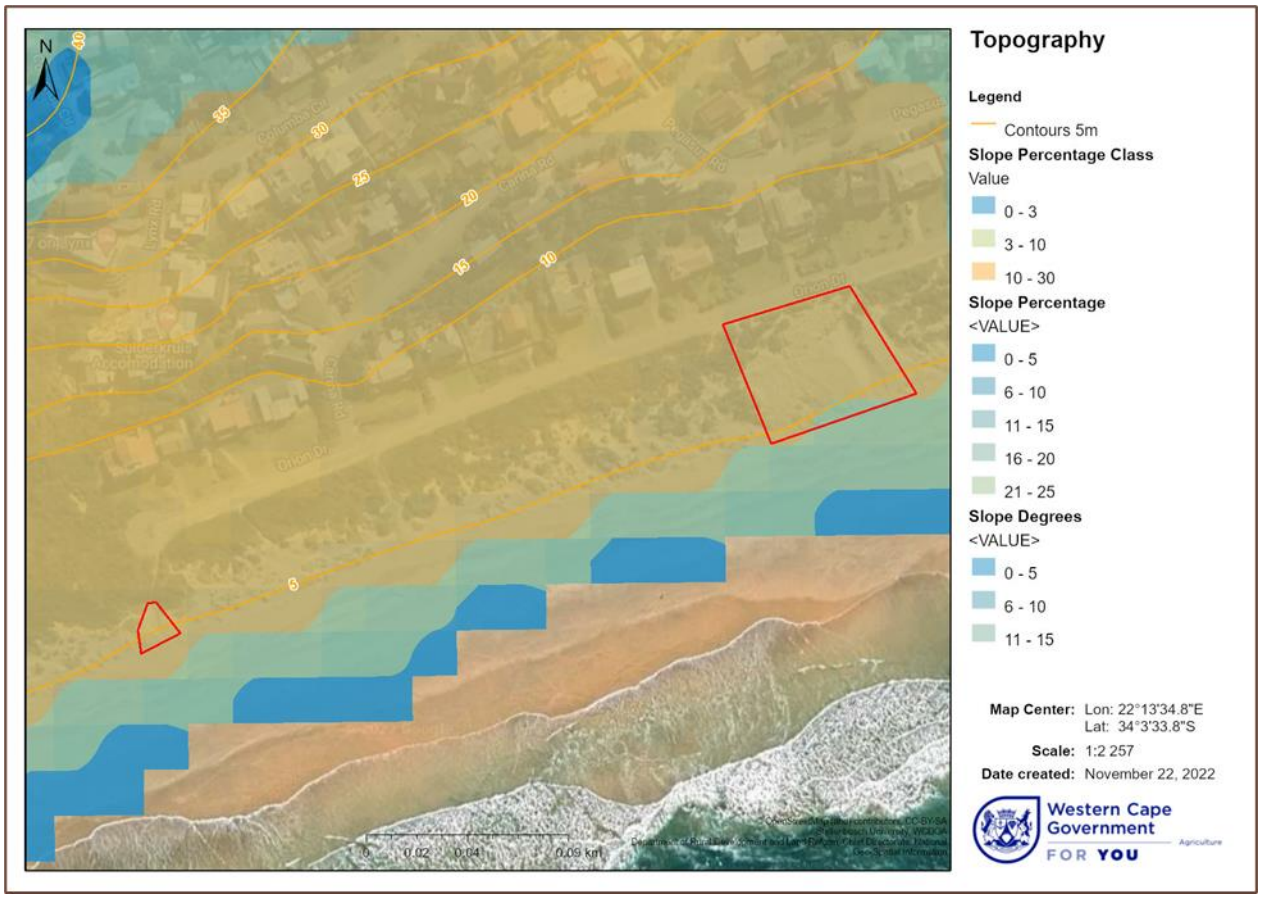


Figure 8: The topography of the site.

6.4 EXISTING INFRASTRUCTURE.

6.4.1 Stormwater Sump 1

Sump 1 (Figure 9) has a beach access point with concrete steps and a short boardwalk.

Stormwater drains into the dune sand through a pipe. Figure 10 shows the pipe outlet in the sand.

Figure 9: An image of Sump 1, taken on 28 October 2022.

Figure 10: Pipe outlet of sump 1.

6.4.1 Stormwater Sump 2

Sump 2 (Figure 11) does not have a formal beach access point, but an existing path is available, through the coastal vegetation brush, to the beach. This site is relatively smaller than Site 1 and the maintenance and rehabilitation preparations will be less extensive.

Figure 11: Sump 2, located on the western edge of ERF 410.

Figure 12: Pipe outlet of sump 2.

7. DESCRIPTION OF THE MAINTENANCE ACTIVITY

7.1 CLEARING THE STORMWATER SUMPS OF SAND

The two stormwater sumps require periodic maintenance by clearing it of windblown beach sand when it gets blocked. The immediate area around the sump outlet should have minimal sand coverage in order for stormwater to drain onto the beach. As mentioned, dune systems may be highly dynamic and constantly changing. The sumps will get blocked, and it is then necessary to clear some of the sand.

7.1.1 Sump 1 and 2 maintenance by hand

Maintenance of the sump outlets must take place by hand as far as possible. The sand around the sump outlets can be moved down the dune to the beach by using shovels and wheelbarrows. Wooden shutter boards can be placed all along the dune to the toe where the cleared sand can be dumped and spread onto the beach. Care must be taken not to disturb vegetation during the clearing and moving of the sand down the beach. Where vegetation occur along the path needed to move the sand, the plants must be rescued and replanted.

When maintenance is done by hand and takes no longer that 8 hours (1 day), a site camp will not be necessary. The working area should be demarcated and everything outside of the working area should be considered no-go areas.

A municipal official from the environmental section must plan and monitor the maintenance activity.

Figure 13: Illustration of maintenance by hand at Sump 1.

Figure 14: Illustration of maintenance by hand at Sump 2.

Sump 2 must only be maintained by hand – no TLB in this area.

7.1.2 Sump 1 maintenance by earth moving equipment

Earthmoving machinery can be useful where the dunes require significant amount of earth moving in a short period of time. Earthworks may be required to remove the sand down to the beach or from areas where the sand has accumulated. A Tractor-Loader-Backender (TLB) may be required to excavate the site and move the sand.

When earth-moving equipment is used precautions should be taken so as not to disturb existing areas of vegetation where possible. The machinery should access the site from existing access points to the beach and may not enter the dune outside of the existing working corridor. The working corridor must be demarcated and all areas outside the corridor considered as no-go areas.

The TLB is not allowed to drive over the dune down to the beach. All areas outside the working area are no-areas (figure 16). A dump truck must be used to transport the sand from the site to the second parking area where it can be dumped and spread, as shown in figure 17.

An Environmental Control Officer (ECO) must be appointed to monitor the maintenance activity whenever machinery will be used. Please refer to Section 12 of this MMP for the monitoring programme for an ECO.

Figure 15: TLB entering site 1 from Orion Drive.

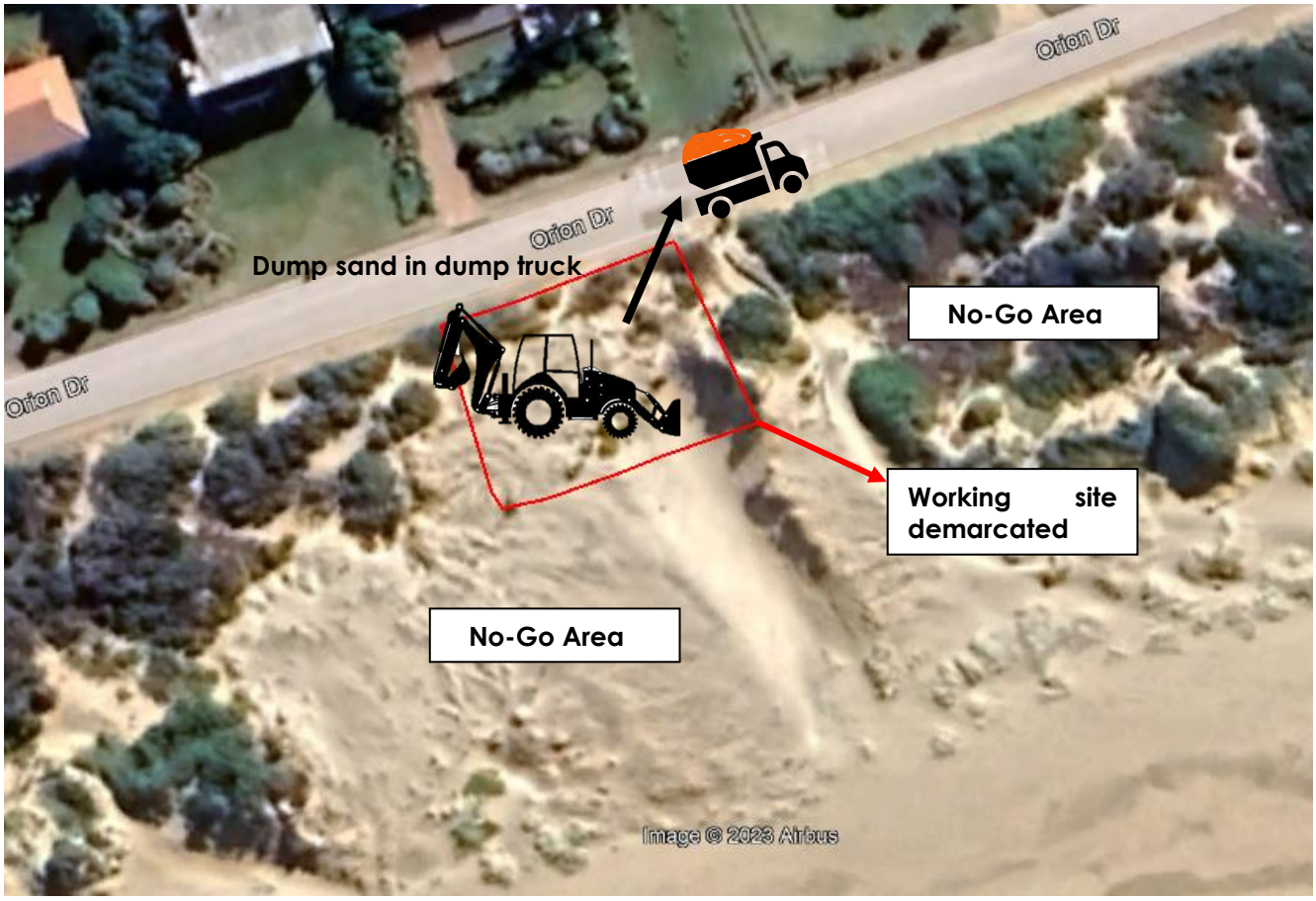


Figure 16: Illustration of TLB at Sump 1 – dumping sand into dump truck.

Figure 17: Sand from the dump truck must be dumped and spread with the TLB as indicated.

When it is necessary to clear sand further down the dune as shown in figure 18 below, the TLB must enter from the beach as shown in figure 19. As mentioned, the TLB is not allowed to drive over the dune from any side. A permit must be obtained for driving on the beach from The Department of Oceans and Coasts. Vehicles and machinery must be in good working order and have no oil leaks.

Figure 18: In the case of working site at the toe of the dune.

The TLB may enter the site from the parking area (figure 19).

Figure 19: Alternative entry point for the TLB from parking area as indicated.

In the case of sand being moved from the toe end of the dune (figure 18) the sand may be dumped and spread along the toe of the dune on the beach (figure 19). Caution should be taken not to dump any sand on vegetation.

7.1.3 Timing and maintenance

Maintenance should ideally be timed in accordance with favourable weather patterns and where necessary, carried out in stages to enable planting to commence almost immediately following re-profiling to minimise risk of erosion and the loss of sand through aeolian movement. If the maintenance is completed too far in advance of planting, the likelihood of significant sand loss is likely to be high. The loss of sand due to poor synchronisation between re-profiling and planting will necessitate further dune re-maintenance. The timing of dune re-maintenance work will therefore take into account climatic conditions, planting season, the availability of planting materials, staffing and equipment availability. However, if rehabilitation is necessary, this rehabilitation should start as soon as practically possible. Ideally rehabilitation would start at the end of summer when the strong winds dissipate, but this is not always practically possible.

7.1.4 Re-vegetation of the dune (when necessary)

7.1.4.1 General planting principles

The most effective long-term method for dune stabilisation is through the planting of vegetation. Vegetation is the least expensive, most durable, most aesthetically appealing and the only self-maintaining technique available. Vegetation on coastal dunes binds the sand as well as reduces wind velocity. Re-vegetation of dunes must be carried out as swiftly as possible following the maintenance of the dune. The use of nursery-raised seedlings, in situ cuttings and seeding are the most common methods of establishing vegetation on the dunes. However, established plants from the immediate vicinity, rescued during the course of other operations, may also be used on occasion.

The following conditions will be applicable when using vegetation to stabilise dune systems:

- Planting will occur as soon the dune is profiled, and sand movement is stabilized;
- Locally indigenous species will be used which is consistent to the local vegetation characteristics (Annexure A of the Rehabilitation Plan);
- Successional planting will be established where possible and appropriate;
- All plants will be inspected to ensure that they are free from pests and diseases;
- All measures will be put in place to create a protected and sheltered environment for newly planted vegetation;
- The combination of high temperatures, low soil moisture and strong winds are the major causes behind poor establishment of dune vegetation. The timing of planting will be such that these conditions are avoided. For best results, planting should take place after summer mainly from April to August. However, if this is not possible then it should take place as soon as possible,
- All necessary preparations (i.e., the addition of mulch or fertilizer) will be made to ensure the establishment of newly planted vegetation;
- Irrigation systems will not be possible, and
- When seed mix is used all preparations (i.e., the installation of wind breaks and mulch) will be undertaken to ensure that seeds are given the best available chance of germinating.

7.1.4.2 Plants sourced from the surrounding dune system

It is proposed to remove 500 mm x 500 mm sized "plugs" from the surrounding vegetated areas to be replanted at rehab sites. It is important not to remove plants at the edges or end of a cluster.

Figure 20: An example of the plant "plugs" to be removed and planted at rehab sites.

7.1.5 Planting

- A sharp spade is the best tool for planting. Bare hands are good in dry sand.
- Make a hole deep enough to get at least 15cm of root into damp sand,
- Where it is uncertain how healthy an individual plant is, plant a couple in each hole.

- Replace the sand firmly and make sure all roots are thoroughly covered.
- Gently tug the plants to check that they are firmly planted.
- Judge space according to the availability of plants. 45cm between plants is adequate.
- On exposed sites, trim the growth to about 10cm so they are not loosened by the wind.
- To plant a slope, start at the top and work downwards to avoid trampling on what you have just planted.
- Plant the whole of a dune face, not just part of it, otherwise erosion problems will be encountered.

7.1.6 Managing Access

7.1.6.1 Protective fencing

The main purpose of fencing is to prevent damage to the dunes from pedestrian traffic when rehabilitation and maintenance is in progress. Physical delineation of the site is critical as it defines the area where the public must not enter.

Various types of fencing may be used, but in this case, we recommend wooden posts with wire strung between the posts. Shade cloth will then be attached to the fencing. Fences must be used to prohibit or direct foot traffic over the dunes. At no stage should concrete be used to secure poles or fences. No-Go signs should be attached to the fences to prevent people entry to the area and disturbing the vegetation.

Fence position

- The seaward or frontal fence will be located near the toe of the foredune, above high-water levels;
- Fences will be roughly parallel to the dune toe;
- The location of fences in hind dunes will vary according to constraints imposed by the landform and existing vegetation, and
- All such areas will have signage, informing people of both restricted access and the need for rehabilitation through access control.

7.1.6.2 Existing boardwalk

Just east of stormwater sump 1 on Orion Drive, there is an existing access point to the beach with a boardwalk. Visitors to the beach must be directed to only use this path and not to walk across the maintenance and rehabilitation site. Signage must be erected to indicate this, and fencing should block access into the site. All maintenance activities must ensure safe access via this boardwalk, for public.

Stormwater sump 2 does not have a boardwalk. Entry to the beach at this site should temporarily be restricted during the maintenance period.

7.1.6.3 Signage

Informative signage will be installed to inform the public of any rehabilitation processes (and the importance of such processes) taking place.

8. IMPLEMENTATION MANAGEMENT

The following recommendations (in addition to those tabulated in Section 9) must be implemented to ensure that maintenance activities do not have a detrimental impact on the environment.

8.1 SITE CAMP

Only when machinery will be used during the maintenance activity is a site camp required. The site camp must be located on a previously transformed area such as one of the parking areas to the east of the two stormwater sumps. It must be located in such a way that it will cause the least disturbance to the general public and the environment. The ECO must be consulted with regards to the proposed location of the site camp prior to the site camp establishment.

Equipment, machinery, raw materials (wire / fencing / wood, nails), and plants will be temporarily stored in a dedicated area. The following general management measures pertaining to the set-up, operation and closure of a site camp should be applied wherever reasonable and practicable:

Fencing & Security: The site camp area must be secured preferably with 2m high fence and shade netting or similar, to prevent any un-authorised individuals from entering the site camp and possibly getting injured or posing a safety and/or security risk. Adequate signage must be displayed, designating the site office / camp as a restricted area to non-personnel.

Fire Fighting Equipment: Fire extinguishers must be present at the site camp. The extinguishers must be in a working condition and recently serviced. It is recommended that all construction workers receive basic training in fire prevention and basic fire-fighting techniques and are informed of the emergency procedure to follow in the event of accidental fires. No open fires may be made on site.

Waste Storage Area: Sufficient bins for the temporary storage of maintenance related waste must be provided inside the site camp and / or at the working area. Maintenance-related waste must be managed as specified in Section 8.3.

Potable Water: An adequate supply of potable water must be provided to maintenance workers.

Ablution Facilities: There are ablution facilities at the parking area by the river mouth which is approx. 850 m east of the first sump. Alternatively, chemical toilet facilities or other approved toilet facilities (at least 1 toilet for each sex and for every 30 workers) must be provided and located on the site in such a way that the toilets will not cause any form of pollution of the site. Toilets must be placed within the site camp and at the construction site. The toilets must be placed on a level surface and secured to prevent them from blowing over. The toilets must be serviced regularly (by the appointed service provider) and kept in an orderly state. The contractor must ensure that no spillage occurs when the toilets are cleaned, serviced or moved. Performing ablutions outside of the provided toilet facilities is strictly prohibited.

Eating Area & Rest Area: A dedicated area within which construction workers can rest and eat during breaks must be provided within the site camp. Seating and shade should be provided.

Housekeeping: The site camp and related site camp facilities must be kept neat and orderly at all times, to prevent potential safety risks and to reduce the visual impact of the site during construction.

8.2 SITE ACCESS

Site access is detailed in Section 7.1.2. Sump 1 is accessed from Orion Drive or from the parking area (depending on the area of the dune to be cleared). Please note that a permit must be obtained for driving on the beach from The Department of Oceans and Coasts. Vehicles and machinery must be in good working order and have no oil leaks.

Sump 2 is accessed from the cul de sac at the end of Orion Drive.

8.3 WASTE MANAGEMENT

An integrated waste management approach must be adopted on site. This approach must include reduction, re-use and recycling. Recycling bins for the various categories (paper, glass, plastic, etc.)

should be provided (as seen in figure 21). These bins should be emptied on a regular basis and solid waste must be disposed of at a landfill licensed in terms of section 20 of the Environment Conservation Act, 1989 (Act No. 73 of 1989) or the National Environmental Management: Waste Act (Act No. 59 of 2008). Adequate waste receptacles, bins should be available for the collection and removal of waste.

Figure 21: Example of marked recycling bins within a camp site.

If it is informal or short-term maintenance work, then the vehicle transporting the workers can have a waste bag which is used to deposit any waste generated on site.

8.4 METHOD STATEMENTS

The maintenance contractor should compile and submit method statements to the environmental section of the Mossel Bay Municipality for approval prior to the commencement of work on that specific activity. The method statement must describe the scope of the work in a step-by-step manner. This will enable the environmental section of the Mossel Bay Municipality to assist with the identification of any mitigation measures which will minimise the impact of these activities on the environment. Approved method statements must be kept on file at the site camp for the duration of the maintenance / repair period. Any amendments to a method statement must be approved by the municipal official and ECO prior to be implemented.

Method statements for the following activities must be submitted:

- Establishment of the site camp when required
- The proposed access to the stormwater sumps – by hand or by machinery
- The proposed re-shaping of the cleared area when necessary
- Removal and replanting of vegetation when necessary

9. IMPACTS AND MITIGATION MEASURES

9.1 . MITIGATION TABLES

	ACTIVITY	MITIGATION MEASURES	TIMEFRAME	RESPONSIBLE PARTY
PRE-COMMENCEMENT OF MAINTENANCE	**9.1.1 Planning and Preparation**	• It is imperative that internal planning and preparation be undertaken by the applicant prior to any commencement on site. • Consider the state of the dune prior to clearance, and if additional measures need be taken as a result of natural events (i.e., storm events) that have altered the dune form drastically, this must be addressed, and if necessary, specialist input should source to advise on the state of the dune, and update the measures, if necessary. • Appoint an appropriately qualified and experienced ECO prior to commencement if machinery is going to be used. • Ensure that the contractual documentation compiled for appointment of the relevant contractor, for the undertaking of maintenance works, includes: - This MMP and all relevant attachments. - Clearly define the non-compliances and roles and responsibilities of the appointed municipal official or ECO and the Contractor. - Comply with all relevant conditions pertaining to the approval of the MMP. - Appoint a DEO (Designated Environmental Officer) or an official from the Mossel Bay Municipality's environmental section. • Obtain any relevant permissions, pertaining to beach access for maintenance vehicles. • Obtain any other relevant permits/licenses. • Ensure that all environmental pre-maintenance compliance measures, have been met.	Prior to appointment of Contractor	Applicant/ Appointed Official
MAINTENANCE PHASE	**9.1.2 Site camp establishment** (when required)	• The area chosen for the office and / or site camp must be the minimum reasonably required, which will involve the least disturbance to the environment. • The contractor`s camp must be approved by the ECO. Options may include: - The beach parking area (if permission is granted and public beach access is not affected); or - A disturbed portion of land, either municipal owned, or private land, as permitted by the landowner. • The contractor`s camp **<u>may not be</u>** situated: - within a flood plain; - within a dune /beach environment; - on slopes greater than 1:3(v:h), or; - within 32m of a watercourse/estuary.	Pre-commencement of maintenance activities / Before site establishment	Maintenance contractor

9.1 . MITIGATION TABLES

	ACTIVITY	MITIGATION MEASURES	TIMEFRAME	RESPONSIBLE PARTY
		• The site layout plan should make provision for site access, parking facilities, site offices, ablution facilities, designated first aid area, hazardous substance storage areas, batching plant, refuelling area (if necessary), and a maintenance area. • The site camp would need to be adequately fenced off along the boundary (preferably with 2m high fence and shade netting) and secured to prevent non-maintenance staff wandering around the site camp and possibly getting injured or posing a safety and security risk. Adequate signage needs to be in place, designating the site office / camp as a restricted area to non-maintenance people. • The site camp should be positioned in such a way that it does not prohibit public access onto the beach. • An integrated waste management approach must be adopted on site. This approach must include reduction, re-use and recycling. Recycling bins for the various categories (paper, glass, plastic, etc.) should be provided. These bins must be emptied on a weekly basis and dropped off at a collection point for recycling by recycling companies. If this is not possible and no recycling takes place in this district then this clause will not apply. Bins must also be provided for builder's waste. These bins should be emptied on a regular basis and solid waste must be disposed of at a landfill licensed in terms of section 20 of the Environment Conservation Act, 1989 (Act No. 73 of 1989) or the National Environmental Management: Waste Act (Act No. 59 of 2008). Biodegradable refuse generated from the office / site camp, maintenance areas, vehicle yard, storage area or any other area shall be handled as indicated above. Adequate waste receptacles, bins and skips should be available for the collection and removal of waste. • No materials may be stockpiled for more than 90-days. • Fire extinguishers must be present at the site camp. The extinguishers must be in a working condition and recently serviced. It is recommended that all maintenance workers receive basic training in fire prevention and basic fire-fighting techniques and are informed of the emergency procedure to follow in the event of accidental fires. No open fires may be made on the maintenance site during any phase of the project. • A spill kit to neutralise/treat spills of fuel/ oil/ lubricants must be available on site. • The site camp and related site camp facilities must be kept neat and orderly at all times, to prevent potential safety risks and to		

9.1 . MITIGATION TABLES

	ACTIVITY	MITIGATION MEASURES	TIMEFRAME	RESPONSIBLE PARTY
		reduce the visual impact of the site during maintenance. Once maintenance has been completed the site camp must be removed. Any contaminated soil must be removed and disposed of at an appropriately registered disposal site. Any areas that have been compacted are required to be ripped to allow for the establishment of vegetation. This ripping must not result in the mixing of sub- and topsoil. No imported soil material may be utilised for rehabilitation.		
	9.1.3 Site access and Demarcation	• The existing road network, where possible, should be used to access the maintenance site. • Utilize manual labour where possible. • The site may only be accessed from: - The parking area east of the sites or the road - Specifications of this access are as follows, and should not be exceeded: ➢ Width = 3m - The contractor is to photograph the anticipated maintenance access route and maintenance corridor, from the road side, and beach side, prior to the removal of vegetation/clearance activities by labour and machinery. • All maintenance vehicles need to adhere to traffic laws. The speed of maintenance vehicles and other heavy vehicles must be strictly controlled to avoid dangerous conditions for other road users • As far as possible care should be taken to ensure that the local traffic flow pattern is not significantly disrupted and all vehicle operators therefore need to be educated in terms of "best-practice" operation to minimise unnecessary traffic congestion or dangers. • Demarcate the working corridor, including access route: - with shade netting and secured to prevent non-maintenance staff wandering into the maintenance area. - Adequate signage needs to be in place, designating the maintenance area as a restricted area to non-maintenance people. Maintain this working corridor daily.	**Ongoing / when required**	**Maintenance contractor**
	9.1.4 Toilet facilities	• When chemical toilet facilities (1 for every gender of 20 workers) are used it must be located on the site camp, in such a way that the toilets do not cause any form of pollution of the site camp. This is especially important in close proximity to any drainage lines. The toilets must be easily accessible and shall be secured to prevent them from blowing over or being pushed over. Toilets should be placed within the site camp as well as within reasonable proximity to	Ongoing / when required	Maintenance contractor

9.1 . MITIGATION TABLES

	ACTIVITY	MITIGATION MEASURES	TIMEFRAME	RESPONSIBLE PARTY
		working areas where maintenance teams are operating. • The contractor shall ensure that no spillage occurs when chemical toilets are cleaned. The toilet shall be placed on level, bare ground. • Performing ablutions outside toilet facilities are strictly prohibited. • The toilets must be serviced regularly and kept in an orderly state. • Cleaning slips must be obtained from service provider and filed in the environmental file.		
	9.1.5 Waste Management	• An integrated waste management approach should be adopted. Emphasis must be put on waste minimisation such as reduction, recycling and re-use, where possible. • Recycling bins for the various categories (paper, glass, plastic, etc.) should be provided when the maintenance works will take place over more than 2 days. These bins must be emptied regularly and dropped off at a collection point for recycling by recycling companies. If this is not possible and no recycling takes place in this district then this clause will not apply. • All bins shall not be allowed to overflow, since waste may blow around on site and into the surrounding environment. The bins must be water tight, windproof and scavenger proof and be clearly marked for the purpose of waste disposal. • If it is informal or short-term (1-2 days) maintenance work, then the vehicle transporting the workers can have a waste bag which is used to deposit any waste generated on site.	Ongoing / when required	Maintenance contractor
	9.1.6 The clearance of vegetation	• The maintenance areas must be properly demarcated prior to activities being undertaken. The areas outside these demarcated areas must be regarded as No-Go areas; • All vegetation clearance must be done by means of manual labour, if possible. • All vegetation beyond the working corridor must be considered no-go areas.	Ongoing / when required	Maintenance contractor
	9.1.7 Removal, Moving / Excavation of Ground Material	• The maintenance area and site access must be properly demarcated. The area outside this demarcated area must be regarded as a "No-Go" area • Contaminated material must be disposed of at an appropriate registered facility • Only the minimum number of excavations must be undertaken • Where practical and feasible, excavations should be done by means of manual labour, with the use of shovels and wheelbarrows; • Use can be made of a Tractor-Loader-Backhoe (TLB) where excavation of large amounts of material needs to be excavated, removed, moved and deposited.	Ongoing / when required	Maintenance contractor

9.1 . MITIGATION TABLES				
	ACTIVITY	**MITIGATION MEASURES**	**TIMEFRAME**	**RESPONSIBLE PARTY**
		• The removed material (sand) can be spread onto the beach at the toe of the dune.		
	9.1.8 Activities within or within close proximity to the beach or estuary	• Workers must receive to necessary training to make them aware of the possible pollution they may cause by the actions in close proximity to the beach/estuary. • The working corridor on the beach, and within the dune, must be the smallest possible width. • The maintenance area must be demarcated to deter labourers from entering the beach/estuary. • The area beyond the demarcation must be regarded as a no-go area • Vehicles must be inspected for leaks before it goes to site. • No refuelling of vehicles should take place at the sites. Vehicles should have enough fuel to carry out their tasks. • A spill kit must be available at all times in the event of spillage. Polluted ground material must be removed and disposed of at an appropriately licensed disposal facility. • Adequate bins must be provided at the site camp/any designated eating area. These bins must be fitted with lids to prevent the waste from blowing into the beach/estuary or surrounding vegetation. • Utilise existing access paths or access through disturbed/invaded vegetation. No clearing of vegetation outside of the demarcated areas. • Maintenance must have contingency plans for high rainfall events during all relevant activities. • Excavated rock and sediments from the maintenance zone, and including any foreign materials, should not be placed within the beach/estuary. • Cement/concrete batching (when required) is to be located in an area of low environmental sensitivity away from the shoreline/estuary. No batching activities shall occur on the unprotected ground. Adequate surface protection will be required. Concrete batching should be restricted to a level and bunded/sealed surfaces. • Contaminated water containing fuel, oil or other hazardous	Ongoing / when required	Maintenance contractor

9.1 . MITIGATION TABLES				
	ACTIVITY	**MITIGATION MEASURES**	**TIMEFRAME**	**RESPONSIBLE PARTY**
		substances must never be released into the environment. It must be disposed of at an appropriate registered landfill facility.		
	9.1.9 Erosion Control	• Control measures will entail the use of shade netting barriers (or similar) or geo-fabric barriers in areas susceptible to erosion. Poles and logs, staked in along the contours of a slope susceptible to erosion may also be used.	Ongoing / when required	Maintenance contractor
	9.1.10 Rehabilitation	• All hazardous waste, spoil material and maintenance litter must be removed from the site camp, on site and within temporary storage areas and disposed of at an appropriate registered landfill facility. • All disturbed areas must be rehabilitated as soon as practically possible. • Implement Rehabilitation Plan for the Dune Stabilisation and Re-vegetation on Erf 410, Orion Drive, Great Brak River, Mossel Bay Municipality. Western Cape, where necessary. If the site has undergone significant changes, and a specialist was brought in to address this, the specialist's recommendations should be integrated into the rehabilitation plan.	Ongoing / when required	Maintenance contractor
	9.1.11 General Maintenance phase nuisances	• Put measures in place to allow for the maximum available flow of traffic; • Noise generating activities will be limited to normal working hours; • Equipment must be in good working condition in order to minimise noise generation. • Labourers and site agents will be educated on how to control activities that have the potential to become disturbances. • Keep the maintenance site clean and tidy	Ongoing / when required	Maintenance contractor

10. REHABILITATION

The rehabilitation of the dune sites is essential not only from an environmental point of view but also from an infrastructure maintenance point of view.

Please refer to the Rehabilitation Plan for the Dune Stabilisation and Re-vegetation on Erf 410, Orion Drive, Great Brak River, Mossel Bay Municipality. Western Cape, for the rehabilitation details.

10.1 APPLICATION OF 'DUTY OF CARE' PRINCIPLE

The plan must be used to remedy any form of land degradation that has resulted from activities on site and prevent any future degradation from reoccurring. Therefore, any activities that pose a threat to the environment, regardless of their location on the property or footprint, must be remedied. This is in alignment with Section 28 duty of care under NEMA which requires every person who causes, has caused or may cause significant degradation of the environment to take reasonable measures to prevent such degradation from occurring, continuing or recurring, or, in so far as such harm to the environmental is authorised by law or cannot reasonably be avoided or stopped, to minimise and rectify such pollution and degradation of the environment.

"Reasonable measures" include measures to investigate, assess and evaluate the impact on the environment; cease, modify or control any act causing degradation and remedying the effects of degradation. The compilation of this independent report is one of the reasonable measures being implemented to prevent further degradation. It will provide an account of the impacts and detail measures to remedy the impacts. Further reasonable measures include the implementation of the recommendations and monitoring the success of maintenance and rehabilitation actions.

11. RESPONSIBLE PARTIES / ROLES AND RESPONSIBILITIES

The Western Cape Government: Department of Transport and Public Works will be the implementing agent and will ultimately be responsible for compliance with this MMP. The Mossel Bay Municipality must ensure that each party acting on its behalf (contractors and sub-contractors) adheres to the requirements of this MMP.

11.1 NAMES AND DETAILS OF RELEVANT PARTIES

Mossel Bay Municipality	
Contact person	Rudi Minnie
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Mossel Bay Municipality – Environmental Official	
Contact person	
Postal Address	101 Marsh Street, Mossel Bay
Tel:	
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Environmental Control Officer	
Contact person	
Physical Address	
Postal Address	
Tel:	
Fax:	
E-mail	

Environmental Control Officer

An Environmental Control Officer (ECO) must be appointed to monitor the maintenance activities to the existing stormwater infrastructure, within the dune system – when machinery will be used or when maintenance work will take longer than 2 days. The duties of the ECO will be to:

- Ensure compliance with all the mitigatory measures proposed in this MMP;
- Assist in finding environmentally acceptable solutions to maintenance problems;
- Establishing an environmental awareness program to educate contractors & labourers;
- Inspecting all aspects of the maintenance / repair process;
- Keeping detailed records of all site activities that may pertain to the environment;
- Must ensure that all labours have attended environmental training sessions, which cover the basic requirements of sound environmental practices on construction sites;
- Liaise with site contractors and other members of the maintenance team with regards to the requirements of the MMP;
- Examining method statements, and;
- Check additional environmental protection measures, should this be necessary.

The ECO should visit the site every day during maintenance (over 2 days) to monitor compliance with the recommendations of this MMP. The ECO should ensure that the correct earthwork practices are adhered to.

The ECO must undertake Environmental Awareness Training before commencement of any work on site. During the training, the ECO will explain the MMP and the recommendations contained therein. The following actions must be taken to ensure that all relevant parties are aware of their environmental role and duties:

1. This MMP must be kept on site at all times.
2. The provisions of this MMP must be explained in detail to all staff during Awareness Training.
3. Training booklets will be handed out to all labourers and must be explained to them.
4. Inspections should be done by the applicant's environmental representative (where applicable) who must be on site at all times
5. Environmental inspections must be conducted each day for the duration of the maintenance by the Environmental Control Officer (where applicable).

The Maintenance Contractor must make allowance for all maintenance site staff, including all subcontractors that will be working at the site, to attend environmental awareness training sessions (undertaken by the ECO) before commencing any work on site. During this training, the ECO will explain the MMP and the conditions contained therein. Attention will be given to the construction process and how the MMP fits into this process. Other items relating to sound environmental management which must be discussed and explained during the environmental awareness training sessions include:

- The demarcated "No-Go" areas;
- General do's and don'ts of the site;
- Making of fires;
- Waste management, use of waste receptacles and littering;
- Use of the toilets provided;
- Use and control of construction materials and equipment etc.;
- Control, maintenance and refuelling of vehicles;
- Methods for cleaning up any spillage;
- Access and road safety;
- Emergency procedures (e.g., in case of fire, spillage etc.)
- General "best practice" principles, with regards to the protection of environmental resources.

Environmental awareness training and education must be ongoing throughout the construction phase and must be undertaken regularly if deemed necessary (especially if it becomes apparent that there are repeat contraventions of the conditions of the MMP), or as new workers come to site. Translators must be utilised where needed.

12. ENVIRONMENTAL MONITORING AND REPORTING

The municipal official must determine before maintenance, during the planning phase, whether maintenance will be done by hand or whether a TLB will be required. When a TLB is required, the appointed ECO must be notified and given a commencement date to which the ECO has to agree to.

12.1 MONITORING BY MUNICIPAL OFFICIAL – MAINTENANCE BY HAND

The municipal official must keep a detailed record of the maintenance / repair activities and compile a monitoring report. The report should include a detailed photographic record of the maintenance / repair activities as well as any environmental issues noted during the course of the maintenance / repair process.

The municipal official must ensure that the contractor and labourers understand the requirements and recommendations of this MMP.

12.2 MONITORING BY AN ECO – MAINTENANCE BY TLB

The ECO must keep a detailed record of the maintenance / repair activities and compile a monitoring report to the client. The report should include a detailed photographic record of the maintenance / repair activities as well as any environmental issues noted during the course of the maintenance / repair process.

The ECO has the authority to recommend to the authorities that they suspend all works (or part thereof) occurring on site, should any action being undertaken on site not comply with the environmental requirements, and where such actions pose a serious threat to any element of the surrounding environment.

The ECO has the authority to issue instructions to the Maintenance Contractor and/or Holder, regarding measures that must be implemented on site in order to ensure compliance with the MMP and Environmental Authorisation, and/or to prevent environmental degradation or pollution from occurring.

The ECO has the authority to issue verbal and written warnings to contractors, in terms of non-compliance with the EA and MMP. Should verbal and written instructions and/or warnings be ignored, the ECO has the authority to request the Competent Authority to issue pre-determined fines or other penalties.

The ECO has the authority and responsibility to report incidents of non-compliance to the Competent Authority or other relevant authority, at any time.

Maintenance done by machinery -TLB – monitoring by the ECO

WHAT SHOULD BE MONITORED	FREQUENCY OF MONITORING	MONITORING PROCEDURE	HOW RESULTS ARE ANALYSED AND PRESENTED
The clearance and replanting of vegetation. (only where necessary) inside the work corridor	Inspections by the ECO prior to the commencement of clearing activities and during the clearing activities to provide advice to the contractor.	Inspect the site and take photographic evidence.	ECO must compile a checklist for completion during each site visit. Data must be used to compile an audit report as/if requested by the client.
The excavations of sand by use of TLB	Inspections by the ECO prior to the commencement as well as after maintenance. ECO to advise on where site camp may be located. (if a site camp is deemed necessary)	Inspect the site and take photographic evidence.	ECO must compile a checklist for completion during each site visit. Data must be used to compile an audit report as/if requested by the client.
Implementation of 'Duty of Care'	Inspections by the ECO to ensure that pollution prevention measures are in place and that maintenance activities are not causing detrimental impacts to the environment.	Inspect the site and take photographic evidence.	ECO must compile a checklist for completion during each site visit. Data must be used to compile an audit report as/if requested by the client.

Maintenance done by hand – monitoring by the municipal official

WHAT SHOULD BE MONITORED	FREQUENCY OF MONITORING	MONITORING PROCEDURE	HOW RESULTS ARE ANALYSED AND PRESENTED
The clearance and replanting of vegetation (only where necessary) inside the work corridor	Inspections by the municipal official from the environmental section of the MBM prior to the commencement of clearing activities and during the clearing activities to provide advice to the contractor.	Inspect the site and take photographic evidence.	The municipal official must compile a checklist for completion. A record should be kept for each maintenance periods' method statement and completion notes.
The removal of sand by hand	Inspections by the municipal official prior to the commencement as well as after maintenance.	Inspect the site and take photographic evidence.	The municipal official must compile a checklist for completion. A record should be kept for each maintenance periods' method statement and completion notes.
Implementation of 'Duty of Care'	Inspections by the municipal official to ensure that pollution prevention measures are in place and that maintenance activities are not causing detrimental impacts to the environment.	Inspect the site and take photographic evidence.	The municipal official must compile a checklist for completion. A record should be kept for each maintenance periods' method statement and completion notes.

13. EMERGENCY RESPONSE PROCEDURES

The potential environmental risks that may arise as a result of maintenance activities, or during the maintenance of the structures must be identified, and appropriate emergency response procedures must be compiled for each emergency scenario. Potential environmental emergencies that require an emergency response include, but are not limited to, unplanned fires, sewage spills, spills of hazardous chemicals, snake bites etc.

- The maintenance contractor is responsible for identifying potential significant environmental risks that may arise as a result of pre-maintenance, maintenance and rehabilitation activities, and the contractor must formulate emergency response procedures for these potential incidents.
- The ECO, the contractor and the Holder are responsible for ensuring that all maintenance workers are aware of the emergency procedures and are properly trained on how to identify and respond to an emergency incident during maintenance.
- An emergency procedure must clearly indicate who will take charge during an emergency, and the roles and responsibilities of workers and authorities during an emergency.
- The maintenance contractor is responsible for ensuring that the requirements of the Occupational Health & Safety Act (OHSA) are adhered to during the maintenance phase. The Holder is responsible for ensuring compliance with the OHSA during the undertaking of maintenance activities.

13.1 EMERGENCY PREPAREDNESS

The following measures must be implemented, as appropriate, to ensure effective responses to emergencies:

- All workers on site during the maintenance phase must be properly educated about possible emergency incidents that may arise, how to avoid such incidents and how to respond in the event of an incident. "Refresher" training sessions on emergency procedures must be held if needed.
- All workers must ideally be given basic fire-awareness training, as well as be advised on basic firefighting and safety techniques. Fire-fighting equipment must be available on-site during maintenance and maintenance activities.
- All workers must be trained on how to respond in the event of a spill of a hazardous substance (fuel, chemicals etc.), if hazardous substances are to be used on site.
- A spill kit for containing and/or neutralising spills of hazardous substances (e.g., hydrocarbons) must be available on site at all times, when hazardous substances are present.
- Any incidents of pollution or spillage of hazardous materials during maintenance must be reported to the ECO as soon as possible. The ECO must then (depending on the nature of the spill) notify the relevant authorities, if needed.
- A first aid kit must be available on site at all times.
- Emergency contact numbers (including the fire department, police and ambulance) must be prominently displayed on site at all times and regularly updated.
- All emergency incidents must be recorded in a site incident log. The cause of the incident, the measures taken in response to the incident and the efficacy of those measures must also be recorded. This information must be used to inform future emergency preparedness planning, and to avoid prevent similar incidents from arising again.

14. ENVIRONMENTAL AWARENESS PLAN

Environmental Awareness Training must be conducted prior to the commencement of maintenance activities. It is the holder's responsibility to familiarise himself/herself with the content and requirements of this MMP. The holder is also responsible to ensure that the contractor and all labourers working on site during the maintenance phase are familiar with the content of this MMP.

The following actions must be taken to ensure that all relevant parties are aware of their environmental role and duties:

- This MMP must be kept on site at all times.
- The provisions of this MMP and the conditions of the any relevant permits/licenses/authorizations must be explained in detail to all staff during Awareness Training.
- Training booklets (Appendix A) will be handed out to all labourers and must be explained to them.
- The ECO to conduct frequent site visits when applicable.
- Monitoring reports to be compiled by the ECO (when applicable) after each maintenance period. These reports will be circulated to all parties involved (including the holder, contractor and the competent authority).

The Maintenance Contractor must make allowance for all maintenance site staff, including all subcontractors that will be working at the site, to attend environmental awareness training sessions (undertaken by the ECO) before commencing any work on site. During this training, the ECO will explain the MMP and the conditions contained therein. Attention will be given to the maintenance process and how the MMP fits into this process. Other items relating to sound environmental management which must be discussed and explained during the environmental awareness training sessions include:

- The demarcated "No-Go" areas (only where necessary);
- General do's and don'ts of the site;
- Making of fires;
- Waste management, use of waste receptacles and littering;
- Use of the toilets provided;
- Use and control of maintenance materials and equipment etc.;
- Control, maintenance and refuelling of vehicles;
- Methods for cleaning up any spillage;
- Access and road safety;
- Emergency procedures (e.g., in case of fire, spillage etc.)
- General "best practice" principles, with regards to the protection of environmental resources.

Environmental awareness training and education must be ongoing throughout the maintenance of each of the three phases of the development and must be undertaken regularly if deemed necessary (especially if it becomes apparent that there are repeat contraventions of the conditions of the MMP), or as new workers come to site. Translators must be utilised where needed.

15. PENALTIES, CLAIMS AND DAMAGES

The contractor will be responsible for ensuring that all procedures required in accordance with the MMP are implemented, any non-compliance as a result of negligence or any other aspects that deviate from the approved scope, are the liability of the contractor. If third parties are called to the site to perform clean up and maintenance procedures, for non-compliant activities, the contractor will be responsible for all costs. The competent authority may impose penalties on the Holder or any of the contractors if conditions contained in this MMP are contravened. This would be based on an agreement or contract between the Holder and the contractor.

Penalties could be imposed in terms of Chapter 11 of the Western Cape Bill on Planning and Development as published in the Extraordinary Provincial Gazette No 5183, 3 October 1997, and would be applicable for any action which leads to damage to the natural environment. Please note that the payment of any fines in terms of the contract shall not absolve the offender from being liable from prosecution in terms of any law.

In cases where severe environmental damage occurs, the competent authority law enforcement division may take legal action against the responsible parties. The reasons for this could include, amongst others:

- Not implementing the conditions of the MMP;
- Spillage that results in environmental damage;
- Incorrect handling and storage of maintenance materials and chemicals;
- Sensitive areas that are not clearly demarcated;
- Performing ablutions in areas other than facilities provided for such actions; and
- Occurrence of unattended and out of control fire.

The Contractor shall comply with the environmental specifications and requirements on an ongoing basis and any failure on his part to do so will entitle the ECO to issue the contractor with penalty / fine as described in the following section.

The following offences, level of severity and value of the financial fines have been drafted according to the sensitivities on the proposed site, the mitigation measures proposed, and the maintenance methods proposed. It must be noted that the level of severity is at the discretion of the ECO and any offences or fines will be recorded in the ECO's monitoring report. The table offences are not limited to the table below, additional offences may be applied by the ECO with prior agreement with the Proponent.

The following fine structure shall apply:

Table 1: Fines and offences.

Finable Transgression	**Min Fine**	**Max Fine**
Failure to notify the ECO of the commencement of maintenance or pre-maintenance activities, prior to the commencement of such activities.	R1 000	R2 000
Failure to comply with the provisions relating to the demarcation of the working area, site camp and associated facilities, and the maintenance of the demarcated boundaries.	R1 000	R5 000
Encroachment into "no-go" areas.	R2 000	R5 000
Failure to provide secured ablution facilities (1:30 ratio) on site. Only when existing ablution facilities at parking area is not used.	R500	R15 000
Failure to comply with the provisions relating to the clearance of vegetation on site.	R2 000	R5 000
Clearance of indigenous vegetation (regardless of the density of alien vegetation present) outside of the demarcated boundaries of the working area and site camp.	R2 500	R15 000
Failure to implement appropriate alien invasive management measures.	R500	R2 000
Failure to adhere to designated access routes and/or the driving of vehicles through undeveloped vegetation outside of the demarcated working area or site camp.	R1 000	R5 000
Movement of vehicles and/or maintenance workers in no-go areas;	R1 000	R10 000
Parking or storage of vehicles, machinery, tools and other materials or equipment related to the Contractors operations, within designated "no-go" areas.	R1 000	R10 000
Parking or storage of vehicles, machinery, tools and other materials or equipment related to the Contractors operations, outside of the areas demarcated for such parking/storage.	R500	R5 000
Failure to comply with the provisions relating to the management of topsoil	R1 000	R5 000

and subsoil.		
Excessive excavation of material in areas not depicted for such purpose / activity on the approved design plans.	R2 500	R10 000
Failure to comply with the provisions relating to waste management on site i.e., recycling of wastes, appropriate and timeous disposal, etc.	R500	R5 000
Failure to comply with the provisions relating to the storage, use and management of hazardous substances and fuels on site and/or the spillage of hydrocarbons or hazardous substances on site leading to environmental damage.	R1 000	R10 000
Mixing cement or concrete on bare ground and/or failure to comply with any other provision regarding cement/ concrete batching.	R1 000	R5 000
Failure to provide adequate fire-fighting equipment (in working order) on site at all times and/or failure to comply with the provisions relating to fire prevention and/or the occurrence of unattended or out of control fires.	R500	R5 000
Refuelling of vehicles, machinery or equipment outside of the designated refuelling area.	R500	R2 000
Maintenance of vehicles, machinery or equipment outside of the designated maintenance yard, except in emergencies.	R500	R2 000
Failure to undertake refuelling or repairs over a drip tray or other impermeable bunded surface to collect spilled hydrocarbons (fuels, lubricants, oils etc.) and other hazardous substances; failure to provide drip trays under fuel burning equipment (including pumps and generators) where there is a risk of hydrocarbon leakage.	R500	R2 000
Failure to produce a required method statement/s to the engineer's and ECO's satisfaction prior to undertaking the activity concerned and/or failure to adhere to an approved method statement.	R1 000	R5 000

The above does not absolve the transgressor from being prosecuted in terms of the ***National Environmental Management Act (Act 107 of 1998)*** which may result in further penalties and other actions by State Departments.

16. CONCLUSION

The recommendations and mitigation measures prescribed in this MMP have been formulated with the intention of addressing potential pre-maintenance and maintenance phase impacts on the environment. It is likely that if the conditions, requirements and recommendations of the above MMP are implemented as described and the relevant stakeholders adhere to the various mitigation measures, then the project will be completed without unforeseen negative environmental impacts.

17. REFERENCES

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