

Gordon's Bay Proclaimed Fishing Harbour Maintenance Management Plan

Report Prepared for

Coega Development Corporation

On behalf of

National Department of Public Works

Report Number 509310/03

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Report Prepared by

 **srk** consulting

August 2017

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Coega Development Corporation

On behalf of

National Department of Public Works

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Profile and Expertise of EAPs

SRK Consulting (South Africa) (Pty) Ltd (SRK) has been appointed by Coega Development Corporation (CDC) on behalf of the National Department of Public Works (NDPW) as the independent consultants to compile a Maintenance Management Plan (MMP) for the Gordon's Bay Harbour.

SRK Consulting comprises over 1 300 professional staff worldwide, offering expertise in a wide range of environmental and engineering disciplines. SRK's Cape Town environmental department has a distinguished track record of managing large environmental and engineering projects and has been practising in the Western Cape since 1979. SRK has rigorous quality assurance standards and is ISO 9001 accredited.

As required by the National Environmental Management Act 107 of 1998 (NEMA), the qualifications and experience of the key individual practitioners responsible for this project are detailed below.

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Certified with the Interim Board for Environmental Assessment Practitioners South Africa (CEAPSA)

Chris Dalglish is a Partner at SRK Consulting and the Head of the Environmental Department in Cape Town. He has over 24 years of experience as an environmental consultant working on a broad range of EIA, auditing, environmental planning and management, public consultation and environmental management system projects. Chris's experience includes managing and co-ordinating major EIAs throughout Southern Africa and South America in the mining, energy, land-use planning and development, water and waste management, and industrial sectors.

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Sharon Jones is a Principal Environmental Consultant with over 18 years' experience. Sharon has managed a broad range of projects in South Africa, Mozambique, Angola, Suriname, Namibia and the DRC, with particular experience in Port and marine-based projects, mining and large infrastructure projects (e.g. airports and dams). In addition to managing various ESIA's, her experience includes the development of Environmental Management Frameworks, Environmental Management Plans and due diligence reviews and gap analysis studies against IFC and World Bank Standards. Sharon holds a BSc (Hons) and MPhil (Env) and is a registered Professional Natural Scientist (Environmental Science) with SACNASP and a CEAPSA.

Statement of SRK Independence

Neither SRK nor any of the authors of this Report have any material present or contingent interest in the outcome of this Report, nor do they have any pecuniary or other interest that could be reasonably regarded as being capable of affecting their independence or that of SRK.

SRK has no beneficial interest in the outcome of the assessment which is capable of affecting its independence.

SRK's fee for completing this Report is based on its normal professional daily rates plus reimbursement of incidental expenses. The payment of that professional fee is not contingent upon the outcome of the Report.

Disclaimer

The opinions expressed in this Report have been based on the information supplied to SRK by CDC and their consultants. The opinions in this Report are provided in response to a specific request from CDC to do so. SRK has exercised all due care in reviewing the supplied information. Whilst SRK has compared key supplied data with expected values, the accuracy of the results and conclusions from the review are entirely reliant on the accuracy and completeness of the supplied data. SRK does not accept responsibility for any errors or omissions in the supplied information and does not accept any consequential liability arising from commercial decisions or actions resulting from them. Opinions presented in this report apply to the site conditions and features as they existed at the time of SRK's investigations, and those reasonably foreseeable. These opinions do not necessarily apply to conditions and features that may arise after the date of this Report, about which SRK had no prior knowledge nor had the opportunity to evaluate.

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Acronyms and Abbreviations

CBA	Critical Biodiversity Area
CDC	Coega Development Corporation
DEA	Department of Environmental Affairs
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
MMP	Maintenance Management Plan
MPA	Marine Protected Area
NDPW	National Department of Public Works
NEMA	National Environmental Management Act 107 of 1998
NSRI	National Sea Rescue Institute
PRDW	PRDW Consulting Port and Coastal Engineers
SRK	SRK Consulting (South Africa) (Pty) Ltd

Glossary

Critical Biodiversity Area	Areas required for conservation in order to meet biodiversity targets for ecosystems, species and ecological processes, as identified in a systematic biodiversity plan.
Ecological Corridor	An area of habitat connecting wildlife populations separated by human activities or structures (e.g. roads, development or logging).
Environment	The external circumstances, conditions and influences that surround and affect the existence and development of an individual, organism or group. These circumstances include biophysical, social, economic, historical and cultural aspects.
Environmental Management Measures	Requirements or specifications for environmental management, as presented in the MMP.
Generic MMP	The generic document applicable to environmental management at all proclaimed fishing harbours. The generic MMP is appended to, and forms part of the Site Specific MMP for each of the individual fishing harbours.
Maintenance dredging	The removal of accumulated sediment to the original depth of the harbour, but excluding any additional deepening or capital dredging. This excludes dredging for the upgrading of structures.
Marine Protected Area	A biodiverse marine area designated to conserve marine life and promote conservation and effective management.
Method Statement	A mandatory written submission by the Contractor to the ECO setting out the plant, materials, labour and method the Contractor proposes using to carry out an activity.
Mitigation Measures	Actions identified to manage (avoid, minimise or optimise) potential environmental impacts which may result from the development.
Site Specific MMP	The Site Specific MMP is applicable to a single fishing harbour only and contains site specific information. The generic MMP is appended to, and forms part of the Site Specific MMP for each of the individual fishing harbours.

1 Introduction

1.1 Background and Introduction

The National Department of Public Works (NDPW) has appointed the Coega Development Corporation (CDC) as Implementing Agent for the repair, maintenance and upgrade of the 13 proclaimed fishing harbours in the Western Cape. Repair of the 13 fishing harbours has been split into four discrete work packages as follows:

- **Work package 1:** Saldanha Bay and Pepper Bay;
- **Work package 2:** Hout Bay, Kalk Bay, Gordon's Bay and Hermanus;
- **Work package 3:** Lamberts Bay, Laaiplek and St Helena Bay;
- **Work package 4:** Stilbaai, Struisbaai, Arniston and Gansbaai.

CDC has appointed SRK Consulting (South Africa) (Pty) Ltd (SRK) to compile a Generic Maintenance Management Plan (MMP) applicable to all 13 fishing harbours and based on which Site Specific MMPs can be compiled for each harbour. The Generic MMP, together with the Site Specific MMP, (collectively referred to as "the MMP") aims to meet the requirements of the National Environmental Management Act 107 of 1998, as amended (NEMA) and the Environmental Impact Assessment (EIA) Regulations, 2014, for an approved MMP for maintenance activities.

PRDW Consulting Port and Coastal Engineers (PRDW) has been appointed by CDC for the professional consulting services required to repair, maintain and upgrade the marine infrastructure for Work Package 2, and has in turn appointed SRK to compile the Site Specific MMP for Gordon's Bay harbour.

1.2 Purpose and Structure of the MMP

The MMP aims to ensure that all future repairs and maintenance to the fishing harbours are undertaken in an environmentally responsible manner, in compliance with relevant environmental legislation. The MMP consists of two components:

- **The Site Specific MMP:** which contains only site specific information applicable to a single fishing harbour; and
- **The Generic MMP (Appendix A):** which contains information and requirements applicable to the management of all fishing harbours and will allow for consistency in environmental management for all harbours in the Western Cape.

For each harbour, the Generic MMP will supplement (and be appended to) the Site Specific MMP.

1.2.1 Structure of the Site Specific MMP

The Site Specific MMP (this document) contains only information specific to Gordon's Bay harbour and consists of the following sections:

Section 1: Background and Introduction

Provides an introduction and background to the project, outlines the purpose of the Site Specific MMP and how it relates to the Generic MMP.

Section 2: Site Description

Describes the location and characteristics of Gordon's Bay harbour, provides property owner details and an overview of the receiving biophysical and socio-economic environment.

Section 3: Description of Proposed Works

Describes the maintenance and repair works currently proposed, noting that the MMP will also be applicable to future works, the details of which may not yet be available.

Section 4: Potential Impacts

Identifies and provides a qualitative assessment of the significance of the potential impacts of the proposed works on the receiving environment, assuming the specifications of the MMP are adequately implemented.

1.2.2 Structure of the Generic MMP

The Generic MMP consists of the following sections, which would be applicable to all fishing harbours:

Section 1: Background and Introduction

Provides an introduction and background to the project and outlines the purpose of this document, as well as the Site Specific MMPs.

Section 2: Governance Framework

Provides a brief summary and interpretation of relevant legislation.

Section 3: Potential Impacts

Provides a generic description of the potential environmental impacts associated with repair and maintenance works within harbour environments as well as identifying (high level) generic mitigation measures.

Section 4: Environmental Management Measures

Provides the management measures applicable during the long-term maintenance of the harbour including the roles and responsibilities for implementation of the MMP, compliance and monitoring requirements as well as detailed environmental management measures to be implemented.

1.3 Scope of the MMP

The scope of repair and maintenance activities addressed in the MMP includes:

- Placement of rock (more than 5 m³) within the footprint of existing rock revetments;
- Maintenance dredging of the harbour basin and beyond; and
- Deposition of dredged material either below or within 100 m of the high-water mark of the sea.

The following activities, if proposed in any of the fishing harbours, do not require an MMP in terms of NEMA and are excluded from the scope of this MMP. These activities should be undertaken in compliance with the Generic Environmental Management Plan (EMP) for the proclaimed fishing harbours (SRK Report Number 509310/02) to ensure compliance with the "duty of care" requirement in terms of Section 28(1) of NEMA:

- Removal of sunken fishing vessels;
- Repair and maintenance of existing marine structures including (but not limited to) breakwaters, quays, slipways, jetties, copings etc.;
- Maintenance and repair of quay furniture (bollards, fenders and access ladders);
- Repair and maintenance of harbour machinery and equipment e.g. cranes;
- Placement of rock (less than 5 m³) within the footprint of existing rock revetments;

- Placement of armour units within the footprint of existing breakwaters; and
- Maintenance or replacement of fencing.

The following activities, if proposed in any of the fishing harbours, are not considered maintenance activities and are excluded from the scope of this MMP. Such activities may require more extensive authorisation procedures and would require screening of relevant legislation:

- The construction of any new structures in the harbour, coastal public property or within 100 m of the high-water mark of the sea and any maintenance or repair works which increase the development footprint of the harbour;
- The dredging, excavation, infilling or depositing of more than 5 m³ of material either below or within 100 m of the high-water mark of the sea, which is not for maintenance purposes (e.g. capital dredging or construction of new rock revetments); and
- The removal of 300 m² or more of indigenous vegetation within 100 m of the high water mark of the sea.

It should be noted that from time to time the Minister of Environmental Affairs may gazette changes to the Environmental Impact Assessment (EIA) Regulations and associated Listing Notices (see Chapter 2 in the Generic MMP) identifying activities that may require either an MMP or Environmental Authorisation.

1.4 Review of the MMP

The MMP will be reviewed and updated every 5 years particularly in response to changes in relevant legislation. Review of the MMP will be done in consultation with the competent authority (in this case the National Department of Environmental Affairs [DEA]) and will be subject to any public consultation required by the competent authority.

1.5 Specific governance framework

The overarching applicable legislation is presented in Chapter 2 of the Generic MMP. At the time of compilation of this MMP for Gordon's Bay harbour, no municipal/local strategic plans or bylaws were noted that could have an influence on the maintenance and repair works to be undertaken within Gordon's Bay Harbour. This was confirmed by an official at the City of Cape Town.

2 Site Location and Description

2.1 Site Description

Gordon's Bay is situated on the eastern shore of False Bay, approximately 50 km from Cape Town (see Figure 2-2). The harbour, located at the foot of the Hottentots-Holland mountain range, covers an area of approximately 4 ha, and is sheltered by the main and secondary breakwaters.

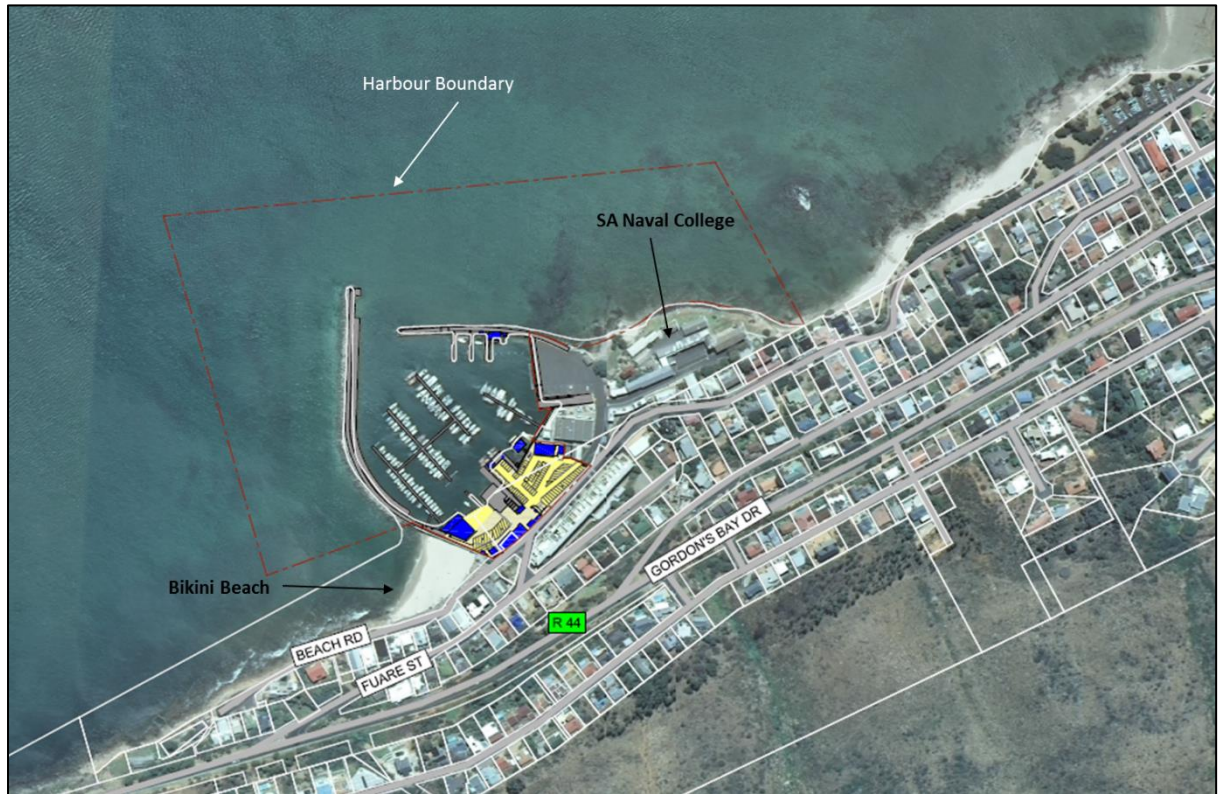


Figure 2-1: Gordon's Bay Harbour and harbour boundaries

Gordon's Bay Harbour is one of 13 proclaimed fishing harbours in the Western Cape and one of three of the harbours located in the City of Cape Town Metropolitan Municipality. The harbour lies between Bikini Beach, a sheltered beach area which is popular as a local recreational destination during summer months, and the South African Naval College (refer to Figure 2-1). The South African Naval College is an important adjacent land-use and occupies the northern portions of the harbour (which falls predominantly outside the harbour jurisdiction boundary). The college occupies a significant area of land along Beach Road. The predominant land-use in the study area is residential, with predominantly compact, single residential housing units. A mixed-use development is located directly opposite the harbour on Beach Road.

Figure 2-3 depicts the Gordon's Bay Harbour and the associated marine structures, including the two breakwaters, the lead-in and naval jetties, the main and naval quays, and a slipway.

Bikini Beach, situated adjacent (to the west) of the main breakwater is a popular recreational area for both local residents and tourists. The beach has been subject to significant erosion and sediment transportation over the past decade, with most of the material being transported into the Gordon's Bay harbour. This has led to regression of the beach by approximately 25 – 30 m since March 2005, reducing the width of the beach by about 50%.



Legend

- Towns
- ★ Harbour
- ✂ Railway
- Other Road
- Secondary Road
- Arterial Road
- National Road
- Perennial River
- Non-Perennial River
- Inland Water
- Wetlands



Data Source:
1/50,000 Topographic Map Sheet
3318; SANBI

Scale:
1:50 000 @ A4

Projection: TM	Datum: HH94
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Central Meridian/Zone:
Lo19

Date: 08/08/2017	Compiled by: FUBM
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Project No: 509310	Fig No: 2-2
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GORDON'S BAY FISHING HARBOUR
LOCALITY MAP



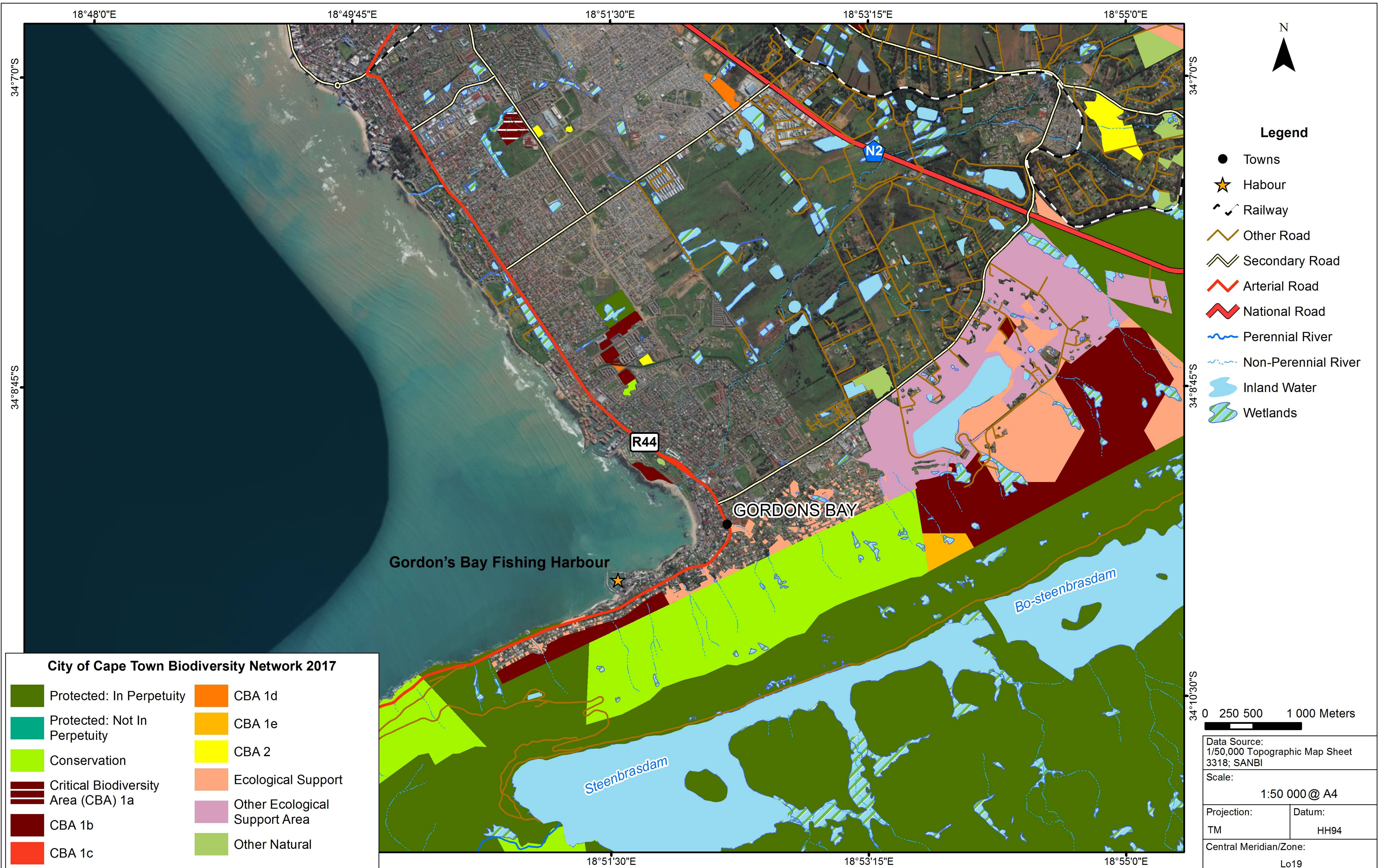
Figure 2-3: Structures at Gordon's Bay Harbour

Source: PRDW

2.2 Surrounding Environment

The mountain streams above the harbour exit onto the beach via a number of stormwater outlets. The Steenbras River mouth is located approximately 5 km to the south of Gordon's Bay Harbour, and the Sir Lowry's Pass River mouth is located about 1 km to the north of Gordon's Bay Harbour. The coastline to the south of Gordon's Bay Harbour is largely undeveloped, and as such provides an ecological link along the coast from the Gordon's Bay Harbour to the Kogelberg Biosphere Reserve and the Steenbras River mouth. A number of river corridors enter Gordon's Bay from the mountain side, consisting of pipes and open channels through the residential areas. These river corridors can be considered as ecological corridors connecting the mountain to the sea.

Although the Gordon's Bay Harbour is located within the Cape Floristic Region, one of the most biologically diverse regions in the world, there are no fauna or flora areas of significance in the harbour itself. However, the mountain slopes behind the harbour are considered a Critical Biodiversity Area (CBA), consisting mostly of Kogelberg Sandstone Fynbos, a critically endangered fynbos vegetation type (refer to Figure 2-4 below). Exotic eucalyptus trees provide shade for the parking areas in the harbour.



GORDON'S BAY FISHING HARBOUR

SENSITIVE AREAS

There are no Marine Protected Areas (MPAs) within the immediate vicinity of the harbour. However, there are two MPAs in False Bay, namely the Helderberg MPA (located on the north-eastern shore of False Bay, adjacent to the Macassar Dunes Reserve) and the Table Mountain National Park MPA (encompassing the entire Cape Peninsula, from Muizenberg in the South to Mouille Point in the North). Both are sufficiently far from the harbour that they are not affected by any harbour related activities. Notable marine species found offshore in the Gordon's Bay area include the migratory Southern Right Whale, the Great White Shark, West Coast Rock Lobster and abalone.

Gordon's Bay Harbour historically played an important function as a fishing harbour. However, the Gordon's Bay Harbour is currently primarily used by the yacht club, naval base, a few fishing vessels, the ski boat launch and the National Sea Rescue Institute (NSRI) (Station 9). Gordon's Bay Harbour still operates as a West Coast Rock Lobster landing facility with approximately five boats operating from the harbour, although no processing takes place at the harbour. The yacht club is the dominant user who uses privately owned and maintained floating moorings.

There are no known industries or stakeholders with marine sea water intakes close to the harbour, which could be affected by activities within or directly surrounding the harbour.

2.3 Property Owner Details

The Gordon's Bay Harbour occupies three separate erven as indicated on Figure 2-5.

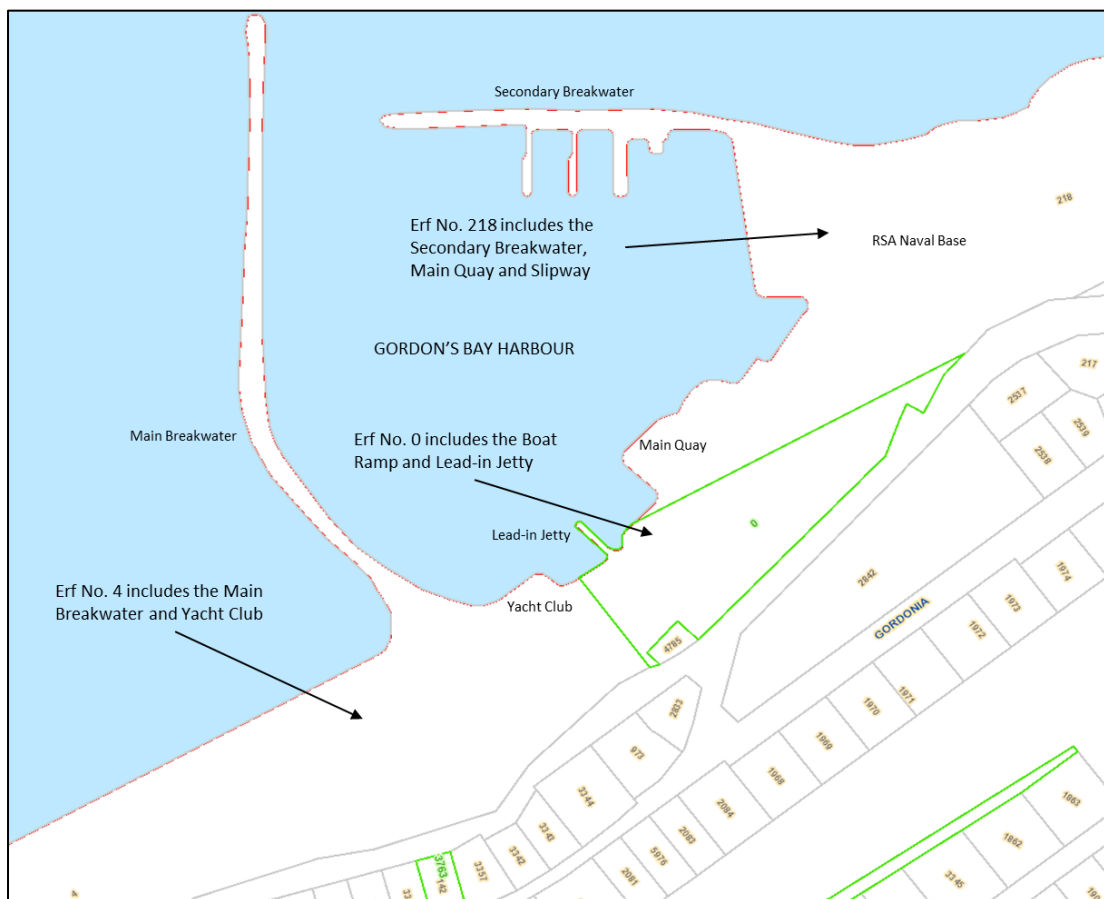


Figure 2-5: Erven at Gordon's Bay Harbour

Source: PRDW

The details of the property owner are presented in Table 2-1 below.

Table 2-1: Property Owner Details (Erf 4 and Erf 0)

Name of Company	National Department of Public Works
Contact Person	Vuyo Ngonyama
Position	Director: Property Management
Postal Address	Private Bag X9027, Cape Town, 8000
Telephone	0214022102
Fax	021 419 2978
Email	vuyo.ngonyama@dpw.gov.za

Table 2-2: Property Owner Details (Erf 218)

Name of Company	South African Naval College
Contact Person	Commander A.S. Nokwane
Position	Executive Officer
Postal Address	SA Naval College, Beach Road, Gordon's Bay, 7140
Telephone	021 856 9501
Fax	021 856 9552
Email	a.nokwane@sanavy.co.za

3 Description of Proposed Works

3.1 Current Works

The scope of work to be undertaken at the Gordon's Bay Harbour includes the following (refer to Figure 3-1):

- Concrete repair and maintenance of existing marine structures;
- Maintenance and repair of quay furniture (bollards, fenders and access ladders);
- Repair and maintenance of the harbour slipway including rails, cradle and winch;
- Repair and maintenance of the quay crane;
- Primary and secondary breakwater repairs;
- Maintenance dredging of the harbour basin and entrance channel; and
- Replenishment of Bikini Beach through the deposition of dredged material.

The dredging activities and associated beach replenishment, which require an authorised MMP, are discussed in more detail below.



Figure 3-1: Repair and maintenance work required at Gordon's Bay Harbour

Source: PRDW

Dredging is required to restore the required water depths in the entrance channel and harbour basin (refer to Figure 3-2 below). Sand has built up in the harbour entrance to such an extent that larger vessels cannot use the harbour and smaller vessels can only enter and leave the harbour during high tide. This is a major concern for the safety of people and vessels using the entrance and for the operation of the NSRI who need to be able to operate under all conditions.

An estimated 20 000m³ needs to be dredged from two dredge areas depicted as Area A and Area B respectively on Figure 3-2 . Area A is approximately 18 500m² extending along the main breakwater and through the entrance channel to the harbour. Area B is approximately 3 250m² in extent, covering the area in which sediment has accumulated beneath the floating jetties in the harbour.

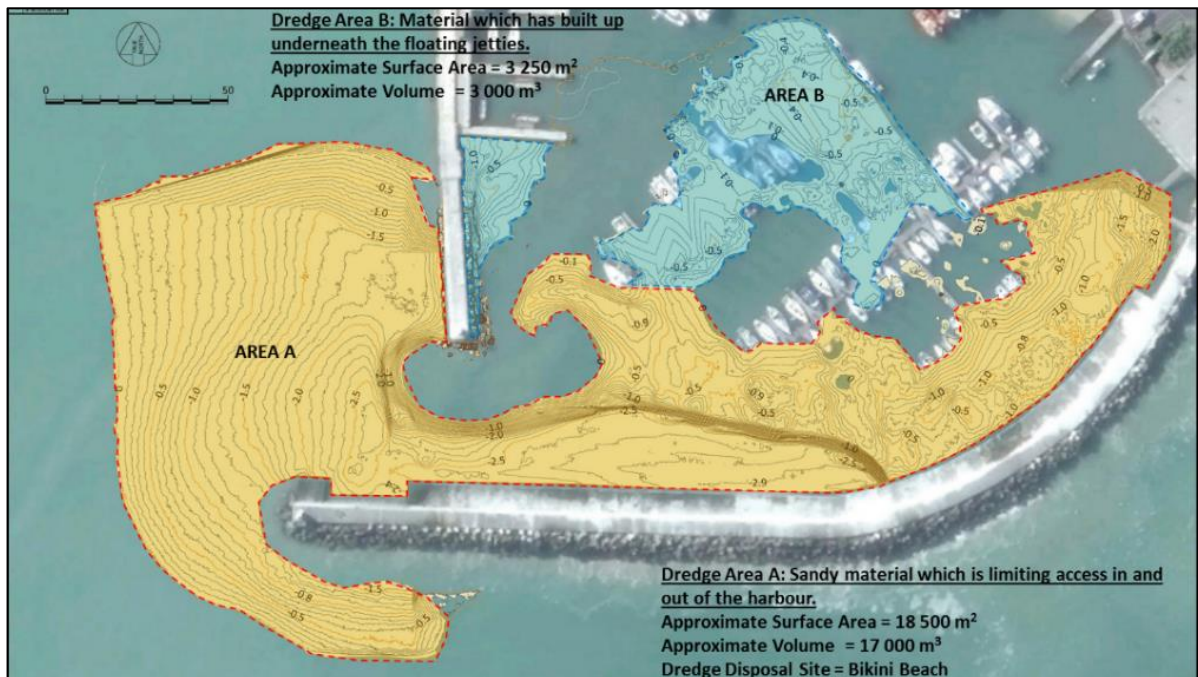


Figure 3-2: Proposed dredging areas at Gordon's Bay Harbour

Source: PRDW

Dredged sand will be discharged on the adjacent Bikini Beach using a small cutter-suction dredger (or a slurry pump mounted on a barge), a suction pipe, and a floating discharge pipeline (refer to Figure 3-3 below). A small suction dredger has previously been used at Gordon's Bay Harbour (refer to Figure 3-3 inset). The dredge material will be agitated, sucked up from the seabed and pumped in a sand and seawater slurry to the discharge point via a discharge pipeline. A floating pipeline will be required between the dredger and breakwater. A discharge pipeline will then run along the breakwater cap and discharge the sand slurry onto Bikini Beach at the top of the intertidal zone. As the slurry runs down the beach, the sand will settle out onto the beach while the seawater runs back into the sea. The discharge area will be kept close to the breakwater to minimise impact on beach users. Wave action and nearshore currents will move and redistribute the deposited sand along the beach, and into the natural beach profile. The discharge area will be cordoned off when the slurry is being discharged to prevent the public from entering this area.

Sand will be discharge into the intertidal zone allowing sand to naturally redistribute along the beach through wave action, until it reaches a natural equilibrium. It is unknown how long this process will take as redistribution of sand would be accelerated by spring tides and storm events with greater wave energy.

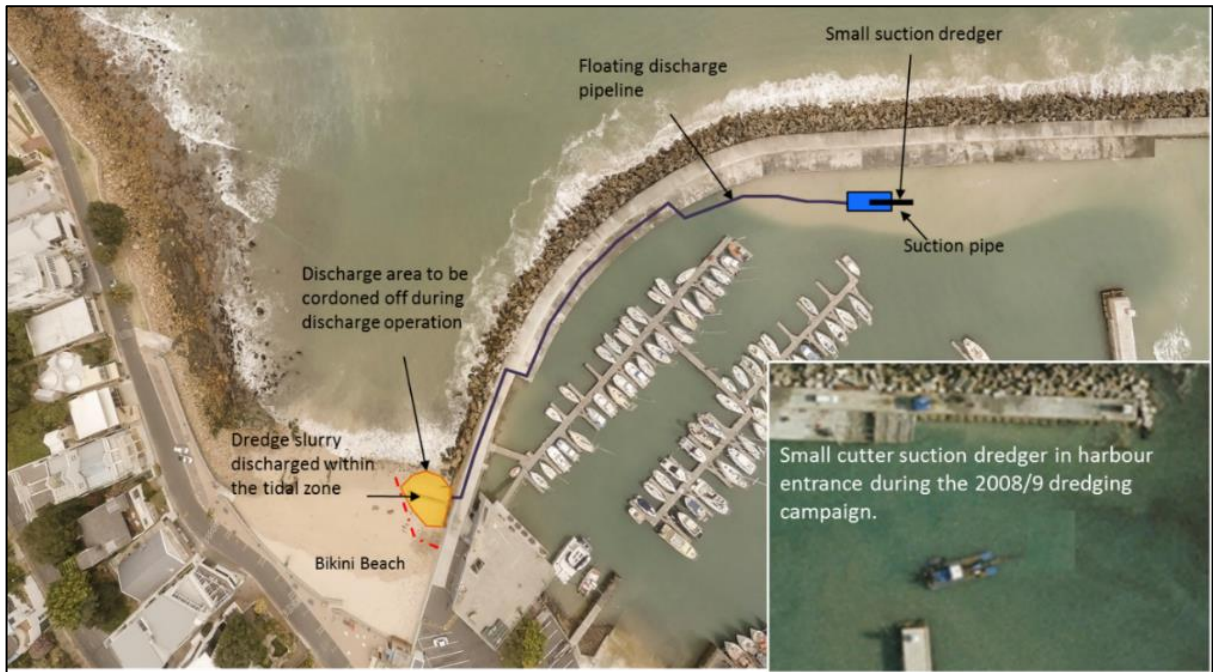


Figure 3-3: Procedure for dredging and sediment discharge at Gordon's Bay Harbour

Source: PRDW

The placement of 20 000m³ of dredged sand onto the beach will widen the beach by 25 to 35 m as compared to its current profile. Figure 3-4 below depicts the beach profile in March 2005 (red dashed line), and the expected beach profile after placement of dredged sand (yellow area).



Figure 3-4: Bikini Beach historic profile (red dashed line) and expected profile after depositing of dredged sand (yellow area)

Source: PRDW

3.1.1 Alternatives Considered

Four options for the re-use or disposal of dredged material were considered:

- Pumping the sand onto Bikini Beach to assist in beach replenishment;
- Pumping the sand to an offshore disposal site;
- Pumping the sand onto the beach east of the harbour; and
- Onshore disposal and potential reuse of material.

Pumping the sand onto Bikini Beach is considered the most appropriate option for the beneficial use of dredged material, as Bikini Beach has eroded significantly since 2005, and the dredged sand can be used for beach replenishment. Sediments to be dredged from the harbour are not contaminated by heavy metals or measured organic compounds and are considered suitable for reuse or offshore disposal into the marine environment (see Appendix B). This option has also been agreed to by the City of Cape Town responsible for the management of Bikini Beach.

3.2 Future Works

It is anticipated that future repair works and maintenance dredging will be required in the long term. Assuming these activities do not differ significantly from those described in this document, this MMP should be considered applicable to all future maintenance works at Gordon's Bay Harbour for which an MMP is required. .

Any future works proposed will need to be discussed with the relevant authorities prior to the commencement of such activities to determine the need for any additional authorisation requirements (if works fall outside the scope of this document) or activity specific environmental management measures.

3.3 Specialist Studies

The proposed discharge of dredged sediment onto Bikini Beach as well as the assessment of potential impacts and identification of relevant mitigation and management measure during dredging and discharge of sediment were informed by the Sediment Specialist Study undertaken by Lwandle Consulting (Appendix B). This study confirmed that the sediments complied with relevant sediment quality guidelines and were not considered contaminated.

This study is applicable only to the dredging operations currently anticipated and any future maintenance dredging will require similar assessments.

4 Impacts on Receiving Environment

A qualitative description of the types of impacts associated with maintenance and repair activities at all fishing harbours is provided in Section 3 of the Generic MMP. The significance and status of the potential impacts associated with the proposed works at Gordon's Bay Harbour are rated below, assuming implementation of the requirements of the MMP.

Table 4-1: Significance of potential impacts at during maintenance and repair works at Gordon's Bay Harbour

Impact	Status	Significance	Description
Higher noise levels adversely affecting surrounding communities	-ve	Very Low	Noise from construction and dredging may affect neighbouring communities and beachgoers using Bikini Beach however this will be temporary and largely limited to daylight hours.
Increased emissions during construction adversely affecting air quality	-ve	Insignificant	Little dust is expected to be generated by construction activities.
Delays to other road users associated with increased traffic	-ve	Very Low	The roads leading to the harbour are narrow and some congestion may be caused by construction vehicles.
Loss or disturbance of terrestrial vegetation and habitat	-ve	Insignificant	With the exception of exotic eucalyptus trees, there is no vegetation at the harbour.
Disturbance of marine habitat within the footprint of proposed dredging.	-ve	Very low	Previous maintenance dredging has taken place within the harbour (most recently in 2009), and no dredging will take place in areas that have not already been dredged during maintenance or construction of the harbour.
Disturbance of marine habitats by the disposal/deposition of dredged material.	-ve	Insignificant	Dredged material will be deposited on Bikini Beach and redistributed by wave action to fit the profile of Bikini Beach. Therefore, disturbance of marine habitats due to the deposition of dredged material is considered unlikely.
Elevated turbidity and sedimentation in surrounding habitat	-ve	Very Low	Sediment from dredging inside the harbour is likely to be mostly contained, however, sediment from dredging outside the harbour as well as deposition of sediment on Bikini Beach may cause some localised increases in turbidity. These would however be temporary.
Nutrient release and associated algal blooms	-ve	Insignificant	The concentration of organic carbon within the harbour is higher than outside the harbour, and concentrations of other organic compounds were not assessed. However, dredged material will be deposited on Bikini Beach and redistributed by wave action, and negative impacts on marine life were deemed to be unlikely.
Liberation of trace metals and other contaminants in dredged sediment, affecting marine life	-ve	Insignificant	Mean metal and organic compound concentrations at the harbour were analysed and found to be below the National Action List thresholds, and negative impacts on marine life were deemed to be unlikely.
Increased employment, income and skills development	+ve	Very Low	Some short-term local employment opportunities may be created during construction, as well as support of the local economy through use of local suppliers (where possible).
Visual impact of dredging activities	-ve	Very Low	Dredge plumes may have a visual impact on sensitive receptors which may include beachgoers and local residential areas adjacent to the harbour, most of which are elevated above the harbour/sea.

Loss or disturbance of cultural heritage resources	-ve	Insignificant	The main breakwater, secondary breakwater and main quay at the harbour are older than 60 years and will be repaired and upgraded. These repairs are not considered to impact on the heritage value of the structures.
Impact of constrained functionality of the harbour on other users	-ve	Low	The activities of other users of the harbour (e.g. yacht club, fishermen) may be disrupted or restricted during construction and dredging activities.
Impact of closure of Bikini Beach on beachgoers	-ve	Very Low	A small section of Bikini Beach will need to be cordoned off during the placement of dredged material onto the beach, which will disrupt beachgoers. In addition, increased turbidity in the water during sediment deposition may make swimming in the area temporarily less desirable.
Replenishment of Bikini Beach improving beach facilities	+ve	Low	Beach replenishment will have long term benefits to beachgoers by substantially increasing the size of the beach area.
Increased beach maintenance requirements	-ve	Insignificant	The increased area of the beach and increased volume of sand may slightly increase the frequency with which wind blown sand and deposition of sand onto the adjacent road may need to be managed.

5 Site Specific Environmental Management Requirements

5.1 Roles and Responsibilities

The key role players during maintenance and repairs of the fishing harbours are described in detail in Section 4.2 of the Generic MMP (Annexure A). The long term maintenance of Bikini Beach is however currently the responsibility of the City of Cape Town, who will retain this responsibility following the deposition of sediment on the beach. A specific Bikini Beach Management Plan (Appendix C) has been compiled to guide long-term beach maintenance, which will be implemented by the City of Cape Town.

5.2 Additional Environmental Management Requirements

In addition to the generic environmental management requirements included in the Generic MMP, the following additional management requirements must be implemented at Gordon's Bay Harbour, largely related to the maintenance of Bikini Beach. The beach management measures to be implemented by the City of Cape Town are also contained in the Bikini Beach Management Plan attached as Appendix C.

Table 5-1: Additional environmental management and mitigation measures that must be implemented at Gordon's Bay Harbour


Maintenance Management Measures						
Aspect	ID	Mitigation measure / Procedure	Responsible	Implementation Timeframe	Monitoring Methods ¹ (where applicable)	Performance Indicators
Dredging and Beach Replenishment	1.	Avoid dredging and beach replenishment during the peak spring/summer holiday seasons (October – April).	NDPW/Consultant	Duration of dredging and beach replenishment	-	<ul style="list-style-type: none"> Minimal disturbance to beachgoers on Bikini Beach
	2.	Cordon off the discharge area on Bikini Beach during beach replenishment.	NDPW/Consultant	Duration of beach replenishment	-	<ul style="list-style-type: none"> Incidences of the public accessing the discharge area
	3.	Closely monitor the deposition of sand and redistribute any excessive sand build up on the beach if this occurs.	Engineer & Contractor	Duration of beach replenishment	<ul style="list-style-type: none"> Visual inspection of sand build-up 	<ul style="list-style-type: none"> No excessive build up of sand on the beach during or directly following deposition
Management of windblown sand	4.	Remove sand build-up along the seawall adjacent to Beach Road to a level approximately 1.5 m below the top of the sea wall to create a sand trap.	City of Cape Town	As required (when sand reaches 0.5m from the top of the seawall).	<ul style="list-style-type: none"> Visual inspection of sand build-up 	<ul style="list-style-type: none"> Amount of sand blowing over seawall
	5.	Slope the beach surface toward the sea to prevent ponding (accumulation of water).	City of Cape Town	When sand build-up is removed from seawall	<ul style="list-style-type: none"> Visual inspection for ponding 	<ul style="list-style-type: none"> Occurrence of ponding
	6.	Sweep roads and sidewalks adjacent to Bikini Beach frequently to remove sand.	City of Cape Town	As required	<ul style="list-style-type: none"> Visual inspection for windblown sand on roads and sidewalks 	<ul style="list-style-type: none"> Roads and sidewalks free of sand

¹ Unless otherwise indicated, monitoring will be undertaken by the ECO.

Maintenance Management Measures						
Aspect	ID	Mitigation measure / Procedure	Responsible	Implementation Timeframe	Monitoring Methods ¹ (where applicable)	Performance Indicators
	7.	Clean stormwater drains and catch pits frequently.	City of Cape Town	As required to prevent blockage	<ul style="list-style-type: none"> Visual inspection for blocked drains due to windblown sand 	<ul style="list-style-type: none"> Occurrence of blocked drains due to windblown sand

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Chris Dalgliesh
Partner and Principal Environmental Consultant

Appendices

Appendix A:

**Generic Maintenance Management Plan:
Western Cape Proclaimed Fishing
Harbours**

Western Cape Proclaimed Fishing Harbours Generic Maintenance Management Plan

Report Prepared for

Coega Development Corporation

On behalf of

National Department of Public Works

Report Number 509310/01



Report Prepared by

 **srk** consulting

July 2017

Western Cape Proclaimed Fishing Harbours Generic Maintenance Management Plan

Coega Development Corporation

On behalf of

National Department of Public Works

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SRK Project Number 509310

July 2017

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Partner

Profile and Expertise of EAPs

SRK Consulting (South Africa) (Pty) Ltd (SRK) has been appointed by Coega Development Corporation (CDC) on behalf of the National Department of Public Works (DPW) as the independent consultants to compile a Generic Maintenance Management Plan (MMP) applicable to all fishing harbours in the Western Cape.

SRK Consulting comprises over 1 300 professional staff worldwide, offering expertise in a wide range of environmental and engineering disciplines. SRK's Cape Town environmental department has a distinguished track record of managing large environmental and engineering projects and has been practising in the Western Cape since 1979. SRK has rigorous quality assurance standards and is ISO 9001 accredited.

As required by the National Environmental Management Act 107 of 1998 (NEMA), the qualifications and experience of the key individual practitioners responsible for this project are detailed below.

Project Director: Christopher Dalgliesh, BBusSc (Hons); MPhil (EnvSci)

Certified with the Interim Board for Environmental Assessment Practitioners South Africa (CEAPSA)

Chris Dalgliesh is a Partner at SRK Consulting and the Head of the Environmental Department in Cape Town. He has over 24 years of experience as an environmental consultant working on a broad range of EIA, auditing, environmental planning and management, public consultation and environmental management system projects. Chris's experience includes managing and co-ordinating major EIAs throughout Southern Africa and South America in the mining, energy, land-use planning and development, water and waste management, and industrial sectors.

Project Manager: Sharon Jones, BSc Hons (Env. Sci); MPhil (EnviroMan)

Certified with the Interim Board for Environmental Assessment Practitioners South Africa

Sharon Jones is a Principal Environmental Consultant with over 18 years' experience. Sharon has managed a broad range of projects in South Africa, Mozambique, Angola, Suriname, Namibia and the DRC, with particular experience in Port and marine-based projects, mining and large infrastructure projects (e.g. airports and dams). In addition to managing various ESIA's, her experience includes the development of Environmental Management Frameworks, Environmental Management Plans and due diligence reviews and gap analysis studies against IFC and World Bank Standards. Sharon holds a BSc (Hons) and MPhil (Env) and is a registered Professional Natural Scientist (Environmental Science) with SACNASP and a CEAPSA.

Statement of SRK Independence

Neither SRK nor any of the authors of this Report have any material present or contingent interest in the outcome of this Report, nor do they have any pecuniary or other interest that could be reasonably regarded as being capable of affecting their independence or that of SRK.

SRK has no beneficial interest in the outcome of the assessment which is capable of affecting its independence.

SRK's fee for completing this Report is based on its normal professional daily rates plus reimbursement of incidental expenses. The payment of that professional fee is not contingent upon the outcome of the Report.

Disclaimer

The opinions expressed in this Report have been based on the information supplied to SRK by CDC and their consultants. The opinions in this Report are provided in response to a specific request from CDC to do so. SRK has exercised all due care in reviewing the supplied information. Whilst SRK has compared key supplied data with expected values, the accuracy of the results and conclusions from the review are entirely reliant on the accuracy and completeness of the supplied data. SRK does not accept responsibility for any errors or omissions in the supplied information and does not accept any consequential liability arising from commercial decisions or actions resulting from them. Opinions presented in this report apply to the site conditions and features as they existed at the time of SRK's investigations, and those reasonably foreseeable. These opinions do not

necessarily apply to conditions and features that may arise after the date of this Report, about which SRK had no prior knowledge nor had the opportunity to evaluate.

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Acronyms and Abbreviations

CDC	Coega Development Corporation
CER	Contractors Environmental Representative
DEA	Department of Environmental Affairs
DEA:O&C	Department of Environmental Affairs: Oceans and Coasts
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
GN	Government Notice
HWC	Heritage Western Cape
ICMA	Integrated Coastal Management Act 24 of 2008
MLRA	Marine Living Resources Act 18 of 1998
MMP	Maintenance Management Plan
MPA	Marine Protected Area
MSDS	Material Safety Data Sheets
NDPW	National Department of Public Works
NEMA	National Environmental Management Act 107 of 1998 as amended
NEM:ICMA	National Environmental Management; Integrated Coastal Management Act 24 of 2008
NEM:WA	National Environmental Management: Waste Act 59 of 2008
NHRA	National Heritage Resources Act 25 of 1999
RP	Responsible Person
SAHRA	South African Heritage Resources Agency
SRK	SRK Consulting (South Africa) (Pty) Ltd

Glossary

Contractor	Any company appointed by the Proponent to undertake construction or related activities on site, and will include the main Contractor for any aspect of the works, as well as any Sub-Contractors.
Contaminated water	Water contaminated by activities on site, e.g. concrete water and run-off from plant / personnel wash areas / quays.
Dredging	The removal of accumulated sediment and/or debris from the bottom of the ocean, generally to allow for better navigation.
Dumping at sea	In the context of this document, dumping at sea is limited to the disposal of dredged sediments at an approved location on the floor of the ocean, either inside or outside of the harbour boundaries.
Environment	The external circumstances, conditions and influences that surround and affect the existence and development of an individual, organism or group. These circumstances include biophysical, social, economic, historical and cultural aspects.
Environmental Authorisation	The authorisation by a competent authority of a listed activity or specified activity in terms of National Environmental Management Act 107 of 1998 as amended (NEMA).
Environmental Control Officer	A suitably qualified and independent individual appointed by the proponent to monitor compliance with the Maintenance Management Plan and general good environmental practice on site during the repair and maintenance activities at various fishing harbours.
Environmental Impact Assessment	A process of evaluating the environmental and socio-economic consequences of a proposed course of action or project.
Environmental incident	Environmental incident refers to an accident or unexpected occurrence related to the project, including fire, spills, pollution events, explosions, etc leading to negative environmental impacts.
Environmental Management Measures	Requirements or specifications for environmental management, as presented in the MMP.
Equivalent spherical diameter	The equivalent spherical diameter (or ESD) of an irregularly shaped object (in this case sand particle) is the diameter of a sphere of equivalent volume.
General waste	Waste that does not pose an immediate hazard or threat to health or to the environment, and includes domestic waste, building and demolition waste, business waste, inert waste and any waste classified as non-hazardous waste in terms of the regulations made under section 69 of the National Environmental Management: Waste Act 59 of 2008.
Generic MMP	The generic document applicable to environmental management at all the proclaimed fishing harbours. The generic MMP will be appended to, and form part of the Site Specific MMP for each of the individual fishing harbours.
Hazardous substance	A substance (including materials and waste) that can have a deleterious (harmful) effect on the environment and those substances declared hazardous substances in terms of the Hazardous Substances Act 15 of 1973.

Hazardous waste	Any waste that contains organic or inorganic elements or compounds that may, owing to the inherent physical, chemical or toxicological characteristics of that waste, have a detrimental impact on health and the environment and includes hazardous substances, materials or objects within the business waste, residue deposits and residue stockpiles.
Maintenance dredging	The removal of accumulated sediment to the original depth of the harbour, but excluding any additional deepening or capital dredging. This excludes dredging for the upgrading of structures.
Method Statement	A mandatory written submission by the Contractor to the Environmental Control Officer (ECO) setting out the plant, materials, labour and method the Contractor proposes using to carry out an activity.
Mitigation Measures	Actions identified to manage (avoid, minimise or optimise) potential environmental impacts which may result from the development.
Pollution	Pollution refers to the contamination of air, water, soil or the environment by a foreign substance or matter.
Proponent	The person or organisation implementing the project.
Resources	The personnel, financial, equipment and technical requirements necessary for the successful completion of mitigation measures and for monitoring activities.
Site Specific MMP	The Site Specific MMP is applicable to a single fishing harbour only and contains site specific information. The generic MMP will be appended to, and form part of the Site Specific MMP for each of the individual fishing harbours.
Solid waste	All solid waste including construction debris, chemical waste, broken / redundant equipment, oil filters, wrapping materials, timber, tins and cans, drums, wire, nails, food and domestic waste (e.g. plastic packets and wrappers).
Sub-Contractors	A Sub-Contractor is any individual or Contractor appointed by the main Contractor, to undertake a specific task on site.

1 Introduction

1.1 Background and Introduction

The National Department of Public Works (NDPW) has appointed the Coega Development Corporation (CDC) as Implementing Agent for the repair, maintenance and upgrade of the 13 proclaimed fishing harbours in the Western Cape. Repair of the 13 fishing harbours has been split into four discrete work packages as follows:

- **Work package 1:** Saldanha Bay and Pepper Bay;
- **Work package 2:** Hout Bay, Kalk Bay, Gordons Bay and Hermanus;
- **Work package 3:** Lamberts Bay, Laaiplek and St Helena Bay;
- **Work package 4:** Stilbaai, Struisbaai, Arniston and Gansbaai.

CDC has appointed SRK Consulting (South Africa) (Pty) Ltd (SRK) to compile a Generic Maintenance Management Plan (MMP) applicable to all 13 fishing harbours and based on which Site Specific MMPs can be compiled for each harbour. The Generic MMP (this report), together with the Site Specific MMP, (collectively referred to as “the MMP”) aims to meet the requirements of the National Environmental Management Act 107 of 1998, as amended (NEMA) and the Environmental Impact Assessment (EIA) Regulations, 2014, for an approved MMP for maintenance activities.

1.2 Proponent Details

The NDPW will be responsible for the long-term maintenance of all fishing harbours and as such will be responsible for the implementation of the MMPs. Relevant proponent contact details are presented in Table 1-1 below.

Table 1-1: Proponent Details

Name of Company	National Department of Public Works
Contact Person	Vuyo Ngonyama
Position	Director: Property Management
Postal Address	Private Bag X9027, Cape Town, 8000
Telephone	0214022102
Email	vuyo.ngonyama@dpw.gov.za

1.3 Purpose and Structure of the MMP

The MMP aims to ensure that all future repairs and maintenance to the fishing harbours are undertaken in an environmentally responsible manner, in compliance with relevant environmental legislation. The MMP consists of two components:

- **The Site Specific MMP:** which contains only site specific information applicable to a single fishing harbour; and
- **The Generic MMP:** which contains information and requirements applicable to the management of all proclaimed fishing harbours and will allow for consistency in environmental management for all proclaimed fishing harbours in the Western Cape.

For each harbour, the Generic MMP will supplement (and be appended to) the Site Specific MMP.

1.3.1 Structure of the Site Specific MMPs

The Site Specific MMPs, which will be prepared for each harbour, will contain only information specific to the relevant fishing harbour and consists of the following sections:

Section 1: Background and Introduction

Provides an introduction and background to the project, outlines the purpose of the Site Specific MMP and how it relates to the Generic MMP.

Section 2: Site Description

Describes the location and characteristics of the harbour, provides property owner details and an overview of the receiving biophysical and socio-economic environment.

Section 3: Description of Proposed Works

Describes the maintenance and repair works currently proposed, noting that the MMP will also be applicable to future works, the details of which may not yet be available.

Section 4: Potential Impacts

Identifies and provides a qualitative assessment of the significance of the potential impacts of the proposed works on the receiving environment, assuming the specifications of the MMP are adequately implemented.

Section 5: Site Specific Environmental Management Requirements

Lists any additional environmental management requirements specific to the harbour in question, and which are **not** included in the Generic MMP.

1.3.2 Structure of the Generic MMP

The Generic MMP (**this document**) consists of the following sections, which would be applicable to all proclaimed fishing harbours:

Section 1: Background and Introduction

Provides an introduction and background to the project and outlines the purpose of this document, as well as the Site Specific MMPs.

Section 2: Governance Framework

Provides a brief summary and interpretation of relevant legislation.

Section 3: Potential Impacts

Provides a generic description of the potential environmental impacts associated with repair and maintenance works within harbour environments and identifies (high level) generic mitigation measures.

Section 4: Environmental Management Measures

Provides the management measures applicable during the long-term maintenance of the harbour including the roles and responsibilities for implementation of the MMP, compliance and monitoring requirements as well as detailed environmental management measures to be implemented.

1.4 Scope of the MMP

The scope of repair and maintenance activities addressed in the MMP includes:

- Placement of rock (more than 5 m³) within the footprint of existing rock revetments;
- Maintenance dredging of a harbour basin; and
- Disposal or deposition of dredged material either below or within 100 m of the high-water mark of the sea (i.e. at a marine disposal site or for beach replenishment).

The following activities, if proposed in any of the fishing harbours, do not require an MMP in terms of NEMA and are excluded from the scope of this MMP. These activities should be undertaken in compliance with the Generic Environmental Management Plan (EMP) for the proclaimed fishing harbours (SRK Report Number 509310/02) to ensure compliance with the “*duty of care*” requirement in terms of Section 28(1) of NEMA. The activities are as follows:

- Removal of sunken fishing vessels;
- Repair and maintenance of existing marine structures including (but not limited to) breakwaters, quays, slipways, jetties, copings etc.;
- Maintenance and repair of quay furniture (bollards, fenders and access ladders);
- Repair and maintenance of harbour machinery and equipment e.g. cranes;
- Placement of rock (less than 5 m³) within the footprint of existing rock revetments;
- Placement of armour units within the footprint of existing breakwaters; and
- Maintenance or replacement of fencing.

The following activities, if proposed in any of the fishing harbours, are not considered maintenance activities and are excluded from the scope of this MMP. Such activities may require more extensive authorisation procedures, which would require screening against relevant legislation:

- The construction of any new structures in the harbour, coastal public property or within 100 m of the high-water mark of the sea and any maintenance or repair works which increase the development footprint of the harbour; and
- The dredging, excavation, infilling or depositing of more than 5 m³ of material either below or within 100 m of the high-water mark of the sea, which is not for maintenance purposes (e.g. capital dredging or construction of new rock revetments); and
- The removal of 300 m² or more of indigenous vegetation within 100 m of the high water mark of the sea.

1.5 Review of the MMP

The MMP will be reviewed and updated every five years particularly in response to changes in relevant legislation. Review of the MMP will be done in consultation with the competent authority (in this case the National Department of Environmental Affairs [DEA]) and will be subject to any public consultation required by the competent authority.

2 Governance Framework

This section provides the legislative framework that has informed the preparation of this (Generic) MMP. Local by-laws or strategic plans, regulated by each municipality that may be applicable are presented in Section 1.4 of the site specific MMP.

2.1 National Environmental Management Act 107 of 1998, as Amended

NEMA establishes a set of principles that all authorities have to consider when exercising their powers. These include the following:

- Development must be sustainable;
- Pollution must be avoided or minimised and remedied;
- Waste must be avoided or minimised, reused or recycled;
- Negative impacts must be minimised; and
- Responsibility for the environmental consequences of a policy, project, product or service applies throughout its life cycle.

Section 28(1) states that “*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*”. If such degradation/pollution cannot be prevented, then appropriate measures must be taken to minimise or rectify such pollution. These measures may include:

- Assessing the impact on the environment;
- Informing and educating employees about the environmental risks of their work and ways of minimising these risks;
- Ceasing, modifying or controlling actions which cause pollution/degradation;
- Containing pollutants or preventing movement of pollutants;
- Eliminating the source of pollution; and
- Remedying the effects of the pollution.

Legal requirements for this project

The NDPW has a responsibility to ensure that the proposed activities conform to the principles of NEMA. NDPW is obliged to take actions to prevent pollution or degradation of the environment in terms of Section 28 of NEMA. This MMP will help the NDPW to conform with the principles of NEMA during the long-term maintenance of the fishing harbours.

2.2 EIA Regulations, 2014

Sections 24 and 44 of NEMA make provision for the promulgation of regulations that identify activities which may not commence without an Environmental Authorisation (EA) issued by the competent authority. In this context, Listing Notices 1¹, 2² and 3³ of the EIA Regulations, 2014, list activities that require EA in terms of NEMA (“NEMA listed activities”). Certain listed activities are exempt from the requirement for EA if they are undertaken for maintenance purposes, and in accordance with an approved MMP.

Table 2-1 indicates the listed activity that is applicable to the proposed works (including dredging, disposal of dredge spoil and the movement or deposition of rock for any other maintenance purposes) and which is exempt from the requirement for EA on the approval of this MMP.

Table 2-1: NEMA listed activity applicable to the project

No.	Listed activity
Listing Notice 1	
19 A	<p>The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 5 cubic metres from-</p> <ul style="list-style-type: none"> (i) the seashore; or (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 - <p>but excluding where such infilling, depositing, dredging, excavation, removal or moving-</p> <ul style="list-style-type: none"> (f) will occur behind a development setback; (g) is for maintenance purposes undertaken in accordance with a maintenance management plan; or (i) occurs within existing ports or harbours that will not increase the development footprint of the port or harbour...

Legal requirements for this project:

As the proposed works will involve the excavation and / or deposition of more than 5 m³ of material within a distance of 100 m of the high-water mark of the sea, NDPW requires the approval of this MMP to commence maintenance dredging activities and the excavation or deposition of dredge spoil or any other rock, sand etc., where such activities may increase the development footprint of the harbour or port.

It is the NDPW's responsibility to ensure that no other listed activities are triggered during ongoing maintenance works, or that, if they are, relevant processes are followed to obtain EA. Note that the approval of this MMP does not authorise any other listed activities that may be applicable.

2.3 National Environmental Management: Integrated Coastal Management Act 24 of 2008

The South African government is a signatory to the London Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (1972) (the London Convention) and to the 1996 Protocol to the London Convention (the London Protocol). The London Convention and London Protocol regulate the deliberate disposal of waste materials in the marine environment.

¹ GN R327 of 2017.

² GN R325 of 2017.

³ GN R324 of 2017.

The London Protocol states that 'Each Contracting Party shall develop a national Action List to provide a mechanism for screening candidate wastes and their constituents on the basis of their potential effects on human health and the marine environment.' Annex II of the London Protocol provides guidance on the assessment of wastes or other material that may be considered for dumping at sea.

In South Africa, the National Environmental Management Integrated Coastal Management Act 24 of 2008 (NEM: ICMA) gives effect to the provisions of the London Convention and London Protocol.

The NEM: ICMA provides for the integrated management of the coastal zone, including the promotion of social equity and best economic use, while protecting the coastal environment.

Chapter 7 of the Act establishes integrated permitting procedures and other measures to ensure the protection and sustainable use of the coastal zone and its resources. This includes the requirement that adequate consideration be given to the objectives of this Act when considering applications for EA for any development within the coastal zone, and the consideration of impacts on coastal public property, the coastal protection zone and coastal access land.

In terms of the Section 71(1) of the NEM: ICMA, an application for a dumping at sea permit will be required for the offshore disposal of dredged material. Such an application requires the characterisation (analysis) of the sediment to be disposed of offshore against the National Action List (as required by the London Convention), details regarding the selection and characterisation of the dredge disposal site and an assessment of the potential impacts of the offshore disposal of dredged material.

Legal requirements for this project:

The MMP covers maintenance dredging and the disposal of dredged material associated with maintenance dredging. The disposal of dredged material below the high water mark of the sea will require a dumping at sea permit. Material to be dredged should be subject to sediment analysis to confirm contamination levels. If found to exceed the action levels in the National Action List for the Screening of Dredged Material, the material is not considered suitable for marine disposal, and must either be suitably diluted prior to disposal or disposed of at a licenced on-shore hazardous waste disposal site.

It is NDPW's responsibility to undertake the required sediment sampling and analysis, which should inform the identification of potential beneficial uses of the material or a suitable dredge disposal site.

2.4 National Environmental Management: Control of Use of Vehicles in the Coastal Zone GN Regulations 496 of 27 June 2014

In terms of Section 3 of the NEM: Control of Use of Vehicles in the Coastal Zone Regulation, the use of vehicles within the coastal area is permissible without a permit on (*inter alia*):

- A public road; and
- Private land, by the owner, or with the written permission of the owner or lawful occupier of that land.

In terms of Section 4 of the Regulations, a permit is required for the use of a vehicle in a coastal area for the purposes of the construction or maintenance of infrastructure authorised by any law. The competent authority is the DEA: O&C and the vehicle access permit for the construction or maintenance of infrastructure must be granted by the Minister.

Legal requirements for this project:

The construction or maintenance of infrastructure in the coastal zone which requires the use of vehicles in the coastal zone would require a permit for the use of vehicles in this zone (or exemption from the requirements of these regulations).

2.5 Marine Living Resources Act 18 of 1998

The Marine Living Resources Act 18 of 1998 (MLRA) governs Marine Protected Areas (MPAs) and states in section 43 that:

(2) No person shall in any marine protected area, without permission in terms of subsection (3)—

- (b) take or destroy any fauna and flora other than fish;*
- (c) dredge, extract sand or gravel, discharge or deposit waste or any other polluting matter, or in any way disturb, alter or destroy the natural environment;*
- (e) carry on any activity which may adversely impact on the ecosystems of that area.*

Legal requirements for this project:

A number of MPAs have been declared under the MLRA. The proximity of the proposed works to any MPAs must be determined and care must be taken to avoid any possible impact on these areas.

2.6 National Heritage Resources Act 25 of 1999

The protection and management of South Africa's heritage resources are controlled by the National Heritage Resources Act 25 of 1999 (NHRA). The enforcing authority for this act is the South African National Heritage Resources Agency (SAHRA). In the Western Cape, SAHRA has delegated this authority to Heritage Western Cape (HWC), however, SAHRA remains the custodian of heritage resources below the high-water mark of the sea. In terms of the Act, historically important features such as graves, trees, archaeological artefacts/sites and fossil beds are protected. Similarly, culturally significant symbols, spaces and landscapes are also afforded protection. Archaeological material is defined in the NHRA to include "any vessel or aircraft, or any part thereof, which was wrecked in South Africa, as well as any cargo, debris or artefacts found or associated therewith, which is older than 60 years or which SAHRA considers worthy of conservation".

In terms of Section 34 of the NHRA, "no person may destroy, damage, deface, excavate, alter, remove from its original position, subdivide or change the planning status of any heritage site without a permit issued by the heritage resources authority responsible for the protection of such site".

Section 38(1) of the NHRA specifies activities that trigger the need for the proponent to notify SAHRA of the proposed development, in order for SAHRA to determine the need for further Heritage Assessment. Relevant triggers which may be applicable to works undertaken within the fishing harbours include:

- Construction of any structure over 300 m in length; and
- Any development or activity that will change the character of a site (i) exceeding 5 000 m² in extent, (ii) involving three or more existing erven or subdivisions thereof.

Legal requirements for this project:

If the proposed works trigger any of the activities listed in Section 38 (1) of the NHRA (e.g. dredging and the disposal of dredge spoil in areas with a total extent exceeding 5 000 m²), involve any structures older than 60 years, or have the potential to impact on any known heritage/archaeological

resources (including wrecks), the proponent is required to notify SAHRA of the proposed activities via the SAHRIS database and undertake any assessments deemed necessary by SAHRA.

2.7 National Environmental Management: Waste Act 59 of 2008

The National Environmental Management: Waste Act 59 of 2008 (NEM:WA) aims to (amongst other things) regulate waste management in order to protect health and the environment by providing reasonable measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development.

The Act makes provision for the listing of waste management activities that have, or are likely to have, a detrimental effect on the environment and may not be undertaken without a Waste Management Licence (WML) issued by the competent authority. The competent authority for WML applications is the DEA for applications involving hazardous waste.

A person wishing to undertake a waste management activity listed under Category C of GN R921 must comply with the Norms and Standards for Storage of Waste, 2013 (GN R926).

Legal requirements for this project:

The on-shore disposal of any waste at a location which is not a registered landfill site suitable for the relevant type of waste (as defined in the NEM:WA) will require a WML. The temporary storage of waste for a period exceeding 90 days will need to comply with the Norms and Standards for Storage of Waste.

3 Impacts on Receiving Environment

While the significance of impacts of the proposed works will largely depend on the receiving environment, the nature of the impacts associated with the work at all fishing harbours is likely to be fairly similar. A description of the types of impacts which may be anticipated as well as key mitigation requirements are provided in Table 3-1. The key mitigation measures have largely been converted into specific management requirements in Section 4.4, however, these should also be considered during planning of proposed maintenance and repair works.

The significance of relevant impacts at each of the fishing harbours is discussed in the Site Specific MMP for each harbour.

Table 3-1: Description of potential impacts and key mitigation measures

Impact	Description	Key mitigation measures
Higher noise levels adversely affecting surrounding communities	Increased noise levels may be generated by construction vehicles and equipment and dredging activities (depending on the dredging methodology). The level of disturbance experienced by surrounding communities will depend on emitted noise levels, ambient noise levels in the area, the nature of surrounding land uses as well as the proximity of sensitive receptors to the area in which works will be undertaken.	<ul style="list-style-type: none"> Limit noisy activities to “normal working hours” or as otherwise required by local bylaws. Notify surrounding land users of particularly noisy activities (e.g. blasting).
Increased emissions during construction adversely affecting air quality	Emissions from construction vehicles and, potentially, dust generated by vehicle movements or the handling of materials could affect the local air quality temporarily. The impact on surrounding communities will once again be determined by the proximity of sensitive receptors to the area in which works will be undertaken.	<ul style="list-style-type: none"> Maintain vehicles and equipment to prevent excessive emissions. Avoid activities that may generate dust (e.g. handling or stockpiling of material) during particularly windy conditions. Cover stockpiles with shade cloth or similar material to prevent windblown dust.
Delays to other road users associated with increased traffic	While repair and maintenance activities are likely to be of short duration with limited need for large construction equipment/vehicles on site, the transport of materials to and from the site may lead to some localised increases in traffic.	<ul style="list-style-type: none"> Avoid the movement of large construction vehicles/delivery of materials etc. to the site during peak traffic hours.
Loss or disturbance of terrestrial vegetation and habitat	Loss of terrestrial vegetation and habitat is considered extremely unlikely given the fact that works addressed in this MMP are limited to maintenance and repairs to existing harbour facilities. The loss or disturbance of terrestrial vegetation and habitats could occur due to the establishment of site camps or storage/laydown areas or infrastructure associated with e.g. handling of dredged sand used for beach replenishment.	<ul style="list-style-type: none"> Confine all works, including the establishment of site camps and storage areas to hardened surfaces or previously disturbed areas as far as practically possible.
Disturbance of marine habitat within the footprint of proposed dredging.	Any benthic marine biota within the footprint of (or directly adjacent to) the proposed dredging activities will be removed, disturbed or smothered. Given that the scope of works covered by this MMP is limited to maintenance dredging it is expected that these habitats would previously have been significantly disturbed during harbour construction, previous maintenance activities and on ongoing use. As such marine biodiversity is expected to be low and unlikely to include sensitive marine habitats. It should also be noted that sandy marine habitats (such as beaches) are adapted to recover quickly from disturbance since these coastal systems naturally undergo regular erosion and accretion events.	<ul style="list-style-type: none"> Limit the footprint of dredging as far as practically possible.
Disturbance of marine habitats by the disposal/deposition of dredged material.	Depending on the contaminants contained in the dredged material (if any), and the selected option for the disposal or deposition/re-use of dredged material, these operations could have a significant impact on undisturbed or sensitive marine or coastal	<ul style="list-style-type: none"> Sample and analyse sediments to be dredged to confirm sediment type, particle size and levels of contamination. Based on the outcomes of the sediment analysis, determine

Impact	Description	Key mitigation measures
	habitats.	<p>the most suitable option for the disposal of dredge spoil / opportunities for reuse of the material and identify relevant mitigation measures applicable to the local conditions.</p> <ul style="list-style-type: none"> Apply for a dumping at sea permit if disposal of dredged material is proposed within the marine environment.
Elevated turbidity and sedimentation in surrounding habitat	Dredging and disposal of dredge spoil will result in the suspension of sediments in the water column, with potential impacts on marine ecology or other water users in the area (e.g. aquaculture activities). In an existing harbour environment, which is likely to be sheltered, the increased turbidity and sedimentation levels are likely to be contained inside the harbour boundaries, where marine life is likely to have been disturbed in the past, and unlikely to include sensitive marine habitats.	<ul style="list-style-type: none"> Monitor turbidity or water quality if required, as determined on a case by case basis depending on the presence of sensitive marine habitats or water users occur (or if specified as a condition of the dumping at sea permit). Select dredge methodologies that limit turbidity and sedimentation, where possible.
Nutrient release and associated algal blooms	Dredging and dredge disposal activities may release nutrients trapped in the dredged sediments, increasing nutrient levels in the water column and potentially leading to algal blooms. This may affect water quality and surrounding water users who may be sensitive to water quality. High nutrient levels in sediment are most likely to occur in existing fishing harbours where organic waste (e.g. fish waste) is dumped or discharged into the harbour.	<ul style="list-style-type: none"> Sample and analyse sediments to be dredged to determine nutrient levels in the sediment and the risk of elevating nutrient levels in the water column significantly, where there is a likelihood of high nutrient levels. If required, monitor nutrient levels in the water column during dredging.
Liberation of trace metals and other contaminants in dredged sediment, affecting marine life	Contaminants in sediments could be released into the water column during dredging and disposal of dredged material, potentially affecting marine biota and other water users in the area.	<ul style="list-style-type: none"> Evaluate (analyse) trace metal / contaminant levels against the thresholds in the National Action List published by DEA in terms of the London Convention for guidance on acceptable threshold levels. If toxicity levels are high, dispose of dredged material on land (at a suitable waste disposal site) and monitor toxicity levels in close proximity to sensitive marine aquatic habitats or water users.
Release/discharge of contaminants during construction, affecting marine life	Contaminants released into the water column during construction activities could affect marine biota and other water users in the area.	<ul style="list-style-type: none"> Control run-off and discharge of any contaminated water into the marine environment. Position potentially polluting activities so as to prevent spills into the marine environment.
Increased employment, income and skills development	Although the duration of repair and maintenance works is likely to be relatively short, opportunities exist for local employment, skills development and support of local industries with positive impacts on the local economy.	<ul style="list-style-type: none"> Encourage the use of local contractors and staff and sourcing of materials from local suppliers where relevant skills and resources are available.
Visual impact of dredging	Dredge plumes (sediment suspended in the water column) will be visible on the surface and may have a visual impact, especially when viewed from an elevated location.	<ul style="list-style-type: none"> Manage dredging and dredge disposal activities to limit dredge plumes where sensitive visual receptors exist (e.g.

Impact	Description	Key mitigation measures
activities	Assuming dredging and dredge disposal activities are relatively limited, dredge plumes are likely to be small and present for only a short period. The significance of the impact would depend on the presence of sensitive receptors.	through the use of silt screens if feasible).
Loss or disturbance of cultural heritage resources	Loss or disturbance of cultural heritage resources could occur due to disturbance of material (including wrecks) of archaeological or heritage value of structures older than 60 years. The terrestrial and marine portions of the site have been significantly disturbed by previous development, and dredging operations, and it is thus extremely unlikely that any material of archaeological value would be encountered. Most of the fishing harbours however include structures older than 60 years.	<ul style="list-style-type: none"> • Notify SAHRA of the proposed works on structures older than 60 years and undertake relevant heritage studies required by SAHRA. • Monitor dredging activities and report any archaeological material that may be uncovered to SAHRA, who will advise on further actions required.
Impact of constrained functionality of the harbour on other users	During maintenance and repair works, there may be constrained functionality of the harbour which could be disruptive to other users. This is however likely to be short-lived and the functionality would improve once the repairs and maintenance have been completed.	<ul style="list-style-type: none"> • Keep other harbour users informed of the proposed timing of potentially disruptive works and maintain open channels of communication with stakeholders.

4 Environmental Management Measures

4.1 Environmental Management Objectives

The environmental management objectives of the MMP include the following:

- Ensure that environmental management measures, structures or mechanisms are taken into account during the planning of harbour repairs and maintenance;
- Ensure that relevant environmental management measures are clearly documented and understood by all relevant parties;
- Ensure that all activities are undertaken in a way that will minimise potential negative effects on the surrounding environment and maximise possible benefits;
- Ensure that suitable organisational, record keeping and reporting structures are put in place to monitor implementation of environmental management measures during all future repairs and maintenance activities; and
- Ensure that the roles and responsibilities for management of various components are clearly defined.

4.2 Roles and Responsibilities

The key role players during maintenance and repairs of the fishing harbours are anticipated to be as follows:

- Proponent (NDPW), where relevant represented by their Implementing Agent;
- Engineer / Responsible Person⁴ (RP), who will oversee the activities of the contractors on site;
- Environmental Control Officer (ECO);
- Contractors responsible for the maintenance and repair activities; and
- Any sub-contractors hired by the contractor.

The anticipated management structure (organogram) is presented in Figure 4-1 below and shows the proposed lines of communication for maintenance activities. NDPW retains overall responsibility for maintenance and the implementation of the MMP.

⁴ Engineers may not be appointed for all maintenance activities. Should a Resident Engineer not be appointed, then this role will be fulfilled by a representative from the NDPW.

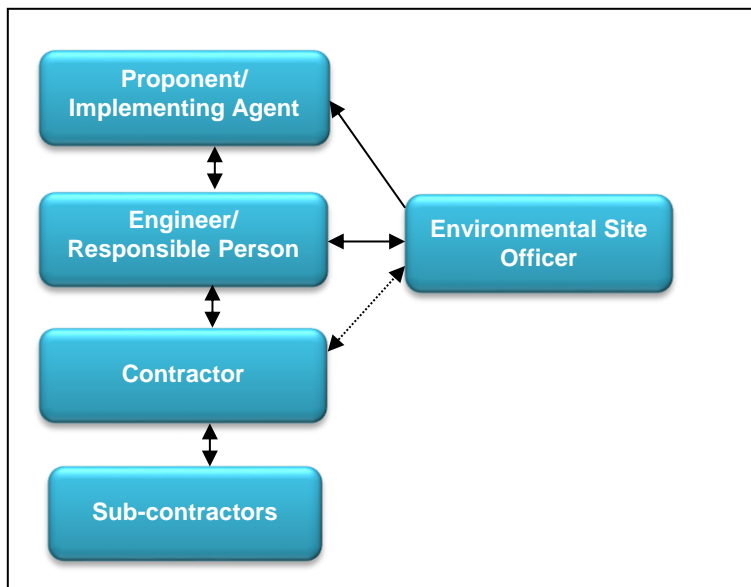


Figure 4-1: Reporting structure

Key roles and responsibilities with respect to the implementation of the MMP are outlined below.

Proponent (NDPW):

NDPW (through their Implementing Agent if applicable) has overall responsibility for management of maintenance activities. In terms of environmental management, the proponent will:

- Appoint suitably experienced Engineers, if required, who will be responsible for the overall management of activities on site;
- Identify any activities not covered by the scope of this MMP, and determine the need for, and where required, obtain relevant authorisations;
- Ensure that the Engineers are aware of the requirements of the MMP, implement the MMP and monitor the Contractor's activities on site;
- Ensure that the Contractor is aware of and contractually bound to the provisions of this MMP by including the relevant environmental management requirements in tender and contract documents, as appropriate;
- Appoint a suitably qualified and experienced ECO to oversee environmental management of the required works;
- Ensure that the Contractor remedies environmental problems timeously and to the satisfaction of the Engineer and authorities (when necessary); and
- Notify the authorities should problems not be remedied timeously.

Responsible Person:

NPDW will appoint suitably qualified Engineers (if necessary), who in turn will designate a responsible person (RP) to oversee activities of the Contractor. This role will be fulfilled either by the Resident Engineer or a suitably qualified representative of NDPW. The RP shall:

- Ensure that the Contractor is duly informed of the MMP and associated responsibilities and implications of this MMP prior to commencement of maintenance activities;
- Identify the need for, and request/provide Method Statements for future maintenance and repair works;
- Monitor the Contractor's activities with regard to the requirements outlined in the MMP;
- Report any environmental emergencies/concerns to the NDPW immediately; and
- Ensure that non-compliance is remedied timeously and to the satisfaction of the relevant authorities.

Environmental Control Officer:

The ECO shall be a suitably qualified/experienced environmental professional or professional firm, appointed by the proponent, for the duration of repair or maintenance works. The ECO shall:

- Request Method Statements from the Contractor prior to the start of relevant activities, where required, and approve these (as appropriate) without causing undue delay;
- Monitor, review and verify compliance with the MMP by the main Contractor, as well as any sub-contractors and specialist contractors;
- Undertake site inspections at least twice a month to determine compliance with the MMP;
- Identify areas of non-compliance and recommend corrective actions (measures) to rectify them in consultation with NDPW, the RP and the Contractor, as required;
- Compile a checklist highlighting areas of non-compliance following each ECO inspection;
- Ensure follow-up and resolution of all non-compliances;
- Provide feedback for continual improvement in environmental performance;
- Respond to changes in project implementation or unanticipated activities which are not addressed in the MMP, and which could potentially have environmental impacts, and advise NDPW, the RP and Contractor as required;
- Act as a point of contact for local residents and community members; and
- Undertake a site closure inspection, which may result in recommendations for additional clean-up and rehabilitation measures.

Contractor:

The Contractor will be required to appoint or designate a Contractor's Environmental Representative (CER) who will assume responsibility for the Contractor's environmental management requirements on site and be the point of contact between the Contractor, the ECO and the RP. The CER shall:

- Ensure that all activities on site are undertaken in accordance with the MMP and /or an approved Method Statement which applicable;
- Monitor the Contractor's activities with regard to the requirements outlined in the MMP;
- Ensure that all employees and Sub-contractors comply with the MMP;
- Immediately notify the RP and ECO of any non-compliance with the MMP, or any other issues of environmental concern; and
- Ensure that non-compliance is remedied timeously and to the satisfaction of the RP and ECO.

The Contractor has a duty to demonstrate respect and care for the environment. The Contractor will be responsible for the cost of rehabilitation of any environmental damage that may result from non-compliance with the MMP, environmental regulations and relevant legislation.

Sub-contractors:

All Sub-contractors will be required to:

- Ensure that all employees are duly informed of the MMP and associated responsibilities and implications of this MMP prior to maintenance activities;
- Ensure that all activities on site are undertaken in accordance with the MMP;
- Monitor employees' activities with regard to the requirements outlined in the MMP;
- Immediately notify the RP and ECO of any non-compliance with the MMP, or any other issues of environmental concern; and
- Ensure that non-compliance is remedied timeously and to the satisfaction of the RP and ECO.

The Sub-contractor has a duty to demonstrate respect and care for the environment. The Sub-contractor will be responsible for the cost of rehabilitation of any environmental damage that may result from non-compliance with the MMP, environmental regulations and relevant legislation, resulting from their presence on site.

4.3 Compliance and Monitoring

4.3.1 Method Statements

A Method Statement is a document setting out specific details regarding the plant, materials, labour and method the Contractor proposes using to carry out certain activities, usually activities that may have a detrimental effect on the environment. It is submitted by the Contractor to the RP and ECO.

The purpose of a Method Statement is for the Contractor to provide additional details regarding the proposed methodology for certain activities, and for the RP and ECO to confirm that these meet the requirements of the MMP and acceptable environmental practice. This allows the MMP to be less prescriptive and affords the Contractor a certain amount of flexibility or to amend stipulations in the MMP, if approved by the ECO. It also provides a reference point to detect deviations from the agreed approach to an activity and allows for the proposed approach and methods for undertaking future maintenance and repair activities to be clearly documented and agreed on prior to commencement.

Each Method Statement will address environmental management aspects relevant to the activity and will typically provide detailed descriptions of items including, but not necessarily limited to:

- Nature, timing and location of activities;
- Procedural requirements and steps;
- Management responsibilities;
- Material and equipment requirements;
- Transportation of equipment to and from site;
- Method for moving equipment / material while on site;
- How and where material will be stored;
- Emergency response approaches, particularly related to spill containment and clean-up;
- Response to compliance / non-conformance with the requirements of the MMP; and
- Any other information deemed necessary by the RP.

Detailed method statements may also be requested by the ECO for certain aspects of the works proposed. The following list provides examples of Method Statements that may be requested from the Contractor:

- Dredging;
- Disposal of dredge spoil;
- Deposition of material for beach replenishment;
- Environmental awareness;
- Material and equipment storage and delivery;
- Fuel storage, dispensing and fuel spills;
- Waste management;
- Management of contaminated water;
- Erosion and stormwater control;
- Cement batching; and
- Any others considered relevant by the ECO or RP.

The Method Statements will be submitted by the Contractor to the RP and ECO not less than **14 days** prior to the intended date of commencement of an activity. The RP and ECO shall accept / reject the Method Statement within **4 days**. An activity covered by a Method Statement shall not commence until the RP and ECO have accepted such method and once accepted, the Contractor shall abide by the relevant Method Statement. A pro forma Method Statement is attached in

Appendix A, although a suitable Method Statement format can be agreed between the RP, ECO and Contractor.

4.3.2 Environmental Records and Reports

Environmental records and reports required during maintenance activities are listed in Table 4-1.

Table 4-1: Reports required during maintenance

Report	Frequency	From	To
Environmental Checklist	Daily (Weekly)	CER	RP (& ECO)
Environmental Compliance Report	Fortnightly	ECO	NDPW & RP
Site Closure Audit	End of Contract	ECO	NDPW

Environmental Checklist

The CR will undertake daily site inspections to check on the implementation of the MMP by the Contractor and complete a brief report/checklist after the inspection. The completed checklists shall be submitted to the RP at the end of each inspection. This checklist should be discussed between the CR and the RP during the initial site inspection, and agreement reached on the preferred format and content.

The checklists will be submitted to the ECO on a weekly basis, however any issues of environmental concern should be reported to the ECO immediately.

Environmental Compliance Report

The ECO will undertake regular site inspections (at least twice a month) to check on the implementation of the MMP by the Contractor and complete an Environmental Compliance/Progress Checklist Report after each inspection, detailing any environmental issues, non-compliance and actions to be implemented. Environmental Compliance Reports will be submitted to the RP and NDPW and a full record will be kept for submission to the Local Authority and/or DEA on request, or as stipulated in the Dumping at Sea Permit.

Site Closure Audit

The ECO will undertake a final site closure audit on completion of the maintenance activities. The purpose of this is to confirm compliance with all site closure requirements identified by the ECO, and that the site has been left in an environmentally suitable condition. If outstanding environmental requirements are observed during this inspection, a further inspection must be carried out to confirm compliance. The Site Closure Audit report must be submitted to NDPW and DEA (if required) for record purposes.

4.3.3 Corrective Action

Corrective action is a critical component of the implementation–review–corrective action–implementation cycle and it is through corrective action that continuous improvement can be achieved. Where repeated non-compliance is recorded, procedures may need to be altered accordingly to avoid the need for repeated corrective action.

If environmental compliance monitoring by the CR and ECO indicates non-conformance with the MMP or approved Method Statements, the RP will formally notify the Contractor through a Corrective Action Request. The Corrective Action Request documents:

- The nature of the non-conformance/environmental damage;
- The actions or outcomes required to correct the situation; and

- The date by which each corrective or preventive action must be completed.

Upon receipt of the Corrective Action Request, the Contractor will be required to produce a Corrective Action Plan, which will detail how the required actions will be implemented. The Corrective Action Plan must be submitted to the ECO for approval prior to implementation. Once it has been approved, the corrective action must be carried out within the time limits stipulated in the Corrective Action Request.

Additional monitoring by the CER, ECO and RP will then be required to confirm the success or failure of the corrective action.

4.4 Management Measures

The environmental management and mitigation measures that must be implemented during all maintenance activities, as well as responsibilities and timelines for the implementation of these measures and monitoring thereof, are presented in Table 4-2 (for all repair and maintenance works), and Table 4-3 (applicable to dredging and dredge disposal).

Table 4-2: Environmental management and mitigation measures that must be implemented for all maintenance and repair works

Maintenance Management Measures						
Aspect	ID	Mitigation measure / Procedure	Responsible	Implementation Timeframe	Monitoring Methods ⁵	Performance Indicators
General environmental management	1.	Include the EMP in all tender documents to ensure that sufficient resources are allocated to environmental management by the Contractor.	NDPW/Engineer	Prior to call for tenders	<ul style="list-style-type: none"> • NDPW to check tender documents and contract 	<ul style="list-style-type: none"> • Incorporated in tender documents
	2.	Screen all proposed works (method statements for future works) and confirm that no NEMA listed activities or the need for any other authorisations are triggered by the works proposed.	NDPW	Prior to approval of Method Statement(s)	<ul style="list-style-type: none"> • Method statement 	<ul style="list-style-type: none"> • Approved method statement
	3.	Appoint/designate a suitable ECO prior to the start of maintenance and repair activities to monitor and ensure compliance with the EMP.	NDPW	Prior to the start of activities	<ul style="list-style-type: none"> • Appointment of ECO 	<ul style="list-style-type: none"> • Appointment of ECO
	4.	Notify the local authority of the proposed works and confirm the applicability of any bylaws which may affect the works.	NDPW/ECO	Prior to the start of activities	<ul style="list-style-type: none"> • Communication with local authority 	<ul style="list-style-type: none"> • Confirmation from local authority
	5.	Obtain permission from DEA:O&C in terms of the Control of Use of Vehicles in the Coastal Area Regulations for vehicles driving on the beach (if required).	NDPW/Contractor	Prior to commencement of maintenance activities	<ul style="list-style-type: none"> • Communication with DEA:O&C 	<ul style="list-style-type: none"> • Permission from DEA:O&C
	6.	Limit all construction and repairs to the existing footprints of marine structures, unless relevant authorisations are in place	NDPW	During design	<ul style="list-style-type: none"> • Method statements and confirmation from Engineer 	<ul style="list-style-type: none"> • No change in footprint of structures • Authorisation for changes in footprint of marine structures
Protection of Heritage Resources	7.	Notify SAHRA of any proposed works on structures old than 60 years and undertake relevant heritage assessments if required.	NDPW	Prior to commencement of maintenance activities	<ul style="list-style-type: none"> • Submission on SAHRIS portal 	<ul style="list-style-type: none"> • Permit from SAHRA to commence with works
	8.	Report all exposed marine/terrestrial heritage resources to the HWC and/or SAHRA. Heritage resources uncovered/disturbed must not be disturbed further until advice has been obtained from the relevant heritage authority on how they should be dealt with.	Contractor and RP	When potential remains exposed	<ul style="list-style-type: none"> • Photographs of find. • Visual inspections of excavations. 	<ul style="list-style-type: none"> • Records of correspondence.
	9.	Ensure that all Contractors and Sub-contractors are made aware of the potential existence of heritage resources (terrestrial and marine), and are instructed on the correct procedure for preserving the integrity thereof.	Contractor/ECO	Before construction activities commence	<ul style="list-style-type: none"> • Attendance registers of awareness sessions. 	<ul style="list-style-type: none"> • Register of all workers that completed the awareness session
Records and Administration	10.	Ensure the Environmental Method Statements are approved and filed on site.	Contractor and ECO	Before relevant construction activities commence	<ul style="list-style-type: none"> • Internal Audit 	<ul style="list-style-type: none"> • Approved Method Statements signed and filed.

⁵ Unless otherwise indicated, monitoring will be undertaken by the ECO.

Maintenance Management Measures						
Aspect	ID	Mitigation measure / Procedure	Responsible	Implementation Timeframe	Monitoring Methods ⁵	Performance Indicators
	11.	Maintain a copy of the EMP and any other environmental authorisations/permits/licences on site.	NDPW	Duration of maintenance activities	<ul style="list-style-type: none"> Internal Audit 	<ul style="list-style-type: none"> Approved documents available on site.
	12.	Maintain a complaints register for all complaints. The register must list: <ul style="list-style-type: none"> Complainant name and contact details; Date complaint was lodged; Person who recorded the complaint; Nature of the complaint; Actions taken to investigate the complaint and outcome of the investigation; Action taken to remedy the situation; and Date on which feedback was provided to complainant.	ECO	Throughout activities	<ul style="list-style-type: none"> Inspect complaints register 	<ul style="list-style-type: none"> Availability of register on site Designated person to maintain register Complaints logged Complaints followed up and closed out
Environmental Awareness	13.	Provide environmental awareness training to all personnel on site. Training should include discussion of: <ul style="list-style-type: none"> Potential impact of waste and effluent on the marine environment; Suitable disposal of waste and effluent; Key measures in the EMP relevant to workers' activities; and How incidents and suggestions for improvement can be reported. Ensure that all attendees remain for the duration of the training and on completion sign an attendance register that clearly indicates participants' names.	Contractor and ESO	On site establishment and ongoing	<ul style="list-style-type: none"> Check training attendance register Observe whether activities are executed in line with EMP requirements during ECO site visits 	<ul style="list-style-type: none"> Register of workers that completed environmental training Compliance of Contractor with the EMP
Site establishment	14.	Submit a method statement for site establishment for approval by the ESO at least two weeks prior to the start of activities.	Contractor	Prior to commencement of maintenance activities and ongoing	<ul style="list-style-type: none"> Method statement Visual inspections of site 	<ul style="list-style-type: none"> Approved method statement Register of illegal entries Site boundaries demarcated and demarcation maintained Signage in place No vegetation cleared or disturbed.
	15.	Demarcate site boundaries upon establishment and ensure that plant, labour and materials remain within site boundaries.				
	16.	Do not clear any vegetation and do not place any plant/materials on vegetation (excluding grassed areas).				
	17.	Designate any locally sensitive areas beyond the boundary of the site as "No go" areas for all personnel on site. No vehicles, machinery, materials or people shall be permitted in the "No go" area at any time without the express permission of the ECO.				
	18.	Place signage in suitable locations to warn members of the public of maintenance activities taking place and to limit access to work areas that may pose a safety risk.				

Maintenance Management Measures						
Aspect	ID	Mitigation measure / Procedure	Responsible	Implementation Timeframe	Monitoring Methods ⁵	Performance Indicators
Waste management	19.	Ensure that no litter and debris reaches the marine environment during maintenance activities. Should this occur, remove such waste/litter from the marine environment immediately.	Contractor	Throughout activities	<ul style="list-style-type: none"> • Visual inspection of waste collection areas • Visual inspection of construction areas (litter) • Check waste disposal slips 	<ul style="list-style-type: none"> • Presence of litter • Availability of rubbish bins • Frequency at which rubbish bins are emptied • Register of frequency of collection and volume of general and hazardous waste sent to final destination • Total volume of general and hazardous waste stored on site vs onsite storage capacity • Evidence of waste separation on site
	20.	Train all staff of the effects of debris and litter in the marine environment and appropriate disposal procedures.				
	21.	Ensure that waste material is not placed where it may be exposed to stormwater.				
	22.	Aim to minimise waste through reducing and re-using (packaging) material.				
	23.	Collect recyclables separately and deliver these to suitable facilities or arrange for collection.				
	24.	Prevent littering by staff at work sites by providing bins or waste bags in sufficient locations.				
	25.	Provide separate bins/waste bags for hazardous / polluting materials and mark these clearly. Remove hazardous / polluting materials from the site at regular intervals and dispose of these materials at a licensed waste disposal facility with a Class appropriate to the type of waste being disposed of.				
26.	Prohibit any burning or burying of waste on site.					
Effluent and waste water management	27.	Prevent discharge of any pollutants, such as cements, concrete, lime, chemicals, and hydrocarbons into watercourses or the sea.	Contractor	Throughout activities	<ul style="list-style-type: none"> • Visual inspections 	<ul style="list-style-type: none"> • Containment of all potentially polluted run-off • Register of suitable disposal of contaminated water from containment basins
	28.	Direct run-off from areas with a high risk of accidental releases of oil or hazardous materials (e.g. fuelling or fuel transfer locations, truck washing bays, concrete swills etc.) into containment basins or conservancy tanks and dispose of contaminated water at an approved site.				
	29.	Prevent illegal washing out of containers in water bodies.				
	30.	Do not dispose of any material of any kind in the sea at any time and under any circumstances. Any person that is deemed to have authorised, supervised, instructed, permitted or carried out such an act, shall be permanently removed from site.				
Concrete/Cement Work	31.	Batch cement (where unavoidable on site) in a bunded area on mortar boards and not directly on the ground (unless in a paved area and approved by the ECO).	Contractor	Throughout activities	<ul style="list-style-type: none"> • Visual inspection and approval by ECO. 	<ul style="list-style-type: none"> • Number of incidents of batching outside bunded

Maintenance Management Measures						
Aspect	ID	Mitigation measure / Procedure	Responsible	Implementation Timeframe	Monitoring Methods ⁵	Performance Indicators
	32.	Physically remove any remains of concrete, either solid, or liquid, immediately and dispose of as waste.				area <ul style="list-style-type: none"> • Contamination of water and soil • Visible litter / waste on site • Register of disposal of excess material.
	33.	Place cement bags in bins and dispose of bags as waste to a licensed waste disposal facility.				
	34.	Sweep / rake / stack excess aggregate / stone chip / gravel / pavers into piles and dispose at a licensed waste disposal facility.				
Hazardous materials	35.	Locate hazardous material storage facilities on an impermeable surface as far as practically possible from the water's edge.	Contractor	Throughout activities	<ul style="list-style-type: none"> • Visual inspection of hazardous materials handling and storage areas 	<ul style="list-style-type: none"> • Number of incidents of non-compliance with safety procedures concerning hazardous materials, including waste materials • Number of spills of hazardous materials, including waste materials • Cost of cleaning up spills • Evidence of contamination and leaks
	36.	Ensure that contaminants (including cement) are not placed directly on the ground (e.g. mix cement on plastic sheeting) to prevent runoff reaching the marine environment.				
	37.	Develop (or adapt and implement) procedures for the safe transport, handling and storage of potential pollutants.				
	38.	Avoid unnecessary use and transport of hazardous substances.				
	39.	Keep Material Safety Data Sheets (MSDS) for all hazardous materials on site and ensure that they are available for reference by staff responsible for handling and storage of materials.				
Transportation and refuelling	40.	Undertake regular maintenance of vehicles and identify and repair minor leaks and prevent equipment failures.	Contractor	Throughout activities	<ul style="list-style-type: none"> • Visual inspection of vehicles, machinery and refuelling/maintenance areas 	<ul style="list-style-type: none"> • Number of incidents of non-compliance • Number of leaks and spills • Cost of cleaning up spills • Availability of spill containment and clean up equipment on site.
	41.	Undertake any on-site refuelling of vehicles/machinery (only of essential) on a sealed surface.				
	42.	Use appropriately sized drip trays for all refuelling – ensure these are strategically placed to capture any spillage of fuel, oil, etc.				
	43.	Undertake maintenance and repair of vehicles off-site at an appropriate facility (unless unavoidable and with permission of the ESO).				
	44.	Clean up any spills immediately, through containment and removal of free product and appropriate disposal of contaminated soils/material.				
	45.	Keep spill containment and clean-up equipment on site and utilise as per product specification.				
Noise management	46.	Limit noisy activities to day-time from Monday to Friday or in accordance with relevant municipal bylaws, if applicable, where sensitive receptors are located close to the proposed works.	Contractor	Throughout activities	<ul style="list-style-type: none"> • Site inspections 	<ul style="list-style-type: none"> • Number of registered complaints

Maintenance Management Measures						
Aspect	ID	Mitigation measure / Procedure	Responsible	Implementation Timeframe	Monitoring Methods ⁵	Performance Indicators
	47.	Comply with the applicable municipal and / or industry noise regulations.				
	48.	Notify adjacent residents before particularly noisy activities will take place.				
	49.	Maintain (offsite) all generators, vehicles and other equipment in good working order to minimise exhaust fumes and excess noise.				
	50.	Control the use of radios, television sets and other such equipment by workers to maintain noise levels so as to avoid disturbance of neighbouring residents/tenants.				
	51.	Enclose diesel generators used for power supply on site to reduce unnecessary noise.				
	52.	If complaints regarding noise are received, investigate potential noise reduction measures such as mufflers on equipment.				
	53.	No unregulated blasting is permitted on site. Submit a Method Statement to the ESO if blasting is required.				
Dust Management	54.	Avoid activities that may generate dust (e.g. handling or stockpiling of material) during particularly windy conditions.	Contractor	Throughout activities	<ul style="list-style-type: none"> Keep record of incidents and complaints Observation of dust plumes 	<ul style="list-style-type: none"> Number of incidents and complaints
	55.	Cover stockpiles with shade cloth or similar material to prevent windblown dust.				
Traffic Management	56.	Manage activities so as to minimise impacts on road traffic as far as possible.	Contractor	Throughout activities	<ul style="list-style-type: none"> Keep record of incidents and complaints Visually inspect vehicles for any obvious faults or overloading 	<ul style="list-style-type: none"> Number of incidents and complaints Condition of vehicles
	57.	Use appropriate road signage, in accordance with the South African Traffic Safety Manual, providing flagmen, barriers etc. at the various access points when necessary.				
	58.	Ensure that large vehicles are suitably marked to be visible to other road users and pedestrians.				
	59.	Ensure that all safety measures are observed and that drivers comply with the rules of the road.				
	60.	Investigate and respond to complaints about traffic.				
	61.	Avoid the delivery of construction equipment and materials to the site during local peak traffic hours.				
Housekeeping	62.	Clean up any spills immediately.	Contractor	Throughout activities	<ul style="list-style-type: none"> Visually inspect areas inside and outside the 	<ul style="list-style-type: none"> Number of contaminations noted on
	63.	Regularly inspect all equipment and machinery for leaks or damage.				

Maintenance Management Measures						
Aspect	ID	Mitigation measure / Procedure	Responsible	Implementation Timeframe	Monitoring Methods ⁵	Performance Indicators
	64.	Repair any defects as soon as possible. In the case of leaks, ensure that the leaking water or effluent is captured and not released into the environment.			plant for pollution	site
	65.	Keep the site clean, especially during the rainy season when pollutants can wash into the sea with the stormwater.				
Fire Management	66.	Ensure that no fires are permitted on or adjacent to site.	Contractor	Throughout activities	<ul style="list-style-type: none"> Inspect fire extinguishers and certificates 	<ul style="list-style-type: none"> Number of fire incidents Certified extinguishers in appropriate locations
	67.	Ensure that no smoking is permitted on the site.				
	68.	Ensure that sufficient fire-fighting equipment is available on site.				
	69.	Ensure that all personnel on site are aware of the location of firefighting equipment on the site and how the equipment is operated.				
	70.	Suitably maintain firefighting equipment.				
Ablution facilities	71.	Provide ablution facilities (i.e. chemical toilets unless suitable toilet facilities are available) further than 100 m from the high-water mark for all site staff at a ratio of 1 toilet per 15 workers.	Contractor	Throughout activities	<ul style="list-style-type: none"> Visual inspections Records of waste disposal 	<ul style="list-style-type: none"> Number of incidents of staff not using facilities Number of pollution incidents
	72.	Secure all temporary / portable toilets to the ground to the satisfaction of the RP to prevent them toppling due to wind or any other cause.				
	73.	Maintain toilets in a hygienic state (i.e. toilet dispensers to be provided, toilets to be cleaned and serviced regularly).				
	74.	Ensure that no spillages occur when the toilets are cleaned or emptied.				
Response to environmental pollution	75.	In the event of environmental pollution, e.g. through spillages, immediately stop the activity causing the problem.	Contractor	Throughout activities	<ul style="list-style-type: none"> Maintain register of pollution events and response Following resumption of activities, frequently inspect repaired equipment to ensure proper functioning 	<ul style="list-style-type: none"> Number of incidents Time activities stopped Number of recurring incidents Availability and completeness of register
	76.	Only resume activity once the problem has been stopped or (in the case of spillages) the pollutant can be captured without reaching the marine environment.				
	77.	Repair faulty equipment as soon as possible.				
	78.	Treat hydrocarbon spills, e.g. during refuelling, with adequate absorbent material, which then needs to be disposed of at a suitable landfill.				
	79.	In the event of equipment, litter and debris entering the sea, remove these immediately.				
	80.	Notify the relevant authorities within one day of an environmental pollution event. Inform at least the following parties: <ul style="list-style-type: none"> NDPW, ECO; and DEA. 				

Maintenance Management Measures						
Aspect	ID	Mitigation measure / Procedure	Responsible	Implementation Timeframe	Monitoring Methods ⁵	Performance Indicators
Closure and Rehabilitation	81.	Remove all equipment, vehicles, equipment, waste and surplus materials, site office facilities, temporary fencing and other items from the site.	Contractor	Once activities are complete	<ul style="list-style-type: none"> • Visual inspection of site • Keep record of rehabilitation measures 	<ul style="list-style-type: none"> • Records of waste disposal • State of areas on and surrounding the site • Site Closure Audit report
	82.	Spread excavated (uncontaminated) soil in areas adjacent to the site and not removed as spoil.				
	83.	Clean up and remove any spills and contaminated soil in the appropriate manner.				
	84.	Do not bury discarded materials on site or on any other land not designated for this purpose.				
	85.	Rehabilitate all areas affected by the works to at least the same condition as was present prior to activities commencing.				
	86.	Compile and submit the Site Closure Audit report to NDPW and DEA.				

Table 4-3: Environmental management and mitigation measures for dredging and dredge disposal

Maintenance Management Measures						
Aspect	ID	Mitigation measure / Procedure	Responsible	Implementation Timeframe	Monitoring Methods (where applicable) ⁶	Performance Indicators
Define dredge volumes and determine dredging frequencies	1.	Define / estimate the limits for maintenance dredging volume /time interval for the harbour to determine dredge frequency. This should ensure that dredge volumes do not become excessive and to constrain accumulation of contaminants. Time interval can be calculated according to the rates at which the fishing harbour 'captures' sediments.	NDPW/Consultant	Prior to dredging or determining suitable dredge disposal options	-	<ul style="list-style-type: none"> Estimate of dredge volume limits/time interval
Sampling and characterisation of sediments	2.	Consult DEA: Oceans and Coasts before any maintenance dredging is undertaken to determine any sampling requirements.	NDPW/Consultant	Prior to dredging or sediment sampling	-	<ul style="list-style-type: none"> Confirmation of sampling requirements from DEA: O&C
	3.	For small dredge volumes (below 30 000 m ³) in low traffic ports ⁷ if sediment is predominantly fine sand or coarser (i.e.>80% of sediment is > 63 µm [equivalent spherical diameter]) the probability of the sediment containing elevated trace metal concentrations or other sediment bound toxins is low, and it is unlikely that sediment sampling and analysis will be required. Where these conditions are not met, sample and characterise sediments to be dredged.		Prior to dredging or determining suitable dredge disposal options	<ul style="list-style-type: none"> Sampling and laboratory analysis of sediments 	<ul style="list-style-type: none"> Sediment analysis report with recommendation regarding sediment disposal and management during dredging
	4.	Compile a sediment analysis report to gauge compliance with relevant contamination thresholds in the National Action List (NAL – see Appendix B) published by DEA in terms of the London Convention 1972 (or other relevant standards published by DEA) and making recommendations regarding the need for further testing and the suitability for unconfined open water disposal, based on the following general principles (see Annexure B for more detailed classifications): <ul style="list-style-type: none"> Sediments with trace metal concentrations below Level 1 (as specified in the NAL) are suitable for unconfined open water disposal and require no further testing. Sediments with trace metal concentrations above Level 1 but below Level 2 may require further testing before disposal at sea. Sediments with trace metal concentrations exceeding Level 2 should not be disposed of at sea without suitable dilution or 				

⁶ Unless otherwise indicated, monitoring will be undertaken by the RP.

⁷ Where ship traffic is largely limited to fishing vessels and exclude deep sea demersal trawl, tuna bait boats, and ocean long liners.

Maintenance Management Measures						
Aspect	ID	Mitigation measure / Procedure	Responsible	Implementation Timeframe	Monitoring Methods (where applicable) ⁶	Performance Indicators
		treatment.				
Identification of suitable dredge spoil disposal options	5.	Determine suitable dredge spoil disposal options based on outcomes of sediment analysis and recommendations of qualified specialist, taking into account the following options and collate into a brief dredge disposal report: <ul style="list-style-type: none"> Beneficial use e.g. beach replenishment or use as building material. (This should be considered the preferred option) Offshore disposal at a site that will allow for dispersion of sediments Offshore disposal at a site that will limit the dispersion of sediments Disposal on shore at a hazardous (Class A) waste disposal site (if contaminated) On shore bioremediation and use/ disposal at a general (Class B) waste disposal site 	NDPW/Consultant	Prior to disposal of dredge spoil	-	<ul style="list-style-type: none"> Consideration of dredge disposal options Motivation for disposal rather than beneficial use
	6.	Determine the need for authorisations or permits for the selected disposal solution and where required proceed with the relevant permitting process.			-	<ul style="list-style-type: none"> Confirmation of need for permits and authorisations
	7.	Determine whether there is an approved marine dump site in close proximity to the harbour, and consult DEA: O&C regarding the possibility of disposing additional dredge spoil at the existing dump site.			-	<ul style="list-style-type: none"> Confirmation of existing marine dumping sites
Use of sediment for beach replenishment	8.	If beach replenishment is identified as a suitable option for the beneficial use of dredged material, consult the local and/or provincial authorities responsible for management of the relevant beach and identify site specific management requirements (see site specific MMP).	NDPW/Consultant	Prior to undertaking beach replenishment	-	<ul style="list-style-type: none"> Confirmation from relevant authority responsible for beach management that beach replenishment is an acceptable option. Site specific management requirements.
Identification of suitable offshore dredge disposal sites (where there is no existing marine dump site)	9.	Where offshore disposal is proposed, identify ideally two suitable candidate dredge spoil disposal sites, taking into account: <ul style="list-style-type: none"> Long term dredge disposal requirements Costs of disposal and associated infrastructure requirements Proximity of disposal sites to dredge sites (harbours) Seafloor space required to accommodate the dredge spoil volume Characteristics of the proposed dredge disposal site 	NDPW/Consultant	Prior to disposal of dredge spoil	-	<ul style="list-style-type: none"> Dump site selection report

Maintenance Management Measures						
Aspect	ID	Mitigation measure / Procedure	Responsible	Implementation Timeframe	Monitoring Methods (where applicable) ⁶	Performance Indicators
		<p>(bathymetry, topography, uniformity etc.)</p> <ul style="list-style-type: none"> Location in proximity to known important biodiversity features or sensitive (natural or human receptors) <p>Identify dredge disposal sites with the following characteristics:</p> <ul style="list-style-type: none"> Similar sediment granulometry to the dredge spoil Where wave and/or current driven turbulence is sufficient to facilitate incorporation of dumped sediments back into the local sediment dynamics and avoid the creation of large mounds of dredge spoil <p>A uniform sedimentary area (with no reefs or other features) large enough to accommodate the dredge spoil volume</p> <p>See Dump Site Selection Protocol (Appendix C) for further guidance.</p>				
	10.	<p>When identifying the extent of seafloor space required to accommodate the dredge spoil volume:</p> <ul style="list-style-type: none"> Dumped sediment should not reduce water depth at the disposal site by more than 10% for offshore disposal sites. (This is not applicable inside the harbour where sediment will not influence wave dynamics) Take into account wave action and migration ability of benthos at the dredge disposal site 			-	<ul style="list-style-type: none"> Details included in dump site selection report
Characterisation of candidate dredge disposal sites (where there is no existing marine dump site)	11.	<p>Undertake sediment sampling and a high level environmental survey to characterise the dredge disposal sites including:</p> <ul style="list-style-type: none"> Coarse bathymetry Absence/presence of reefs Sediment granulometry Levels of trace metals in the sediment Oceanographic circulation patterns Biodiversity assessment (if required by DEA: Oceans and Coasts, depending on the dump site location and size) <p>The number of samples required should be informed by the size of the proposed dredge disposal site, the condition of the site as well as the location of the site.</p>	NDPW/Consultant	Prior to disposal of dredge spoil	-	<ul style="list-style-type: none"> Details included in dump site selection report
Dumping at Sea Permit	12.	<p>If a valid Dumping at Sea Permit has not been granted, apply for and obtain a Dumping at Sea Permit in terms of the NEM:ICMA prior to the disposal of dredge spoil at sea (either within or outside of harbour boundaries). See Guidance on applying for Dumping at Sea Permit attached as Appendix D.</p>	NDPW/Consultant	Prior to disposal of dredge spoil	-	<ul style="list-style-type: none"> Application for Dumping at Sea Permit

Maintenance Management Measures						
Aspect	ID	Mitigation measure / Procedure	Responsible	Implementation Timeframe	Monitoring Methods (where applicable) ⁶	Performance Indicators
	13.	<p>Include the following information in the submission of the Dumping at Sea Permit application to DEA:O&C:</p> <ul style="list-style-type: none"> • Sediment analysis report (see item 4 above) • Dump site selection report (see item 9 - 11 above), ideally proposing more than one potential disposal site • Maps depicting proposed dump site location • An estimate of future dredge disposal requirements • An estimate of annual volumes of dredge material to be disposed of • Required/proposed validity of dumping at sea permit 				
	14.	Provide DEA: O&C with the name of the dredging contractor prior to the commencement of dredging to allow for the Dumping at Sea Permit to be updated to include this information.			-	<ul style="list-style-type: none"> • Dumping at Sea permit with correct dredge contractors details
Dredging and dredge disposal	15.	<p>Determine and implement site specific dredging and dredge disposal mitigation and monitoring measures taking into account:</p> <ul style="list-style-type: none"> • Contamination levels in sediments • Proximity to sensitive environments or water users • Proposed dredge methodology • Proposed dredge volumes • Selected dredge disposal methodology and (where application) location of dredge disposal site 	NDPW/Consultant	Prior to commencement of and during dredging or dredge disposal	-	<ul style="list-style-type: none"> • Site specific dredging and dredge disposal mitigation measures
	16.	Ensure that the dredging contractor is aware of the MMP, the Dumping at Sea Permit and any other relevant authorisations prior to the commencement of dredging activities, and that they are aware of their relevant environmental management obligations in terms of these documents.	NDPW/Consultant	On appointment of dredge contractor	-	<ul style="list-style-type: none"> • Copies of relevant documents issued to dredge contractor • Compliance with MMP and dumping at sea permit conditions
	17.	Implement all relevant conditions of the Dumping at Sea Permit during dredging activities	Contractor	Duration of dredging and dredge disposal	-	<ul style="list-style-type: none"> • Compliance with MMP and dumping at sea permit conditions
Monitoring during dredging and dredge spoil disposal	18.	Implement monitoring requirements (if any) specified in the Dumping at Sea Permit issued by the DEA: O&C during dredging and dredge spoil disposal.	Contractor	As specified in the Dumping at Sea Permit	<ul style="list-style-type: none"> • As specified in the Dumping at Sea Permit 	<ul style="list-style-type: none"> • Compliance with the monitoring requirements specified in the Dumping at Sea Permit.
Long term monitoring of dredge spoil disposal site	19.	If sediments in the dredge spoil and dredge spoil disposal site are similar, no long term monitoring of the dredge spoil disposal site is required, unless otherwise specified in the Dumping at Sea permit.	NDPW/Consultant	1 year after disposal	<ul style="list-style-type: none"> • Sediment sampling and analysis 	<ul style="list-style-type: none"> • Monitoring report

Maintenance Management Measures						
Aspect	ID	Mitigation measure / Procedure	Responsible	Implementation Timeframe	Monitoring Methods (where applicable) ⁶	Performance Indicators
	20.	If sediments in the dredge spoil and dredge spoil disposal site are not similar, sample sediments at the dredge disposal site and analyse contaminant levels 1 year after disposal to demonstrate whether the dredge spoil has been mixed into the overall sediment body (simple statistical analysis of variance approach). This would provide insight on the suitability of the site for future disposal.				
Safety	21.	Maintain a marine exclusion zone around the dredge areas to prevent unauthorised access and injury to third parties.	Contractor	Designate exclusion zone before dredging activities commence	• Visual inspection.	• Clearly delineated exclusion zone.
	22.	Inform other users of the harbour about the exact timing and location of construction/dredging activities through the issuing of notices to surrounding land users		Before dredging activities commence	• Internal Audit.	• Record of communication.
	23.	Conduct visual inspection of area to be dredged for marine fauna/mammals immediately before commencing with dredging activities, to avoid injury.		Before dredging activities commence	• Visual inspections.	• Records of sightings.
	24.	Avoid dredging at night.		Ongoing	• Visual inspections at night.	• No dredging at night.
Oil Spill Contingency Plan	25.	Update any relevant oil spill contingency plan or develop a new oil spill contingency plan to be implemented in the event of an oil spill during dredging, dredge disposal and vessel salvaging activities. (See Appendix E)	Contractor	Prior to dredging activities	• Submission of oil spill contingency plan to ECO for approval	• Approved oil spill contingency plan
	26.	Include the use of physical containment or recovery equipment including a variety of booms, barriers, and skimmers, as well as natural and synthetic sorbent materials in the case of a spill, as well as the use of sorbent materials in the final stages of clean up.				
Heritage Resources	27.	Report all exposed marine/terrestrial heritage resources to the HWC and/or SAHRA. Heritage resources uncovered/disturbed must not be disturbed further until advice has been obtained from the relevant heritage authority on how they should be dealt with.	Contractor and RP	When potential remains exposed	• Photographs of find. • Visual inspections of excavations.	• Records of correspondence.
	28.	Ensure that all Contractors and Sub-contractors are made aware of the potential existence of heritage resources (terrestrial and marine), and instructed on the correct procedure for preserving the integrity thereof.	ECO	Before construction activities commence	• Attendance registers of awareness sessions.	• Occurrence of awareness sessions.

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Chris Dalgliesh
Partner

Appendices

Appendix A:

Method Statement Pro Forma

METHOD STATEMENT PRO FORMA

CONTRACT:.....

DATE:.....

PROPOSED ACTIVITY (give title of method statement):

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

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

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

Start Date:

End Date:

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

Note: please attach extra pages if more space is required

Appendix B:

National Action List

The National Action List is currently being revised and DEA:O&C should be consulted for the most up-to-date version.

Appendix C:

Dump Site Selection Protocol

DUMP-SITE SELECTION

Site selection considerations

1. Proper selection of a dump-site at sea for the reception of waste is of paramount importance. Information required to select a dump-site shall include:
 1. Physical, chemical and biological characteristics of the water column and the sea-bed;
 2. Location of amenities, values and other uses of the sea in the area under consideration;
 3. Assessment of the constituent fluxes associated with dumping in relation to existing fluxes of substances in the marine environment; and
 4. Economic and operational feasibility.
2. Guidance for procedures to be followed in dump-site selection can be found in a report of the Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection (GESAMP Reports and Studies No. 16 - Scientific Criteria for the Selection of Waste Disposal Sites at Sea). Prior to selecting a dump-site, it is essential that data be available on the oceanographic characteristics of the general area in which the site is to be located. This information can be obtained from the literature but field work should be undertaken to fill the gaps.

Required information includes:

1. The nature of the seabed, including its topography, geochemical and geological characteristics, its biological composition and activity, and prior dumping activities affecting the area;
2. the physical nature of the water column, including temperature, depth, possible existence of a thermocline/pycnocline and how it varies in depth with season and

weather conditions, tidal period and orientation of the tidal ellipse, mean direction and velocity of the surface and bottom drifts, velocities of storm-wave induced bottom currents, general wind and wave characteristics, and the average number of storm days per year, suspended matter; and

3. The chemical and biological nature of the water column, including pH, salinity, dissolved oxygen at surface and bottom, chemical and 8 biochemical oxygen demand, nutrients and their various forms and primary productivity.

3. Some of the important amenities, biological features and uses of the sea to be considered in determining the specific location of the dumpsite are:

1. The shoreline and bathing beaches;

2. Areas of beauty or significant cultural or historical importance;

3. Areas of special scientific or biological importance, such as sanctuaries;

4. Fishing areas;

5. Spawning, nursery and recruitment areas;

6. Migration routes;

7. Seasonal and critical habitats;

8. Shipping lanes;

9. Military exclusion zones; and

10. Engineering uses of the seafloor, including mining, undersea cables, desalination or energy conversion sites.

Size of the dump-site

4. Size of the dump-site is an important consideration for the following reasons:
 1. It should be large enough, unless it is an approved dispersion site, to have the bulk of the material remain either within the site limits or within a predicted area of impact after dumping;
 2. It should be large enough to accommodate anticipated volumes of solid waste and/or liquid wastes to be diluted to near background levels before or upon reaching site boundaries;
 3. It should be large enough in relation to anticipated volumes for dumping so that it would serve its function for many years; and
 4. It should not be so large that monitoring would require undue expenditure of time and money.

Site capacity

5. In order to assess the capacity of a site, especially for solid wastes, the following should be taken into consideration:
 1. The anticipated loading rates per day, week, month or year;
 2. Whether or not it is a dispersive site; and
 3. The allowable reduction in water depth over the site because of mounding of material.

Evaluation of potential impacts

6. An important consideration in determining the suitability of a waste for dumping at a specific site is the degree to which this results in increased exposures of organisms to substances that may cause adverse effects.

7. The extent of adverse effects of a substance is a function of the exposures of organisms (including humans). Exposure, in turn, is a function, inter alia, of input flux and the physical, chemical and biological processes that control the transport, behaviour, fate and distribution of a substance.
8. The presence of natural substances and the ubiquitous occurrence of contaminants means that there will always be some pre-existing exposures of organisms to all substances contained in any waste that might be dumped. Concerns about exposures to hazardous substances thus relate to additional exposures as a consequence of dumping. This, in turn, can be translated back to the relative magnitude of the input fluxes of substances from dumping compared with existing input fluxes from other sources.
9. Accordingly, due consideration needs to be given to the relative magnitude of the substance fluxes associated with dumping in the local and regional area surrounding the dump-site. In cases where it is predicted that dumping will substantially augment existing fluxes associated with natural processes, dumping at the site under consideration should be deemed inadvisable.
10. In the case of synthetic substances, the relationship between fluxes associated with dumping and pre-existing fluxes in the vicinity of the site may not provide a suitable basis for decisions.
11. Temporal characteristics should be considered to identify potentially critical times of the year (e.g., for marine life) when dumping should not take place. This consideration leaves periods when it is expected that dumping operations will have less impact than at other times. If these restrictions become too burdensome and costly, there should be some opportunity for compromise in which priorities may have to be established concerning species to be left wholly undisturbed. Examples of such biological considerations are:

1. Periods when marine organisms are migrating from one part of the ecosystem to another (e.g., from an estuary to open sea or vice versa) and growing and breeding periods;
2. Periods when marine organisms are hibernating on or are buried in the sediments; and
3. Periods when particularly sensitive and possibly endangered species are exposed.

Contaminant mobility

12. Contaminant mobility is dependent upon several factors, among which are:
 1. Type of matrix;
 2. Form of contaminant;
 3. Contaminant partitioning;
 4. Physical state of the system, e.g., temperature, water flow, suspended matter;
 5. Physio-chemical state of the system;
 6. Length of diffusion and advection pathways; and
 7. Biological activities e.g., bioturbation.

Appendix D:

Guidance on Applying for Dumping at Sea Permit

Guidance on applying for a Dumping at Sea Permit under the Integrated Coastal Management Act 2008 (Act No. 24 of 2008).

1. Introduction

This document provides some guidance on the methods and requirements when applying for a Dumping at Sea Permit in terms of Chapter 8 (71) of the Integrated Coastal Management Act 2008 (Act No. 24 of 2008) (ICM Act). The focus of the guide is specifically on the disposal of dredged material into designated open water disposal sites.

Section 71(1)(a) of the ICM Act provides that “A person who wishes to dump at sea any waste or other material must apply in writing to the Minister in the form stipulated by the Minister for a dumping permit that authorises the waste or other material to be loaded aboard a vessel, aircraft, platform or other structure and to be dumped at sea”.

In 2012, the Minister’s authority to issue dumping permits was officially delegated to the Chief Director: Integrated Coastal Management, in the Branch: Oceans and Coasts.

2. Documents required

All requests to dispose of waste and other matter into the marine environment must be submitted on an official application. “Annex 4 contains a summary of supporting documents required as part of that application”.

The supporting documentation required will largely depend on the type of application submitted for evaluation. Failure to provide the listed/required documentation may result in an unsuccessful application.

Documentation:

- Scientific report (sediment analysis)
- Maps depicting proposed dumpsite location
- Application fee payment receipt
- Completed and signed application form
- Approved Environmental Authorisation in accordance with the Environmental Impact Assessment process in the case of capital dredging projects.

3. Maintenance Dredging

Maintenance dredging is routinely undertaken to maintain port depths and to further supply beach nourishment schemes with clean sediment from sand trap areas (Sand Bypass Systems). Maintenance Dredging does not require the completion of an Environmental Impact Assessment. National Environmental Management Act, EIA regulations, Listed Item 1 Activity 16 (c) “Construction or earth moving activities in the sea, an estuary, or within the littoral active zone or a distance of 10 meters inland of high water mark of the sea or an estuary, whichever is the greater in respect of but excluding such construction or earth moving activities is undertaken for purposes of maintenance of the facilities. However, the following supporting documentation is required as part of the application:

- a. **Sediment Heavy Metal Assessments** – Assessments of contaminants must be completed in line with the National Action List for the assessment of dredged material requiring unconfined open water disposal (Annex 2). In addition, the test result should not be older than 3 years from the date at which the samples were collected. The assessment for contamination in sediment is not limited to heavy metals. The Department may require additional Persistent Organic Pollution (POPs) testing, at the expense of the applicant, if reasonable concern suggests a high presence of POPs in the sediment proposed for disposal. Furthermore, the

Department may request a biological testing of the sediment if initial chemical analyses suggest a significant probability of biological effects.

With reference to the new Action List (Annex 2), a decision on whether or not to require biological testing, or to prohibit disposal of the sediment at sea, is determined as followed:

- I. If none of the metals measures exceed the Action Levels, then no biological testing is required, and the material can be dumped;
- II. If Action Levels for both Annex I metals (Cd and Hg) are exceeded, or the combined level of Cd and Hg is >5ug/g, then biological testing is required;
- III. If Action Level for either of the Annex I metal, and two or more of the Annex II metals are exceed, then biological testing is required;
- IV. If the Action Levels of three or more Annex II metal are exceeded, and the total of Annex II metals is >500 ug/g, then biological testing is required;
- V. If the combined level of Annex II is >100 ug/g, then biological testing is required;
- VI. If either of the Prohibition Levels for the Annex I metals is exceeded, or if the prohibition Level of two or more of the Annex II is exceeded, dumping will not be allowed.

b. Disposal Site Map and Co-ordinates – A detailed diagram of the disposal site and areas proposed for disposal must be (Annex 3). It is preferred that a side-scan sonar or bathymetric survey of the proposed disposal area, not older than 12 months, be attached to the application. These maps will assist the Department with managing the level of mounting in the disposal site as well as current trends of sediment movement over time. The co-ordinates submitted should preferably be in the following format:

- I. Degrees, Minutes, seconds
- II. Decimal Degrees

4. Capital Dredging Projects

Disposal of dredged spoil would require further assessment and approvals as opposed to maintenance operations. The application procedure and requirements would follow that of maintenance operation as indicated earlier. However, the following additional documentation is required:

a. An approved Environmental Authorisation – The Department requires a completed Environmental Impact Assessment report and subsequent approved Environmental Authorisation to undertake the activity. Specialist marine studies may be required as part of the EIA process before a permit may be considered.

5. Sand By-Pass

Currently, authorised sand by-pass operations fall outside the scope of the Section 71 of the ICM Act. Such activities are not considered dumping because by definition it involves the lawful depositing of a substance for a purpose other than mere disposal of it (see the ICM Act definition of ‘dumping’). Sand by-pass schemes nevertheless require an Environmental Authorisation under the National Environmental Management Act. Listed Item 1, Activity 18 (ii) “The infilling or depositing of any material of more than 5 cubic metre into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock from the sea.

6. Compliance Monitoring

The Department reserves the right to undertake site inspections in order to assess the permit holder’s compliance with the permit conditions stipulated.

7. Payment Procedure and Administration

Once the Department has received all relevant documentation which would include a signed application form, a payment of R 300 (which is subject to change at the Departments discretion) would be required. The details of the payment process will be communicated to the applicant by an Official of the Department. No assessment of the received application(s) will take place proof of payment has been provided. Please note that the application fee is non-refundable, regardless of the application outcome.

Applicants are required to pay the prescribed fee within 30 days of invoice date, or interest may be levied upon the application.

8. Processing time

45 working days for the review (this has been repealed by new ICM Act as from May 2015).

9. Completed application forms should be sent to:

The Director: Coastal Pollution Management

Tel: (021) 819 2439

Contact Person:

Ms Nokuzola Sukwana

Tel: (021) 819 2446

Email: nsukwana@environment.gov.za

Appendix E:

Guidelines for Development of an Oil Spill Contingency Plan

Guidelines for development of an Oil Spill Contingency Plan

A plan for action needs to be prepared in anticipation of a spill of a marine contaminant, such as oil. Contingency plans are essential because they establish practical plans of action for all types of spills so that, when spills do occur, a quick response can minimize the damage. Site or project specific oil spill contingency plans must be aligned with any local oil spill contingency plans and must be submitted to Coastal Pollution Management for approval.

The first step in developing a plan is to learn as much about the area as possible.

- Contingency plans normally include the following:
 - Identification of authority and a chain of command in the case of a spill;
 - A list of persons and organizations that must be immediately informed of a spill;
 - An inventory of available trained spill personnel and spill response equipment;
 - A list of actions that must be taken (in order of priority);
 - A communication network to coordinate response;
 - Probable oil movement patterns under different weather conditions; and
 - Sensitivity maps and other technical data.
- In developing the contingency plan, the following must be taken into consideration:
 - Important or sensitive physical and biological resources within or near the area, such as marshes, unusual flora (plant life) and wildlife resources such as fish, shellfish, marine mammals and birds;
 - Important habitat areas required by particular species for spawning, feeding or migration;
 - Tides, currents and local climatic conditions, such as wind and severe weather patterns;
 - Shoreline characteristics; and
 - Proximity to roads, trained response personnel, oil spill clean-up equipment, etc

Appendix B: Sediment Specialist Study



lwandle
MARINE ENVIRONMENTAL SERVICES

SEDIMENT SPECIALIST STUDY
WESTERN CAPE SMALL HARBOURS:
Gordons Bay
Data Report

PREPARED FOR:



REPORT REF.: LT-JOB-540 V 2.0

January 2017



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<u>Date</u>	<u>Report No. and Revision No.</u>	<u>Created</u>	<u>Reviewed</u>	<u>Approved for release</u>
04/01/2017	LT-16-540 V1.0	Lisa Holton and Raissa Philibert	Robin Carter	
24/01/2017	LT-16-540 V2	Raissa Philibert	Robin Carter	Robin Carter

EXECUTIVE SUMMARY

As part of the National Department of Public Works (NDPW) Small Harbours Programme, PRDW has been awarded the work packages covering the proclaimed west coast fishing harbours at Gordons Bay, Hout Bay, Kalk Bay, Hermanus, Pepper Bay and Saldanha Bay. Sediment properties were measured in Gordons Bay harbour and then compared against National Action List (DEA 2012) and the BCLME (2006) sediment quality guidelines.

The comparisons show that Gordons Bay sediments are uncontaminated by heavy metals or the measured organic compounds and would qualify for unconfined open ocean disposal

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1 INTRODUCTION

The Coega Development Corporation is responsible for the implementation of the National Department of Public Works (NDPW) Small Harbours Programme. The aim of this programme is to accelerate projects pertaining to the improvement of infrastructure, day-to-day operations and aesthetics at 13 proclaimed harbours in the Western Cape. These projects include repairs of existing infrastructure, dredging of harbour basins, characterisation of basin sediments and identification of suitable disposal locations for the dredged material. The 13 proclaimed harbours were divided into several work packages and the contracts for services in each work package awarded separately. PRDW has been awarded work packages 1 and 2 covering the proclaimed fishing harbours at Gordons Bay, Hout Bay, Kalk Bay and Hermanus (work package 1), along with Pepper Bay and Saldanha Bay (work package 2).

PRDW envisages the need for dredging at Gordons Bay. As such, PRDW has contracted Lwandle to analyse the sediment composition and levels of contaminants within the sediments at Gordons Bay in order to determine whether the dredge material can be safely disposed at sea.

2 BACKGROUND

Sediment is an important repository for many contaminants that are anthropogenically introduced into surface waters and any form of disturbance to this sediment may have ecological effects through re-suspension. Hence sediments removed from one area and disposed of elsewhere can lead to detrimental environmental impacts. The London Protocol, to which South Africa is a signatory, regulates the disposal of dredged sediments and other waste materials in the marine environment. This protocol requires the screening of target dredge sediments based on their constituents and potential effects on the environment. This screening assesses whether the material can be disposed without further testing. As part of this screening process, contaminants of concern need to be tested.

Using the London Protocol as a framework, South Africa has produced a National framework that outlines a set of protocols relating to the screening of sediments for disposal tailored to the expected natural levels of chemicals in sediments along the South African coastline. The National Action List includes heavy metals such as arsenic, chromium, copper and cadmium; and organic pollutants such as polyaromatic hydrocarbons (PAH) and residual pesticides (DEA 2012). Even though PAHs are potential contaminants, the sources of PAH and heavy metals in harbours are very similar and are likely to accumulate in the same areas. Samples containing low levels of all heavy metals analysed are unlikely to have high PAH concentrations. Sediment heavy metal concentrations are therefore considered to be an appropriate screening test for assessing suitability disposal of dredged sediments to sea.

On the West Coast of South Africa, cadmium levels are naturally high and appropriate guidelines should be used to evaluate the environmental risks associated with measured cadmium levels prior to disposing these sediments (DEA 2012). Gordons Bay harbour falls under the Benguela Current Large Marine Ecosystem (BCLME) guidelines (CSIR 2006). The particle size distribution of the sediments as well as the total organic carbon are also measured as these can provide normalising factors qualifying toxicity risks of sediment constituents.

Following these protocols a sediment measurement campaign was carried out in Gordons Bay with the distributions of heavy metal concentrations and organic content being measured across eight sites. As particle size analyses have been recently conducted by the CSIR at this site this variable was excluded from the survey. This document presents and discusses the results of this survey and concludes whether or not the sediments present comply with the requirements for unconfined open ocean disposal of dredge material.

3 SAMPLING

Sediments from eight sampling sites were obtained in Gordons Bay harbour (Figure 3.1) during December 2016. The samples were taken at seven locations identified as likely to be dredged as well as one extra sample points outside of the harbour wall near Bikini Beach (Figure 2.1), proposed as a potential dredge spoil disposal site. An additional site, which is also a potential dredge spoil disposal site, was scheduled to be sampled. However, access to the location was restricted and this site was removed from the sampling campaign. The collected samples were analysed for heavy metals and total organic carbon content (TOC). Results are set out below.



Figure 3.1 Gordons Bay Harbour sediment sampling sites for the December 2016 field trip.

4 RESULTS

4.1 HEAVY METAL CONCENTRATIONS

Concentrations of the following metals were investigated: aluminium, arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc. The seven sample sites within the harbour were treated as replicates and the mean of the measured metal concentrations was compared against the recommended environmental quality guidelines for the BCLME region and the National Action List values (Table 4.1). It is evident that measured heavy metal concentrations from Gordons Bay harbour did not exceed the probable effect concentration (BCLME) or the low action level (National Action List) thresholds.

Table 4.1 Heavy metal concentrations (mg/kg) measured in sediments at the seven harbour sites at Gordons Bay harbour during the December 2016 field survey. The probable effect concentration (PEC) (BCLME) and the low action level (LAL) and upper action level (UAL) (National Action List) are also shown.

Metal	GB-2	GB-3	GB-4	GB-5	GB-6	GB-7	GB-8	Mean	Mean excluding GB-7 and GB-8	PEC	LAL	UAL
Aluminium	3220	3550	3770	4480	4240	9460	10700	5631	3852	-	-	-
Arsenic	1.2	1	1	0.9	5.9	5	5.2	2.9	2	41.6	30	150
Cadmium	0.1	0.1	0.1	0.1	<0.1	0.6	0.7	0.3	0.1	4.21	1.5	10
Chromium	8.4	8.9	8.6	11.1	7.7	35.3	29.4	15.6	8.9	160	50	500
Copper	3	8	<1	<1	<1	28	42	20	5.5	108	100	500
Lead	<5	<5	<5	<5	7	8	10	8	7	112	100	500
Mercury	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.7	0.5	5
Nickel	3	3	3	4	2.9	15.7	12.8	6.3	3.1	42.8	50	500
Zinc	17	22.5	13.8	24.8	13.5	92.8	93.5	39.7	18.32	271	150	750

4.2 ORGANIC CONTENT

Sediment samples from each site were analysed for their weight percentage of total organic carbon (TOC). The TOC percentage concentration ranged from 0.02% at GB-1, the proposed dredged disposal site, to 2.06% near the jetty at GB-8.

Table 4.2 Total Organic Carbon percentage concentrations for all sites in Gordons Bay Harbour.

	GB-2	GB-3	GB-4	GB-5	GB-6	GB-7	GB-8	Mean GB-7 and GB-8	Mean excluding GB-7 and GB-8
Total organic carbon	0.07	0.17	0.08	0.06	0.12	1.59	2.06	0.59	0.10

4.3 COMPARISON WITH PROPOSED DISPOSAL SITE

The concentrations of metals and total organic carbon within the harbour are higher than those at the proposed disposal site. This is particularly true when considering the two sites close to the jetties (GB-7 and GB-8). Figure 4.1 compares the mean metal concentrations for the harbour sites including and excluding sites GB-7 and GB-8, located further into the harbour, to the proposed dredge disposal site for all the metals except aluminium.

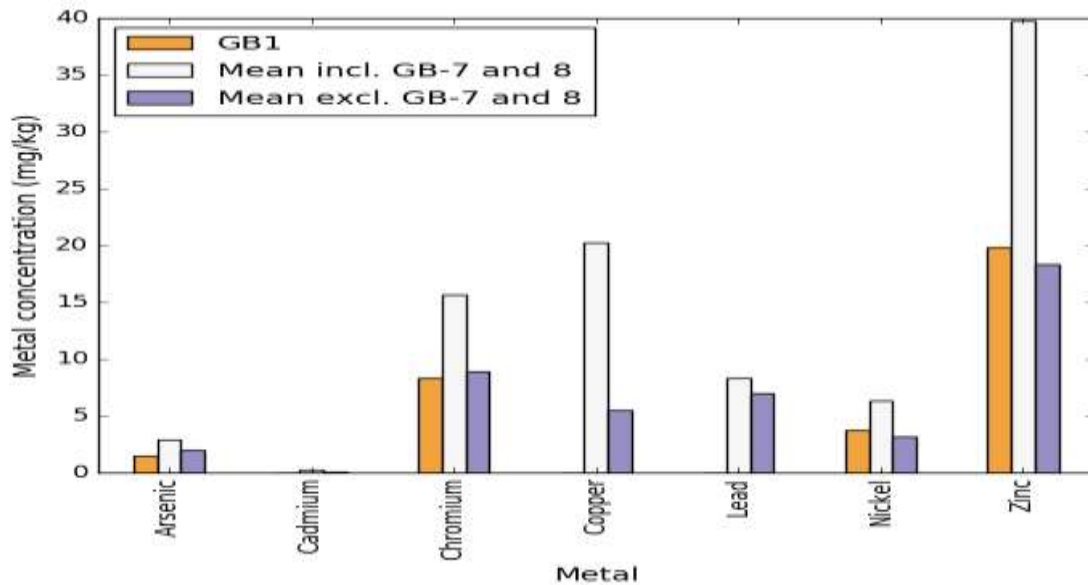


Figure 4.1: Comparison of mean metal concentrations within the harbour to metal concentrations at one proposed disposal site (GB-1). Concentrations of cadmium, copper and lead were below the detection limit at GB-1.

Concentrations of each of the heavy metals normalised against that of aluminium are often used to identify metal sources (natural or anthropogenic). This is due to aluminium being a proxy for clay minerals and strong relationships of heavy metals with this element being indicative of terrigenous geochemical sources of the metals. Sites GB-7 and GB-8 showed enriched heavy metal content compared to the breakwater stations in excess of that predictable by Al concentrations (

Table 4.3). This suggests that the high metal concentrations at these stations are of anthropogenic origin (possibly from stormwater runoff, the moored boats or the jetty infrastructure).

Table 4.3: Concentrations of heavy metals (mg/kg) normalised to that of Aluminium (g/kg). – indicate samples where the metal concentrations were below detection limit.

	GB1	GB2	GB3	GB4	GB5	GB6	GB7	GB8
Arsenic	0.549	0.373	0.282	0.265	0.201	1.392	0.529	0.486
Cadmium	-	0.031	0.028	0.027	0.022	-	0.063	0.065
Chromium	3.040	2.609	2.507	2.281	2.478	1.816	3.732	2.748
Copper	-	0.932	2.254	-	-	-	2.960	3.925
Lead	-	-	-	-	-	1.651	0.846	0.935
Mercury	-	-	-	-	-	-	-	-
Nickel	1.355	0.932	0.845	0.796	0.893	0.684	1.660	1.196
Zinc	7.253	5.280	6.338	3.660	5.536	3.184	9.810	8.738

According to the geophysical investigation conducted in Gordons Bay by the CSIR (CSIR 2016), sediments are transported from the entrance of the harbour and deposited inside the harbour. As such, sediments within the harbour contained a higher proportion of fine sediments (<0.063 mm) than those at the entrance or the sand bank at the west of the harbour (CSIR 2016). Finer sediments

tend to be associated with higher TOC and metal concentrations than coarser sediments. This may also contribute to the higher metal and TOC concentrations at sites further into the harbour (GB-7 and GB-8) than sites at the entrance of the harbour.

4.4 COASTAL HABITATS AT PROPOSED DISPOSAL SITES

According to the measured sediment properties, disposal to the open ocean would be allowed. However, dredging and dredge spoil disposal should be managed such that associated effects of disposal including water column turbidity and deposition outside of the designated disposal site are limited. Furthermore, smothering or irreversible changes to the sediment properties at the disposal site are to be avoided, if possible.

Figure 4.2 shows the habitats surrounding Gordons Bay Harbour based on the National Biodiversity Assessment data (Sink et al 2012). The proposed disposal site to the east of harbour is within the Agulhas sheltered rocky coast, a critically endangered habitat (Sink et al 2012). Here rock features may be inundated through the disposal of the dredge spoil at this site. Such effects need to be avoided. The proposed disposal site to the west of the harbour falls within the Agulhas intermediate sandy coast habitat. Sediment dumped west of the harbour (away from the intersection of the breakwater with the shore) would be worked into and mixed with that adjacent to Bikini beach. If the dredge volumes are relatively small, the effects (changes to the sediment properties around the disposal site) should be constrained. There are also additional seasonal considerations which may help to minimise the effects. For instance, if the dredging and spoil disposal is done in winter, the winter storm wave conditions would facilitate mixing. Moreover, in winter, there are fewer recreational beach users and hence, a decrease potential for user conflict.



Figure 4.2: Habitat types around Gordons Bay harbour based on the National Biodiversity Assessment data.

5 CONCLUSIONS

The survey data show that no chemical substances are present at higher than ‘normal’ concentrations within Gordons Bay. Therefore, according to the South African National Action List for the screening of dredged sediment disposal at the values reported above, dredged harbour sediments are suitable for unconfined disposal at sea. The probability of sediment associated contaminants generating negative environmental effects on the receiving sediment body is considered to be low. It is to be noted that sediment metal and TOC concentrations at the provisionally identified disposal site at Bikini beach, south-west of the harbour, were much lower than those within the harbour. This may be due to anthropogenic sources. Furthermore, fine sediments with elevated heavy metal and TOC loads do not deposit outside of the harbour but are preferentially deposited within the harbour area and thus increasing the concentration of heavy metals and TOC there. Disposal of dredge spoil to the east of the harbour may inundate the rocky features at the proposed site and such effects need to be avoided. On the other hand, disposal of

dredge spoil on the western side of the harbour is less likely to result in changes in sediment properties at the disposal site. However, seasonal conditions and the volume of dredged material can influence the magnitude of generated effects.

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Appendix C: Bikini Beach Management Plan

**Professional Consultancy Services for Coastal Engineering Infrastructure
Activities – Proclaimed Fishing Harbours Western Cape**

Work Package 1 – Bikini Beach Management Plan

REV.01

22 August 2017



COEGA DEVELOPMENT CORPORATION
South Africa




Professional Consultancy Services for Coastal Engineering Infrastructure Activities – Proclaimed Fishing Harbours Western Cape

Work Package 1 – Bikini Beach Management Plan

Gordons Bay

S2042-1-TN-EN-401

22 August 2017

REV.	TYPE	DATE	EXECUTED	CHECK	APPROVED	CLIENT	DESCRIPTION / COMMENTS
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01	C	22/08/2017	MGT	GPH			For Approval

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1. INTRODUCTION

The Gordons Bay harbour basin and entrance urgently requires maintenance dredging. The most appropriate and beneficial dredge discharge option is to pump the dredged sand onto the adjacent Bikini Beach. The added advantage of this option is the replenishment of the eroded Bikini Beach. The City of Cape Town, who manage Bikini Beach and the surrounding area, are concerned about the increase in volume of windblown sand due to the increase in beach area. This technical note describes the proposed operation and potential additional maintenance requirements for the City of Cape Town, as a result of the larger beach.

1.1 Gordons Bay Harbour

Gordons Bay is situated on the eastern shore of False Bay, approximately 50 km from Cape Town. The harbour covers an area of approximately 4 ha, which is sheltered by the main and secondary breakwaters. The Gordons Bay harbour is primarily used by the yacht club, naval base, a few fishing vessels, the ski boat launch and the NSRI (Station 9). Figure 1-1 shows the locality and boundary of the Gordons Bay harbour.



Figure 1-1: Gordons Bay harbour and harbour boundary



1.2 Maintenance Dredging

Dredging is required for Gordons Bay harbour to ensure safe navigation through the entrance. Sand has built up in the harbour entrance to such an extent that larger vessels cannot use the harbour and smaller vessels can only enter and leave the harbour during high tide. This is a major concern for the safety of people and vessels using the entrance, and for the operation of the NSRI based within the harbour, who need to be operational under all conditions.

Figure 1-2 shows the extent of sand build-up in the harbour entrance, and the sandbar along the inside of the main breakwater (October 2016). A total volume of approximately 20,000 m³ needs to be dredged to restore the entrance channel and harbour basin to required depths.



Figure 1-2: Aerial view of Gordons Bay harbour in October 2016

1.3 Maintenance Dredging Operation

The maintenance dredging required in the harbour and entrance will most likely be carried out using a small cutter-suction dredger or a slurry pump mounted on a barge. The dredge material will be agitated, sucked up from the seabed and pumped in a sand and seawater slurry to the discharge point via a discharge pipeline. A floating pipeline will be required between the dredger and breakwater. A discharge pipeline will then run along the breakwater cap and discharge the sand slurry onto Bikini Beach at the top of the intertidal zone. As the slurry runs down the beach, the sand will settle out onto the beach while the seawater runs back into the sea. The discharge area will be kept close to the breakwater to minimise impact on beach users. Wave action and nearshore currents will move and redistribute the deposited sand along the beach, and into the natural beach profile. The discharge area will be cordoned off when the slurry is being discharged to prevent the public from entering this area. The indicative dredging operation is illustrated in Figure 1-3.



Figure 1-3: Proposed maintenance dredging operation and dredge material discharge

2. SITE INFORMATION

2.1 Bikini Beach

Bikini Beach is situated West of and adjacent to the main Gordons Bay harbour breakwater and it is a popular recreational area for both locals and tourists. Over the past decade, the plan shape area of the beach has nearly halved in size due to erosion and sediment transportation, with most of this material being transported into the Gordons Bay harbour. Due to the excessive beach erosion, the existing beach access ramp is no longer effective and ends on a very rocky shoreline as shown in Figure 2-1 below.



Figure 2-1: Bikini Beach access ramp



Currently the upper beach profile is relatively flat; however, it steepens quite rapidly as you move towards the MHWS water mark ($\pm 1:15$ slope). Figure 2-2 shows an indicative profile of Bikini Beach.

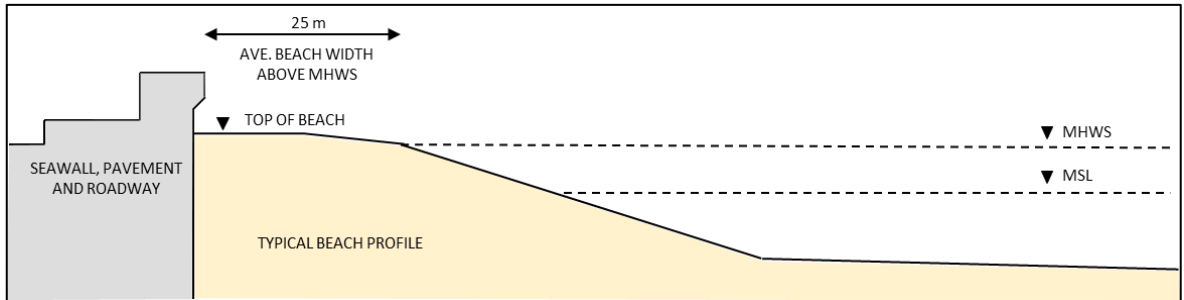


Figure 2-2: Typical Bikini Beach profile

2.2 Wind

Gordons Bay is reasonably well protected from the dominant and strong South-Easterly winds. The wind that will most likely blow sand from the beach and onto infrastructure behind the beach are the less frequent and weaker North-Westerly winds. Figure 2-3 shows a wind rose drawn from a WASA modelled dataset, extracted from a point in False Bay between Strand and Gordons Bay.

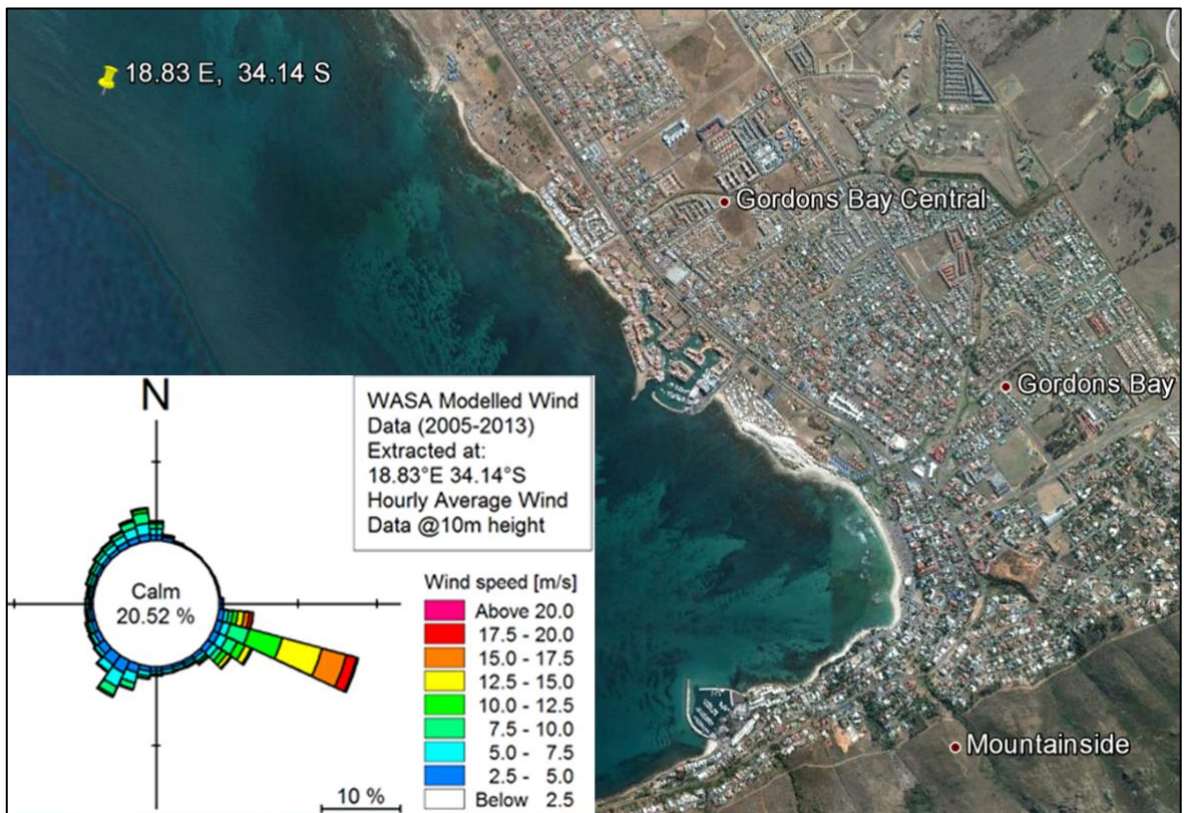


Figure 2-3: Wind Rose for the Gordons Bay Area



3. BEACH MANAGEMENT

3.1 Beach Sand Replenishment

When sand is placed on Bikini Beach, wave action will naturally redistribute the deposited sand along the beach, resulting in a similar beach orientation to that observed prior to erosion. If 20,000 m³ of sand is pumped onto the beach, it is expected to widen the current beach profile by between 25 m and 35 m. This is still well within the March 2005 beach footprint as shown in Figure 3-1.

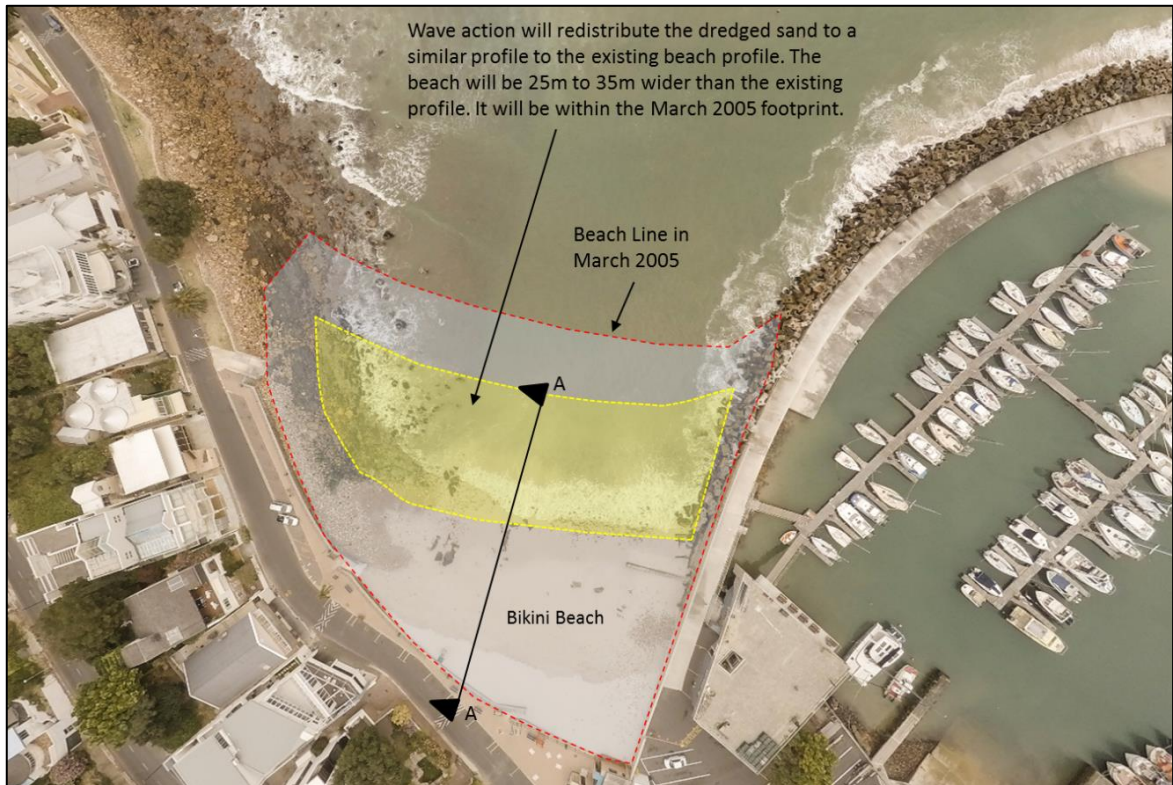


Figure 3-1: Potential beach alignment after harbour dredging

In addition to the increased footprint of the beach, the profile will also adjust to cater for the dredged material. The top levelled surface of the beach will extend out a further 25 to 35 m, while keeping the natural beach slope. Figure 3-2 illustrates the wider beach with the additional sand.

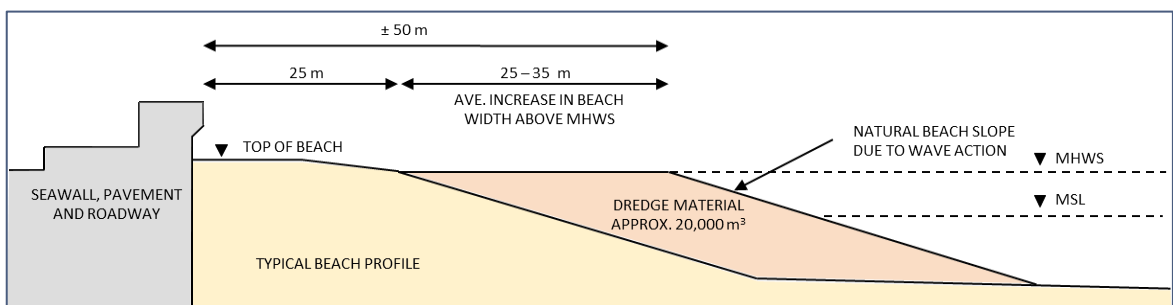


Figure 3-2: Section A-A: Typical new Bikini Beach profile

3.2 Wind-Blown Sand

With the proposed beach replenishment, Bikini Beach will have a larger surface area and it could result in higher volumes of windblown sand. This may have an impact on the current maintenance work that the City carries out on the beach and adjacent infrastructure. This includes the sweeping and removal of sand from adjacent road and pavement and more frequent cleaning of the storm water drains and catch pits.

It is mainly the weaker North-Westerly winds that will blow sand onto the adjacent infrastructure and these winds typically blow during the winter months. After rainy periods the beach will be wet and this will help limit the amount of windblown sand. Figure 3-3 illustrates the build-up of sand against the seawall at the back of the beach. As this sand build-up increases the sand will eventually start blowing over the seawall and into the road.



Figure 3-3: Build-up of sand along the back of Bikini Beach

The volume of additional sand which the City of Cape Town will need to manage due to the beach replenishment, cannot accurately be quantified as it will depend on a number of factors including:

- Width of beach (this will erode over the coming years)
- Sand build-up along the seawall;
- Wind direction and wind strength; and
- Moisture content of the sand.

3.3 Beach Management

It is recommended that the sand build-up along the sea wall be monitored, and when it reaches approximately half a meter below the top of the seawall, plant should be used on the beach to push the sand back towards the sea. The sand should be removed to a level of approximately 1.5 m below the top of the seawall, and the beach surface should slope towards the sea to prevent ponding. This will help reduce the sand volumes being blown over the seawall and onto adjacent infrastructure. This intervention essentially creates a sand trap along the back of the beach area, which allows sand accumulation before the seawall is breached/overtopped by windblown sand. By simply monitoring the back-beach levels, timeous intervention can be made. Any sand that does blow over the seawall will need to be cleaned up as part of the current

maintenance programme. Figure 3-4 illustrates the area where the beach levels need to be monitored and where excess sand should be removed to maintain a sand trap.

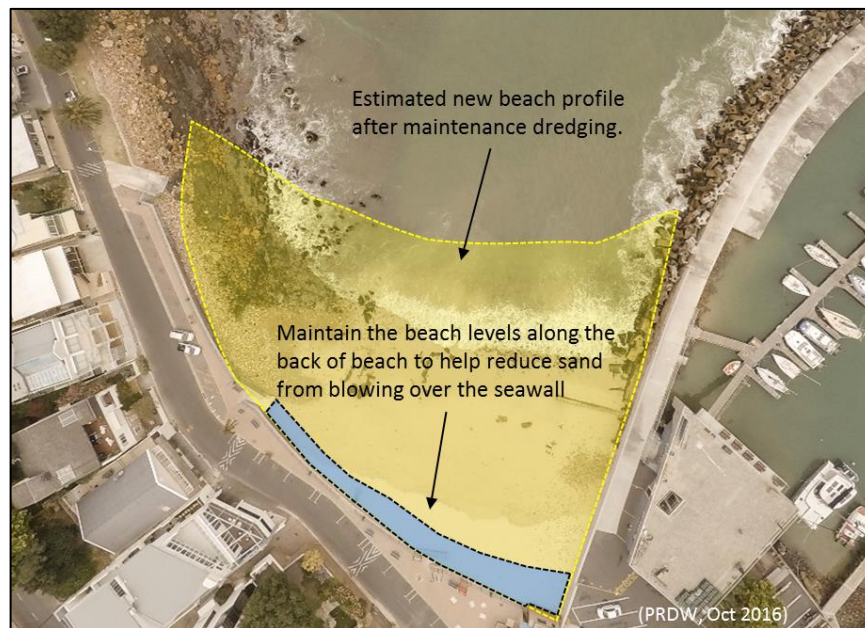


Figure 3-4: Sand trap along the back of Bikini Beach

4. Conclusions

The Gordons Bay Harbour is in desperate need of maintenance dredging for vessels to safely navigate in and out of the harbour. The adjacent Bikini Beach has been significantly eroded over the past decade and approximately half the beach area has been lost during this period.

Bikini beach has been identified as the preferred site for discharging the dredged sand and in turn it will be a good opportunity to replenish the eroded beach. The proposed dredging operation is expected to increase the beach width by between 25 and 35 m. The replenished beach area will however still be less than it was in 2005. The City of Cape Town currently maintains Bikini Beach and removes windblown sand from adjacent infrastructure. The wider beach is likely to result in an increase of windblown sand, and the City may need to remove sand more frequently. This work includes:

- Sweeping the road and pavement; and
- Cleaning the storm water drains and catch-pits.

It is recommended that the sand build-up along the sea wall be monitored and that the sand levels maintained well below the top of the seawall. This will essentially create a sand trap which will reduce the volumes of windblown sand over the top of the seawall and onto adjacent infrastructure.

As has happened in the past, Bikini beach will continue to erode due to wave action and currents, resulting in the sand naturally migrating back towards and into the harbour entrance. After a few years, the harbour will require further maintenance dredging to keep the harbour entrance open and functional.

Appendix D:

Declaration by Parties

National Department of Public Works (NDPW)

I, _____, representing NDPW, record as follows:

We have read and understood this Maintenance Management Programme (MMP).

I am aware of NDPW's responsibilities in terms of complying with, enforcing and implementing the provisions of the MMP.

I undertake to comply with those requirements of the applicable environmental laws, approvals and obligations arising out of the MMP in the discharging of my obligations.

Signed: _____ Name: _____

Position: _____ Date: _____

[Contractor]

I/we, _____ record as follows:

I/ we, the undersigned, do hereby declare that I/ we am/ are aware of the requirement by [Proponent] that construction activities will be carried out with due regard to their impact on the environment.

In view of this requirement, I/ we will, in addition to complying with the letter of the terms of the Contract dealing with protection of the environment, also take into consideration the spirit of such requirements and will, in selecting appropriate sub-contractors, employees, plant, materials and methods of construction, in-so-far as I/ we have the choice, include in the analysis not only the technical and economic (both financial and with regard to time) aspects but also the impact on the environment of the options. In this regard, I/ we recognise and accept the need to abide by the "precautionary principle" which aims to ensure the protection of the environment by the adoption of the most environmentally sensitive construction approach in the face of uncertainty with regard to the environmental implications of construction.

I/we have signed the Declaration of Understanding with respect to the Maintenance Management Programme.

Signed: _____ Date: _____

[Contractor]

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