

Proposed Dredging of the Milnerton Lagoon in the Diep River Estuary, Cape Town Final Basic Assessment Report

EIA REFERENCE: 16/3/3/1/A1/18/3048/25

PREPARED IN COMPLIANCE WITH THE REQUIREMENTS
OF THE EIA REGULATIONS OF 2014, AS AMENDED,
AND THE NATIONAL ENVIRONMENTAL MANAGEMENT
ACT, 1998 (ACT NO. 107 OF 1998), AS AMENDED

VERSION: FINAL

DATE: January 2026

APPLICANT

City of Cape Town



CITY OF CAPE TOWN
ISIXEKO SASEKAPA
STAD KAAPSTAD

ENVIRONMENTAL ASSESSMENT PRACTITIONER

 **Infinity**
Environmental

Email: milnertondredging@infinityenv.co.za

Tel: 021 834 1600

Collingwood Building, Black River Park
2 Fir Street, Observatory, Cape Town

DOCUMENT DETAILS

Final Basic Assessment Report: Proposed Dredging of the Milnerton Lagoon in the Diep River Estuary, Cape Town

APPLICANT

City of Cape Town
Civic Centre
Hertzog Boulevard
Cape Town

PROFESSIONAL SERVICE PROVIDER

Infinity Environmental (Pty) Ltd.

Collingwood Building
Black River Park
2 Fir Street
Observatory, Cape Town

Contact
milnertondredging@infinityenv.co.za
www.infinityenv.co.za

Report purpose

This report is prepared in compliance with the requirements of the Environmental Impact Assessment Regulations of 2014 (as amended) and is intended to:

- Present the proposed project and the need for the project.
- Describe the affected environment, to facilitate informed decision making.
- Provide an overview of the BA Process being followed, including public consultation.
- Assess the predicted positive and negative impacts of the project on the environment.
- Provide recommendations to mitigate negative impacts and to enhance the benefits of the project; and
- Provide for environmental management during the implementation of the project.

Authors

Jeremy Rose B.Sc. (Hons), Reg. E.A.P. #2019/1116, Pr.Sci.Nat. #120148

T Hobson, M.Sc., Reg. E.A.P. #2019/1018

K Gilmour, M.Sc., Cand E.A.P. #2024/8037; Cand Nat Sci 169880

DOCUMENT CONTROL

Date	Version
5 November 2026	Draft
28 January 2026	Final

DECLARATION OF EAP'S INDEPENDENCE

I, Jeremy Rose, appointed by the City of Cape Town as Environmental Assessment Practitioner for the Proposed Dredging of the Milnerton Lagoon in the Diep River Estuary, Cape Town, hereby declare that the information provided in this report and supporting documentation is complete and correct to the best of my knowledge; that other than fair remuneration for work performed in terms of this application I have no business, financial, personal or other interest in the activity or application and that there are no circumstances that may compromise my objectivity; that I have disclosed, to the Applicant, the specialist(s), the Competent Authority and registered interested and affected parties all material information that have or may have the potential to influence the decision of the Competent Authority; that I have ensured that information in respect of the application was distributed or was made available to registered interested and affected parties and that participation will be facilitated in such a manner that all interested and affected parties were provided with a reasonable opportunity to participate and to provide comments; and that I am aware that a false declaration is an offence in terms of Regulation 48 of the NEMA EIA Regulations.



Jeremy Themba Rose BSc (Hons), Reg. E.A.P. 2019/1116, Pr.Sci.Nat. 120148, IAAsa member 5781

Infinity Environmental (Pty) Ltd: Director & Principal EAP

© Infinity Environmental 2026. This document contains intellectual property and propriety information that are protected by copyright in favour of Infinity Environmental (Pty) Ltd. The document may therefore not be reproduced, used or distributed to any third party without the prior written consent of Infinity Environmental.

EXECUTIVE SUMMARY

BACKGROUND AND INTRODUCTION

The Milnerton Lagoon ('lagoon' or 'estuary') is the lower section of the Diep River Estuary where the Diep River enters the sea at Lagoon Beach in Cape Town (refer to **Figure 1** below). Water quality in the lagoon has declined significantly in recent years due to high levels of pollution and other anthropogenic impacts. The effects of poor water quality in the estuary include a sulphurous odour and discoloured water, due to high levels of suspended solids and extremely low oxygen levels.

Sewage-derived pollution is a major contributor to water quality impacts in the estuary, and includes excessive loading of organic solids from the Potsdam wastewater treatment works (WWTW). During 2024 and 2025, the lagoon has also been affected by the discharge of large volumes of untreated sewage because of the episodic failure of the Koeberg Road sewage pump station and its resulting discharges into the Theo Marais stormwater canal upstream of Otto du Plessis Drive).

In addition to the ongoing effects of inflowing pollutants, water quality in the lower estuary is affected by the extent to which clean seawater can enter the lagoon during high tides, replacing polluted river flows with cooler, saline water with higher dissolved oxygen concentrations. This daily tidal exchange is dependent on the dynamics of the estuary mouth, coastal processes, and flows from the river. In general, greater tidal exchange has been associated with improved water quality in the lower lagoon (between the Loxton Road bridge and the mouth). Tidal exchange is reduced when the mouth is partially closed, which is influenced by many different factors including deposition of sediments at the mouth. Organic sediments derived from wastewater and urban runoff accumulate on the bed of the estuary over time and are periodically flushed out to sea in large flood events. Accumulated organic-rich sediments increase the demand for oxygen from the water column as microbes decompose the material. This process reduces the levels of dissolved oxygen concentrations in the estuary. If there is insufficient oxygen available in the water (as is often the case in the lagoon), conditions turn anoxic and bacteria produce hydrogen sulphide, resulting in characteristic foul odours. The proposed activity is the dredging of the lower section of the Milnerton Lagoon from just upstream of the Loxton Road bridge to the estuary mouth and the placement of dredged sediment along channel margins (refer to **Figure 2 and 3** below).

The main purpose of the proposed dredging is to maximise tidal flushing and improve the hydrodynamics of the lower section of the lagoon. The dredged material is to be placed on the sides of the dredge channel to form sand banks. Additional benefits associated with this sediment placement on the sides of the channel include exposure of the deposited sediment to ultraviolet (UV) light and oxygen during low tide, which can reduce odours and increase the rate of decomposition of organic materials. **The proposed approach is based on thorough assessments of various remediation options, including the Water Quality Remediation Plan for the Milnerton Lagoon (Rose et al., 2023), 'the 2023 Remediation Plan', and has been identified as a feasible intervention – see section H below for a motivation of the preferred alternative.**

Approximately 30 000 m³ of material will be moved within the lagoon during the initial dredging phase of the project, and it is proposed that authorisation be granted for up to 120 000 m³ in total, to allow for future maintenance of an open estuary mouth (see **Appendix H2**), as and when needed to ensure the hydrodynamic function of the lower lagoon is maintained.

Explanatory note

A draft version of this BAR was published for comment by interested and affected parties in November 2025. Additions and changes are underlined in this final version for ease of reference. This final BAR is submitted to the competent authority for a decision.

In terms of the EIA Regulations of 2014, as amended, the proposed dredging of the lagoon requires an environmental authorisation (EA) from the Department of Environmental Affairs and Development Planning (DEA&DP) and a Basic Assessment (BA) must be undertaken by an Environmental Assessment Practitioner (EAP). Infinity Environmental is the appointed EAP and is responsible for the environmental assessment process.

CURRENT & PLANNED POLLUTION REMEDIATION IN THE DIEP RIVER ESTUARY

In response to the impacts on waterbodies caused by failing sewage infrastructure, the Applicant, the City of Cape Town ('the City'), has initiated a series of ongoing and planned projects to reduce pollution in the canal and estuary and to upgrade infrastructure across the catchment. Current pollution response actions include routine unblocking and repair of sewers, investigations and enforcement of pollution incidents, increased maintenance frequency at the Koeberg Pump Station, and water pressure reduction in parts of the catchment.

In addition, major infrastructure upgrades are underway or scheduled, including:

- the upgrading and expansion of the Potsdam Wastewater Treatment Works (scheduled for completion by December 2027);
- A capacity upgrade and construction of an overflow pond at Koeberg Road Pump Station (2027);
- Construction of the new Montague Gardens Bulk Sewer (2026);
- Rehabilitation of the Montague Drive Bulk Sewer (2027);
- Upgrades to the Phoenix Park Pump Station (2028); and
- Upgrades to the Sanddrif East Pump Station (June 2027).

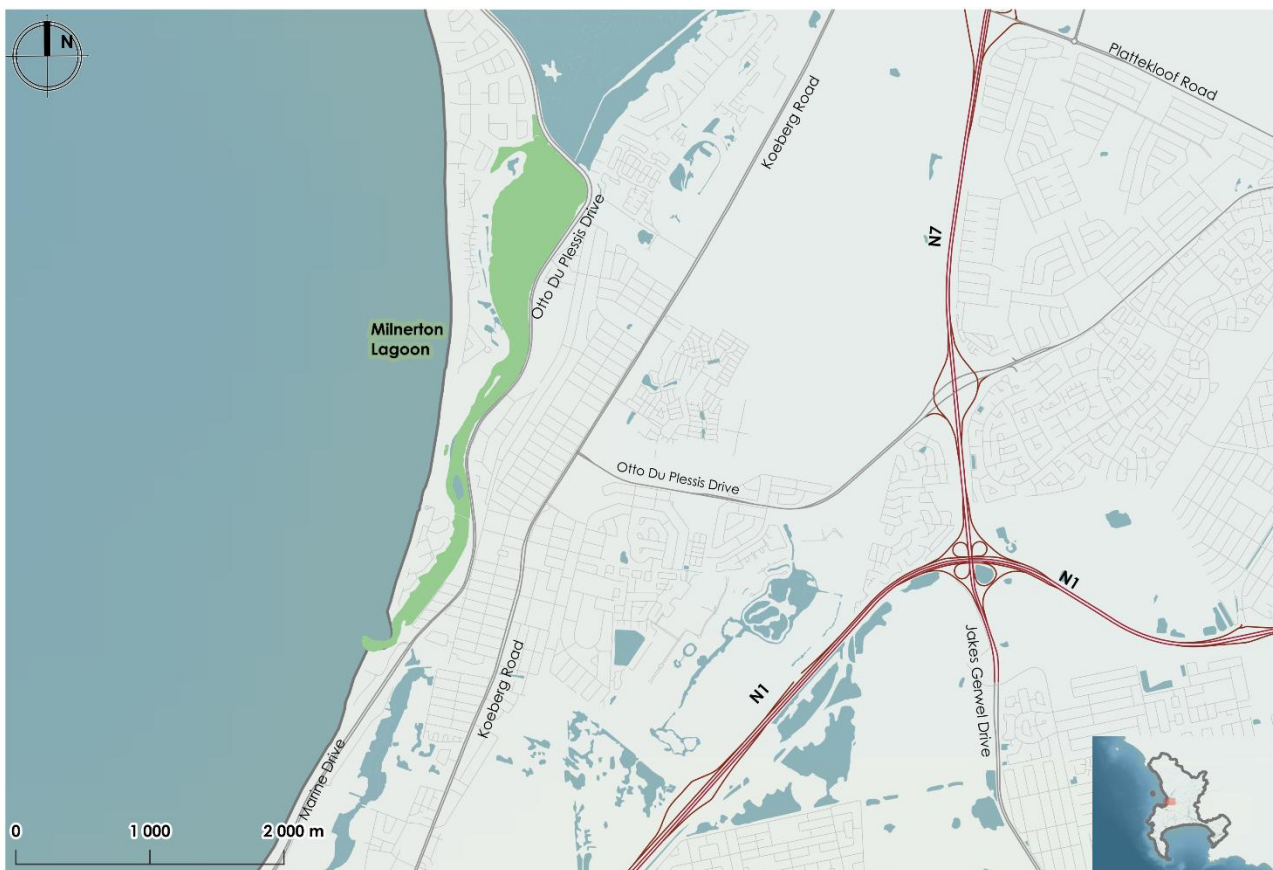


Figure 1: Locality map indicating the site located on Erf 20315, within the Milnerton Lagoon.

PROJECT BACKGROUND AND MOTIVATION

The Diep River Estuarine Management Plan (adopted in 2022) includes a set of objectives and actions, of which Objective H1 and Action 12 involve the following, 'Assess the possible cost and benefit of dredging the lower lagoon to facilitate the release of sediments and nutrient loads and emulate natural scour and enable ingress of increased volumes of seawater into the system... Implement dredging if a significant benefit is anticipated.' (refer to pg 9. of EMP, 2022).

A Water Quality Remediation Plan for the Milnerton Lagoon was prepared for the City of Cape Town in 2023 (Rose *et al.*, 2023), 'the 2023 Remediation Plan', which assessed various short-, medium- and long-term remediation measures proposed for the lagoon and recommended that the primary focus of remediation of the pollution within the lagoon should be on reducing the sources of pollution into the estuary. Of the short-term remediation measures assessed in the 2023 Remediation Plan, one that was recommended for implementation was dredging of the lagoon to remove built-up organic sediments and increase tidal exchange in the estuary.

Hydrodynamic modelling of the proposed dredging has been conducted, and found that the proposed dredging would facilitate greater saline intrusion during incoming and outgoing tides in the lower part of the lagoon. The dredging is expected to increase the exchange of saline and fresh water in the lower lagoon. The increased seawater intrusion is also expected to introduce dissolved oxygen into the lagoon, reducing chemical oxygen demand and disrupting anoxic conditions. During the dry season, average salinities near the mouth of the lagoon are modelled to increase by 11.6 %. During the wet season, average salinities near the mouth are modelled to increase by 54.0 % in the lower water column.

Since 2023, multiple flood events have naturally scoured the system, flushing significant quantities of sediment from the lagoon out to sea. The removal of organic sediments has become less of a priority, and dredging is instead proposed for its potential to improve the hydrodynamics and tidal exchange as a viable localised remediation measure.

Dredging alone is not expected to achieve the desired permanent ecological, human health and/or aesthetic outcomes within the Milnerton Lagoon unless there is a significant reduction in polluted inflows into the Diep River. In alignment with the 2023 Remediation Plan (Rose *et al.*, 2023), it is proposed that dredging only proceed once oxygen levels in the lower lagoon begin to show recovery, ensuring that the intervention coincides with improvements in upstream water quality; defined here in terms of dissolved oxygen as the 90th percentile of oxygen concentrations in bottom waters being above the 1.0 mg/L threshold over a three-month period with weekly monitoring, and the 90th percentile in mid- and surface water concentrations being above 2.0 mg/L, which is the threshold for hypoxic conditions harmful to organisms adapted to oxygenated waters.

ALTERNATIVES

The various sensitivities and contextual constraints presented by the site resulted in two potential design and layout alternatives, which together with the no-go alternative were considered for this application:

- **Alternative 1 (Preferred Alternative)- Dredging with placement of material within the lagoon:** This option involves dredging approximately 30,000 m³ of sediment from the channel and placing it on the sides of the dredged area to build up sandbanks within the intertidal zone – refer to **Figure 2** below. During the post-dredging phase of the project, periodic maintenance of the channel and open mouth conditions may be required to preserve the hydrodynamic function of the lower lagoon. Any such maintenance to restore or maintain the channel depth and an open estuary mouth is to be conducted strictly in accordance with the MMP (see **Appendix H2**), and only when necessary to sustain hydrodynamic functioning of the lower lagoon.

These sandbanks would be naturally exposed to cycles of oxygen and ultraviolet light (UV) through wetting and drying, assisting in the breakdown of organics. Importantly, this option does not require off-site disposal, will not take up scarce landfill space nor involve the impacts of dewatering, handling and transport of sediment off-site, making it the least costly and least disruptive alternative. Dredging could be completed in approximately five months, with impacts limited to the dredged footprint and without significant loss of public space.

This proposed intervention includes the creation of a berm upstream of the small island at the Wooden Bridge, using 600 m³ of dredged material, as a means to potentially concentrate flows west of the island and increase flow velocities.

Alternative 5 (Not Preferred) – Dredging of the channel with partial off-site disposal:

This option involves dredging of up to 30,000 m³ of material, which would be separated by cyclone, with clean sand returned to the lagoon (i.e., with placement of sediment particularly on the eastern bank of the channel) and only around 6 000 m³ of nutrient-enriched fine sediments dewatered and removed off-site (refer to **Figure 3** below). During the post-dredging phase of the project, periodic maintenance of the channel and open mouth conditions may be required to preserve the hydrodynamic function of the lower lagoon. Any such maintenance to restore or maintain the channel depth and an open estuary mouth is to be conducted strictly in accordance with the MMP (see **Appendix H2**), and only when necessary to sustain hydrodynamic functioning of the lower lagoon.

The intervention involves forming a berm upstream of the small island at the Wooden Bridge, using approximately 600 m³ of dredged material, to help direct flows to the west of the island and enhance flow velocities.

- **The No-Go Alternative:** Entails maintenance of the *status quo* and therefore not implementing dredging in the Milnerton Lagoon. Under this option, the hydrodynamic functioning of the lagoon would remain dependent on natural processes, potentially with limited tidal flushing and increased retention of freshwater during summer. While winter flooding may cause natural and temporarily improved intertidal exchange, this has proven insufficient to support lasting ecological recovery.

Given the continued impacts on the lagoon, the No-Go Alternative is considered neither reasonable nor feasible. The implementation of the proposed dredging is preferred, as it offers potential short- to medium-term benefits for the hydrodynamic function of the lower lagoon, with the potential to cause a positive indirect impact on estuary ecosystem health and local community well-being.

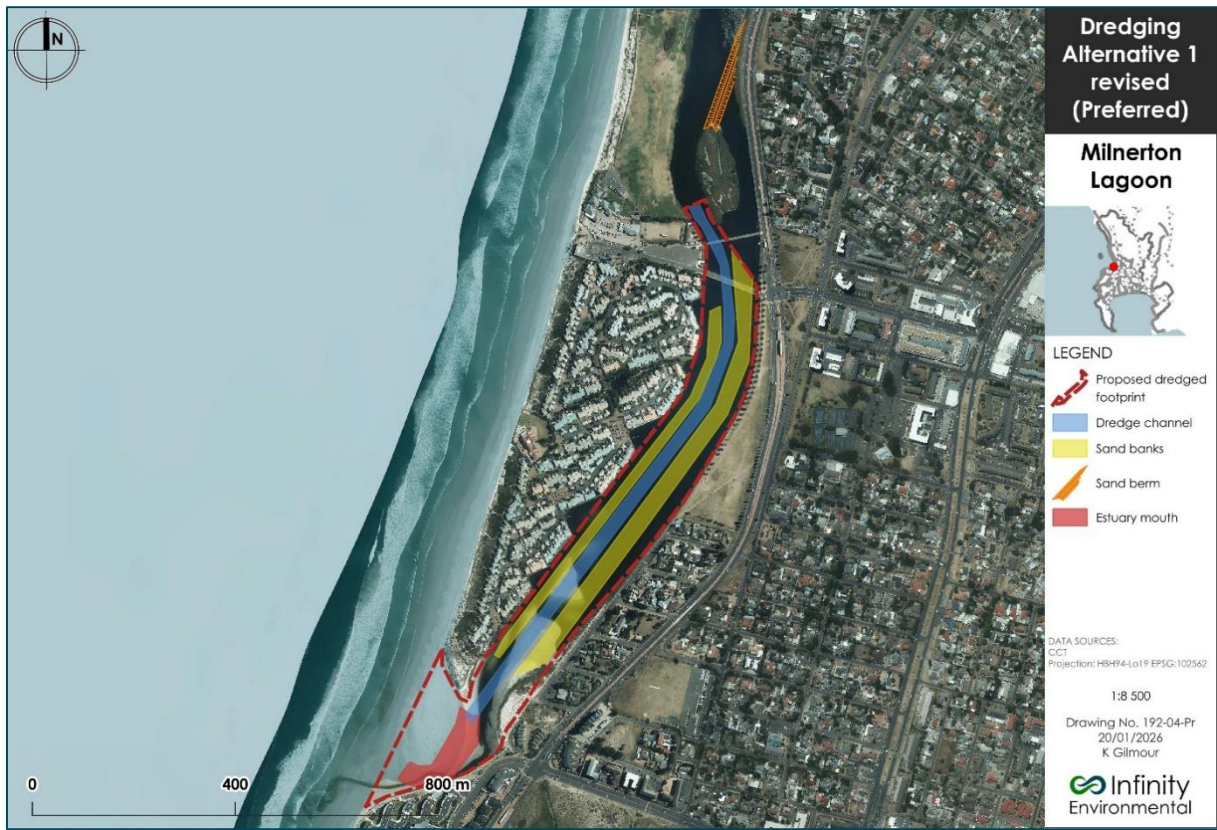


Figure 2: Schematic of the updated preferred alternative, illustrating the proposed dredging area (blue) in the Milnerton Lagoon, with the excavated material (yellow polygons) placed on either side of the channel. The proposed sand berm is highlighted in orange, while the dotted outline depicts the precise footprint of the dredged area. The design has been amended slightly since the draft BAR based on comments received, to maintain deeper water along the western bank immediately downstream of the Loxton Road bridge.

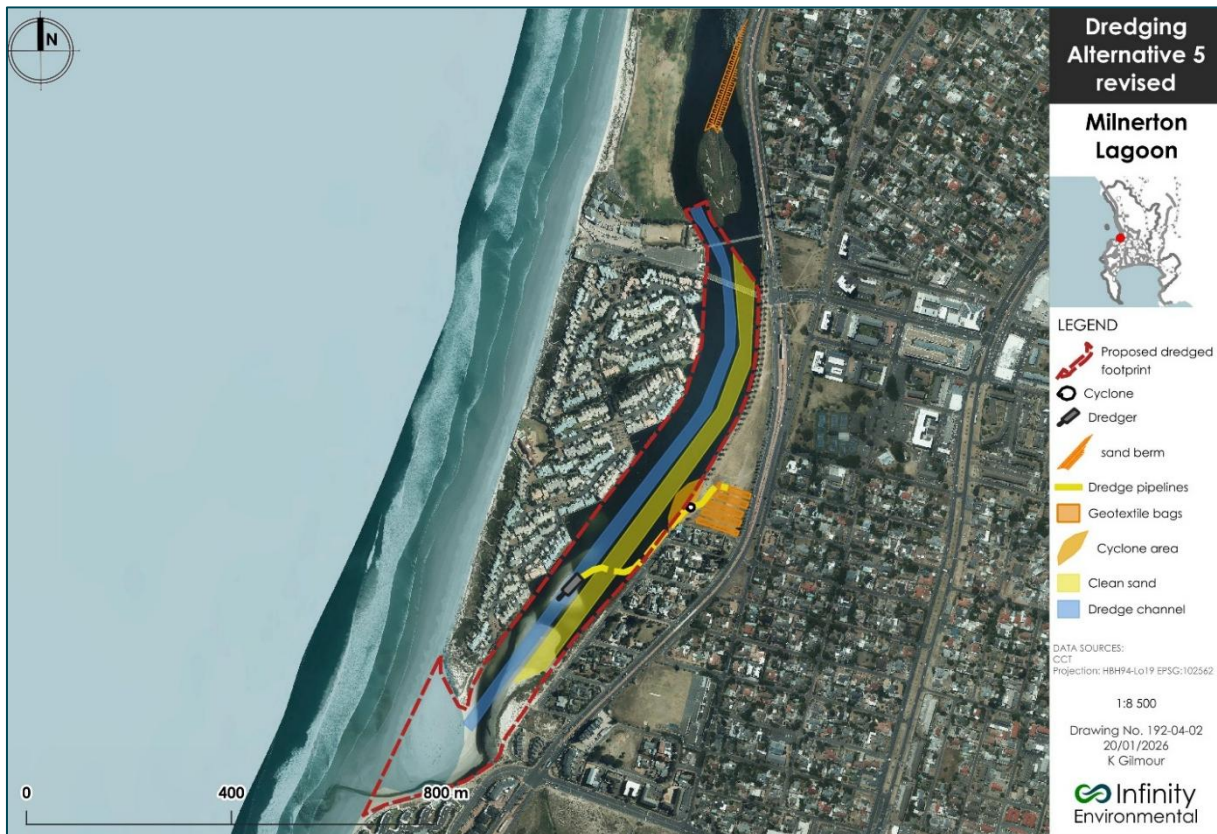


Figure 3: Design and layout Alternative 5 – the proposed dredging with off-site disposal.

LIMITATIONS OF DREDGING AS A REMEDIATION MEASURE

It must be clearly stated that dredging of the Milnerton Lagoon is not in itself expected to contribute significantly to improving water quality or amenity value of this waterbody other than by improving tidal exchange in the lower part of the lagoon. The causes of water quality impacts are well understood and include the discharge of wastewater at the Potsdam WWTW, the periodic discharge of substantial volumes of untreated sewage from failing pump stations and the ongoing low-level runoff of untreated wastewater from un-serviced areas of the catchment. As assessed in this report, the positive impacts of dredging as a remediation measure are likely to be limited in extent (since improvements to tidal exchange will occur mainly in the lower lagoon) and duration (as winter flooding may cause the channel to revert to its current channel). Therefore, the dredging of the lower lagoon is preferably recommended after some improvement in water quality occurs, ensuring that the intervention coincides with improvements in upstream water quality. Dredging is therefore recommended as a short- to medium-term intervention that can feasibly be implemented to help address pollution within the Milnerton Lagoon considering the complimentary maintenance activities ensuring the dredged channel depth is maintained and the estuary mouth kept open.

ENVIRONMENTAL ASSESSMENT PROCESS

The proposed dredging involves activities listed in terms of the 2014 Environmental Impact Assessment (EIA) Regulations of 2014, as amended, and the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended (NEMA):

Listed activity	Description
15 of Listing Notice 1 (GNR 327 of 2017), as amended	The development of structures in the coastal public property where the development footprint is bigger than 50 square metres
19A(ii) of Listing Notice 1 (GNR 327 of 2017), as amended	The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 5 cubic metres from ... an estuary

The Basic Assessment process includes the technical assessment of impacts (as captured in this report) as well as public participation and inputs from interested and affected parties. Key steps in the process are as follows:



Figure 4: Process flow indicating the general steps and timeframes of a Basic Assessment Process.

IMPACT ASSESSMENT

The proposed dredging is a pollution remediation measure aimed at delivering a range of positive outcomes, including enhanced tidal exchange to support estuarine functioning and resilience,

creation of new intertidal habitats, increased dissolved oxygen levels to disrupt anoxic conditions and reduce odorous hydrogen sulphide emissions, and improved air quality, aesthetics, and recreational value with associated social and economic benefits. Potential negative impacts include direct disturbance and mortality of benthic and estuarine organisms, noise and physical disturbance to species, temporary water quality impacts and avifaunal habitat disruption, and short-term implementation-related nuisances such as noise, odour, and increased activity; however, given the already degraded condition of the lagoon, these impacts are predominantly assessed as low in significance and can be further reduced to negligible levels through the implementation of mitigation measures set out in the EMPr (see **Appendix H1**). As assessed in this report, the positive impacts of dredging as a remediation measure are likely to be limited in extent (since improvements to tidal exchange will occur mainly in the lower lagoon) and duration (as winter flooding may cause the channel to revert to its current channel). This measure is nonetheless recommended as one of the few short- to medium-term interventions available that can feasibly be implemented to help address pollution within the Milnerton Lagoon considering the complimentary maintenance activities ensuring the dredged channel depth is maintained and the estuary mouth kept open.

Crucially, long-term estuarine recovery is dependent on improving water inflow quality from the catchment and reducing pollution from sources like the Potsdam WWTW.

The dredging project, with mitigation, is assessed as having a low positive impact on the estuarine ecosystem, particularly by expanding benthic habitats and potentially supporting bird foraging areas. Overall, the environmental assessment concludes that with recommended mitigation measures in place, the dredging project represents the BPEO, with mostly low or very low residual impacts during the implementation phase, and positive effects in the post-dredging phase. However, impacts on water quality during dredging remain a medium negative concern despite mitigation.

The following table presents a summary of the impacts assessed for the project.

	Preferred Alternative (Dredging without offsite disposal)		Alternative 5 (Dredging with offsite disposal)		No-Go Alternative	
	Without mitigation	With mitigation	Without mitigation	With mitigation	Without mitigation	With mitigation
	IMPLEMENTATION PHASE					
Disturbance to and mortality of estuarine communities in the dredge footprint	Low negative	Low negative	Low negative	Low negative	None	None
Impact to estuarine habitat due to dewatering process	N/A	N/A	Insignificant	Insignificant	None	None
Noise impacts on surrounding estuarine ecology due to dredging activities	Low negative	Very Low negative	Medium negative	Medium negative	None	None
Smothering of estuarine fauna from dredging activities	Low negative	Low negative	Low negative	Low negative	None	None
Impacts on estuarine water quality	Medium negative	Medium negative	Low negative	Low negative	None	None

	Preferred Alternative (Dredging without offsite disposal)		Alternative 5 (Dredging with offsite disposal)		No-Go Alternative	
	Without mitigation	With mitigation	Without mitigation	With mitigation	Without mitigation	With mitigation
Waste generation and improper disposal	Medium negative	Very Low negative	Medium negative	Very Low negative	None	None
Odour impacts on adjacent residents associated with disturbance of sediment during dredging	Low negative	Low negative	Medium negative	Medium-Low negative	Medium negative	Medium negative
Noise impacts on adjacent residents and businesses	Medium negative	Low negative	Medium-High negative	Medium negative	None	None
Dredging-related impacts including dust generation and risk of spills	Medium negative	Very Low negative	Medium-High negative	Low negative	None	None
Sense of Place of park area used for dewatering by adjacent residents during dredging and dewatering activities	No impact	No impact	Medium negative	Medium-Low negative	None	None
Traffic disruption during dredging activities	Low negative	Very Low negative	Medium negative	Low negative	None	None
	POST-DREDGING PHASE					
Impacts of proposed dredging on magnitude of the estuarine tidal prism	Low positive	Low positive	Low positive	Low positive	Low negative	Very Low negative
Impacts of a deeper channel at the mouth of nutrient-enriched fine sediments settlement and flushing	Very Low positive	Very Low positive	Very Low positive	Very Low positive	Low negative	Very Low negative
Impacts on estuarine health linked to new intertidal areas resulting from sediment enrichment	Very Low positive	Very Low positive	Very Low positive	Very Low positive	Low negative	Low negative

EAP'S RECOMMENDATION

Based on the findings of the specialist study and on the other factors considered in the impact assessment, it is recommended that the dredging of the Milnerton Lagoon **should receive environmental authorisation**. It is the Environmental Assessment Practitioner's considered opinion that the proposal promotes the two constitutional imperatives relating to the environment as contained in Section 24 of the Bill of Rights (Subsection 7(2) of the Constitution of the Republic of South Africa, 1996):

"Everyone has the right—

(a) to an environment that is not harmful to their health or wellbeing; and

(b) to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that—

(i) prevent pollution and ecological degradation;

(ii) promote conservation; and

(iii) secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development."

Remediating urban pollution impacts on the Milnerton Lagoon is an urgent priority, in light of the ecological, social, and economic impacts of the ongoing water quality and odour issues on surrounding residents and businesses (as described in greater detail within **Section 8** of the report). Dredging of the lower lagoon is one component of the required remedial and pollution abatement actions and is recommended as a short- to medium-term measure to improve hydrodynamic functioning and maximise the amount of tidal flushing in the lower lagoon.

Sediment samples collected in the lower lagoon in November 2023 as part of the dredging investigations were tested for trace metals as well as a full suite of organic and other contaminants. These samples were specifically targeted to include the areas of highest accumulation of fine sediments. In these samples, six metals (arsenic, cadmium, chromium, lead, nickel, and zinc) were all detected at lower concentrations than those reported in 2021. Guideline values for chronic and acute ecological impact are not currently exceeded, and available data do not suggest that metal contaminants are a significant driver of ecological impact in the Milnerton Lagoon.

Sediment quality is currently a pressing ecological concern in the Milnerton Lagoon only to the extent that it impacts on water quality. Water quality in flows entering the lagoon is so poor that sediment in the lagoon is not thought to be having a significant impact on oxygen levels. The biological and chemical oxygen demand of influent pollution, including both raw and poorly treated effluent, has created conditions of high and unmet oxygen demand in water entering the lagoon. There is in fact no oxygen in the water that could be taken up by the decomposition of organic sediments. This is supported by the fact that although two wet winters flushed much of the fine sediment from the lagoon into the sea, oxygen levels have remained at and near zero (barring brief periods of improved tidal flushing that brought oxygen rich seawater into the lagoon).

In other words, in the recent past, the high organic content of sediments in the lower lagoon is believed to have been a significant contributor to oxygen deficiencies and resultant odour production, but water quality has now deteriorated to such a point that no amount of sediment removal can address the challenge. Dredging therefore targets the improvement of hydrodynamic functioning to improve water quality and reduce odour in the lower lagoon while measures to improve influent water quality are underway.

The alternative that includes offsite disposal of sediment is not preferred since this alternative involves dewatering operations, would use limited landfill space, and involves transport and loading to move sediment off-site to an appropriate and capacitated landfill site, as well as odour and nuisance

impacts associated with the dewatering area without offering any significant, additional hydrodynamic or water quality benefits over the preferred alternative.

Dredging of the Milnerton Lagoon is not in itself expected to contribute significantly to improving water quality or amenity value of this waterbody other than by improving tidal flushing of the lower part of the lagoon. Upstream pollution sources remain the primary cause of poor water quality and odour in the lower lagoon, and it is emphasised that upstream measures to reduce and mitigate the flow of polluted runoff into the lagoon are the most critical aspect of the City of Cape Town's response to the current situation. As assessed in this report, the positive impacts of the dredging are likely to be limited in extent (with tidal interchange improved only in the lower lagoon) and duration (with winter flooding potentially resulting in a return to the current channel profile). The dredging of the lower lagoon is therefore only recommended after some improvement in water quality occurs (particularly that the 90th percentile of oxygen concentrations in bottom waters be above the 1.0 mg/L threshold over a three-month period with weekly monitoring, and the 90th percentile in mid- and surface water concentrations be above 2.0 mg/L.), ensuring that the intervention coincides with improvements in upstream water quality. This remediation measure is recommended as a short- to medium-term intervention that can feasibly be implemented to ameliorate the pollution of the lagoon. The no-go alternative, which entails the maintenance of the *status quo*, is not recommended.

It is imperative that the City of Cape Town implement the upstream interventions specified in its various pollution abatement plans, directives, and catchment strategies, with urgency, and that these interventions will reduce the loading of inflowing pollutants to the lagoon.

To ensure the effective implementation of the relevant mitigation and management actions, an Environmental Management Programme (EMPr) is included as **Appendix H1** of this Final BAR. The mitigation measures necessary to ensure that the project is planned, implemented, and operated in an environmentally responsible and sustainable manner are listed in the EMPr. The EMPr should be updated regularly and provide clear and implementable measures for the establishment and operation of the proposed dredging.

PUBLIC PARTICIPATION

Potential interested and affected parties (I&APs) were invited to comment on the Draft BAR and its associated appendices for a 30-day review and comment period, and to register as I&APs. I&APs were required to provide contact information and a declaration of any interest they had in the application in order to register. The comment period on the Draft BAR and its appendices commenced on Wednesday, 05 November 2025 and ended on Friday, 05 December 2025.

I&APs were invited to review the draft Basic Assessment Report, and comment using any of the following methods:



Online at www.infinityenv.co.za/public/milnertondredging



By email to milnertondredging@infinityenv.co.za



By WhatsApp message to [060 524 7676](https://wa.me/0605247676)



The 30-day commenting period started on Wednesday, 5 November 2025 and ended on Friday, 5 December 2025.

A register of I&APs who commented, requested registration, or attended a public open day has been maintained (see **Appendix F**).

Notification letters were posted or emailed on 05 November 2025 to all identified I&APs informing them of the proposal and the opportunity to comment on the Draft BAR during the respective commenting period (refer to the **Appendix F**). Site notices were also displayed adjacent to the site, and a media notice was published in a local newspaper (refer to **Appendix F** and **F** respectively) on 05 November 2025. The Draft BAR was made available for download at www.infinityenv.co.za/public/milnertondredging. A hard copy of the Draft BAR and its appendices was made available in the Milnerton Public Open Library for the duration of the public participation process.

Members of the public were also invited to a Public Open House, which took place on 19 November 2025 at the Italian Club of Cape Town (see **Appendix F** for proof).

All registered I&APs will continue to receive communication regarding the proposed project and will be notified of any future opportunities for comment.

PROCESSING OF PERSONAL INFORMATION

Infinity Environmental is required by the Environmental Impact Assessment (EIA) Regulations of 2014, as amended and the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended, to maintain a register of I&APs including people who have commented, attended meetings, or requested registration. This requires Infinity to collect and process certain personal information as defined in the Protection of Personal Information Act, 2013 (Act No. 4 of 2013), as amended. The following personal information has been collected, with the required consent, for the purpose of public participation from registered I&APs and was collected from anyone who commented or registered on the project:

- Name, contact details and address.
- A copy of any comments submitted; and
- Details of any interest declared in the granting or refusal of the application.

Should you have registered and/or commented on the Draft BAR and its appendices, your name and your comments have been included in published documents. Your contact details, address, and interest declaration have been provided to the competent authority and must also be provided to any appellants in the event that the environmental authorisation is appealed in terms of the National Appeal Regulations, G.N.R 5989 of 2025. Personal information will be stored by Infinity Environmental (Pty) Ltd at 2 Fir Street, Observatory 7925, and on a cloud storage system, which may include servers outside the Republic of South Africa. You may at any time request access to or rectify this personal information by contacting us on info@infinityenv.co.za.

Visit www.infinityenv.co.za/legal to view our Privacy Policy

REPORT OVERVIEW

	Executive Summary
Section A	<u>Administrative Details</u>
Section B	<u>Confirmation of specific project details</u>
Section C	<u>Legislation, policies and guidelines or protocols</u>
Section D	<u>Applicable listed activities</u>
Section E	<u>Planning context and need and desirability</u>
Section F	<u>Public participation</u>
Section G	<u>Description of the receiving environment</u>
Section H	<u>Alternatives, methodology and assessment of alternatives</u>
Section I	<u>Findings, impact management and mitigation measures</u>
Section J	<u>General</u>
Declarations	
Appendices	

ABBREVIATIONS

ha	Hectare
m ²	Square metre
BAR	Basic Assessment Report
BPEO	Best Practicable Environmental Option
CBA	Critical Biodiversity Area
DEA&DP	Department of Environmental Affairs and Development Planning
DWS	National Department of Water and Sanitation
DO	Dissolved Oxygen
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
EIA Regulations	Environmental Impact Assessment Regulations of 2014, as amended
EMPr	Environmental Management Programme
ESA	Ecological Support Area
I&AP	Interested and Affected Party
NEMA	National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended
NEMBA	National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004), as amended
NHRA	National Heritage Resources Act, 1999 (Act No. 25 of 1999), as amended
NWA	National Water Act, 1998 (Act No. 36 of 1998), as amended
SDF	Spatial Development Framework
ToR	Terms of Reference

Summary of how the requirements of Appendix 1 of the 2014 NEMA EIA Regulations of 2014 (as amended) are met by this BAR:

Appendix 1 requirement	Section of BAR
1) A basic assessment report must contain the information that is necessary for the competent authority to consider and come to a decision on the application, and must include-	
(a) details of – i. the EAP who prepared the report; and ii. the expertise of the EAP, including a curriculum vitae;	A <i>EAP is EAPASA-registered</i>
(b) the location of the activity, including (i) the 21 digit Surveyor General code of each cadastral land parcel; (ii) where available, the physical address and farm name; (iii) where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties;	B - 4.6 B - 4.4 B - 4.7
(c) a plan which locates the proposed activity or activities applied for as well as associated structures and infrastructure at an appropriate scale; or, if it is- (i) a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or (ii) on land where the property has not been defined, the coordinates within which the activity (iii) is to be undertaken;	Appendix B1
(d) a description of the scope of the proposed activity, including (i) all listed and specified activities triggered and being applied for; and (ii) a description of the activities to be undertaken including associated structures and infrastructure;	D B - 4.4
(e) a description of the policy and legislative context within which the development is proposed including- (i) an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks, and instruments that are applicable to this activity and have been considered in the preparation of the report; and (ii) how the proposed activity complies with and responds to the legislation and policy context, plans, guidelines, tools frameworks, and instruments	E
(f) a motivation for the need and desirability for the proposed development including the need and desirability of the activity in the context of the preferred location	E, H Appendix K
(g) a motivation for the preferred site, activity and technology alternative;	H
(h) a full description of the process followed to reach the proposed preferred alternative within the site, including – (i) details of all the alternatives considered; (ii) details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs; (iii) a summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them; (iv) the environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects; (v) the impacts and risks identified for each alternative, including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts- (aa) can be reversed; (bb) may cause irreplaceable loss of resources; and (cc) can be avoided, managed or mitigated; (vi) the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives; (vii) positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects; (viii) the possible mitigation measures that could be applied and level of residual risk; (ix) the outcome of the site selection matrix;	H and I

(x) if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such; and (xi) a concluding statement indicating the preferred alternatives, including preferred location of the activity;	
(i) a full description of the process undertaken to identify, assess and rank the impacts the activity will impose on the preferred location through the life of the activity, including– (i) a description of all environmental issues and risks that were identified during the environmental impact assessment process; and (ii) an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures;	I
(j) an assessment of each identified potentially significant impact and risk, including– (i) cumulative impacts; (ii) the nature, significance and consequences of the impact and risk; (iii) the extent and duration of the impact and risk; (iv) the probability of the impact and risk occurring; (v) the degree to which the impact and risk can be reversed; (vi) the degree to which the impact and risk may cause irreplaceable loss of resources; and (vii) the degree to which the impact and risk can be avoided, managed or mitigated;	I
(k) where applicable, a summary of the findings and impact management measures identified in any specialist report complying with Appendix 6 to these Regulations and an indication as to how these findings and recommendations have been included in the final report;	I
(l) an environmental impact statement which contains– (i) a summary of the key findings of the environmental impact assessment; (ii) a map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred site indicating any areas that should be avoided, including buffers; and (iii) a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives;	J Appendix B2 J
(m) based on the assessment, and where applicable, impact management measures from specialist reports, the recording of the proposed impact management outcomes for the development for inclusion in the EMPr;	J - 2.1
(n) any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation;	J - 2.2
(o) a description of any assumptions, uncertainties, and gaps in knowledge which relate to the assessment and mitigation measures proposed;	J - 2.4
(p) a reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation;	J - 2.3
(q) where the proposed activity does not include operational aspects, the period for which the environmental authorisation is required, the date on which the activity will be concluded, and the post construction monitoring requirements finalised;	J - 2.5
(r) an undertaking under oath or affirmation by the EAP in relation to– (i) the correctness of the information provided in the reports; (ii) the inclusion of comments and inputs from stakeholders and I&APs; (iii) the inclusion of inputs and recommendations from the specialist reports where relevant; and (iv) any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested and affected parties; and	K
(s) where applicable, details of any financial provisions for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts;	n/a
(t) any specific information that may be required by the competent authority; and	n/a
(u) any other matters required in terms of section 24(4)(a) and (b) of the Act.	n/a



Western Cape
Government

Department of Environmental Affairs and
Development Planning

BASIC ASSESSMENT REPORT

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

APRIL 2024

BASIC ASSESSMENT REPORT

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

APRIL 2024

(For official use only)	
Pre-application Reference Number (if applicable):	
EIA Application Reference Number:	
NEAS Reference Number:	
Exemption Reference Number (if applicable):	
Date BAR received by Department:	
Date BAR received by Directorate:	
Date BAR received by Case Officer:	

GENERAL PROJECT DESCRIPTION

(This must include an overview of the project including the Farm name/Portion/Erf number)

Proposed Dredging of the Milnerton Lagoon in the Diep River Estuary, Erf 20315, Milnerton, Cape Town

IMPORTANT INFORMATION TO BE READ PRIOR TO COMPLETING THIS BASIC ASSESSMENT REPORT

- The purpose** of this template is to provide a format for the Basic Assessment report as set out in Appendix 1 of the National Environmental Management Act, 1998 (Act No. 107 of 1998) ("NEMA"), Environmental Impact Assessment ("EIA") Regulations, 2014 (as amended) in order to ultimately obtain Environmental Authorisation.
- The Environmental Impact Assessment ("EIA") Regulations is defined in terms of Chapter 5 of the National Environmental Management Act, 1998 (Act No. 107 of 1998) ("NEMA") hereinafter referred to as the "NEMA EIA Regulations".
- Submission of documentation, reports and other correspondence:*
The Department has adopted a digital format for corresponding with proponents/applicants or the general public. If there is a conflict between this approach and any provision in the legislation, then the provisions in the legislation prevail. If there is any uncertainty about the requirements or arrangements, the relevant Competent Authority must be consulted.

The Directorate: Development Management has created generic e-mail addresses for the respective Regions, to centralise their administration. Please make use of the relevant general administration e-mail address below when submitting documents:

DEADPEIAAdmin@westerncape.gov.za

Directorate: Development Management (Region 1):
City of Cape Town; West Coast District Municipal area;
Cape Winelands District Municipal area and Overberg District Municipal area.

DEADPEIAAdmin.George@westerncape.gov.za

Directorate: Development Management (Region 3):
Garden Route District Municipal area and Central Karoo District Municipal area

General queries must be submitted via the general administration e-mail for EIA related queries. Where a case-officer of DEA&DP has been assigned, correspondence may be directed to such official and copied to the relevant general administration e-mail for record purposes.

All correspondence, comments, requests and decisions in terms of applications, will be issued to either the applicant/requester in a digital format via email, with digital signatures, and copied to the Environmental Assessment Practitioner ("EAP") (where applicable).

4. The required information must be typed within the spaces provided in this Basic Assessment Report ("BAR"). The sizes of the spaces provided are not necessarily indicative of the amount of information to be provided.
5. All applicable sections of this BAR must be completed.
6. Unless protected by law, all information contained in, and attached to this BAR, will become public information on receipt by the Competent Authority. If information is not submitted with this BAR due to such information being protected by law, the applicant and/or Environmental Assessment Practitioner ("EAP") must declare such non-disclosure and provide the reasons for believing that the information is protected.
7. This BAR is current as of **April 2024**. It is the responsibility of the Applicant/ EAP to ascertain whether subsequent versions of the BAR have been released by the Department. Visit this Department's website at <http://www.westerncape.gov.za> to check for the latest version of this BAR.
8. This BAR is the standard format, which must be used in all instances when preparing a BAR for Basic Assessment applications for an environmental authorisation in terms of the NEMA EIA Regulations when the Western Cape Government Department of Environmental Affairs and Development Planning ("DEA&DP") is the Competent Authority.
9. Unless otherwise indicated by the Department, one hard copy and one electronic copy of this BAR must be submitted to the Department at the postal address given below or by delivery thereof to the Registry Office of the Department. Reasonable access to copies of this Report must be provided to the relevant Organs of State for consultation purposes, which may, if so indicated by the Department, include providing a printed copy to a specific Organ of State.
10. This BAR must be duly dated and originally signed by the Applicant, EAP (if applicable) and Specialist(s) and must be submitted to the Department at the details provided below.
11. The Department's latest Circulars pertaining to the "One Environmental Management System" and the EIA Regulations, any subsequent Circulars, and guidelines must be taken into account when completing this BAR.
12. Should a water use licence application be required in terms of the National Water Act, 1998 (Act No. 36 of 1998) ("NWA"), the "One Environmental System" is applicable, specifically in terms of the synchronisation of the consideration of the application in terms of the NEMA and the NWA. Refer to this Department's Circular EADP 0028/2014: One Environmental Management System.
13. Where Section 38 of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) ("NHRA") is triggered, a copy of Heritage Western Cape's final comment must be attached to the BAR.
14. The Screening Tool developed by the National Department of Environmental Affairs must be used to generate a screening report. Please use the Screening Tool link <https://screening.environment.gov.za/screeningtool> to generate the Screening Tool Report. The screening tool report must be attached to this BAR.
15. Where this Department is also identified as the Licencing Authority to decide on applications under the National Environmental Management: Air Quality Act (Act No. 29 of 2004) ("NEM:AQA"), the submission of the Report must also be made as follows, for-
Waste Management Licence Applications, this report must also (i.e., another hard copy and electronic copy) be submitted for the attention of the Department's Waste Management Directorate (Tel: 021-483-2728/2705 and Fax: 021-483-4425) at the same postal address as the Cape Town Office.

Atmospheric Emissions Licence Applications, this report must also be (i.e., another hard copy and electronic copy) submitted for the attention of the Licensing Authority or this Department's Air Quality Management Directorate (Tel: 021 483 2888 and Fax: 021 483 4368) at the same postal address as the Cape Town Office.

DEPARTMENTAL DETAILS	
CAPE TOWN OFFICE: DIRECTORATE: DEVELOPMENT MANAGEMENT (REGION 1) (City of Cape Town, West Coast District, Cape Winelands District & Overberg District)	GEORGE REGIONAL OFFICE: DIRECTORATE: DEVELOPMENT MANAGEMENT (REGION 3) (Central Karoo District & Garden Route District)
The completed Form must be sent via electronic mail to: DEADPEIAAdmin@westerncape.gov.za	The completed Form must be sent via electronic mail to: DEADPEIAAdmin.George@westerncape.gov.za
Queries should be directed to the Directorate: Development Management (Region 1) at: E-mail: DEADPEIAAdmin@westerncape.gov.za Tel: (021) 483-5829	Queries should be directed to the Directorate: Development Management (Region 3) at: E-mail: DEADPEIAAdmin.George@westerncape.gov.za Tel: (044) 814-2006
Western Cape Government Department of Environmental Affairs and Development Planning Attention: Directorate: Development Management (Region 1) Private Bag X 9086 Cape Town, 8000	Western Cape Government Department of Environmental Affairs and Development Planning Attention: Directorate: Development Management (Region 3) Private Bag X 6509 George, 6530

MAPS

Provide a location map (see below) as Appendix A1 to this BAR that shows the location of the proposed development and associated structures and infrastructure on the property.	
Locality Map:	The scale of the locality map must be at least 1:50 000. For linear activities or development proposals of more than 25 kilometres, a smaller scale e.g., 1:250 000 can be used. The scale must be indicated on the map. The map must indicate the following: <ul style="list-style-type: none"> • an accurate indication of the project site position as well as the positions of the alternative sites, if any; • road names or numbers of all the major roads as well as the roads that provide access to the site(s) • a north arrow; • a legend; and • a linear scale. For ocean based or aquatic activity, the coordinates must be provided within which the activity is to be undertaken and a map at an appropriate scale clearly indicating the area within which the activity is to be undertaken. Where comment from the Western Cape Government: Transport and Public Works is required, a map illustrating the properties (owned by the Western Cape Government: Transport and Public Works) that will be affected by the proposed development must be included in the Report.
Provide a detailed site development plan / site map (see below) as Appendix B1 to this BAR; and if applicable, all alternative properties and locations.	
Site Plan:	Detailed site development plan(s) must be prepared for each alternative site or alternative activity. The site plans must contain or conform to the following: <ul style="list-style-type: none"> • The detailed site plan must preferably be at a scale of 1:500 or at an appropriate scale. The scale must be clearly indicated on the plan, preferably together with a linear scale. • The property boundaries and numbers of all the properties within 50m of the site must be indicated on the site plan. • On land where the property has not been defined, the co-ordinates of the area in which the proposed activity or development is proposed must be provided. • The current land use (not zoning) as well as the land use zoning of each of the adjoining properties must be clearly indicated on the site plan. • The position of each component of the proposed activity or development as well as any other structures on the site must be indicated on the site plan.

	<ul style="list-style-type: none"> Services, including electricity supply cables (indicate aboveground or underground), water supply pipelines, boreholes, sewage pipelines, storm water infrastructure and access roads that will form part of the proposed development must be clearly indicated on the site plan. Servitudes and an indication of the purpose of each servitude must be indicated on the site plan. Sensitive environmental elements within 100m of the site must be included on the site plan, including (but not limited to): <ul style="list-style-type: none"> Watercourses / Rivers / Wetlands Flood lines (i.e., 1:100 year, 1:50 year and 1:10 year where applicable); Coastal Risk Zones as delineated for the Western Cape by the Department of Environmental Affairs and Development Planning ("DEA&DP"); Ridges; Cultural and historical features/landscapes; Areas with indigenous vegetation (even if degraded or infested with alien species). Whenever the slope of the site exceeds 1:10, a contour map of the site must be submitted. North arrow <p>A map/site plan must also be provided at an appropriate scale, which superimposes the proposed development and its associated structures and infrastructure on the environmental sensitivities of the preferred and alternative sites indicating any areas that should be avoided, including buffer areas.</p>
Site photographs	Colour photographs of the site that shows the overall condition of the site and its surroundings (taken on the site and taken from outside the site) with a description of each photograph. The vantage points from which the photographs were taken must be indicated on the site plan, or locality plan as applicable. If available, please also provide a recent aerial photograph. Photographs must be attached to this BAR as Appendix C . The aerial photograph(s) should be supplemented with additional photographs of relevant features on the site. Date of photographs must be included. Please note that the above requirements must be duplicated for all alternative sites.
Biodiversity Overlay Map:	A map of the relevant biodiversity information and conditions must be provided as an overlay map on the property/site plan. The Map must be attached to this BAR as Appendix D .
Linear activities or development and multiple properties	GPS co-ordinates must be provided in degrees, minutes and seconds using the Hartebeeshoek 94 WGS84 co-ordinate system. Where numerous properties/sites are involved (linear activities) you must attach a list of the Farm Name(s)/Portion(s)/Erf number(s) to this BAR as an Appendix. For linear activities that are longer than 500m, please provide a map with the co-ordinates taken every 100m along the route to this BAR as Appendix A3 .

ACRONYMS

BAR	Basic Assessment Report
BCLME	Benguela Current Large Marine Ecosystem
DAFF:	Department of Forestry and Fisheries
DEA:	Department of Environmental Affairs
DEA&DP:	Department of Environmental Affairs and Development Planning
DFFE:	Department of Forestry, Fisheries and the Environment
DHS:	Department of Human Settlement
DO:	Dissolved Oxygen
DoA:	Department of Agriculture
DoH:	Department of Health
DWS:	Department of Water and Sanitation
EMPr:	Environmental Management Programme
EMF:	Environmental Management Framework
HWC:	Heritage Western Cape
MSDF:	Municipal Spatial Development Framework
NFEPA:	National Freshwater Ecosystem Protection Assessment
NSBA:	National Spatial Biodiversity Assessment
PSDF:	Provincial Spatial Development Framework
UOD:	Underwater Offshore Disposal
SDF:	Spatial Development Framework
TOR:	Terms of Reference
WCBSP:	Western Cape Biodiversity Spatial Plan
WCG:	Western Cape Government

ATTACHMENTS

Note: The Appendices must be attached to the BAR as per the list below. Please use a ✓ (tick) or a x (cross) to indicate whether the Appendix is attached to the BAR.

The following checklist of attachments must be completed.

APPENDIX			✓ (Tick) or x (cross)
Appendix A:	Maps		
	Appendix A1:	Locality Map	✓
	Appendix A2:	Coastal Risk Zones as delineated in terms of NEM:ICMA for the Western Cape by the Department of Environmental Affairs and Development Planning	N/A See EFZ map appended as A2
	Appendix A3:	Map with the GPS co-ordinates for linear activities	N/A
Appendix B:	Appendix B1:	Site development plan(s)	Refer to Figures 2 & 3
	Appendix B2	A map of appropriate scale, which superimposes the proposed development and its associated structures and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that should be avoided, including buffer areas;	✓
Appendix C:	Photographs		✓
Appendix D:	Biodiversity overlay map		Refer to Appendix B2
Appendix E:	Permit(s) / license(s) / exemption notice, agreements, comments from State Department/Organs of state and service letters from the municipality.		
	Appendix E1:	Final comment/ROD from HWC	Not applicable
	Appendix E2:	Copy of comment from Cape Nature	None received
	Appendix E3:	Final Comment from the DWS <i>Email correspondence with DWS confirming that the proposed dredging does not involve any water uses</i>	✓
	Appendix E4:	Comment from the DEA: Oceans and Coast	None received
	Appendix E5.1:	Comment from the DFFE <i>Comment received on 09 September 2025 confirming that no Dumping at Sea Permit is required for the proposed Dredging (i.e., Option 1).</i>	✓

	Appendix E5.2:	Comment from the DFFE: <i>30 May 2023 confirming that no CWDP is required, and comment received.</i>	✓ Refer to Appendix F for comment on dBAR
	Appendix E6:	Comment from WCG: Transport and Public Works	N/A
	Appendix E7:	Comment from WCG: DoA	N/A
	Appendix E8:	Comment from WCG: DHS	N/A
	Appendix E9:	Comment from WCG: DoH	N/A
	Appendix E10:	Comment from DEA&DP: Pollution Management	None received
	Appendix E11:	Comment from DEA&DP: Waste Management	None received
	Appendix E12:	Comment from DEA&DP: Biodiversity and Coastal Management	Refer to Appendix F
	Appendix E13:	Comment from DEA&DP: Air Quality	None received yet
	Appendix E14:	Comment from DEA&DP: Coastal Management	Refer to Appendix E12
	Appendix E15:	Comment from the local authority	Refer to Appendix F
	Appendix E16:	Confirmation of all services (water, electricity, sewage, solid waste management)	N/A
	Appendix E17:	Comment from the District Municipality	Refer to Appendix F
	Appendix E18:	Copy of an exemption notice	N/A
	Appendix E19:	Pre-approval for the reclamation of land	N/A
	Appendix E20:	Proof of agreement/TOR of the specialist studies conducted.	Refer to specialist reports (Appendix G)
	Appendix E21:	Proof of land use rights - Zoning Map	✓

	Appendix E22:	Proof of public participation agreement for linear activities	N/A
Appendix F:	Public participation information: including a copy of the register of I&APs, the comments and responses Report, proof of notices, advertisements and any other public participation information as is required.		✓
Appendix G:	Specialist Report(s)		
	Appendix G1:	Estuarine Impact Assessment and Hydrodynamic Modelling Report for the Dredging of Milnerton Lagoon, Cape Town by Anchor Environmental Consultants (2025)	✓
	Appendix G2:	Avifauna Compliance Statement by AVISENSE Africa (2025)	✓
Appendix H:	Appendix H1:	Environmental Management Programme	✓
	Appendix H2:	Maintenance Management Plan	✓
Appendix I:	Appendix I1:	DFFE Screening Tool Report	✓
	Appendix I2:	Site Sensitivity Verification Report	✓
Appendix J:	The impact and risk assessment for each alternative		X
Appendix K:	Need and desirability for the proposed activity or development in terms of this Department's guideline on Need and Desirability (March 2013)/DEA Integrated Environmental Management Guideline		✓
<u>Appendix L:</u>	<u>Curriculum Vitae of the EAP</u>		<u>✓</u>
<u>Appendix M:</u>	<u>Diep River Estuarine Management Plan</u>		<u>✓</u>

SECTION A: ADMINISTRATIVE DETAILS

Highlight the Departmental Region in which the intended application will fall	CAPE TOWN OFFICE: REGION 1		GEORGE OFFICE: BEGION 3
	(City of Cape Town, West Coast District)	(Cape Winelands District & Overberg District)	(Central Karoo District & Garden Route District)
Duplicate this section where there is more than one Proponent Name of Applicant/Proponent: Name of contact person for Applicant/Proponent (if other): Company/ Trading name/State Department/Organ of State: Company Registration Number: Postal address: Telephone: E-mail:	City of Cape Town		
	Chandre Rhoda		
	City of Cape Town: Environmental Management Department, Biodiversity Management Branch		
	N/A		
	Civic Centre, Hertzog Boulevard		
	Cape Town		Postal code: 8000
	021 444 7793		Cell: 076 625 6395
	Chandre.Rhoda@capetown.gov.za		Fax:
	Company of EAP: Infinity Environmental		
	EAP name: Jeremy Rose		
Postal address: Suite 17, Private Bag X11			
Mowbray		Postal code: 7705	
(021) 834 1602		Cell: 084 055 5678	
jeremy@infinityenv.co.za; tayla@infinityenv.co.za; kelly@infinityenv.co.za;		Fax:	
Qualifications: J Rose (EAP): B.Sc. Environmental and Geographic Science (Hons) T Hobson (Reg. EAP): M.Sc. Environment, Society and Sustainability K Gilmour (Candidate EAP): M.Sc. Biological Science			
EAP registration no: J Rose: 2019/1116 T Hobson: 2019/1018 K Gilmour: 2024/8037			
Duplicate this section where there is more than one landowner Name of landowner: Name of contact person for landowner (if other): Postal address: Telephone: E-mail:	City of Cape Town		
	Rachel Schnackenberg		
	Civic Centre, Hertzog Boulevard		
	Cape Town		Postal code: 8000
	+27(0) 21 444 7793		Cell:
	Rachel.schnackenberg@capetown.gov.za		Fax:
	Name of Person in control of the land: City of Cape Town		
Name of contact person for person in control of the land: Regional Head: Biodiversity Management Branch - Northern Region			
Dalton Gibbs			
Postal address:		Postal code:	
Telephone: (021) 444 7792		Cell:	

E-mail:	Dalton.gibbs@capetown.gov.za	Fax: ()
---------	------------------------------	----------

Duplicate this section where there is more than one Municipal Jurisdiction Municipality in whose area of jurisdiction the proposed activity will fall: Contact person: Postal address: Telephone E-mail:	City of Cape Town: Environmental and Heritage Management Branch - Northern Region (Milnerton and Kraaifontein Districts)	
	Sonja Warnich-Stemmet	
	87 Pienaar Road	
	Milnerton	Postal code:
	021 444 0598	Cell:
	sonja.warnichstemmet@capetown.gov.za	Fax:

SECTION B: CONFIRMATION OF SPECIFIC PROJECT DETAILS AS INCLUDED IN THE APPLICATION FORM

1.	Is the proposed development (please tick):	New		Expansion	
	The proposed activities are neither development nor expansion.				
2.	Is the proposed site(s) a brownfield of greenfield site? Please explain.				
N/A - although the Milnerton Lagoon has been extensively modified and transformed because of development around the estuary and pollution input within the catchment itself, the terms 'brownfield' and 'greenfield' are typically applied to development applications and are not directly relevant to the proposed activity.					
3.	For Linear activities or developments				
3.1.	Provide the Farm(s)/Farm Portion(s)/Erf number(s) for all routes:				
3.2.	Development footprint of the proposed development for all alternatives.				m ²
3.3.	Provide a description of the proposed development (e.g. for roads the length, width and width of the road reserve in the case of pipelines indicate the length and diameter) for all alternatives.				
3.4.	Indicate how access to the proposed routes will be obtained for all alternatives.				
3.5.	SG Digit codes of the Farms/Farm Portions/Erf numbers for all alternatives				
	SG Code:				
3.6.	Starting point co-ordinates for all alternatives				
	Latitude (S)	°	'	''	
	Longitude (E)	°	'	''	
	Middle point co-ordinates for all alternatives				
	Latitude (S)	°	'	''	
	Longitude (E)	°	'	''	
	End point co-ordinates for all alternatives				
	Latitude (S)	°	'	''	
	Longitude (E)	°	'	''	

Note: For Linear activities or developments longer than 500m, a map indicating the co-ordinates for every 100m along the route must be attached to this BAR as Appendix A3.

4.	Other developments	
4.1.	Property size(s) of all proposed site(s):	859168.2 m ²
4.2.	Developed footprint of the existing facility and associated infrastructure (if applicable):	N/A
4.3.	Development footprint of the proposed development and associated infrastructure size(s) for all alternatives:	Approximately 102 731 m ² (10.3 ha)
4.4.	Provide a detailed description of the proposed development and its associated infrastructure (This must include details of e.g. buildings, structures, infrastructure, storage facilities, sewage/effluent treatment and holding facilities).	

Project Background

Site Location

The Milnerton Lagoon is the well-known lower part of the Diep River Estuary where the Diep River enters the sea at Lagoon Beach in Cape Town (refer to **Figure 1** above) and extends from the Otto du Plessis road bridge over the estuary to the mouth between Woodbridge Island and Lagoon Beach. Rietvlei wetland, fed by the Diep River habitat, is located north of the Milnerton Lagoon and is 5 km north-east of the Cape Town harbour. The Diep River originates in the Riebeeek Kasteel Mountains north-east of the town of Malmesbury, flowing south-west for approximately 65 km towards the estuary in Cape Town. The lower catchment of the Diep River in Cape Town is highly urbanised, and the estuary is confined to a channel stabilised by road embankments and bridges with a maximum width of 150 m. The estuary mouth naturally migrates between a gabion structure and concrete wall to the south and the Woodbridge Island, a naturally raised area approximately 250 m north of the mouth.

Water quality impacts in the Milnerton Lagoon

The Diep River estuary is a highly modified system and is affected by high levels of pollution and other human activities. Water quality in the lagoon has declined significantly in recent years due to ongoing high levels of pollution and other anthropogenic impacts. The effects of poor water quality within the estuary include a sulphurous odour and discoloured water, due to high levels of suspended solids and extremely low oxygen levels.

Flows in the estuary are seasonally variable, with significantly reduced or non-existent flows from the upstream catchment during summer, while constant WWTW discharge remains the majority of flows during the drier summer months. In the Diep River catchment, extensive agriculture covers more than half the land surface. This increases siltation in the river, contributes to high nutrient loads, and lowers the flow due to abstraction for irrigation purposes.

Sewage-derived pollution is a major contributor to water quality impacts in the estuary, and includes excessive loading of organic solids from the Potsdam wastewater treatment works (WWTW). During 2024 and 2025, the lagoon has also been affected by the discharge of large volumes of untreated sewage because of the episodic failure of the Koeberg Road sewage pump station and its resulting discharges into the Theo Marais stormwater canal upstream of Otto du Plessis Drive).

Other urban impacts include stormwater runoff with contaminant loads from roads, gardens, and industrial areas, and sewage where failing or blocked sewer pipes spill into the stormwater system.

Indicators of sewage pollution in the lagoon include high chemical oxygen demand, nutrient levels (incl. total ammoniacal nitrogen and orthophosphate) and suspended solids, very low levels of

dissolved oxygen, and elevated levels of enterococci and/or *E.coli*. Recent water quality monitoring conducted between November 2024 and February 2025 (Rose et al. 2025a and 2025b) found that:

- » Suspended solids were elevated in the lagoon close to the Potsdam Wastewater Treatment Works (WWTW) and in its final effluent discharge.
- » Anoxic conditions with < 0.5 mg/L of dissolved oxygen dominate in the lagoon upstream of the Wooden Bridge. Low oxygen levels in the lagoon are attributed to the very high (though unmeasured) levels of chemical and biological oxygen demand associated with high organic content and suspended solids from the Potsdam WWTW and the Theo Marais canal.
- » All samples collected within the lagoon and its tributaries or inflowing stormwater channels exceeded bacterial pollution guidelines for intermediate recreational use by at least an order of magnitude, and counts at most sites were well in excess of 100 000 colony-forming unit (cfu)/100 ml for *E. coli* and 5000 cfu/100 ml for enterococci.
- » Various sources of sewage pollution were apparent in the bacterial data, namely the flows from Potsdam WWTW, Theo Marais and Erica Drive. Potsdam WWTW final effluent had *E. coli* counts well above licence thresholds - suggesting a failure in disinfection of treated effluent discharge.
- » Elevated orthophosphate concentrations were apparent in the treated effluent discharge at Potsdam and in increased downstream concentrations of this nutrient. Levels of this nutrient in the lagoon were at or near the highest recorded in the City's inland water quality datasets to date.
- » The highest concentrations of un-ionized ammonia (NH₃) during these sample events were recorded in the upper reaches of the lagoon (≥ 0.7 mg/l between the Erica Drive outflow and the Otto du Plessis bridge). These levels were within the range defined by the Department of Water Affairs and Forestry (DWAF at the time, now Department of Water and Sanitation [DWS]) (1996) as likely to result in acute toxicity to sensitive aquatic organisms.
- » Almost all inorganic nitrogen was in its ammoniacal form, indicating very low levels of nitrification associated with high chemical and biological oxygen demand and low dissolved oxygen availability. Total inorganic nitrogen concentrations were at or near the highest recorded in the inland water quality datasets to date.
- » The conditions observed in the lagoon continue to be conducive to the production of hydrogen sulphide, with anoxic conditions and very high nutrient loading.
- » The data collected remains indicative of extremely poor water quality in the Milnerton Lagoon and suggest the presence of substantial inflows of raw sewage from the Theo Marais canal more significantly given its higher volume and therefore downstream loading, inadequately treated effluent from the Potsdam WWTW.
- » Tidal interchange continues to positively (albeit insufficiently) affect the water quality conditions in the lowest reaches of the lagoon, indicated by the lower counts of faecal indicator bacteria, higher salinity and cooler water temperature in this region particularly on an inflowing tide. Dilution is the driving factor influencing these improvements, as well as die-off of some faecal indicator bacteria in saline conditions. This improvement in water quality due to tidal exchange was not discernible upstream of the Wooden Bridge.

These assessments conclude that the lagoon is impacted by an excessively high loading of organic waste from the Potsdam wastewater treatment works (WWTW), which discharges into the estuary. The existing WWTW is unable to cope with the loading of influent it currently receives and this, coupled with maintenance issues, has resulted in deterioration of final discharge effluent quality. An overall increase in raw sewage flows to the WWTW has been measured in recent years, often exceeding its design capacity of 47 megalitres (ML)/day. The effectiveness of solids removal and biological treatment at this WWTW require urgent attention to reduce its impacts on the Diep River Estuary.

Figure 5 shows the locations of pump stations and sewers in the vicinity of Milnerton Lagoon. Gravity fed sewers convey raw sewage to low points, from where they are pumped in rising mains, eventually

passing into the WWTW. When pump stations fail as a result of sewer blockages, mechanical failure or power outages, sewage builds up, either at the pump station itself, or in the downstream sewers, from where it overflows from the lowest lying manholes. This sewage then drains into the stormwater system and in this way passes into the Diep River system / Milnerton Lagoon. Pump stations are prone to blockages from inappropriate waste that is disposed of into the sewers, and includes bricks, concrete, plastic waste and rags, all of which can block pumps and sewers.

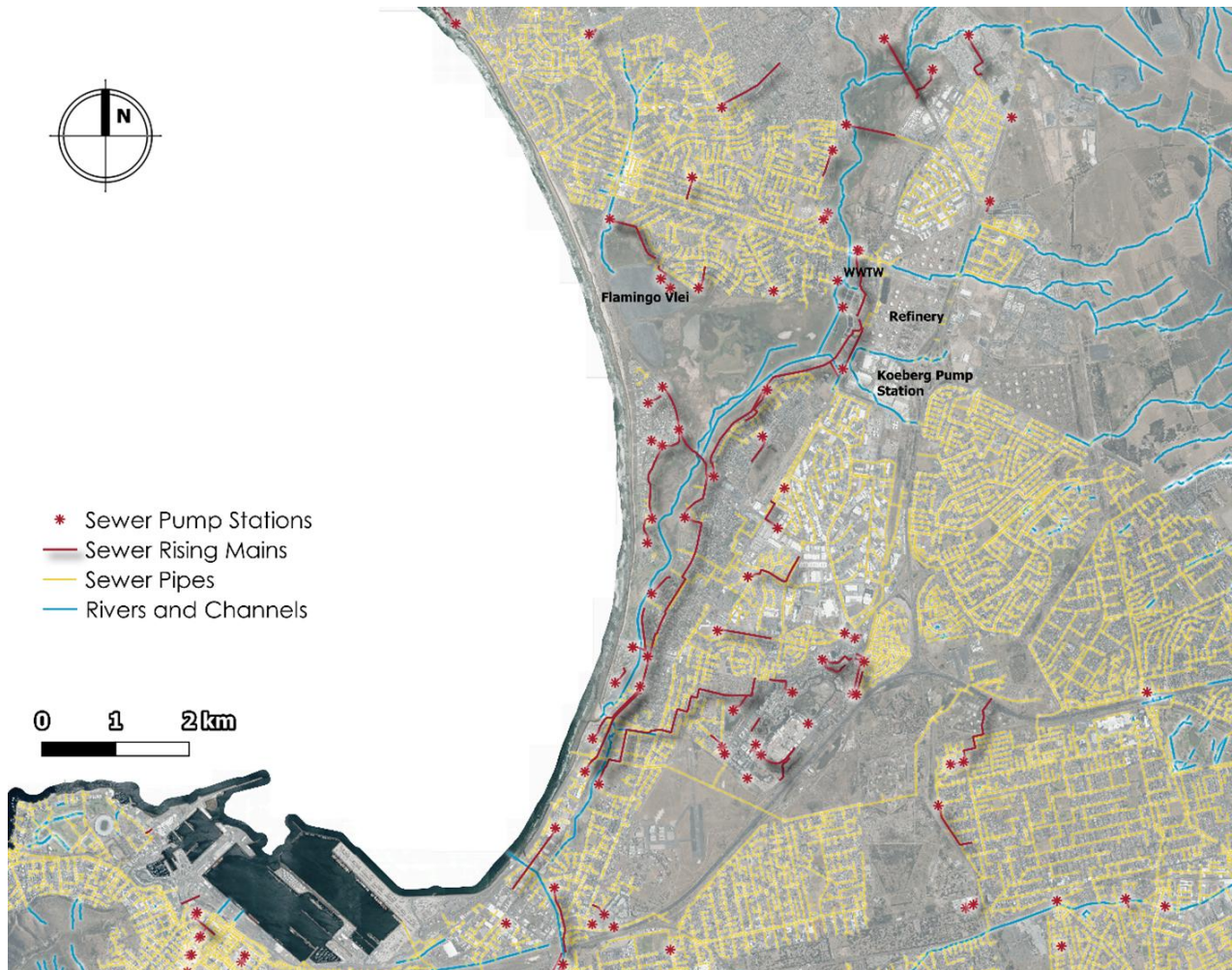


Figure 5: Indication of the locations of pump stations and sewers in the vicinity of the Milnerton Lagoon.

In addition to the ongoing effects of inflowing pollutants, water quality in the lower estuary is affected by the extent to which clean seawater can enter the lagoon during high tides, replacing polluted river flows with cooler, saline water with higher dissolved oxygen concentrations. This daily tidal exchange is dependent on the dynamics of the estuary mouth, coastal processes, and flows from the river. In general, greater tidal exchange has been associated with improved water quality in the lower lagoon (between the Loxton Road bridge and the mouth). Tidal exchange is reduced when the mouth is partially closed; which is influenced by many different factors, including deposition of sediments at the mouth.

Organic sediment impacts in the Milnerton Lagoon

Organic sediments derived from wastewater and urban runoff accumulate on the bed of the estuary over time and are periodically flushed out to sea in large flood events. Accumulated sediments use oxygen from the water column to decompose, and this increased oxygen demand lowers dissolved oxygen concentrations in the estuary. If there is insufficient oxygen available in the water (as is often

the case in the lagoon) anaerobic decomposition may result, producing hydrogen sulphide with its characteristic foul odours.

Prior to major flood events in 2023 and 2024, organic sediments accumulated in the lagoon with limited tidal exchange near the lagoon mouth. Flood events occurred in 2023 and 2024, which resulted in natural scouring of the system and a reduction in the amount of accumulated sediments. Approximately 110 000 m³ sediment was scoured between March 2023 and November 2024. Considering the ongoing ingress of pollution within the lagoon, organic sediment continues to settle and accumulate on the estuary bed; facilitating anaerobic decomposition and persistence of odour within the lagoon.

Planned Pollution Remediation in the Diep River Estuary

Water quality in the Milnerton Lagoon is impacted by multiple pollution sources, as noted above. Current efforts to address these sources of pollution are the subject of a suite of existing plans and projects including the Lower Diep River Transversal Action Plan¹, the 2022 Diep River Estuarine Management Plan (CCT and Infinity., 2022 - [Appendix M of this report](#)), the Rehabilitation Plan for the 2025 Theo Marais canal (Rose *et al.*, 2025) and the Potsdam WWTW upgrade project.

In response to the impacts caused by failing sewage infrastructure. The Applicant, the City of Cape Town ('the City'), has initiated a series of ongoing and planned projects to reduce pollution in the canal and estuary and to upgrade infrastructure across the catchment. Current pollution response actions include routine unblocking and repair of sewers, investigations and enforcement of pollution incidents, increased maintenance frequency at the Koeberg Pump Station, and water pressure reduction in parts of the catchment.

In addition, major infrastructure upgrades are underway or scheduled, including:

- Upgrades and expansion of the Potsdam Wastewater Treatment Works (scheduled for completion by December 2027);
- Capacity upgrade and construction of an overflow pond at Koeberg Road Pump Station (2027);
- Construction of the new Montague Gardens Bulk Sewer (2026);
- Rehabilitation of the Montague Drive Bulk Sewer (2027);
- Upgrades to the Phoenix Park Pump Station (2028); and
- Upgrades to the Sandrif East Pump Station (2027).

A Water Quality Remediation Plan for the Milnerton Lagoon prepared for the City of Cape Town in 2023 (Rose *et al.*, 2023 – referred to as '2023 Remediation Plan') assessed various short-, medium- and long-term remediation measures proposed for the lagoon and recommended that the primary focus should be on reducing pollutant inputs to the estuary.

Of the short-term remediation measures assessed in the 2023 Remediation Plan, it was recommended that the City pursue the following options:

- » Mechanical aeration of the lower lagoon to raise dissolved oxygen concentrations within the lagoon; a pilot project in this regard was implemented between November 2023 and May 2024, but achieved only limited effects on the very low oxygen levels in the lagoon and was thus not further investigated as a viable remediation intervention;
- » Saltwater flushing by pumping of water from the beach or offshore into the estuary, to dilute flows from the catchment and increase the flushing of sediments from the lower lagoon into the sea; this is still being pursued as a short-term intervention under a separate application; and

¹ <https://share.google/tF7SbeGYPeLvPip5w>

- » **Dredging to remove built-up organic sediments and increase tidal exchange in the estuary** (as considered within this application).

The 2023 Remediation Plan noted that these measures alone are not expected to achieve the desired permanent ecological, human health and/or aesthetic outcomes unless there is a significant change at a catchment scale, reducing the routing of major pollutants into the Diep River and its associated watercourses. Water quality has in fact declined since 2023. However, dredging is proposed to be pursued as a specific focus on improving tidal exchange in the lower Milnerton Lagoon.

Proposed Dredging

The aim of the proposed dredging is to allow seawater to penetrate further upstream, replacing polluted freshwater inputs. The intention is not to deepen the entire lagoon, but rather to relocate dredged material within it to create an intertidal sandbank and mudflat (as shown in **Figure 6** below). These areas would be exposed to light and air, enabling organic material to break down under oxygenated conditions. This may prevent the build-up of an anoxic layer typical of deeper, stagnant waters. The approach is to concentrate flows into a channel and distribute dredged material within the lagoon to form intertidal banks that support natural decomposition and improve lagoon health.

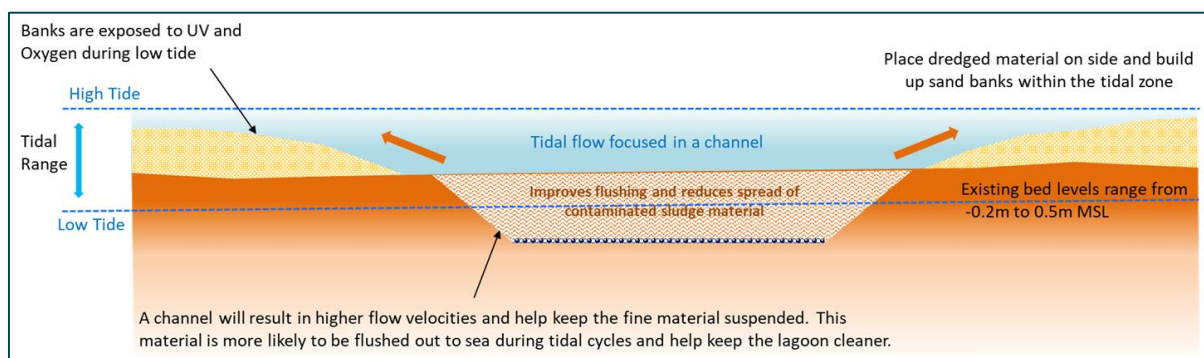


Figure 6: Schematic depicting a concentrated channel to improve tidal flow and deposition of dredged material onto intertidal sandbanks.

The various design and layout alternatives assessed for the proposed dredging are discussed further in the Alternatives **Section H** below. The preferred alternative is the reshaping of the lagoon by dredging a channel and placing material on both sides of the dredged channel within the intertidal zone. Approximately 30 000 m³ of sediment will be dredged to reshape the lagoon and establish a channel that enhances tidal flushing and helps maintain an open mouth. This approach is expected to contribute to improved hydrodynamic functioning and create intertidal sandbanks. The works are expected to take approximately five months and would not require off-site disposal. However, in response to several concerns raised regarding a potential compromise of security at Woodbridge Island due to the placement of dredged material on both sides of the dredged channel (of particular concern, the placement of dredged material on the western edge adjacent to the Woodbridge Island residents), the project design has been adjusted such that dredged material will not be deposited in the area adjacent to the Loxton Road bridge to prevent access across this area (Figure 2).

The works are expected to take approximately five months and would not require off-site disposal.

Dredging is not itself not expected to achieve the desired permanent ecological, human health and/or aesthetic outcomes within the Milnerton Lagoon unless there is a significant reduction in polluted inflows into the Diep River. It is therefore proposed that the implementation of proposed dredging (as considered in this application) be delayed until water quality inflows into the lagoon reach acceptable levels, defined here in terms of dissolved oxygen as the 90th percentile of oxygen concentrations in bottom waters being above the 1.0 mg/L threshold over a three-month period with weekly monitoring, and the 90th percentile in mid- and surface water concentrations being above 2.0 mg/L.

Sediment characterisation

Like all estuaries, the Milnerton Lagoon is a depositional zone, meaning that fine-grained suspended particulate matter from river flow and surface runoff tends to settle and accumulate in the system. The currents in estuaries are usually too weak to hold the particulate matter in suspension, and it settles on the bottom along with any contaminants that have adsorbed onto and been transported with the suspended particulate matter. Other physical and chemical processes may also promote the settlement of sediment in estuaries, such as the so-called 'salting out' effect in which salt ions in the water cause the aggregation of small particles (clays and silts) into larger particles that then fall out of suspension. The sediment in the middle parts of estuaries is typically muddier than sediment in the lower (near mouth) and upper (near river) parts.

In addition to natural processes, large amounts of organic sediments derived from wastewater and urban runoff accumulate on the bed of the Diep River estuary, and are periodically flushed out to sea in large flood events. Bacteria preferentially use oxygen from the water column to decompose accumulated organic sediments, thus lowering the dissolved oxygen concentrations across the estuary. When there is insufficient oxygen available in the water (as is often the case in the lagoon), decomposing bacteria switch to anaerobic respiration, a by-product of which is hydrogen sulphide. It is during these periods of low dissolved oxygen in the lagoon that creates the foul odour associated with hydrogen sulphide.

Difference in sediment volumes post-flood events

The health of the lagoon was significantly improved after the 2023 and 2024 winter flood events (4 floods in 2023 and 8 in 2024) due to scouring and flushing of a large portion of the fine organic sediment from the lagoon. An estimated 110 000 m³ nett volume of material was washed out to sea, based on the difference between the bathymetric surveys conducted in November 2022 and November 2024 (refer to **Figure 7** below). The lagoon mouth was also scoured open allowing for better flushing of the lower section of lagoon, and at low tides the lagoon bed was exposed to free oxygen and sunlight.

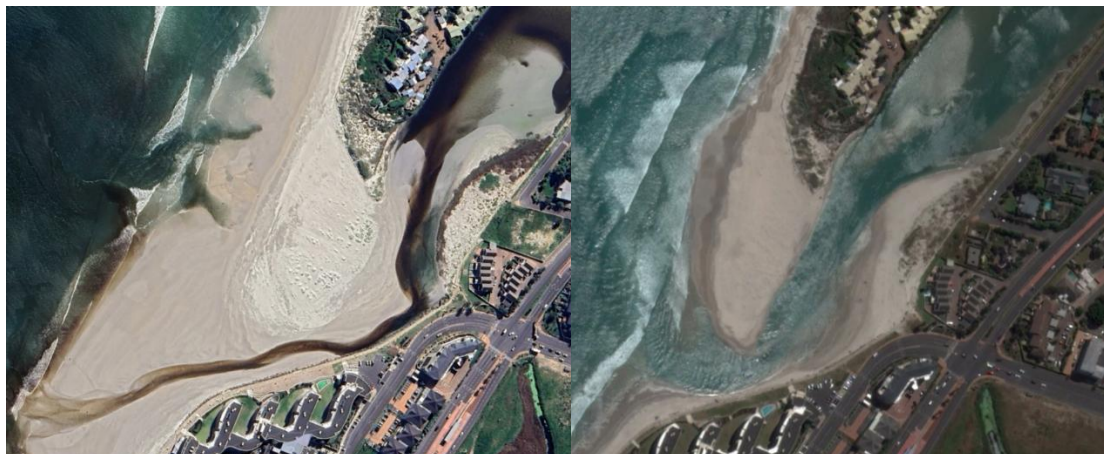
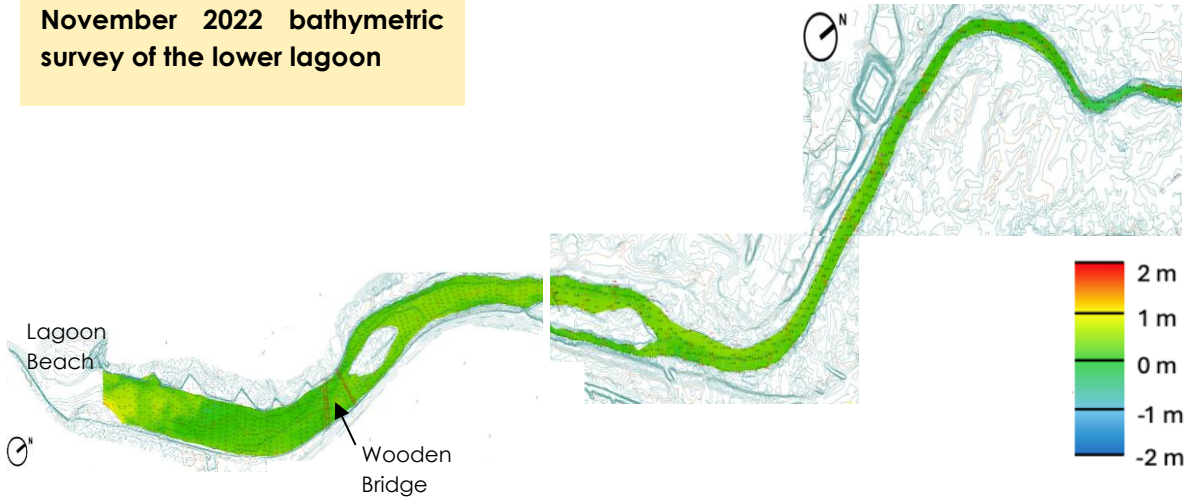


Figure 7: Examples of tidal interchange difference associated with mouth state and flow rates in the river. Left: Limited tidal flushing during dry summer months. Right: Improved tidal flushing during wet winter months.

November 2022 bathymetric survey of the lower lagoon



November 2024 bathymetric survey of the lower lagoon

Total volume of sediment scoured in the 4 major flood events in 2023 and 7 major events in 2024:
109 564 m³

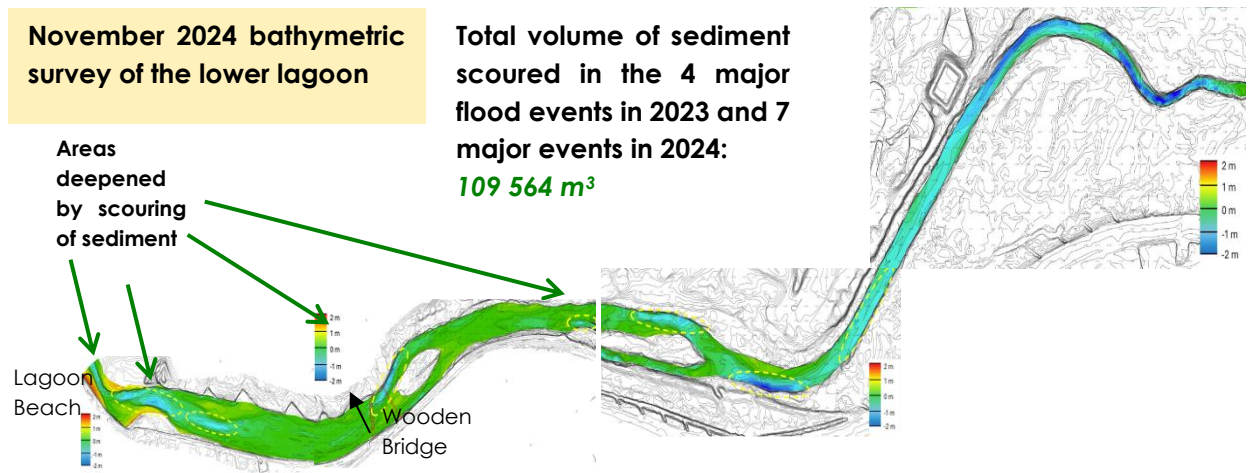


Figure 8: Sediment volume change in the lower lagoon between years 2022 and 2024.

Sediment particle size and organic content

The sediment in the Diep River estuary is composed largely of sand. In a 2021 assessment, the contribution of mud to the bulk weight of sediment sampled in the estuary generally increased with distance upstream of the estuary mouth (Gihwala et al., 2021). Samples analysed from the area surrounding the Wooden Bridge between 2021 and 2023 have consistently been made up of less than 10 % mud by weight, with more than 90 % classed as sand or gravel (see **Figure 9**).



Figure 9: Sediment cores from the area near the Wooden Bridge (top) and near the mouth (bottom) in February 2023.

Sediment quality

Numerous studies on chemicals in water or sediment have been performed in the Diep River and estuary. The CSIR (2015) defined baseline metal concentrations for sediment sampled in rivers, wetlands, and estuaries in Cape Town, and used the concentrations to identify metal enriched/contaminated sediment. In 2015, the CSIR found that sediment from a rural section of the Diep River (upstream of the estuary) contained several metal contaminants, while sediment samples taken from within the estuary itself did not show this contamination.

Gihwala et al., (2021) found that trace metal accumulation in sediments was higher further upstream in the Diep River Estuary, particularly near the Blaauwberg Bridge and beyond the Otto du Plessis Bridge. In most cases, metal concentrations increased with the proportion of fine mud in the sediment, which is a typical pattern even in uncontaminated systems. The study reported that some parts of the estuary showed contamination by cadmium, mercury, lead, and zinc. However, in the lagoon downstream of Woodbridge Island, concentrations of these metals were within guideline values for the Benguela Current Large Marine Ecosystem (BCLME) and remained below the Effects Range Low thresholds set by Long et al. (1995) for sediment quality in North America.

Samples collected in the lower lagoon in November 2023 as part of the dredging investigations were tested for trace metals as well as a full suite of organic and other contaminants. These samples were specifically targeted to include the areas of highest accumulation of fine sediments. In these samples, metals were all below the values set out in the National Action List used to make decisions on the suitability of dredged material for underwater offshore disposal (UOD) in South African coastal waters (refer to **Figure 10**) and also well set out in Long et al. (1995). While the contamination of estuaries with trace metals and organic contaminants will continue to require periodic monitoring and assessment, guideline values for chronic and acute ecological impact are not currently exceeded and available data do not suggest that metal contaminants are a significant driver of ecological impact in the Milnerton Lagoon.

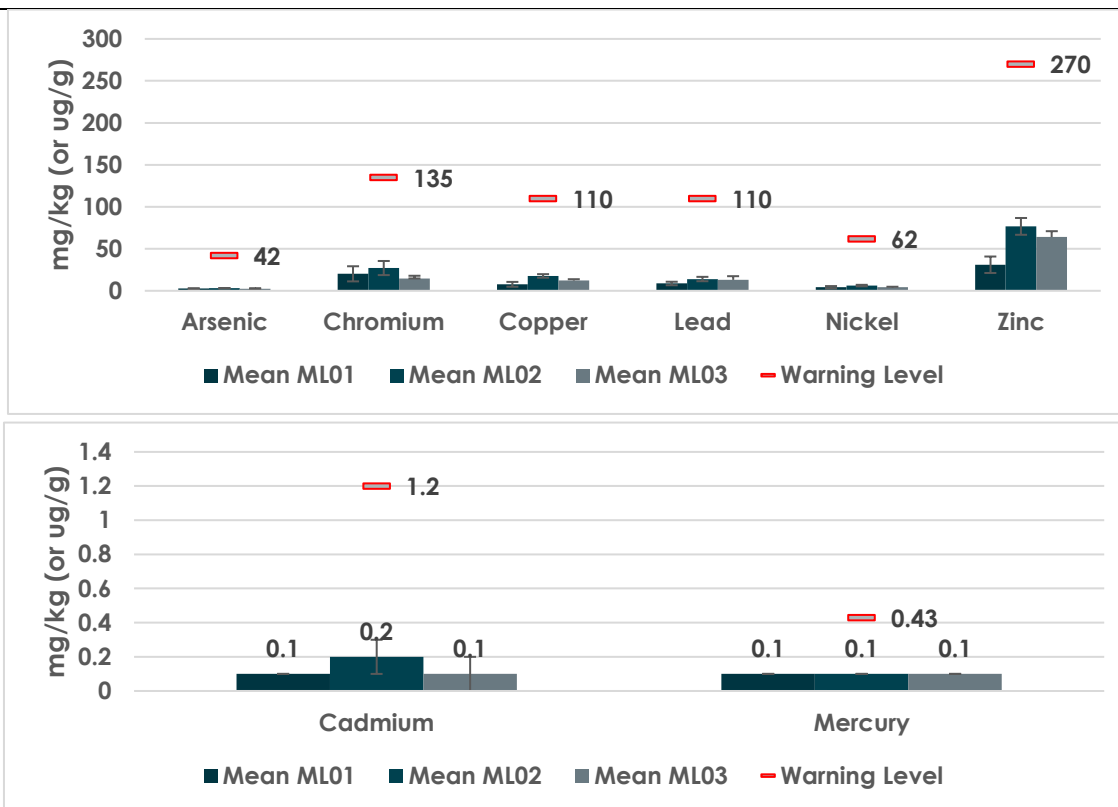


Figure 10: Comparison of trace metal content at three sites in the lower lagoon in November 2023 against the National Action List used to make decisions on the suitability of dredged material for underwater offshore disposal in South African coastal waters

4.5 Indicate how access to the proposed site(s) will be obtained for all alternatives.

Four alternative site accesses have been considered, with the objective to shorten the distance of access to minimise disturbance to habitat and fauna, avoid destabilisation and compaction of sand, limit risk to beach users and the need for additional infrastructure where possible.

Following completion of the works, all areas along the access route that were unavoidably impacted will undergo appropriate rehabilitation to restore the areas to their original condition and to reduce long-term effects.

In order of preference, the following site accesses may be utilised as required and subject to landowner approvals and traffic management plans (refer to [Figure 11](#) below):

1. **Access off Lagoon Beach Drive (at Boundary Road)** – Access off Lagoon Beach Drive via the parking lot and lies adjacent to the restaurant property is the preferred access option. This access to the site will be granted via the beach directly from the ramp, using a designated drive route that avoids the dune vegetation as much as possible. The route predominantly follows the intertidal zone of the estuary mouth before entering the lagoon, thereby limiting ecological disruption.
2. **Direct access via existing slipway at Woodbridge Island** – This option involves access via the Loxton Road bridge and existing slipway between the Loxton Road bridge and Wooden Bridge, thus requiring plant or equipment to pass under the Loxton Road bridge to reach the downstream parts of the site, which may constrain access for larger construction vehicles or equipment.
3. **Direct access at the corner of Kei Road and Esplanade Street** – This option involves access to the lagoon via an unstabilised section of bank between two engineered structures stabilising the lagoon bank. This access route might require the establishment of infrastructure to ensure access – such a temporary slipway or ramp.

4. **Indirect access via Lagoon Beach from the primary public beach parking area** - This is the least preferred access option. Accessing the site via limited existing public parking would likely draw public attention, exacerbate traffic congestion, require the longest entry into the site over beach sand. This access point may negatively affect public perception of the Applicant's environmental intentions, particularly concerning the lagoon's pollution mitigation efforts. Furthermore, this access route would mean that the access road traverses three properties that fall outside of the site (i.e., Remainder of Erf No. 16831, the Remainder of Erf No. 14540 and the Remainder of Erf No. 17), all of which are likely under the Applicant's ownership. While no formal landowner consent is required considering the access route would constitute a linear activity, this access poses the greatest risk of habitat disturbance and public intrusion.

Sandbags may be needed at the following beach access points—especially at the existing ramp from the main beach parking area—to address natural scouring and improve stability, as soft sand and erosion may hinder site access.

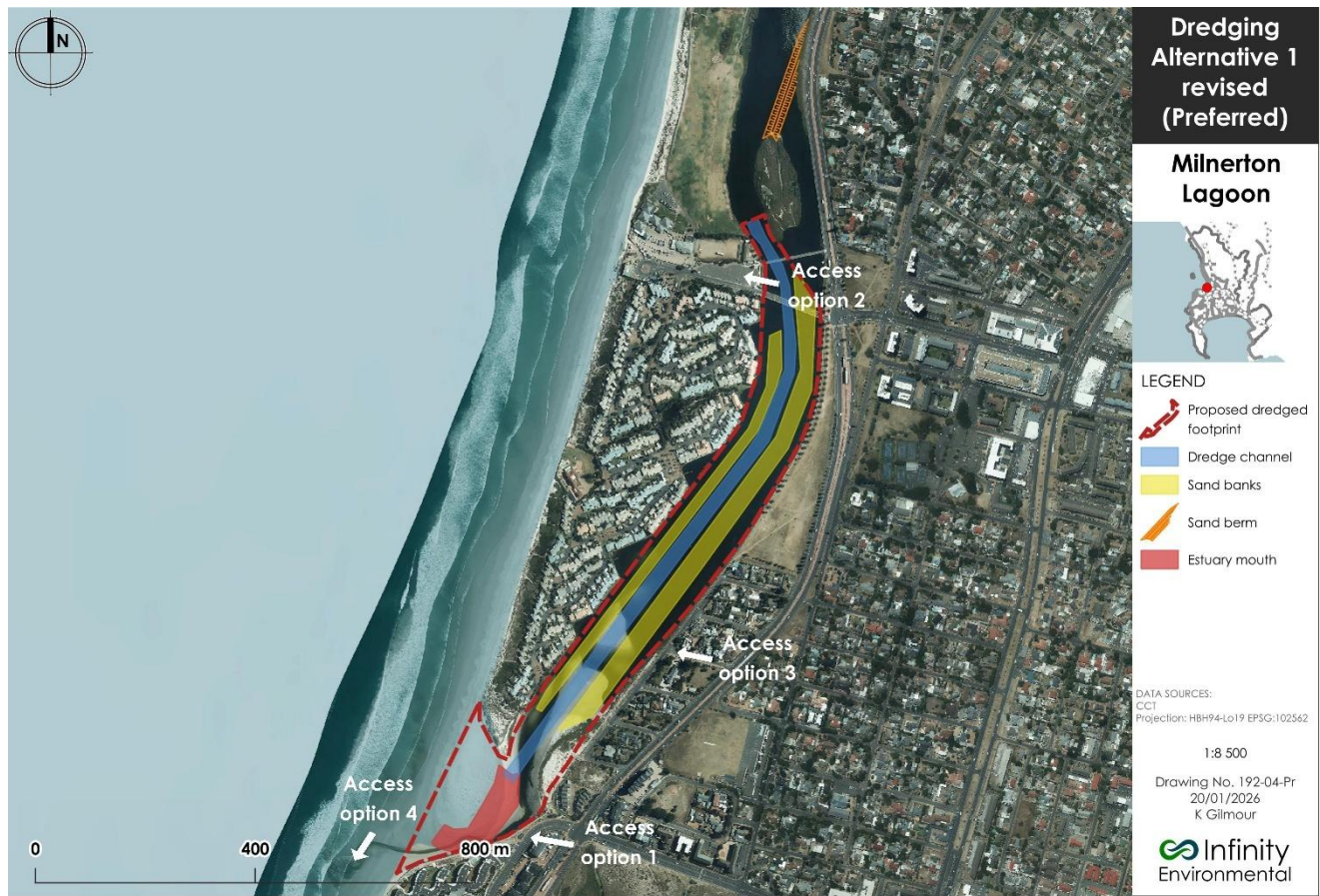


Figure 11: Map showing the proposed access alternatives in relation to the preferred alternative

4.6.	SG Digit code(s) of the proposed site(s) for all alternatives:	C01600340002031500000		
4.7.	Coordinates of the proposed site(s) for all alternatives:			
	Access 1: Access off Lagoon Beach Drive (directly north of Boundary Road)			
	Latitude (S)	33°	53'	25.27"
	Longitude (E)	18°	29'	7.75"
	Access 2: Direct access via existing slipway at Woodbridge Island			
	Latitude (S)	33°	52'	54.35"

Longitude (E)	18°	29'	23.02"
Access 3: Direct access at the corner of Kei Road and Esplanade Street			
Latitude (S)	33°	53'	15.96"
Longitude (E)	18°	29'	16.08"
Access 4: Indirect access via Lagoon Beach from the primary public beach parking area			
Latitude (S)	33°	53'	32.22"
Longitude (E)	18°	28'	55.04"

SECTION C: LEGISLATION/POLICIES AND/OR GUIDELINES/PROTOCOLS

1. Exemption applied for in terms of the NEMA and the NEMA EIA Regulations

Has exemption been applied for in terms of the NEMA and the NEMA EIA Regulations. If yes, include a copy of the exemption notice in Appendix E18.	YES	NO
---	-----	----

2. Is the following legislation applicable to the proposed activity or development.

The National Environmental Management: Integrated Coastal Management Act, 2008 (Act No. 24 of 2008) ("NEM:ICMA"). If yes, attach a copy of the comment from the relevant competent authority as Appendix E4 and the pre-approval for the reclamation of land as Appendix E19.	YES	NO
The National Heritage Resources Act, 1999 (Act No. 25 of 1999) ("NHRA"). If yes, attach a copy of the comment from Heritage Western Cape as Appendix E1.	YES	NO
The National Water Act, 1998 (Act No. 36 of 1998) ("NWA"). If yes, attach a copy of the comment from the DWS as Appendix E3.	YES	NO
The National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004) ("NEM:AQA"). If yes, attach a copy of the comment from the relevant authorities as Appendix E13.	YES	NO
The National Environmental Management Waste Act (Act No. 59 of 2008) ("NEM:WA")	YES	NO
The National Environmental Management Biodiversity Act, 2004 (Act No. 10 of 2004 ("NEMBA").	YES	NO
The National Environmental Management: Protected Areas Act, 2003 (Act No. 57 of 2003) ("NEMPAA").	YES	NO
The Milnerton Lagoon forms part of the Table Bay Nature Reserve (promulgated in Provincial Notice No. 175, published in Gazette No. 9345, 3 August 1984).		
The Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983). If yes, attach comment from the relevant competent authority as Appendix E5.	YES	NO

3. Other legislation

List any other legislation that is applicable to the proposed activity or development.
<p>Provincial legislation</p> <ul style="list-style-type: none"> » Western Cape Biodiversity Act, 2021 (Act No. 6 of 2021), as amended. <p>Municipal by-laws</p> <p>By-laws of the City of Cape Town metropolitan municipality with direct relevance to the proposed dredging include:</p> <ul style="list-style-type: none"> » City of Cape Town Municipal Planning By-law (2019), as amended; » City of Cape Town Metropolitan Municipality Integrated Waste Management By-Law (2009), as amended;

- » City of Cape Town Metropolitan Municipality Stormwater Management By-Law (2005), as amended;
- » City of Cape Town Environmental Health By-Law (2003), as amended; and
- » City of Cape Town: Air Quality Management By-Law (2016), as amended.

4. Policies

Explain which policies were considered and how the proposed activity or development complies and responds to these policies.

Diep River Estuarine Management Plan (2022)

An Estuarine Management Plan (EMP) for the Diep River Estuary (City of Cape Town and Infinity Environmental, 2022) was adopted by the City's Council in December 2022 and approved by the provincial Member of the Executive Council (MEC) in terms of Section 9 of the National Estuarine Management Protocol in April 2023. The plan acknowledges the systemic pressures arising from multiple land uses within the wider catchment area of the Diep River and adopts a transversal approach towards addressing these pressures. A set of specific objectives, for water quality, ecology, hydrology and other factors is established and a total of 47 priority actions are set out in the EMP for the 2022-2026 period; of which dredging of the Milnerton Lagoon is specifically listed as a priority action.

Integrated Coastal Management Policy (2014), as amended

This policy provides the overarching framework for how the City of Cape Town manages its coastline, including estuaries such as the Milnerton Lagoon. Considering the proposed dredging is a significant estuarine intervention that alters sediment regimes, water flow and quality, with an impact on the estuarine habitats, the proposed activity must align with the Integrated Coastal Management Policy's core principles. These principles include protecting coastal ecosystem function, preserving natural processes, and ensuring that environmental, social, and economic considerations are balanced in decision-making. The policy specifically cautions against unmanaged alterations to coastal systems, reinforcing the need for careful assessment of dredging as a remediation measure considering its potential trade-offs. Refer to **Section I** of this BAR wherein the trade-offs of the proposed dredging have been thoroughly reviewed.

Cape Town Coastal Management Programme (2014), as amended

The Coastal Management Programme (CMP) of the City was developed in accordance with the National Environmental Management: Integrated Coastal Management Act, 2008 (Act No. 24 of 2008), as amended (NEM:ICMA) operationalises the City's coastal policy through targeted actions and planning. The CMP identifies key issues along the coastline, such as pollution, habitat degradation, and sedimentation—all of which are relevant to the Milnerton Lagoon. As a strategic tool, the CMP lends legitimacy to dredging as a recognised form of remediation in degraded estuarine systems (refer to page 92 of the CMP). This programme also sets expectations for how such interventions should be monitored, reported on, and aligned with stakeholder engagement and broader coastal management priorities - fulfilled through the Basic Assessment process undertaken by this application.

The City of Cape Town Coastal By-law (2020), as amended

The Coastal By-law of the City governs activities within the coastal zone, including pollution control, environmental protection, and the regulation of development and infrastructure. Dredging, particularly when aimed at removing contaminated sediments or restoring intertidal flow, intersects directly with this By-law's provisions on preventing and remediating adverse environmental effects in the coastal environment. It also regulates activities that alter natural processes like sediment

transport or estuarine geomorphology. Importantly, the By-law provides the City with the authority to impose conditions on projects, such as spoil management, site rehabilitation, and turbidity controls, and to enforce compliance. These aspects will be included in the Environmental Management Programme (EMPr) for the project to ensure the proposed dredging activities within the coastal zone are properly managed and ensure the protection of the lagoon and its associated environment (refer to **Appendix H1**).

Milnerton Erosion Response Guideline (2020), as amended

This guideline outlines the City's approach to addressing coastal erosion in the Milnerton area, focusing on the dynamics of sediment supply and loss of beach sand. Since dredging can influence sediment availability and transport near the estuary mouth and coastal zones, this guideline is relevant to ensure that such activities do not unintentionally worsen erosion elsewhere within the system. The guideline also provides best practice recommendations on timing, methodology, and natural recovery, ensuring that dredging complements (rather than contradicts) broader coastal protection measures in the region. The proposed dredging and placement of dredged sediment on the sides within the intertidal zone could reduce the risk of erosion – hence, the proposal aligns with the Milnerton Erosion Response Guideline (2020).

Western Cape Coastal Management Programme (2022 – 2027)

The provincial strategy under the NEM:ICMA is represented in the Western Cape Coastal Management Programme along with an addressal of the priority coastal issues such as pollution, estuarine degradation, and integrated resource management. For the Milnerton Lagoon, the programme is relevant in ensuring alignment between municipal and provincial responses, particularly in terms of funding, regulatory oversight, and coordinated remediation efforts. It reinforces the principle that dredging alone cannot address lagoon pollution unless upstream pollution sources—such as wastewater and stormwater discharges—are also managed. Additionally, the programme outlines monitoring and compliance obligations that must be met when undertaking estuarine restoration projects like dredging.

City of Cape Town Floodplain and River Corridor Management Policy (2009), as amended

This policy guides the management of floodplains and river corridors to protect the ecological functioning of these systems while allowing for appropriate development and infrastructure interventions. The proposed dredging of the Milnerton Lagoon falls squarely within the scope of this policy, as it involves intervention within a river-estuarine system affected by sedimentation and pollution. Dredging as a remediation measure can support the restoration of natural hydrological flows, reduce flooding risks, and improve water quality, all of which align with the policy's aims to rehabilitate degraded watercourses and maintain the integrity of river corridors. However, the policy also emphasises minimising ecological disruption, which means dredging must be carefully designed to avoid harm to riparian vegetation, estuarine habitats, and wetland functions – which are accounted for within the EMPr (refer to **Appendix H1**).

Management of Urban Stormwater Impacts Policy (2009), as amended

This policy focuses on mitigating the adverse impacts of urban stormwater on watercourses, including erosion, sedimentation, pollution, and degradation of aquatic ecosystems. The Milnerton Lagoon has been heavily impacted by uncontrolled stormwater discharges carrying pollutants and excess sediment — issues directly addressed by this policy. Dredging of the lagoon is a relevant response to the cumulative impacts of urban stormwater, particularly where sediment build-up and nutrient loading have caused ecological stress and odour problems. The policy supports interventions that enhance stormwater treatment capacity, improve the health of receiving waterbodies, and restore natural functioning. Therefore, dredging may be considered a supportive

action under this policy, provided it is accompanied by upstream measures to reduce pollutant loads and prevent ongoing degradation

Other spatial planning policies and frameworks

Various spatial planning policies and frameworks were considered in the determination of need and desirability, including the relevant Spatial Development Framework and the District Plan. Refer to **Section E** below for an overview of how the proposed activity aligns with the relevant land-use policies.

5. Guidelines

List the guidelines which have been considered relevant to the proposed activity or development and explain how they have influenced the development proposal.

“One Environmental Management System” and the 2014 EIA Regulations (Circular: EADP 0028/2014)

The development proposal is being undertaken in accordance with the requirements of the EIA Regulations (2014), as amended and the concept of the “one environmental system”.

Department of Environmental Affairs (DEA): Public Participation Guidelines in terms of the NEMA EIA Regulations (2017)

The Public Participation Process (PPP), as included in Regulation 41 of the EIA Regulations of 2014 (as amended), will be undertaken. DEA's Guideline on Public Participation will be consulted with throughout the Basic Assessment process.

DEA: Public Participation guideline in terms of NEMA EIA Regulations (2017)

These guidelines were considered in the determination of appropriate public participation strategies. All public participation requirements as stipulated in the EIA Regulations will be met.

DEA: Guideline on Alternatives (2013)

The provisions of the Guidelines were implemented in the Basic Assessment, through the identification and assessment of feasible and reasonable alternatives to the proposed activity, with a focus on impact minimization.

DEA: Guideline for Environmental Management Plans (2005)

This guideline was applied to inform and guide the preparation of the EMPr in a manner that promotes the effectiveness of the EMPr.

DEA&DP Guidelines on Need and Desirability (2013)

This guideline informed the compilation of **Section E** and **Appendix K** of this report.

6. Protocols

Explain how the proposed activity or development complies with the requirements of the protocols referred to in the NOI and/or application form

The Procedures for the Assessment and Minimum Report Content Requirements for Environmental Themes (GN 320 of 2020 and 1120 of 2020 respectively) ('the Protocols') came into effect on 9 May 2020 and 30 October 2020. These protocols mandate site sensitivity verifications for identified

Themes on the site based on the National Environmental Screening Tool. The Screening Tool Report (STR), generated in March 2025, assigned sensitivities to the site as follows:

- » Agriculture Theme (**Medium** sensitivity)
- » Animal Species Theme (**High** sensitivity)
- » Aquatic Biodiversity Theme (**Very High** sensitivity)
- » Archaeological and Cultural Heritage Theme (**Very High** sensitivity)
- » Civil Aviation Theme (**High** sensitivity)
- » Defence Theme (**Very High** sensitivity)
- » Palaeontology Theme (**Medium** sensitivity)
- » Plant Species Theme (**Medium** sensitivity)
- » Terrestrial Biodiversity Theme (**Very High** sensitivity)

Additional assessments or verifications identified by the screening tool comprised:

- » Landscape/Visual Assessment
- » Hydrology Assessment
- » Marine Impact Assessment
- » Socio-Economic Assessment

In terms of the Protocols, the themes above require a site sensitivity verification followed by specialist assessments of confirmed sensitivities, where applicable. The table below provides an overview of the site sensitivity as verified by the Environmental Assessment Practitioner and confirms the assessment(s) that have been undertaken. See **Appendix I2: Site Sensitivity Verification Report** for further detail.

Theme/Assessment	Site Sensitivity Verification	Outcome
The site's medium sensitivity for the Agriculture theme results from its identification as having low to moderate agricultural land capability. This assessment is based on the National Land Capability Dataset, which considers climate and soil type but does not consider existing land use.	The proposed dredging will take place within the Diep River Estuary itself, and thus this site sensitivity verification disputes the Screening Tool rating of Medium sensitivity for the agriculture theme of the site, and instead confirms the agricultural sensitivity to be non-existent.	No agricultural assessment or compliance statement is required for this theme.
The Animal Species theme is mapped as High sensitivity due to its location within the mapped distribution of three IUCN red-listed bird species, namely the African Marsh Harrier <i>Circus ranivorus</i> , the Caspian Tern <i>Hydroprogne caspia</i> and the Great White Pelican <i>Pelecanus onocrotalus</i> . The invertebrate species Peringuey's Meadow Katydid <i>Conocephalus peringueyi</i> and <i>Bullacris obliqua</i> are also	The lagoon does not provide suitable habitat for the listed invertebrate species, which are instead associated with mountain fynbos. While some temporary disturbance is anticipated during the implementation phase, the proposed dredging will not result in any loss of habitat used by these species but rather the long-term improvement of the avifaunal habitat post-dredging as confirmed by the avifaunal	The impacts of the proposed dredging on birds are assessed in the Estuarine Specialist Assessment, and a separate impact assessment is not required. An avifaunal / animal species compliance statement for these species has been prepared by avifaunal specialist Andrew Jenkins and is appended to this BAR (see Appendix G2). The specialist recommends

identified in the Screening Tool Report.	specialist (refer to Appendix G2 of this BAR). The avifaunal specialist confirmed that with the application of the recommended mitigation measures, the impacts of the proposed dredging on local birdlife are of Low significance and thus the animal species sensitivity rating of the Screening Tool is confirmed to be Low.	the project be authorised from a bird impact perspective.
The Aquatic Biodiversity Theme is mapped as Very High sensitivity.	The sensitivity rating in the Screening Tool is supported; due to the site's location within the lower reaches of the Diep River Estuary, an Estuarine Impact Assessment was deemed more appropriate than an Aquatic Biodiversity Impact Assessment.	An Estuarine Impact Assessment was compiled by Anchor Environmental Consultants, which considers the aquatic theme, and is appended to this BAR (Appendix G1).
The Archaeological and Cultural Heritage Theme is mapped as Very High sensitivity due to the proximity of the site to the Wooden Bridge, which is a provincial heritage site.	The proposed activity is not anticipated to impact on the Wooden Bridge, as dredging activities will be limited to the lagoon itself. While the sensitivity rating is not disputed, the proposed activities will not impact on this heritage resource, and no specialist assessment is required. Furthermore, the nature of the proposed dredging does not require any assessment of heritage impact in terms of Section 38 of the National Heritage Resources Act, 1999 (Act No. 25 of 1999), as amended (NHRA).	Despite proximity to the Wooden Bridge, the proposed dredging will not impact on this heritage resource. Hence, no impact assessment is deemed necessary for this theme.
The Civil Aviation Theme is mapped as High sensitivity because the site is within 15 km of a civil aviation radar and aerodrome.	The proposed activity is approximately 14 km north-west of the Cape Town International Airport. The Ysterplaat Air Force Base is	No specialist impact assessment is required for civil aviation theme.

	<p>located approximately 1.2 km south-east of the proposed site.</p> <p>Despite the proximity to these aviation sites, given the nature of the proposed dredging, there is no sensitivity in relation to civil aviation and no impact assessment can be justified for this theme.</p>	
<p>The Defence Theme is mapped as Very High sensitivity due to proximity to a military defence site.</p>	<p>The Screening Tool does not provide any background information explaining the reason for this classification, and there is no formal guidance available on methods for determining a site's Defence Theme sensitivity. It is assumed that the proximity of the Ysterplaat Air Force Base to the site is the reason for the sensitivity rating. The proposed activity does not have any potential to interfere with radar or communication equipment and given the nature of the dredging activity, it is not anticipated to impact upon any defence features.</p> <p>The sensitivity rating of the Screening Tool is disputed.</p>	<p>A specialist impact assessment is not required for the defence theme.</p>
<p>The Palaeontology Theme is mapped as Medium sensitivity.</p>	<p>The lower lagoon mouth is a dynamic area without exposed bedrock.</p> <p>The site is therefore not expected to have hold palaeontological sensitivity, and the Screening Tool mapping is therefore disputed.</p>	<p>No specialist impact assessment nor screening is required for the palaeontological theme.</p>
<p>The Plant Species Theme is mapped as Medium sensitivity.</p>	<p>The site, excluding the park area adjacent to Marine Drive (which may be used for temporary dewatering), is not terrestrial, and has been highly disturbed by prolonged anthropogenic pollution</p>	<p>No standalone Plant Species study is recommended. An Estuarine Impact Assessment was undertaken (refer to Appendix G1), which assessed anticipated</p>

	<p>inputs. An Estuarine Impact Assessment was undertaken, which found that the only remaining 'natural vegetation' of environmental significance is the vegetation downstream of the Woodbridge comprising a thin strip of dunes between the Woodbridge Island development and the beach itself.</p> <p>The open space park area proposed for dewatering activities (should the least preferred Design and Layout Alternative 5 be implemented), is completely transformed and exhibits no remaining natural habitat features. It is fully landscaped and maintained as a manicured grassed area, reflecting a high degree of human modification.</p> <p>The sensitivity rating of the site is therefore contested and is instead proposed as Low, based on the following considerations. Due to the highly modified and degraded nature of the site and the temporary dewatering area, which is within the Diep River Estuary itself, it is not likely that the proposed dredging will impact on any plant species identified in the Screening Tool. Moreover, an Estuarine Impact Assessment was undertaken, which assessed anticipated impacts on estuarine ecosystems (including a review of vegetation).</p>	<p>impacts on vegetation, and is deemed sufficient for this theme.</p>
<p>The Terrestrial Biodiversity Theme is mapped as Very High sensitivity due to the mapped presence of Cape Flats Dune Strandveld vegetation.</p>	<p>The proposed dredging area, excluding the park area adjacent to Marine Drive (which may be used for temporary dewatering), is within the estuary itself and</p>	<p>A Terrestrial Biodiversity Impact Assessment is not required. The Estuarine Impact Assessment (Appendix G1 to this BAR) addresses all anticipated</p>

	<p>does not therefore support any terrestrial vegetation. The Estuarine Impact Assessment undertaken for the project (Appendix G1 of the BAR), found that the only remaining 'natural vegetation' of environmental significance is the vegetation downstream of the Woodbridge comprising a thin strip of dunes between the Woodbridge Island development and the beach itself.</p> <p>The open space park area proposed for dewatering activities (should the least preferred Design and Layout Alternative 5 be implemented), is completely transformed and exhibits no remaining natural habitat features. It is fully landscaped and maintained as a grassed area, reflecting a high degree of human modification.</p> <p>Therefore, no impact upon terrestrial biodiversity is expected because of the proposed dredging. The sensitivity rating in the Screening Tool is disputed for this theme and suggested instead as Low.</p>	impacts on estuarine biodiversity.
Landscape and Visual Impact Assessment (no sensitivity rating)	The proposed dredging will not result in any permanent change in the landscape nor sense of place. Temporary visual disturbance is anticipated as a result of the dredging and particularly dewatering activities, which has been assessed in the BAR – refer to Section I below.	A standalone Visual Impact Assessment is not required.
Hydrology Assessment (no sensitivity rating)	One of primary objectives of the dredging activity is to improve the hydrodynamic functioning of the Milnerton	Hydrodynamic Modelling addressing the hydrological impacts of the proposed dredging was undertaken

	Lagoon through the scouring of a central channel within the lagoon and the maintenance of an open estuary mouth. This application is informed by a hydrodynamic modelling assessment.	by Anchor Environmental and is included within the Estuarine Impact Assessment report attached to this Final BAR (see Appendix G1).
Marine Impact Assessment (no sensitivity rating)	The site is located within the Diep River Estuary, which forms the interface between marine and freshwater environment. Considering the proposed dredging does not constitute any disposal of dredged material to sea nor to the estuary mouth but rather constitutes the placement of dredged material along the sides of the dredged channel within the intertidal zone of the lower lagoon, no direct impacts on the marine environment are anticipated. Instead, impacts on the estuarine environment are anticipated and thus an Estuarine Impact Assessment was undertaken for the proposed dredging.	No Marine Impact Assessment is recommended for the proposed dredging. Instead, an Estuarine Impact Assessment was undertaken to address the impacts of the proposed dredging on the estuarine environment and is attached to this Final BAR (refer to Appendix G1 below).
Socio-Economic Impact Assessment (no sensitivity rating)	The poor water quality of the Milnerton Lagoon currently results in significant socio-economic impacts, most notably the persistent foul odours that negatively affect nearby residents, businesses and beach-goers. No significant negative socio-economic impacts are expected because of this project; instead improvements are expected in this regard post-dredging since the improved water quality of the lower lagoon is anticipated to contribute to improved user experience of the lagoon, nuisance reduction for nearby	A standalone Socio-Economic Impact Assessment is not supported for this project. This BAR seeks to sufficiently address the socio-economic aspects of the proposal.

	residents and businesses and potentially cultivate a boost in recreational and tourism opportunities within the area. It is the opinion of the EAP that the socio-economic aspects of this project are adequately addressed in this BAR (refer to Section G, question 8).	
--	---	--

SECTION D: APPLICABLE LISTED ACTIVITIES

List the applicable activities in terms of the NEMA EIA Regulations

Activity No(s):	Provide the relevant Basic Assessment Activity(ies) as set out in Listing Notice 1	Describe the portion of the proposed development to which the applicable listed activity relates.
15	The development of structures in the coastal public property where the development footprint is bigger than 50 square metres,	The proposed dredging may require the temporary or semi-permanent development of structures within the Milnerton Lagoon estuary, which forms part of the coastal public property ² , to ensure the practical implementation of the proposed dredging. Such structures could include platforms, slipways, or other access and support infrastructure required to enable dredging operations and the safe movement of equipment and personnel. In some instances, these structures may need to remain in place for longer than six weeks to support the duration of the works and may involve the clearance of limited vegetation within the estuary margins. The footprint of these structures may exceed 50 m ² and would therefore trigger this listed activity.
19A(ii)	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— the littoral	The proposed activity concerns the dredging and placement of dredged material within the intertidal zone during the dredging phase of the project, and the maintenance of the dredged channel depth and an open estuary mouth during the post-dredging phase. These activities involve the dredging and moving of up to 30 000 m ³ of sediment from the bottom of Milnerton

² Coastal Public Property (CPP) is defined under Section 7 of the National Environmental Management: Integrated Coastal Management Act, 2008 (Act No. 24 of 2008), as amended, to include 'coastal waters' in which estuaries are included and therefore held in trust by the State for the public.

	active zone, an estuary or a distance of 100 metres inland of the highwater mark of the sea or an estuary, whichever distance is the greater;	<p>Lagoon (an estuary) during the dredging phase of the project and up to a total of 120 000 m³ in future maintenance to maintain a scour channel and open estuary mouth in accordance with the Maintenance Management Plan (see Appendix H2). The width of the dredged channel will be approximately 20 m, with its bottom at 1 m below land levelling datum (LLD) (refer to Figure 2 above) and side slopes with a 1:5 slope. Excavated material is to be placed and spread at 0.5 m above LLD to create flats in the intertidal zone on the sides of the channel.</p> <p>A berm will be established upstream of the small island at the Wooden Bridge, to concentrate flows west of the island. Approximately 600 m³ of sand from the bed of the estuary will be moved to achieve this.</p> <p>Sandbags may be needed at the site access points (assessed under Section B, question 4.5)—especially at the existing ramp from the main beach parking area—to address natural scouring and improve stability, as soft sand and erosion may hinder site access.</p> <p>Thus, the proposed dredging and maintenance activities will result in the infilling, depositing of dredged material into, and the dredging of more than 5 m³ from, the lower section of the Milnerton Lagoon, which forms part of the Diep River Estuary, during the dredging phase of the project and as part of maintenance or repeated dredging efforts in the future.</p>
Activity No(s):	Provide the relevant Basic Assessment Activity(ies) as set out in Listing Notice 2	Describe the portion of the proposed development to which the applicable listed activity relates.
None		
Activity No(s):	Provide the relevant Basic Assessment Activity(ies) as set out in Listing Notice 3	Describe the portion of the proposed development to which the applicable listed activity relates.
None		
<p>Note:</p> <ul style="list-style-type: none"> The listed activities specified above must reconcile with activities applied for in the application form. The onus is on the Applicant to ensure that all applicable listed activities are included in the application. If a specific listed activity is not included in an Environmental Authorisation, a new application for Environmental Authorisation will have to be submitted. Where additional listed activities have been identified, that have not been included in the application form, and amended application form must be submitted to the competent authority. 		

List the applicable waste management listed activities in terms of the NEM:WA

Activity No(s):	Provide the relevant Basic Assessment Activity(ies) as set out in Category A	Describe the portion of the proposed development to which the applicable listed activity relates.

List the applicable listed activities in terms of the NEM:AQA

Activity No(s):	Provide the relevant Listed Activity(ies)	Describe the portion of the proposed development to which the applicable listed activity relates.

SECTION E: PLANNING CONTEXT AND NEED AND DESIRABILITY

1.	Provide a description of the preferred alternative.
<p>The preferred alternative is the dredging of the lagoon and placement of material on the sides within the tidal zone. Sediment will be dredged to reshape the lagoon and establish a concentrated channel that enhances tidal flushing and helps maintain an open mouth. The dredged material would be deposited along the channel edges within the tidal zone, forming sandbanks and mudflats exposed to oxygen and sunlight. These intertidal banks would encourage natural decomposition of organic matter, thereby reducing the build-up of anoxic nutrient-enriched fine sediments in stagnant areas.</p> <p><u>Approximately 30 000 m³ of material will be moved within the lagoon during the initial dredging phase of the project, and it is proposed that authorisation be granted for up to 120 000 m³ in total, to allow for future maintenance of an open estuary mouth (see Appendix H2), as and when needed to ensure the hydrodynamic function of the lower lagoon is maintained. The width of the dredged channel will be approximately 20 m, with its bottom at 1 m below LLD (refer to Figure 2 above) and side slopes with a 1:5 slope. Excavated material is to be placed and spread at 0.5 m above LLD to create flats in the intertidal zone on either side of the channel.</u></p> <p><u>A sand berm is proposed to be constructed upstream of the small island at the Wooden Bridge, to concentrate flows west of the existing vegetated island to protect this island from erosion considering its structural importance to the system, aid in the restriction of spreading of polluted water and sludge build-up in the lower lagoon and increase flow velocities to aid in flushing. Approximately 600 m³ of sand from the bed of the estuary (i.e., local material) will be moved to achieve this.</u></p> <p>This approach is expected to contribute to improved hydrodynamic functioning and create intertidal sandbanks. Concentrating flows into a defined channel may increase scour and allow seawater to penetrate further upstream, improving water quality and lagoon functioning. The works are expected to take approximately five months and would not involve off-site disposal.</p> <p>The preferred Site Development Plan illustrating the preferred dredging alternative is included in Figures 1 and Figure 2 above.</p> <p><u>Four alternative site accesses have been considered, with the objective to shorten the distance of access to minimise disturbance to habitat and fauna, avoid destabilisation and compaction of sand, limit risk to beach users and the need for additional infrastructure where possible. Following completion of the works, all areas along the access route that were unavoidably impacted will undergo appropriate rehabilitation to restore the areas to their original condition and to reduce long-term effects in accordance with section 6.1 of the EMPr. Refer to Section B, question 4.5 for an assessment of the four assessed access alternatives.</u></p>	
2.	Explain how the proposed development is in line with the existing land use rights of the property as you have indicated in the NOI and application form? Include the proof of the existing land use rights granted in Appendix E21.
<p>The proposed dredging activity is not a development that requires specific land use rights. Rather, this proposal is intended as a measure essential to support the broader remediation of the highly disturbed and polluted Milnerton Lagoon and therefore, does not conflict with the current land use rights or zoning provisions nor of the intention of management of the City of Cape Town's Table Bay Nature Reserve but rather supports the function of the lagoon as public open space.</p>	

Proof of existing land use rights granted for the site property, i.e., Erf No. 20315, confirming the permitted uses under the applicable zoning scheme, is provided in Appendix E21 . The current zoning of the site, located within Erf 20315, is Public Open Space 3.	
3.	Explain how potential conflict with respect to existing approvals for the proposed site (as indicated in the NOI/and or application form) and the proposed development have been resolved.
<p>There are no anticipated conflicts with existing approvals for the proposed site. The rehabilitation of the lagoon has been the subject of various plans (e.g., the 2023 Remediation Plan), engagements with the Department of Environmental Affairs and Development Planning (DEA&DP) and Directives in terms of Section 28(4) of the NEMA (e.g., DEA&DP Ref. No.: 14/1/1/E1/1/5/1/0851/23 – NEMA S28(4) Directive to assess and address the significant pollution impacts of the Koeberg Pump Station and other sources of sewage pollution on the Theo Marais canal, the lower Diep River Catchment and the Milnerton Lagoon).</p> <p>The proposed dredging of the lower section of the Milnerton Lagoon is proposed as an appropriate remediation activity aligned with existing approvals for the Diep River Estuary and is informed by the findings of the 2023 Remediation Plan (Rose <i>et al.</i>, 2023).</p>	
4.	Explain how the proposed development will be in line with the following?
4.1	The Provincial Spatial Development Framework.
<p>The 2014 Provincial Spatial Development Framework (PSDF), as partially reviewed and amended in 2020, coordinates, integrates and aligns the Provincial plans and development strategies with policies of National Government; the plans, policies and development strategies of Provincial Departments; and the plans, policies and development strategies of municipalities. The Western Cape's biodiversity underpins livelihoods, the economy and provision of valuable ecosystem services. The PSDF recognises that the Western Cape Province is a “<i>uniquely endowed global region</i>”, and further states that the government must act “<i>with great stewardship and wisdom, with a view to a sustainable future for the present inhabitants and the generations that will follow</i>” (PSDF, 2014, pg. 2). This speaks to the concept of sustainable development, enshrined in the Constitution.</p> <p>One of the agendas of the PSDF is to provide for sustainable use of provincial assets (i.e., resources: refer to Figure 12 below). This includes its “<i>natural capital</i>” (biological diversity) and its “<i>varied scenic and cultural resources</i>”, which are the attraction that makes the Western Cape the country's premier tourist destination (PSDF, 2014, pg. 38). The Western Cape's spatial assets provide a unique lifestyle, which is not only important to the economy as a whole, but also important to the wellbeing of all residents. The province's natural and spatial capital are interdependent. One cannot be substituted for the other. The Milnerton Lagoon was historically a popular site for recreation but has been significantly disturbed and polluted over time with associated nuisance effects such as odour and aesthetic decline, particularly for local communities and tourism-related activities.</p>	

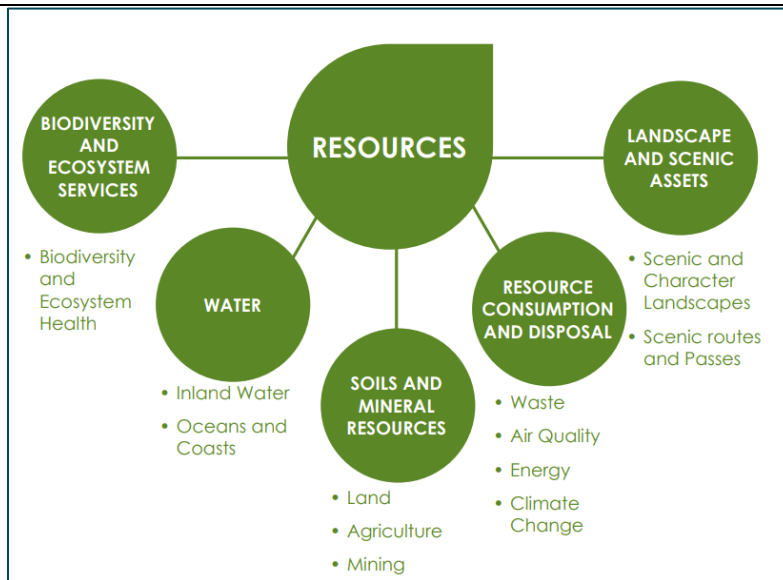


Figure 12: Mind Map of Assets, Resources and Risks Theme extracted from Diagram 9 on pg. 38 of the PSDF (2014).

The PSDF identifies key challenges to the management and preservation of biodiversity and ecosystem services within the province, including land transformation and climate change. The proposed dredging activity aligns with Policy R1, to “*protect biodiversity and ecosystem services*”, and with Policy R2 of the PSDF, which is to “*safeguard inland and coastal water resources, and manage the sustainable use of water*”. As stated in the PSDF, rehabilitation efforts associated with degraded aquatic ecosystems can require “*complex inter-disciplinary intervention*”, such as the proposed remediation interventions intended for the Milnerton Lagoon. The dredging of the lagoon is one of a suite of necessary rehabilitation measures to begin rectifying the very poor ecological state of the Milnerton lagoon. It is intended that the proposed dredging, alongside other critical remediation and pollution abatement measures, comprising a complex inter-disciplinary intervention.

The proposed dredging aligns with the City of Cape Town's strategic objective of restoring and maintaining key natural assets that underpin sustainable urban development. Improved water quality and ecosystem functioning in the Milnerton Lagoon will support the area's recreational potential, enhance surrounding property values, and create opportunities for local businesses dependent on a cleaner, healthier environment. As a targeted, short- to medium-term intervention recommended in the 2023 Remediation Plan (Rose *et al.*, 2023), the preferred dredging alternative represents a cost-effective measure that contributes to the long-term resilience, ecological functionality, and socio-economic benefits of the lagoon and its surrounding area.

By integrating ecological sensitivity, social responsibility, and economic rationale, the proposed dredging is fully aligned with the guiding sustainability principles of the PSDF. It supports long-term resilience and remediation of the lagoon without compromising the ability of future generations to meet their own needs.

4.2 | The Integrated Development Plan of the local municipality.

The City of Cape Town's Five-Year Integrated Development Plan (IDP) (January 2022 – June 2027), communicates the City's long-term vision and how it is to be achieved, recognising that “*Cape Town's climate, natural assets, and biodiversity are part of what make the city a unique and desirable place to live, work and visit*” (CoCT IDP, 2022-2027, pg. 22).

The vision of the IDP is to create a City of hope, in which safety, economic growth and basic services are a priority. Housing, public space, environment, amenities and transport are

incorporated into a strategic plan to build a resilient, spatially integrated, inclusive, capable and collaborative city.

The proposed dredging activity aligns with the objectives outlined in the IDP for public space, environment and amenities:

- » Objective 9.1 prioritises a healthy and sustainable environment through environmental and biodiversity management.
- » Objective 9.2.B focuses on environmental health, outlining the need for a healthy environment with reduced exposure to disease-causing substances and sources.
- » Objective 10 addresses the need for clean and healthy waterways and beaches. Unsustainable waste management has been identified as a key cause of pollution to water bodies. Objective 10.1.A includes the need for water quality improvement via improved waste management efforts. Objective 10.1.B states that waterway rehabilitation projects are needed, and that *“catching up on the significant backlog in waterway dredging and cleaning will be a priority”* (CoCT IDP, 2022-2027, pg. 86).
- » Objective 11 provides for quality and safe parks and recreation facilities supported by community partnerships. Objective 11.1.B. addresses the need for quality recreational and park areas. Objective 11.2.A includes the need for public space improvement, whereby functional, attractive and safe public spaces are contributing significantly to environmental sustainability, enterprise development and job creation.
- » Objective 14 addresses the City's desire to increase the resilience of the City. This includes the need for improved environmental health to reduce vulnerability to future pandemics and improve the overall well-being of the City.

The proposed dredging aligns with and supports the City's strategic objectives as outlined in its IDP. The dredging activity constitutes a critical short- to medium-term remediation intervention to ensure the sustainability of the Milnerton Lagoon by promoting a healthier environment, restoring clean waterways and beaches, and encouraging safe recreational use of the lagoon. Collectively, these outcomes will strengthen the City's resilience, while supporting its social, environmental, and economic goals.

4.3. The Spatial Development Framework of the local municipality.

The City of Cape Town's approved 2023 Municipality Spatial Development Framework (MSDF) provides a framework aimed at building a more inclusive, integrated, vibrant and healthy city. The MSDF identifies natural assets and destination places, which make the City a desirable place to live, work, study and travel. According to the MSDF, the Milnerton Lagoon falls within a Coastal High Intensity Use Area and within a spatial transformation area of incremental growth and consolidation as well as a critical natural asset. The lagoon is also identified as a destination place, meaning it is a significant area of attraction contributing to the unique identity of Cape Town.

The MSDF outlines three spatial strategies that serve to direct the City's decision-making on development and capital expenditure to implement the MSDF – these strategies are listed below:

- 1: Plan for economic growth, and improve access to economic opportunities.
- 2: Manage urban growth, and create a balance between urban development, food security and environmental protection.
- 3: Building an inclusive, integrated, vibrant and healthy City.

The proposed dredging of the Milnerton Lagoon aligns with spatial strategy 2, particularly the sub-strategies and associated policies relating to enhancing the City's unique assets and destination

places and appropriately managing land development impacts on natural resources – refer to the MSDF: Volume 1, 2023, pg. 74).

- » Policy 13 highlights the need to “*protect and enhance scenic route sightlines and places of scenic value, including destination places*”.
- » Policy 18 addresses the need to “*increase efforts to protect and enhance biodiversity networks at all levels of government, with the public and private sector*”.
- » Policy 19 states the need to “*plan for and mitigate the impacts of urban development on water resources and encourage water-sensitive design responses*”.

According to the Blaauwberg District Plan (2023), the Milnerton Lagoon is a coastal-based destination place. The district development guidelines asserts that activities and developments should:

- » Promote greater recreational and tourism opportunities;
- » Support the maintenance and enhancement of the character of natural, recreational and/heritage aspects of smaller but hugely valuable recreational and tourism nodes;
- » Support the many existing small natural special places, which are not appropriate for large numbers of people and attendant support facilities, but which nevertheless are valuable; and
- » Support natural assets that contribute to quality of life, recreation and the tourism economy.

The Spatial Development Objectives in the Blaauwberg District Plan (2023) include promoting access to the coast by the general public and tourists. Supporting land use guidelines include exploring and promoting public amenity and tourism opportunities at accessible locations along the coast such as Milnerton Lagoon.

According to the 2023 Blaauwberg District Plan, the pollution and degradation of rivers, wetlands and groundwater systems in the district and greater Western Cape are critical issues. Improved water quality in the Diep River Estuary and Milnerton Lagoon would benefit recreational use and improve the natural character and experience of the lower section of the lagoon. The proposed remediation activity of dredging the lower reaches of the Milnerton Lagoon is intended to improve the hydrodynamic functioning near the mouth of the estuary, to contribute to improved water quality and flushing of the lagoon; therefore aligning with these guidelines and policies.

4.4. The Environmental Management Framework applicable to the area.

The 2023 Integrated District Spatial Development Framework and Environmental Management Framework (specifically for the Blaauwberg District Plan [BDP]) is informed by the Cape Town Municipal Spatial Development Framework (MSDF) and focuses on influencing the future, taking into consideration the current realities in the district. The EMF has been adopted by the Department of Environmental Affairs and Development Planning (DEA&DP) as per Provincial Government Notice No. 9104, published in Gazette No. 87/2025 on 15 July 2025, and is integrated into the Table Bay District Plan.

The proposed dredging of the Milnerton Lagoon is congruent with the environmental objectives of the BDP (January, 2023), particularly its focus on rehabilitation, ecological health, and coastal edge resilience. The Blaauwberg District Plan (BDP) – Baseline and Analysis Report (2023), notes that the Milnerton Lagoon is freshwater-dominated in summer as a result of the discharge from sewage works (see pg. 45) and that the water quality within the lagoon has been “*seriously compromised not only by the sewage effluent and inputs from the catchment, but also as a result*”

of stormwater discharges from adjacent industrial areas and informal settlements" (BDP - Baseline and Analysis Report, 2023, pg. 46).

Of the 'Spatial Implications' presented for the BDP, "Maximise amenity opportunities, with minimum disturbance to the coastal environment and processes" at identified nodes, includes reference to the Milnerton Lagoon Mouth (see Section 4.4 of the BDP - Baseline and Analysis Report, 2023). Another key development trend in the district is acknowledged to be 'supportive land uses', including a significant number of tourist-related accommodation establishments along and near the lagoon considering the proximity to the ocean.

By targeting accumulated sediment deposition that impedes tidal exchange and contributes to stagnation and anaerobic decomposition, the dredging aligns with the Plan's strategy to address the critical issues regarding pollution and degradation of rivers and wetland systems within the district (see pg. 46 of the BDP - Baseline and Analysis Report, 2023) and to restore ecological function in the lagoon. The proposed dredging as a restoration measure for the degraded estuary system, is consistent with the Plan's broader objectives of enhancing biodiversity resilience to risks (see Section 12.1 of the BDP - Baseline and Analysis Report, 2023).

Moreover, the Plan recognizes that development along the coastline, including that along the Milnerton Lagoon and Lagoon Beach have resulted in the modification of the coastal environment, along with the destruction and fragmentation of dune systems, interference with coastal dynamics and processes leading to increased erosion, loss of amenity and tourism opportunities among others (see pg. 60 of the BDP - Baseline and Analysis Report, 2023).

Restoring water quality, improving circulation, and reducing nuisance accumulation of sediment all contribute to reactivating the lagoon as a viable public open space asset. Thus, the dredging proposal aligns with the Plan's guiding vision of combining ecological restoration, climate adaptation, and public amenity in the Blaauwberg District of the City.

5.	Explain how comments from the relevant authorities and/or specialist(s) with respect to biodiversity have influenced the proposed development.
----	--

No comments have been received from the competent authority to date as this Final BAR is being distributed for the first time for public comment.

The Estuarine Impact Assessment (refer to **Appendix G1**) has informed the project design, as explained in the relevant sections of this BAR.

6.	Explain how the Western Cape Biodiversity Spatial Plan (including the guidelines in the handbook) has influenced the proposed development.
----	--

The Western Cape Biodiversity Spatial Plan (WCBS, 2017) identifies the priority biodiversity areas and ecological infrastructure in the province that need to be preserved. Identifying these areas can inform proactive protection, forward planning and decision-making. The City of Cape Town's Biodiversity Network is included in the WCBS, although it is based on a separate biodiversity planning assessment. The WCBS indicates terrestrial and aquatic features that must be safeguarded if biodiversity is to persist and ecosystems are to continue functioning, including Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs) that represent biodiversity priority areas that should be maintained in a natural to near-natural state.

The Milnerton Lagoon is within a Protected Area, part of the Table Bay Nature Reserve (as per Provincial Gazette No. 8825, published in Gazette Notice No. 91, 22 September 2023) – refer to **Figure 13** below. The primary function of Protected Areas is to secure biodiversity and maintain the ecological integrity of the landscapes in which they are situated. The National Environmental Management: Protected Areas Act, 2003 (Act No. 57 of 2003) (NEM:PAA) requires that land use and management in protected areas is governed by a formally approved management plan. For

the Milnerton Lagoon, this is the Table Bay Nature Reserve Integrated Reserve Management Plan (City of Cape Town: Environment and Spatial Planning Directorate, 2011).

Desired management objectives for Protected Areas are that they must be kept in a natural state, with a management plan focused on maintaining or improving the state of biodiversity. The proposed dredging activity aligns with this objective as it aims to improve the hydrodynamic functioning of the lower reaches of the Milnerton Lagoon and is a remediation measure which, if implemented alongside other pollution abatement measures, is intended to improve the water quality in the Milnerton Lagoon and Diep River Estuary.



Figure 13: Biodiversity Spatial Plan classifications of the proposed site.

7. Explain how the proposed development is in line with the intention/purpose of the relevant zones as defined in the NEM:ICMA.

The site is located within the estuarine functional zone of the Diep River Estuary. The mouth of the lagoon forms part of the littoral active zone³ (LAZ). The proposed project area is also considered part of the Coastal Protection Zone⁴ (CPZ) in terms of NEM:ICMA. The objectives of the CPZ are to prevent the intensification of natural hazards in the coastal zone, preserve the natural functioning of the littoral active zone, and safeguard the ecological integrity of the coastal environment to maintain the productive capacity of the coastal zone.

³ The NEM:ICMA, defines the 'littoral active zone' as "any land forming part of, or adjacent to, the seashore that is unstable and dynamic as a result of natural processes; and characterised by dunes, beaches, sand bars and other landforms composed of unconsolidated sand, pebbles or other such material which is either unvegetated or only partially vegetated".

⁴ The NEM:ICMA, defines the 'coastal protected zone' as the buffer area of land adjoining coastal public property that safeguards the ecological integrity, natural functioning, and hazard-mitigation role of the coastal environment.

<p>The proposed project area also lies within the coastal public property⁵ (CPP) according to the NEM:ICMA. The purpose of the CPP is “to improve public access to the seashore; to protect sensitive coastal areas; to secure the natural functioning of dynamic coastal processes...” as well as to facilitate the achievement of any of the objectives of the NEM:ICMA.</p> <p>The proposed dredging activity is intended to improve the hydrodynamic functioning of the mouth of the estuary, by facilitating improved flow and tidal flushing. Additionally, dredging is anticipated to improve the ecological integrity of the lagoon by reducing the accumulation of organic sediment and increasing tidal exchange.</p>	
8.	<p>Explain whether the screening report has changed from the one submitted together with the application form. The screening report must be attached as Appendix I.</p> <p>The Screening Tool Report is current as generated in March 2025.</p>
9.	<p>Explain how the proposed development will optimise vacant land available within an urban area.</p> <p>The proposed dredging activity is not a development but rather forms part of a remediation plan for Milnerton Lagoon. The optimisation of vacant land is not a relevant consideration for this activity.</p>
10.	<p>Explain how the proposed development will optimise the use of existing resources and infrastructure.</p> <p>The proposed dredging activity is not a development but rather forms part of a remediation plan for Milnerton Lagoon. The use of existing resources and infrastructure is not a relevant consideration for this activity.</p>
11.	<p>Explain whether the necessary services are available and whether the local authority has confirmed sufficient, spare, unallocated service capacity. (Confirmation of all services must be included in Appendix E16).</p> <p>The proposed dredging does not require a fixed electrical connection. If temporary power is needed during implementation, portable generators will be used by the appointed contractor. A limited supply of potable water will be provided on site for construction personnel. Portable toilet facilities will be provided, as well as waste management facilities on site.</p>
12.	<p>In addition to the above, explain the need and desirability of the proposed activity or development in terms of this Department's guideline on Need and Desirability (March 2013) or the DEA's Integrated Environmental Management Guideline on Need and Desirability. This may be attached to this BAR as Appendix K.</p> <p>The Need and Desirability of the proposed dredging is captured under Appendix K of the BAR.</p>

⁵ The NEM:ICMA, defines the 'coastal public property' includes the seashore, coastal waters, and natural coastal resources that are held in trust by the state for the benefit and enjoyment of all South Africans.

SECTION F: PUBLIC PARTICIPATION

The Public Participation Process ("PPP") must fulfil the requirements as outlined in the NEMA EIA Regulations and must be attached as Appendix F. Please note that If the NEM: WA and/or the NEM: AQA is applicable to the proposed development, an advertisement must be placed in at least two newspapers.

1. Exclusively for linear activities: Indicate what PPP was agreed to by the competent authority. Include proof of this agreement in Appendix E22.

Not applicable. The proposed activity is not linear.

2. Confirm that the PPP as indicated in the application form has been complied with. All the PPP must be included in Appendix F.

The Draft BAR was distributed for public comment **from Wednesday, 05 November 2025 to Friday, 05 December 2025**. The following public participation process (PPP), in terms of Regulation 41 of the EIA Regulations of 2014, as amended, was implemented:

- » An initial database of potential I&APs was compiled. The database included known adjacent landowners, ward councillors, municipal officials, relevant state departments and organs of state.
- » Post, email, and/or telephonic methods were used to reach the adjacent landowners and/or occupiers.
- » A notice was placed in a weekly local-circulating newspaper (the *Tabletalk*) on Wednesday, 05 November 2025.
- » A1-sized site notices were placed on the site boundaries by the EAP, complying with the relevant regulatory requirements.
- » The Draft BAR was made available for download at www.infinityenv.co.za/public/milnertondredging.
- » A hard copy of the DBAR and its appendices was made available in the Milnerton Public Open Library from Thursday, 06 November 2025.
- » Members of the public were also invited to the Public Open House, which took place on 19 November 2025 at the Italian Club of Cape Town (see **Appendix F** for proof).
- » Comments have been accepted via a website form, by email, or via text messaging and addressed in the Public Participation Report (see **Appendix F** for reference).
- » All comments received during the commenting period have been included and addressed under **Appendix F** of the Final BAR, and submitted to the competent authority for decision-making.

Confirmation and proof of compliance with the PPP requirements is provided under **Appendix F** of this Final BAR, including all supporting documentation and stakeholder engagement records, on submission of the Final BAR for decision-making.

3. Confirm which of the State Departments and Organs of State indicated in the Notice of Intent/application form were consulted with.

The EAP consulted with the competent authority (DEA&DP: Development Management Directorate) through a pre-application meeting held on 25 September 2025.

The following State Departments and Organs of State were consulted with on the availability of the Draft BAR:

- » Department of Environmental Affairs and Development Planning: Development Management;
- » Department of Environmental Affairs and Development Planning: Biodiversity and Coastal Management;
- » Department of Environmental Affairs and Development Planning: Waste Management;
- » Department of Environmental Affairs and Development Planning: Pollution and Chemicals Management;
- » Department of Forestry, Fisheries and the Environment: Oceans and Coasts;
- » Department of Forestry, Fisheries and the Environment: Water Sources and Wetlands Conservation;
- » Department of Water and Sanitation: Western Cape Regional Office;
- » City of Cape Town: Environmental Management Department;
- » CapeNature; and
- » Heritage Western Cape.

4. If any of the State Departments and Organs of State were not consulted, indicate which and why.

Not applicable.

5. If any of the State Departments and Organs of State did not respond, indicate which.

The following State Departments and Organs of State were consulted with on the availability of the Draft BAR but did not provide comment on the project:

- » Department of Environmental Affairs and Development Planning: Waste Management;
- » Department of Environmental Affairs and Development Planning: Pollution and Chemicals Management;
- » Department of Forestry, Fisheries and the Environment: Water Sources and Wetlands Conservation;
- » CapeNature; and
- » Heritage Western Cape.

6. Provide a summary of the issues raised by I&APs and an indication of the manner in which the issues were incorporated into the development proposal.

All comments received on the Draft BAR have been included in a Comments and Responses Report and specifically attached as **Appendix F** to the Final BAR. Refer to this appendix for more detail on responses provided to comments that were raised.

Issues raised by I&APs are summarised below, with an indication of the responses or manner in which they were incorporated.

<u>Comment by I&APs</u>	<u>Response</u>
<u>Concerns regarding security risk if deep-water barrier of the lagoon is reduced by placement of sand on western shoreline.</u>	<u>A slight amendment has been made to the design and layout alternative, which now restricts dredged material placement on the western bank of the lagoon (refer to Figure 2), thereby eliminating the risk of walkable sandbanks forming along the Woodbridge Island edge.</u>
<u>Concerns about odour and sediment quality.</u>	<u>Clarifications on sediment quality explained that recent flood events naturally removed most of the fine, organic-rich material that previously contributed to odour, and that testing shows sediment contaminants are below guideline thresholds.</u>

	<u>Current odour problems arise primarily from polluted inflows, not the remaining sediment, and that dredging aims to improve tidal exchange rather than directly resolve water quality</u>
<u>View that dredging should not proceed until upstream pollution is addressed</u>	<u>Confirmation that upstream pollution mitigation remains the key determinant of long-term lagoon health</u>
<u>Clarification of listed activities</u>	<u>Updates have been made in the fBAR and Application Form, as well as associated appendices.</u>
<u>Concerns regarding visual and aesthetic impacts of proposed sandbanks</u>	<u>At high tide, all proposed sandbanks will remain fully submerged. At low tide, sandbanks will be visible but will appear similar to existing natural sandbanks already present in the lagoon system. The dredged material will be placed at levels designed to remain below high-tide elevation. The proposal has been revised to avoid placing material along the western bank immediately downstream of the Loxton Road bridge to address visual and security concerns raised by Woodbridge Island residents.</u>
<u>Concerns about property value impacts and perceived long-term devaluation</u>	<u>Dredging is proposed as a remediation measure to improve tidal exchange and reduce anoxic conditions, contributing to reduced odour and improved lagoon function. Upstream water-quality improvements remain the primary driver of environmental recovery. The revised design ensures no walkable access is created adjacent to Woodbridge Island, and the lagoon's appearance at high tide remains unchanged. Off-site disposal is not considered feasible due to high cost, volume, landfill constraints, and minimal additional environmental benefit.</u>
<u>Requests for sediment removal off-site rather than placement within the lagoon</u>	<u>Off-site disposal was assessed but found not to be the best practicable environmental option due to significant costs, logistical constraints, traffic impacts, and the lack of substantial additional environmental benefit. Sediment quality testing indicates that the remaining sediment is predominantly clean sand with contaminants below guideline thresholds. Flood events in 2023–2024 removed most of the historic organic, odour-producing sediment.</u>
<u>Concerns about health impacts, including pathogens, hydrogen sulphide, and air quality</u>	<u>Sediment testing shows contaminants and metals are below chronic and acute ecological risk thresholds. Odour experienced in recent years is caused primarily by upstream polluted inflows, not sediment quality. Temporary odour may occur during dredging but will be monitored through the City's Scientific Services H₂S station at Woodbridge Island, with exceedances to be communicated to relevant authorities and stakeholders.</u>
<u>Concerns regarding disruption during dredging (noise, access routes, business impacts)</u>	<u>The preferred access route is via Lagoon Beach Drive (Boundary Road), avoiding disturbance to dune vegetation and reducing impacts on adjacent amenities. Work will occur during normal construction hours, with any extended hours requiring ECO approval and prior notification to affected land users. Duration is anticipated to be approximately 5 months.</u>

<u>Concerns regarding flood risk and spring tides</u>	<u>Hydrodynamic modelling confirms that dredging will not increase flood levels or alter tidal dynamics in a way that would raise flood risk to adjacent properties. Dredging adjusts morphology but does not increase lagoon storage volume or alter flood conveyance pathways.</u>
<u>Supportive comment: creation of mudflats beneficial for birds (Friends of Rietvlei)</u>	<u>Support for Alternative 1 is noted. Proposed intertidal areas are expected to create suitable roosting and feeding habitat. The EMPr includes requirements for fauna protection, noise controls, and timing-of-works considerations to protect avifaunal assemblages.</u>
<u>General emphasis on the importance of upstream pollution remediation</u>	<u>Agreed. The BAR highlights that long-term recovery depends on upstream interventions currently underway, including major WWTW and pump-station upgrades. Dredging should be implemented only once inflowing water quality meets minimum dissolved-oxygen thresholds.</u>

Note:

A register of all the I&AP's notified, including the Organs of State, and all the registered I&APs must be included in Appendix F. The register must be maintained and made available to any person requesting access to the register in writing.

The EAP must notify I&AP's that all information submitted by I&AP's becomes public information.

Your attention is drawn to Regulation 40 (3) of the NEMA EIA Regulations which states that *"Potential or registered interested and affected parties, including the competent authority, may be provided with an opportunity to comment on reports and plans contemplated in subregulation (1) prior to submission of an application but **must** be provided with an opportunity to comment on such reports once an application has been submitted to the competent authority."*

All the comments received from I&APs on the pre -application BAR (if applicable and the draft BAR must be recorded, responded to and included in the Comments and Responses Report and must be included in Appendix F.

All information obtained during the PPP (the minutes of any meetings held by the EAP with I&APs and other role players wherein the views of the participants are recorded) and must be included in Appendix F.

Please note that proof of the PPP conducted must be included in Appendix F. In terms of the required "proof" the following is required:

- a site map showing where the site notice was displayed, dated photographs showing the notice displayed on site and a copy of the text displayed on the notice;
- in terms of the written notices given, a copy of the written notice sent, as well as:
 - if registered mail was sent, a list of the registered mail sent (showing the registered mail number, the name of the person the mail was sent to, the address of the person and the date the registered mail was sent);
 - if normal mail was sent, a list of the mail sent (showing the name of the person the mail was sent to, the address of the person, the date the mail was sent, and the signature of the post office worker or the post office stamp indicating that the letter was sent);
 - if a facsimile was sent, a copy of the facsimile Report;
 - if an electronic mail was sent, a copy of the electronic mail sent; and
 - if a "mail drop" was done, a signed register of "mail drops" received (showing the name of the person the notice was handed to, the address of the person, the date, and the signature of the person); and
- a copy of the newspaper advertisement ("newspaper clipping") that was placed, indicating the name of the newspaper and date of publication (of such quality that the wording in the advertisement is legible).

SECTION G: DESCRIPTION OF THE RECEIVING ENVIRONMENT

All specialist studies must be attached as Appendix G.

1. Groundwater

1.1.	Was a specialist study conducted?	YES	NO
1.2.	Provide the name and or company who conducted the specialist study.		
No specialist study for groundwater is required, given the nature of the proposed activity.			
1.3.	Indicate above which aquifer your proposed development will be located and explain how this has influenced your proposed development.		
<p>According to the 1:50 000 scale groundwater map of Cape Town (3318CD), the area is underlain by an intergranular aquifer. An intergranular aquifer is where groundwater flows in openings and void spaces between sand grains or weathered rock.</p> <p>The geology underlying the Diep River Estuary is coastal dune deposits of the Quaternary Witzand Formation. The formation is characterised by white sand with finely crushed shells and pebbles. It overlies the Springfontyn Formation, which comprises light-grey to pale red sandy soils. Localised Quaternary age deposits of limestone and calcrete (Langebaan Formation) and silcrete and ferricrete are present in the area as well, along with alluvium deposits on the banks of the Diep River further upstream. The Quaternary cover is underlain by phyllite, greywacke and quartzitic sandstones of the Tygerberg Formation (Malmesbury Group). Depth to bedrock in the area ranges from approximately >10 m to 30 m.</p> <p>The project area is an estuary, and the proposed activity is limited to shallow dredging of superficial deposits of sand and organic sediment in the lower lagoon. No significant impacts on groundwater are anticipated as a result of this activity – the relatively limited volumes to be relocated within the estuary are not expected to alter the water table, which is determined by river flows and tidal interchange, or affect groundwater quality.</p> <p>Though not directly measured, the groundwater is expected to be shallow (within 5 metres of ground level) due to the unconfined nature of the aquifer, the underlying geology, and the proximity of the site to the sea. The proposed shallow dredging is not expected to have a significant impact on the water table or groundwater quality.</p>			
1.4.	Indicate the depth of groundwater and explain how the depth of groundwater and type of aquifer (if present) has influenced your proposed development.		
<p>Though not measured, the groundwater is expected to be shallow (within 5 metres of ground level) due to the unconfined nature of the aquifer, the underlying geology, and the proximity of the site to the sea. The proposed shallow dredging is not expected to have a significant impact on the water table or groundwater quality.</p>			

2. Surface water

2.1.	Was a specialist study conducted?	YES	NO
2.2.	Provide the name and/or company who conducted the specialist study.		
<p>Dr Barry Clark and Amy Wright of Anchor Environmental conducted an Estuarine Impact Assessment addressing surface water impacts. See below (3: Coastal Environment) for a more detailed description.</p>			

2.3.	Explain how the presence of watercourse(s) and/or wetlands on the property(ies) has influenced your proposed development.
<p>The proposed site falls within the lower reaches of the Milnerton Lagoon: a part of the Diep River Estuary with significant tidal influence. Upstream wetlands and watercourses are not expected to be impacted by the proposed dredging.</p> <p>An Estuarine Impact Assessment, including hydrodynamic modelling, informed this Basic Assessment as described below.</p>	

3. Coastal Environment

3.1.	Was a specialist study conducted?	YES	NO
3.2.	Provide the name and/or company who conducted the specialist study.		
Dr Barry Clark and Amy Wright of Anchor Environmental Consultants (Pty) Ltd			
3.3.	Explain how the relevant considerations of Section 63 of the NEM:ICMA were taken into account and explain how this influenced your proposed development.		
<p>The proposed dredging activity will take place within the CPP, the CPZ, the LAZ, and the Estuarine Functional Zone (EFZ). As such, an Estuarine Impact Assessment with Hydrodynamic Modelling was compiled by specialists at Anchor Environmental Consultants to inform this report (refer to Appendix G1).</p> <p>According to Section 63 of the NEM:ICMA, <i>“the extent to which the proposed development or activity is consistent with the purpose for establishing and protecting those areas”</i> must be accounted for.</p> <p>In line with subsection 1 of Section 63, it is envisaged that in combination with other lagoon specific and catchment scale interventions, the proposed dredging will result in improved tidal flushing of the lower lagoon, an increase in dissolved oxygen levels, and increased potential for future scouring of sediment. Overall, dredging, in combination with other crucial interventions (such as the completion of the Potsdam WWTW upgrade and decrease in catchment-wide pollution input), will contribute to the protection of the coastal zones and EFZ, by contributing to pollution remediation in these areas.</p>			
3.4.	Explain how estuary management plans (if applicable) has influenced the proposed development.		
<p>The Diep River Estuarine Management Plan was adopted in 2022 following the standards specified in the National Estuarine Management Protocol (published in Provincial Notice No. 533, published in Gazette No. 44724, 18 June 2021). It includes a set of objectives and actions, of which Objective H1 and Action 12 were to <i>“Assess the possible cost and benefit of dredging the lower lagoon to facilitate the release of sediments and nutrient loads and emulate natural scour and enable ingress of increased volumes of seawater into the system. Implement dredging if a significant benefit is anticipated”</i>. The 2023 Remediation Plan for the Milnerton Lagoon (Rose <i>et al.</i>, 2023) was compiled to identify and assess potential short-, medium- and long-term remediation measures. Dredging was one of the seven remediation measures considered and was recommended to occur after pollutant loading from Potsdam WWTW has been reduced. A large extent of the lagoon was recommended for phased dredging based on field surveys and transects of the lagoon, but since then, multiple flood events have scoured the estuary.</p> <p>In alignment with the 2023 Remediation Plan (Rose <i>et al.</i>, 2023), it is proposed that dredging only proceed once oxygen levels in the lower lagoon begin to show recovery, ensuring that the intervention coincides with improvements in upstream water quality. This timing would maximise ecological benefit, rather than undertaking dredging while pollution inputs remain unchanged. Due to the natural scouring that has occurred during flood events, only the lower reaches of the lagoon are proposed for dredging. The proposed dredging of the lower section of the lagoon is designed</p>			

as a short- to medium-term measure as was originally proposed in the 2023 Remediation Plan (Rose <i>et al.</i> , 2023).	
3.5.	Explain how the modelled coastal risk zones, the coastal protection zone, littoral active zone and estuarine functional zones, have influenced the proposed development.
<p>The proposed dredging has been designed with consideration of the coastal risk zones since the site is located within the EFZ of the Diep River Estuary and is also considered part of the CPZ and CPP in terms of the NEM:ICMA – these zones are recognised as highly dynamic and sensitive. The mouth of the lagoon is highly dynamic and forms part of the LAZ.</p> <p>The objectives of the CPZ include the following:</p> <ul style="list-style-type: none"> » To avoid increasing the effect or severity of natural hazards in the coastal zone; » maintain the natural functioning of the LAZ; and » maintain the productive capacity of the coastal zone by protecting the ecological integrity of the coastal environment... <p>The proposed project area lies within the CPP. The purpose of CPP is to, amongst other things:</p> <ul style="list-style-type: none"> » improve public access to the seashore; » protect sensitive coastal areas; » secure the natural functioning of dynamic coastal processes; » support natural functioning of dynamic coastal processes. <p>The placement of dredged sediment along the channel sides within the intertidal zone was therefore influenced by these objectives, as it creates new intertidal flats that support ecological functions while avoiding dredging activities in sensitive dune or riparian areas.</p> <p>By aligning with the CPZ and LAZ objectives, the dredging is intended to improve hydrodynamic functioning, increase tidal flushing, and reduce the build-up of nutrient-rich sediments that compromise water quality. This supports the broader aims of the EFZ by enhancing ecological resilience while also contributing to hazard mitigation through improved flow capacity. At the same time, the project recognises the limitations imposed by coastal risk zones and climate change pressures, ensuring that the intervention is framed as a short- to medium-term remediation measure that complements, rather than replaces, the need for improved inflows and long-term catchment management.</p>	

4. Biodiversity

4.1.	Were specialist studies conducted?	YES	NO
4.2.	Provide the name and/or company who conducted the specialist studies.		
Biodiversity was addressed in the Estuarine Impact Assessment conducted by Anchor Environmental Consultants (refer to Appendix G1).			
4.3.	Explain which systematic conservation planning and other biodiversity informants such as vegetation maps, NFEPA, NSBA etc. have been used and how has this influenced your proposed development.		
The Diep River Estuary is classified in the 2018 National Biodiversity Assessment (NBA) as a 'Heavily Modified' estuarine system, meaning that a large shift in natural process and ecosystem function and/or loss of habitat and biota have occurred; hence, the proposed dredging seeks to address this degradation within the lagoon.			
4.4.	Explain how the objectives and management guidelines of the Biodiversity Spatial Plan have been used and how has this influenced your proposed development.		

	<p>The City of Cape Town's Biodiversity Spatial Plan (BSP), specifically the 2018 BioNet and 2025 BSP, classify the proposed site as a Protected Area, as it forms part of the Table Bay Nature Reserve. The BSP objectives are to maintain the area as a Protected Area. The proposed dredging is a remediation measure intended to address certain impacts of pollution within the lagoon, which would contribute to the maintenance of the Protected Area.</p>
4.5.	<p>Explain what impact the proposed development will have on the site-specific features and/or function of the Biodiversity Spatial Plan category and how has this influenced the proposed development.</p>
	<p>The proposed dredging is intended to maximise tidal flushing and improve the hydrodynamics of the lower section of the lagoon. The creation of a dredge channel is intended to increase flow velocities and help keep fine material suspended so that it can be flushed out to sea during tidal cycles. The dredged material is proposed to be placed on the sides of the dredge channel to form sand banks. Additional benefits associated with this sediment placement on the sides of the channel include exposure of the deposited sediment to UV light and oxygen during low tide, which can reduce foul odours, pathogens, and labile organics such as dissolved organic carbon.</p> <p>The proposed dredging will therefore impact positively on the Protected Area category, namely for the Table Bay Nature Reserve, and work to mitigate the negative effects of pollution within the lower section of the Milneron Lagoon.</p>
4.6.	<p>If your proposed development is located in a protected area, explain how the proposed development is in line with the protected area management plan.</p>
	<p>The Integrated Reserve Management Plan for the Table Bay Nature Reserve (City of Cape Town: Environment and Spatial Planning Directorate, 2011) pre-dates the significant declines in water quality in the estuary that led to the need for dredging as a remediation measure, although it does refer to reduced water flows, siltation, and deterioration in water quality as challenges to be addressed.</p> <p>As a remediation measure to address environmental degradation, dredging aligns with other, more recent management plans including the Estuarine Management Plan, 2022 and the 2023 Remediation Plan (Rose <i>et al.</i>, 2023).</p>
4.7.	<p>Explain how the presence of fauna on and adjacent to the proposed development has influenced your proposed development.</p>
	<p>The Estuarine Impact Assessment (Appendix G1) describes in detail the fauna and their habitats in the lower Diep River Estuary.</p> <p>With regard to invertebrate fauna, it notes that there have been significant changes to the benthic macrofauna communities in the Diep River Estuary over time, specifically, a dramatic decline in species richness, and an increase in freshwater species. Species that have increased in abundance include insects (primarily freshwater species). Two alien invertebrates not previously reported from the system have also been introduced. These changes reflect the changing water quality profile of the system.</p> <p>The Diep River Estuary system (including Rietvlei) is considered an important area for water birds in the region and is recognised as an Important Bird and Biodiversity Area (IBA) by Birdlife International.</p> <p>While most of the information of bird abundance and species richness for the area is focused on Rietvlei, rather than the lower estuary, various sources have reported Kelp Gull <i>Larus dominicanus</i>, Hartlaub's Gull <i>Chroicocephalus hartlaubii</i>, Common Tern <i>Sterna hirundo</i> and Cape Shoveler <i>Spatula smithii</i>, as well as predominantly freshwater species such as Red-knobbed Coot <i>Fulica cristata</i> and African Darter <i>Anhinga rufa</i>. Site visits undertaken by Anchor in December 2020 and February 2022 confirmed that the estuary is an important feeding and roosting area for many bird species, including Greater Flamingo <i>Phoenicopterus roseus</i>, White-breasted Cormorants <i>Phalacrocorax lucidus</i> and Pied Avocets <i>Recurvirostra avosetta</i>.</p>

Estuaries are considered critically important nursery habitat for fish, and the Diep River Estuary historically represented some 10% of the nursery area for fish on the West Coast, including species such as the White steenbras *Lithognathus lithognathus*. However, there are clear declines in fish species richness over time. These changes are likely linked to changes in water quality, specifically increased ammonia levels linked to malfunctions in the Potsdam WWTW, as well as substantially reduced dissolved oxygen concentrations, which regularly drop below the 2 mg/l threshold for the survival of aquatic species. While many estuarine-associated species are adapted to hypoxia, an increased frequency of low oxygen events (anoxia) has almost certainly negatively impacted benthic fish communities – evidenced by two major fish die-off events in the lagoon that occurred on 04 March 2022 and 30 December 2023.

Dredging is expected to result in short-term disturbance and related impacts to birds and any fish remaining in the lower lagoon. Invertebrates will be impacted more directly, if present in the dredged areas, but are expected to recover post-dredging. The avifaunal specialist confirmed that despite the habitat disturbance anticipated for the implementation phase of the proposed dredging, such disturbance would be temporary in nature and result in the improvement of habitat not only for avifauna, but for the estuarine ecology within the lower section of the Milnerton Lagoon.

5. Geographical Aspects

Explain whether any geographical aspects will be affected and how has this influenced the proposed activity or development.

No geographical aspects will be affected by the proposed activity.

6. Heritage Resources

6.1.	Was a specialist study conducted?	YES	NO
6.2.	Provide the name and/or company who conducted the specialist study.		
No specialist study was deemed necessary to assess the impact of the proposed dredging on any heritage resources.			
6.3.	Explain how areas that contain sensitive heritage resources have influenced the proposed development.		
<p>The wooden pedestrian bridge (referred to as “the Wooden Bridge”) that crosses the lower lagoon from Marine Drive to Woodbridge Island was first built in 1901, and was rebuilt in 2018-2019. This bridge was declared a National Monument under old National Monuments Council legislation in 1987 and is now a Provincial Heritage Site.⁶</p> <p>The proposed dredging considered in this application will not impact the Wooden Bridge since dredging will take place within the lagoon itself. Management measures have been included within the EMPr, specifying the avoidance of any damage to the bridge and its foundations.</p>			

⁶ South African Heritage Resources Agency Information System listing: The site is listed in the SAHRA inventory with the site name Old Wooden Bridge, Milnerton. Inventory Number: 3318CD1042. Provincial Heritage Sites Register: Cape Town – Milnerton – 9/2/018/0062. Old Wooden Bridge over the Milnerton Lagoon, 1987-07-17.

7. Historical and Cultural Aspects

Explain whether there are any culturally or historically significant elements as defined in Section 2 of the NHRA that will be affected and how has this influenced the proposed development.

According to Section 2 of the NHRA, cultural significance means “aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance” and heritage resource refers to “any place or object of cultural significance”. In terms of Section 34 (1) of the NHRA, “no person may alter or demolish any structure or part of a structure which is older than 60 years without a permit issued by the relevant provincial heritage resources authority”. The proposed activity is not anticipated to impact Woodbridge as dredging activities will be limited to the lagoon itself. The Old Milnerton Town Hall is located approximately 250 m east of the site and declared a Provincial Heritage Site. The proposed activity will not impact the Town Hall.

8. Socio/Economic Aspects

8.1. Describe the existing social and economic characteristics of the community in the vicinity of the proposed site.

Milnerton Lagoon falls within Ward 55 Sub-council 16 of the City of Cape Town, which according to the 2011 Census has a population of 30 716 people. 49 % of the population are males and 51 % are females. The dominant language is English (59 %), followed by Afrikaans (19 %). The median age is 33 years, with 67 % of the population ranging between 18 - 64 years old.

Other socio-economic indicators are shown in Chart 1 below.

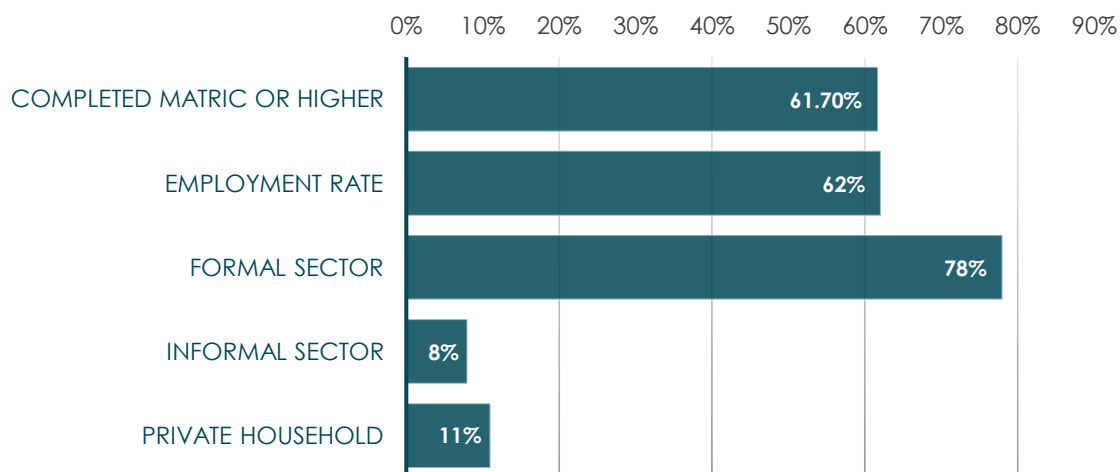


Chart 1: Ward 55 socio-economic indicators (2011 Census, StatsSA/CCT).

8.2. Explain the socio-economic value/contribution of the proposed development.

The high levels of suspended solids and extremely low oxygen levels in the lagoon have led to persistently poor water quality, which presents with sulphurous odours and discoloured water. Current socio-economic impacts of the poor water quality include nuisance impacts of foul odours on residents and businesses near the lagoon.

The dredging of the lagoon is one of a suite of necessary rehabilitation measures aimed at rectifying the very poor ecological state of Milnerton lagoon. It is intended that dredging, alongside other critical remediation and pollution abatement measures, may contribute to an improved state of the lower lagoon. Improved water quality in the Diep River Estuary and Milnerton Lagoon would benefit recreational use and improve the natural character and experience of the lower section of the lagoon. The proposed remediation activity of dredging the lower reaches of the Milnerton Lagoon

is intended to improve the hydrodynamic functioning near the mouth of the estuary, to contribute to improved water quality and flushing of the lagoon, and therefore aligns with the relevant spatial planning guidelines and policies described under **Section E** of this report.

The goal of dredging is to primarily improve the hydrodynamic function of the estuary mouth, increase tidal exchange and dissolved oxygen levels in the lower section of the lagoon. Whilst the aim of the proposed dredging is not directly focused on socio-economic benefits, visual and odour nuisance will be reduced through targeted dredging, enhancing the aesthetic and recreational value of the lagoon and generating positive social and economic effects, particularly for local communities and tourism-related activities.

In addition, the dredging activities will create short-term employment opportunities, particularly for low- and semi-skilled workers. Where feasible, these opportunities will be prioritised for residents from nearby communities, contributing to local income generation and socio-economic upliftment during the implementation phase.

While the socio-economic benefits of the proposed dredging may not be large-scale or long-term in themselves, the intervention supports foundational improvements in environmental quality, which are essential for promoting a healthier environment, restoring clean waterways and beaches, and encouraging safe recreational use of the lagoon. Collectively, these outcomes will strengthen the City's resilience, while supporting its social, environmental, and economic goals.

8.3.	Explain what social initiatives will be implemented by applicant to address the needs of the community and to uplift the area.
------	--

This is a rehabilitation project rather than a development project and thus is not specifically designed as a social development initiative. As such, there is not a direct focus on social initiatives and upliftment of communities within the broader area. The proposed dredging will result in indirect socio-economic benefits as described in response to question 8.2 above, and temporary employment opportunities associated with the implementation phase expenditure of capital budget.

8.4.	Explain whether the proposed development will impact on people's health and well-being (e.g. in terms of noise, odours, visual character and sense of place etc) and how has this influenced the proposed development.
------	--

During the implementation phase, there will be temporary negative impacts related to noise, odour, and visual disturbance associated with the preferred Design and Layout Alternative 1. The disruption of settled sediment on the lagoon floor may release substantial amounts of hydrogen sulphide, which will cause a nuisance odour to neighbouring residents of the lagoon. Dredging requires heavy machinery, meaning there will be noise disturbance to nearby residents during operational hours. Construction projects naturally generate waste, and pose a risk of littering, as well as potential hydrocarbon spills, dust generation, all of which may cause inconveniences to the public if not handled appropriately. Mitigation measures have been included in the EMPr to address all these impacts, which will be limited to the implementation phase (refer to **Appendix H1**).

Should the least preferred Design and Layout Alternative 5 be implemented, then the dewatering activities within the public open space park area alongside the lagoon would result in the temporary occupation of a highly visible and well-used section of public open space. This area, located near Woodbridge Island and adjacent to Marine Drive, is frequented by residents, visitors, and recreational users due to its accessibility, the pedestrian footpath alongside the lagoon, this park's amenity value and the outdoor gym facility that encourages public use. Its repurposing for dewatering activities, such as the installation of geotextile tubes, delivery of flocculant chemicals, and ongoing pumping operations, would disrupt the natural and recreational character of the site, detracting from the areas' sense of place during the months-long dewatering period. In addition, the use of this park space introduces more pronounced risks of nuisance impacts including odour, noise from pumping equipment, and visual intrusion from sediment storage infrastructure.

These exacerbated nuisance disturbances associated with the least preferred Design and Layout Alternative 5 may extend beyond the immediate footprint of the dewatering operation, affecting nearby residential properties, pedestrian traffic, and tourism experiences associated with the lagoon and coastal walkway.

It is expected that post-dredging, alongside other critical interventions in the catchment, will contribute to an overall improvement in tidal exchange and hydrodynamic functioning of the estuary mouth, improving dissolved oxygen in the lower section of the lagoon with an indirect potential positive net effect on the well-being of residents and businesses near-to the lower lagoon.

SECTION H: ALTERNATIVES, METHODOLOGY AND ASSESSMENT OF ALTERNATIVES

1. Details of the alternatives identified and considered

1.1.	Property and site alternatives to avoid negative impacts, mitigate unavoidable negative impacts and maximise positive impacts.
Provide a description of the preferred property and site alternative.	
<p>The preferred property and site alternative for the proposed dredging is the approximately 1.12 km lower section of the lagoon, located within Erf 20315, that extends from the lagoon mouth, south-west of Woodbridge Island, extending just north of the Wooden Bridge.</p>	
Provide a description of any other property and site alternatives investigated.	
<p>The 2023 Water Quality Remediation Plan for Milnerton Lagoon (Rose <i>et al.</i>, 2023) originally recommended dredging along a 7 km stretch of the estuary, extending from the lagoon mouth upstream into the Diep River catchment as far as the Potsdam Wastewater Treatment Works near Killarney Gardens. This section of the estuary would have traversed Erf 20315, Erf 22992, Erf 22990, Erf 1945, and Erf 23046. The initial dredging concept was to be undertaken in three phases, each targeting a different section of the estuary, to manage the significant financial cost of dredging the full system under a single contract.</p> <p>Under this original broader dredging concept, three potential dewatering sites were investigated (refer to Figure 14 below for visual representation of the alternative dewatering sites initially investigated):</p> <ul style="list-style-type: none"> • Dewatering Site Alternative 1 (Preferred): Location: Woodbridge Island Public Open Space Capacity: approximately 22 000 m³. Located adjacent to the lower lagoon dredging footprint with direct access from Marine Drive, enabling efficient pumping and minimal transport requirements. • Dewatering Site Alternative 2: Location: R27 Road Reserve Capacity: approximately 16 800 m³. Located further upstream from the dredging area, requiring additional logistics and sediment transfer infrastructure. • Dewatering Site Alternative 3: Location: Theo Marais Capacity: approximately 10 000 m³. Located near the Vissershok Landfill Site, which would have reduced disposal transport distance, but situated significantly further from the dredging area, necessitating extended pumping distances and supporting infrastructure. 	



Figure 14: Visual representation (extracted from Figure 5-13 of Rose et al. (2023)) of the three phases initially proposed for dredging within the lagoon and the corresponding dewatering areas.

This original full-lagoon dredging proposal was not taken forward. Major flood events in 2023 and 2024 resulted in natural scouring of approximately 110 000 m³ of sediment, significantly reducing the volume of accumulated material. In addition, the capital expenditure required for full-lagoon dredging (estimated at R133 million) was considered disproportionate to the limited environmental benefits, particularly given the ongoing upstream pollution inputs that would continue to affect water quality.

As a result, the dredging scope was refined to focus on the 1.12 km lower section of the lagoon, which offers the greatest hydrodynamic benefit for the least financial and environmental cost. Under this revised scope, Dewatering Site 1 remains the most practical and suitable site due to its immediate proximity to the dredging area, minimal transport requirements, and operational efficiency – should the Design and Layout Alternative 5 be implemented. The Dewatering site 1 includes the following

properties: Erven 157, 161, 167, 176, 190, Remainder of Erf 3, 10620, 10621, 10622, 10625 and Street Parcel 94, are identified for use as the dewatering site should dewatering be implemented. All identified properties are owned by the Applicant.

Dewatering Sites 2 and 3, along with the full-lagoon dredging concept, were not carried forward for further assessment.

Provide a motivation for the preferred property and site alternative including the outcome of the site selection matrix.

Natural events have altered the need for the large-scale dredging intervention along the lagoon extent. The winter floods of 2023 and 2024 breached the lagoon mouth and naturally scoured much of the fine sediment from the lagoon bed. This resulted in improved flushing in the lower lagoon and led to a notable recovery in water quality conditions, thereby reducing the urgency of dredging to address sediment accumulation.

The 2023 Remediation Plan (Rose *et al.*, 2023) also provided critical monitoring data to guide decision-making around dredging, including its likely outcomes and extent of necessity. While dredging was shown to increase dissolved oxygen levels, modelling indicated no significant reduction in nutrients or algal growth unless upstream inflows of pollution were addressed. Given these findings, alongside the very high costs and the uncertain long-term effectiveness of dredging in the context of ongoing pollutant inputs, dredging as a primary remediation measure was reconsidered.

As a result, the Applicant has revised the proposal. Instead of targeting the full 7 km stretch, the focus has shifted to the lower 1.12 km section of the lagoon, within Erf 20315. This section extends from the lagoon mouth south-west of Woodbridge Island to just north of the Wooden Bridge. Concentrating on this area targets hydrodynamic improvements. Consequently, should the Design and Layout Alternative 5 be implemented, Dewatering Site 1 remains the most practical and suitable site for dewatering due to its immediate proximity to the dredging area, minimal transport requirements, and operational efficiency.

Only the preferred property and site alternative, i.e., dredging of the 1.12 km stretch within the lagoon and should dewatering occur, dewatering on the public open space area (park area) immediately adjacent to the site, is assessed in this report.

Provide a full description of the process followed to reach the preferred alternative within the site.

Following changes in lagoon conditions since the completion of the 2023 Water Quality Remediation Plan (Rose *et al.*, 2023), the removal of organic sediments in isolation is no longer expected to significantly improve water quality; instead, the primary benefits of dredging are expected to come from improvements to mouth functioning and tidal flushing. The Diep River Estuarine Management Plan (October, 2022) had identified dredging as a potential measure to restore hydrodynamic function within the system. Building on this, the 2023 Remediation Plan (Rose *et al.*, 2023) outlined several possible dredging sites across the lagoon. However, during detailed project review, it became clear that the lower lagoon is the most effective area for dredging to achieve meaningful remediation outcomes, as the hydrodynamic benefits are most effectively realised by dredging the mouth and the immediately upstream section. In light of the observed changes within the lagoon post the 2023 and 2024 flood events, and further technical deliberation, the Applicant has accordingly revised the proposal to focus exclusively on this lower section.

Provide a detailed motivation if no property and site alternatives were considered.

Not applicable – as outlined above, other property and site alternatives were investigated for this proposal.

List the positive and negative impacts that the property and site alternatives will have on the environment.

The proposed dredging is a pollution remediation measure intended to achieve specific positive outcomes. The preferred property and site alternative (i.e., the approximately 1.12 km lower section of

the lagoon extending from the lagoon mouth to north of the Wooden Bridge) is anticipated to have the following positive impacts:

- The preferred property and site alternative is already highly impacted due to historical and ongoing pollution inputs into the lagoon, which significantly minimises the likelihood of ecological disturbance within the dredged footprint.
- Dredging at the preferred site is expected to increase tidal exchange in the lower estuarine system, supporting wider ecosystem improvements.
- The clearance of sediment from the lower estuarine system will create new intertidal areas, facilitating improved habitat diversity within the lower lagoon.
- Intertidal mudflats with more frequent exposure to the air will increase sediment oxygenation levels and are therefore expected to reduce sulphurous odours. Increased tidal interchange is expected to result in increased dissolved oxygen availability in the lowest reaches of the lagoon, also contributing to improved localised water quality conditions and associated odour.
- By increasing dissolved oxygen concentration in the water column within the lower lagoon, the proposed dredging will disrupt anoxic conditions and reduce sulphur-producing bacteria that generate the foul “rotten-egg” smell; thereby improving public experience of residents, businesses and visitors that live and work nearby the lagoon.

Each of these impacts is assessed as having a positive significance, though low or very low in significance, unless coupled with pollution abatement and remediation in the greater catchment, in which case the significance of the positive impact is anticipated to increase to high positive. Potential negative impacts are also anticipated, including:

- As the preferred property and site alternative is within the lagoon itself, dredging will inevitably disturb and cause mortality of biological communities within the dredged footprint. Careful, restricted implementation will therefore be required in this section of the lower lagoon.
- Noise disturbance within the immediate surrounds is anticipated – though the habitat and species diversity within the area is already heavily degraded.
- Both the dredging and placement of dredged material on the sides of the channel margins within the site will result in the smothering of estuarine and benthic organisms within these areas;
- The avifaunal specialist confirmed that the proposed dredging at the preferred site will involve disturbance and degradation of bird habitat during the implementation phase, though this disturbance will be short-lived and ultimately improve the avifaunal habitat quality once dredging is complete.
- Although activities within and around the site may cause temporary implementation-related impacts (e.g., noise, odour [from disturbed sediment] and movement of equipment and personnel), these will be short-term in nature and managed through the EMP.

Each of these impacts is assessed as either having low negative significance, or can be effectively mitigated to negligible levels, given the lagoon’s already degraded condition and the fact that the nuisance effects of dredging will be temporary and limited to the implementation phase.

1.2.	Activity alternatives to avoid negative impacts, mitigate unavoidable negative impacts and maximise positive impacts.
------	---

Provide a description of the preferred activity alternative.

The preferred activity alternative is the proposed dredging of a channel within the lower section of the Milnerton Lagoon to increase flow velocities and scour, help keep the mouth of the estuary open, maximise tidal flushing, as well as creating raised intertidal mudflats with more frequent exposure to the air to increase sediment oxygenation levels and reduce sulphurous odours. Increased tidal interchange is expected to result in increased dissolved oxygen availability in the lowest reaches of the lagoon.

Up to 30 000 m³ of material will be moved within the lagoon to achieve this during the dredging phase of the project, and up to a total of 120 000 m³ may be moved in future maintenance to maintain a scour channel and open estuary mouth in accordance with the Maintenance Management Plan (see **Appendix H2**), as and when needed to ensure the hydrodynamic function of the lower lagoon is maintained.

The width of the dredged channel is proposed to be approximately 20 metres, with its bottom at 1 m below land levelling datum (LLD) and side slopes with a 1:5 slope. Excavated material is to be placed and spread at 0.5 m above LLD to create flats in the intertidal zone. Dredged material will be placed on the sides of the channel building sand banks that will be exposed to oxygen and sunlight. Dredging will be carried out with either a cutter suction dredger or amphibious excavator(s) capable of operating in the lower lagoon to move sand by hydraulic or mechanical means. The use of a cutter suction dredger or an amphibious excavator will depend on the Design and Layout Alternative implemented on site – refer to the *Technology Alternatives discussed below for further detail on the methodology proposed for the dredging activity.*

The entrainment of fine sediments by flows from the river and washing of these out to sea is an anticipated, and desired, side effect of disturbing the lagoon bed. This sediment disturbance may trigger short-term algal blooms, but these are expected to be temporary. A sand berm is proposed to be constructed upstream of the small island at the Wooden Bridge, to concentrate flows west of the island (to protect the island from erosion considering its structural importance to the system) and increase flow velocities. Approximately 600 m³ of sand from the bed of the estuary will be moved to achieve this.

Provide a description of any other activity alternatives investigated.

The 2023 Remediation Plan (Rose *et al.*, 2023) identified seven possible interventions to improve water quality in Milnerton Lagoon: dredging, aeration, seawater flushing, marine outfall installation, biofiltration, treatment wetlands, and inoculation. After assessing these options, dredging was found to be the preferable intervention as it provides a cost-effective, low-impact, and efficient approach to achieving the project objectives, which is primarily to improve the hydrodynamic function of the lower lagoon. Other interventions were either found to have limited impact on the lagoon system (e.g., biofiltration is not expected to work at the large scale required and treatment wetlands have limited effectiveness to handle high volumes and highly polluted wastewater), had already been trialled with limited success (aeration was trialled in 2024), or were deemed unfeasible due to cost or technical risks (such as a new marine outfall). Refer to the response to the question below for further detail on why the other remediation interventions were ruled out.

While some of these interventions may be revisited as complementary measures in the long term, the current application focuses exclusively on dredging as the only practical intervention able to produce tangible improvements in the short- to medium-term considering the complimentary maintenance activities ensuring the dredged channel depth is maintained and the estuary mouth kept open.

Provide a motivation for the preferred activity alternative.

Dredging as the activity alternative, is proposed as part of a suite of complementary interventions (already in planning or implementation), with a specific focus on improving hydrodynamic function of the lagoon mouth, resulting in increased tidal exchange and sediment scour. Hydrodynamic modelling found that dredging the channel down the centre of the lower lagoon would facilitate greater saline intrusion and saline wedge development during high energy incoming and outgoing tides (refer to **Appendix G1**). This is expected to increase the exchange of saline and fresh water in the lower lagoon, with the seawater bringing dissolved oxygen into the lagoon.

Furthermore, should partial off-site disposal be the implemented design and layout alternative (refer to Design and Layout Alternative 5 below) then the dredged material would be separated by cyclone,

with clean sand returned to the lagoon (i.e., with placement of sediment particularly on the eastern bank of the channel) and approximately 6 000 m³ of nutrient-enriched fine dewatered and removed off-site (see **Figure 19** below).

During the dry season, average salinities near the mouth of the lagoon are modelled to increase by 11.6 %. Due to the larger volume of saline water in the lagoon because of dredging, a higher volume of freshwater flows (essentially Potsdam treated effluent in summer) is required to “rinse out” the saltwater after each high tide. The upgrade of Potsdam WWTW, expected to be completed by 2027, will increase its daily treatment capacity from 43 ML per day to 100 ML per day, which should provide the extra flows to maintain flushing of the lagoon on a tidal cycle. During the wet season, modelled average salinities near the mouth increased by 54 % in the lower water column. Overall salinities during the wet months would still be very low (6.8 PSU after dredging). During high flow events there will be almost exclusively freshwater in the lagoon (but still flushing due to high flow rates). The increased flows during the wet seasons decrease the extent to which the saline wedge moves upstream during incoming tides.

The other remediation interventions identified in the 2023 Remediation Plan (Rose *et al.*, 2023) were ruled out as feasible activity alternatives for consideration in this application, and were consequently not assessed in this Basic Assessment application, due to the following reasons:

Aeration:

Due to the pressures to implement remediation interventions within the highly degraded lagoon, an aeration project was trialled in the late summer of 2024, but the impacts of the project on the dissolved oxygen concentrations in the lower lagoon were insignificant against the drawdown and demand of the organic sediment in the lagoon due to excessive loading of polluted water into the lagoon upstream. While aeration did temporarily increase dissolved oxygen concentrations, the 2024 trial (reported on by Day *et al.*, 2024) found that the achievable improvement in dissolved oxygen was insufficient to significantly improve conditions in the estuary due to high organic loads from upstream.

Seawater pumping:

Pumping seawater into the lagoon was considered favourably within the 2023 Remediation Plan (Rose *et al.*, 2023) with the opportunity to meaningfully improve oxygen levels and dilute nutrients within the lagoon. Pilot investigations for the abstraction of seawater from beach wells for this purpose began in October 2025, and it is proposed that should this prove successful that a seawater pumping project should be implemented in the short term, with monitoring to determine its effectiveness.

Marine outfall:

Although diverting treated wastewater from Potsdam directly offshore via a new marine outfall would lower nutrient loads within the lagoon, this remediation option would also fundamentally alter the lagoon's hydrodynamics by removing the main source of summer freshwater flows, and as assessed within the 2023 Remediation Plan (Rose *et al.*, 2023), would require intensive estuary mouth management in summer to prevent closure. The high capital cost, lengthy authorisation timelines, and significant regulatory risks around offshore effluent disposal led to this option being excluded as a feasible solution.

Biofiltration:

The option was found to show promise in small experimental applications, but is not expected to have a measurable impact on lagoon-scale water quality. In-situ trials of this technology have not yet been made, nor have gravity-fed flowthrough systems been tested. Implementation in the Milnerton Lagoon context would therefore be experimental but is only likely to address a fraction of inflows (not significant

enough to make any real remediation impact on the existing scenario) and was therefore not considered a viable standalone intervention for the current scale of pollution.

Treatment wetlands:

Constructed wetlands are well-known to be ineffective under very high pollutant loadings (2023 Remediation Plan; Rose, Day, Basson, *et al.*, 2023) such as those affecting the Milnerton Lagoon, and would require extensive land, rehabilitation of contaminated reedbeds, ongoing maintenance, and associated environmental authorisations. Their impact would be limited to polishing lower-pollution inflows and would not address the main sources of contamination.

The use of wetlands for the treatment of runoff with high levels of sewage and associated nutrients and organic sediments is not advocated as an effective use of scarce space in an urban context. The transfer of such effluent into an effectively managed WWTW for treatment was instead argued within the 2023 Remediation Plan (Rose *et al.*, 2023). to be more effective in remediation of the lagoon.

Inoculation (biological enhancement):

The 2023 Remediation Plan (Rose *et al.*, 2023) references Inoculation as an emerging or experimental measure, with insufficient evidence of effectiveness at the scale of Milnerton Lagoon. It has not yet been trialled in the complex estuarine environment, or at the scales required, and cannot be recommended as a short-term intervention without evidence of likely success.

The other remediation options assessed in the 2023 Remediation Plan were excluded due to a combination of high cost, long lead times, limited efficacy under current loading conditions, or significant regulatory hurdles. Dredging remains the most practical immediate intervention to improve hydraulic efficiency, reduce organic nutrient-enriched fine sediments accumulation, and support future remediation measures. While some of the remediation alternatives assessed in the 2023 Remediation Plan (Rose *et al.*, 2023), particularly pumped addition of seawater to the lagoon, may be pursued as complementary measures, the current application focuses on dredging as a means to improve functioning of the estuary and improve water quality.

Provide a detailed motivation if no activity alternatives exist.

Water quality in the Milnerton Lagoon is impacted by multiple pollution sources, as noted above. Current efforts to address these sources of pollution are the subject of a suite of existing plans and projects including the Potsdam WWTW upgrade project (by 2027); capacity upgrade and construction of an overflow pond at Koeberg Pump Station (2027); construction of the new Montague Gardens Bulk Sewer (2026); rehabilitation of the Montague Drive Bulk Sewer (2027); upgrades to the Phoenix Park Pump Station (2028); and upgrades to the Sanddrif East Pump Station (2027).

A Water Quality Remediation Plan for the Milnerton Lagoon prepared for the City of Cape (Rose *et al.*, 2023) assessed various short-, medium- and long-term remediation measures proposed for the lagoon and recommended that the primary focus should be on reducing pollutant inputs to the estuary. The City is currently implementing major capital upgrades to the Potsdam WWTW, intended to increase both its treatment capacity and the effectiveness of treatment. Of the short-term remediation measures assessed in the 2023 Remediation Plan (Rose *et al.*, 2023), listed as various activity alternatives considered in addition to dredging, but not assessed in this application, it was recommended that the City pursue the following options:

- Mechanical aeration of the lower lagoon to raise dissolved oxygen concentrations; a pilot project in this regard was implemented between November 2023 and May 2024, but had only limited effects on the very low oxygen levels in the lagoon;
- Saltwater flushing by pumping of water from the beach or offshore into the estuary, to dilute flows from the catchment and increase the flushing of sediments from the lower lagoon into the sea; and

- Dredging to remove built-up organic sediments and increase tidal exchange in the estuary.

Dredging is the subject of this Basic Assessment and is proposed for short- to medium-term implementation. Saltwater flushing will be the subject of a separate application for authorisation should it be required.

List the positive and negative impacts that the activity alternatives will have on the environment.

The proposed dredging is a pollution remediation measure intended to achieve specific positive outcomes. The preferred activity alternative (i.e., dredging within the lagoon) is anticipated to have the following positive impacts:

- Improved tidal exchange and enhanced hydrodynamic functioning of the lower estuarine system, supporting broader ecosystem health and resilience.
- Increased dissolved oxygen levels in the water column, potentially disrupting anoxic conditions and reducing the production of hydrogen sulphide (the “rotten-egg” smell).
- Creation of new intertidal habitats and enhancing habitat diversity in the estuary.
- Visual and odour nuisance may be reduced through targeted dredging, enhancing the aesthetic and recreational value of the lagoon and generating positive social and economic effects, particularly for local communities and tourism-related activities.
- The significance of these positive impacts is assessed as low to very low when considered in isolation, but would increase to high positive significance if integrated with catchment-wide pollution control and remediation efforts. Potential negative impacts are also anticipated, including: disturbance and mortality of benthic and estuarine organisms within the dredged footprint, though limited considering the already compromised ecological condition of the area.
- Noise and physical disturbances associated with dredging may affect estuarine species, though these impacts are limited by the existing degraded habitat conditions.
- Avifaunal habitats will experience temporary degradation and disturbance during dredging operations; however, long-term habitat quality is expected to improve once dredging is completed and ecological recovery begins.

Potential negative impacts are also anticipated for the design and layout alternatives, including:

- Water quality impacts are anticipated as a result of dredging and the placement of sediment along the channel edges. These activities may temporarily increase turbidity, reduce water clarity, and release pollutants such as nutrients, hydrocarbons, heavy metals, and other contaminants into the water, potentially disturbing sensitive species should these be present. However, these impacts are anticipated to be short-term and limited to active dredging periods, including both the initial dredging phase and future maintenance events.
- Short-term implementation-related nuisances such as noise, odour (from disturbed sediment), and increased activity (personnel and machinery movement) will occur but are expected to be temporary, manageable, and limited to the implementation phase, with mitigation measures outlined in the EMP to reduce the significance of nuisance.

Each of these impacts is assessed as either having low negative significance, or can be effectively mitigated to negligible levels, given the lagoon’s already degraded condition and the fact that the nuisance effects of dredging will be temporary and limited to the implementation phase.

1.3.	Design or layout alternatives to avoid negative impacts, mitigate unavoidable negative impacts and maximise positive impacts
------	--

Provide a description of the preferred design or layout alternative.

The preferred design and layout alternative is the proposed dredging of a scour channel in Milnerton Lagoon at the site (i.e., the approximately 1.12 km lower section of the lagoon extending from the lagoon mouth to north of the Wooden Bridge), to reshape the channel profile and increase scour and

tidal exchange, with placement of dredged material on the sides of the scoured channel within the intertidal zone of the lower lagoon (refer to **Figure 14**).

Provide a description of any other design or layout alternatives investigated.

Following the recommendation to pursue dredging as the remediation option, five dredging design and layout alternatives were further investigated (as listed below). These design and layout alternatives concern the proposal to dredge a channel near the Loxton Road bridge to the mouth of the lagoon. The location of the dredge channel in the centre of the lagoon is based on the most recent bathymetric survey of the lagoon, which shows natural scour (and thus highest natural flow velocities) to occur along the proposed alignment (refer to the 2023 Remediation Plan; Rose et al., 2023). Selecting this alignment for dredging is expected to maximise the potential benefits of the proposed dredging. However, each dredging design and layout alternative differs in its use for, placement within, or disposal of dredged material:

Alternative 1 – Dredging with placement of material within the lagoon (Preferred Alternative):

This option involves dredging approximately 30,000 m³ of sediment from the channel and placing it on the sides of the dredged area to build up sandbanks within the tidal zone – refer to **Figure 15** below. During the post-dredging phase of the project, up to a total of 120 000 m³ in future maintenance to maintain a scour channel and open estuary mouth in accordance with the Maintenance Management Plan (see **Appendix H2**), as and when needed to ensure the hydrodynamic function of the lower lagoon is maintained.

These sandbanks would be naturally exposed to cycles of oxygen and ultraviolet light (UV) through wetting and drying, assisting in the breakdown of organics. Importantly, this option does not require off-site disposal or dewatering, thereby will not take up scarce landfill space nor involve the excessive transport and loading to move sediment off-site to an appropriate and capacitated landfill site, making it the least costly and least disruptive alternative. Dredging could be completed in approximately five months, with impacts limited to the dredged footprint and without significant loss of public space.

This proposed intervention includes the creation of a berm upstream of the small island at the Wooden Bridge, using 600 m³ of dredged material, as a means to potentially concentrate flows west of the island and increase flow velocities.

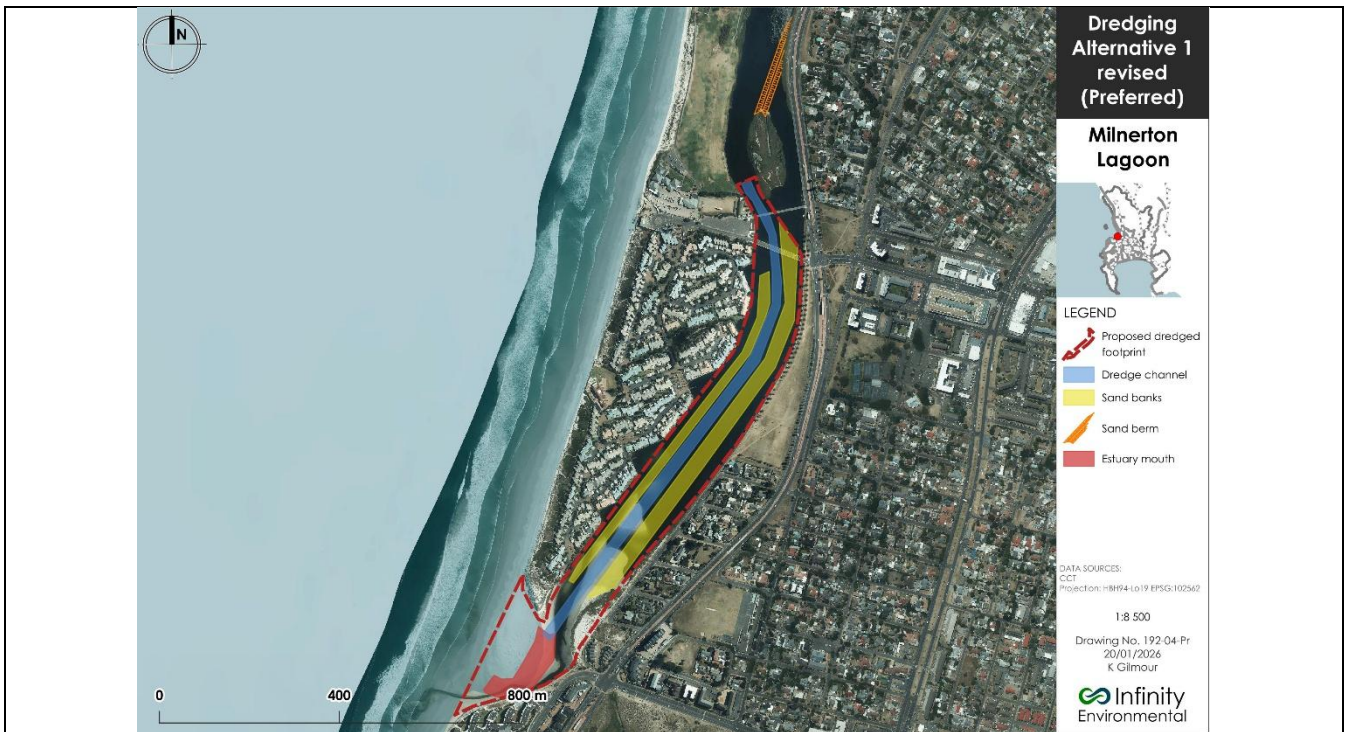


Figure 15: This schematic representation presents the (updated) preferred design and layout alternative – Alternative 1 – the proposed dredging with placement of material within the lagoon. [Adjusted after the draft BAR to exclude a small section of material placement south of Loxton Road on the western shore]

Alternative 2 – Dredging with cyclone separation and disposal at lagoon mouth (discarded):

This method would use a suction dredger with cyclone separation, returning clean sand to the lagoon while discharging fine, organic-rich sediments at the lagoon mouth during outgoing tides for removal to sea – refer to **Figure 16** below. Although this option would reduce sediment oxygen demand and improve flushing efficiency, it carried higher costs than Alternative 1 and introduced short-term public impacts; including odour risks, disturbance from temporary equipment and disposal operations and public scrutiny for capital expenditure considering the lengthier process to receive approval ahead of commencement. The disposal of dredged material at the mouth of the estuary would require a Dumping at Sea and/or a Coastal Waters Discharge Permit in terms of the NEM:ICMA and hence, a full Scoping and EIA process to obtain EA before commencement. The length of the approval process and the increased associated costs and timeframes ahead of commencement rendered this application lesser preferred to Alternative 1.

The intervention involves forming a berm upstream of the small island at the Wooden Bridge, using approximately 600 m³ of dredged material, to help direct flows to the west of the island and enhance flow velocities.



Figure 16: This schematic presents the design and layout Alternative 2 – the proposed dredging with cyclone separation and disposal at lagoon mouth.

Alternative 3 – Full dredging with off-site disposal (discarded):

This option proposed dredging the entire channel area (approximately 120 000 m³) using a cutter-suction dredger, pumping dredged slurry to geotextile tubes for dewatering, and disposing of the full volume off-site – refer to **Figure 17**. The process would take approximately 18 months, involve significant loss of park space for dewatering operations, create risks of odour nuisance, and generate heavy vehicle traffic for waste removal. While this option would remove the largest volume of sediments, it was considered excessively costly, highly disruptive due to the need to uptake scarce landfill space and involve the excessive transport and loading of sediment removal off-site to an appropriate and capacitated landfill site and is not sustainable given that dredging would still need to be repeated in future.

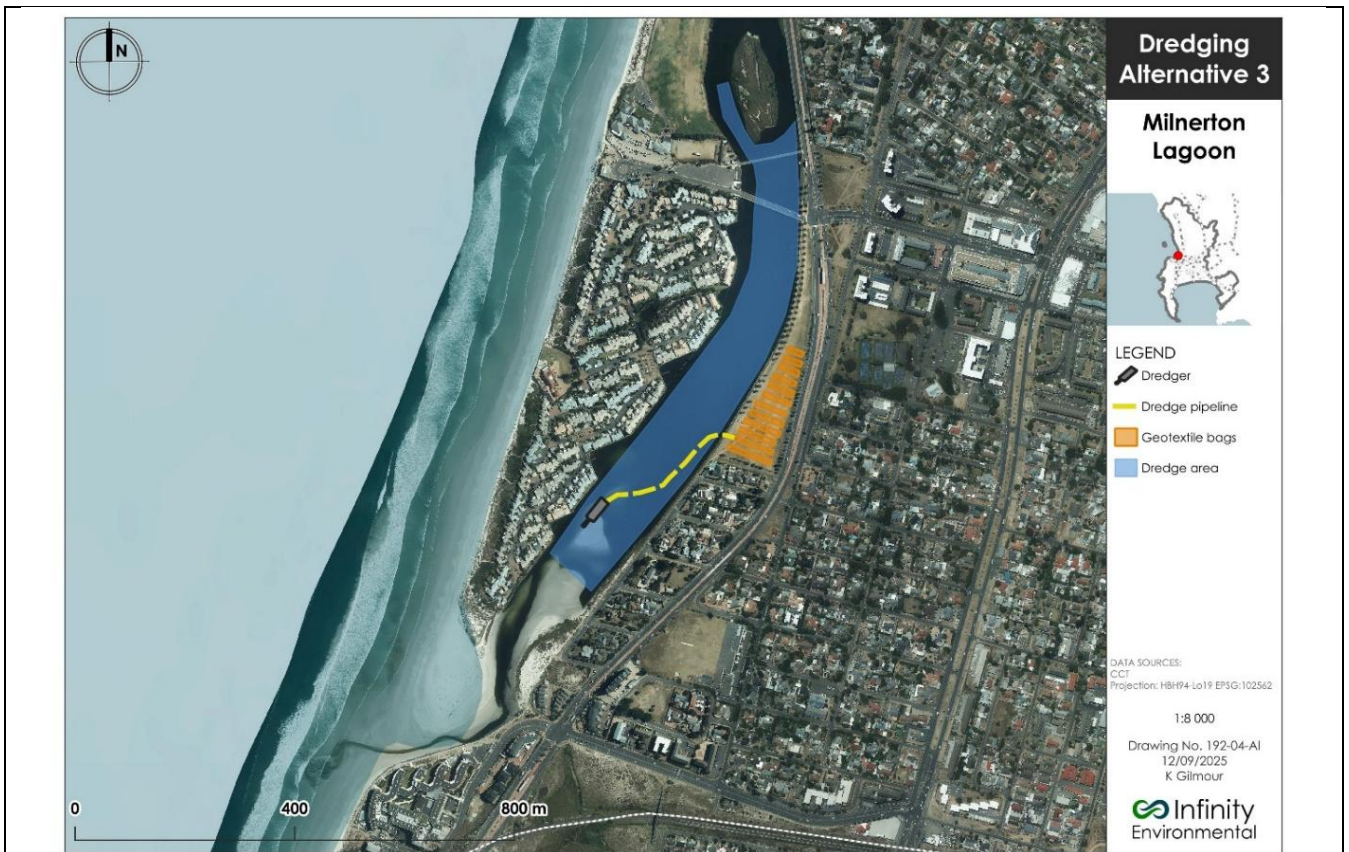


Figure 17: This schematic presents the design and layout Alternative 3 – the proposed ‘full’ dredging with off-site disposal.

Alternative 4 – Full dredging with separation of sand and nutrient-enriched fine sediments, off-site disposal of fine materials (discarded):

Similar to Alternative 3, this option would dredge approximately 120 000 m³ of material but include a separation step where clean sand would be returned to the lagoon and fine materials (± 24 000 m³), dewatered and then disposed of off-site (refer to **Figure 18** below). The implementation period was estimated at 20 months, again requiring park space for geotextile dewatering and generating odour and traffic impacts. While somewhat less costly than Alternative 3 due to reduced disposal volumes, the option still carried high costs, long implementation timeframes, and disruptive impacts, without providing significantly greater benefits than Alternative 1.

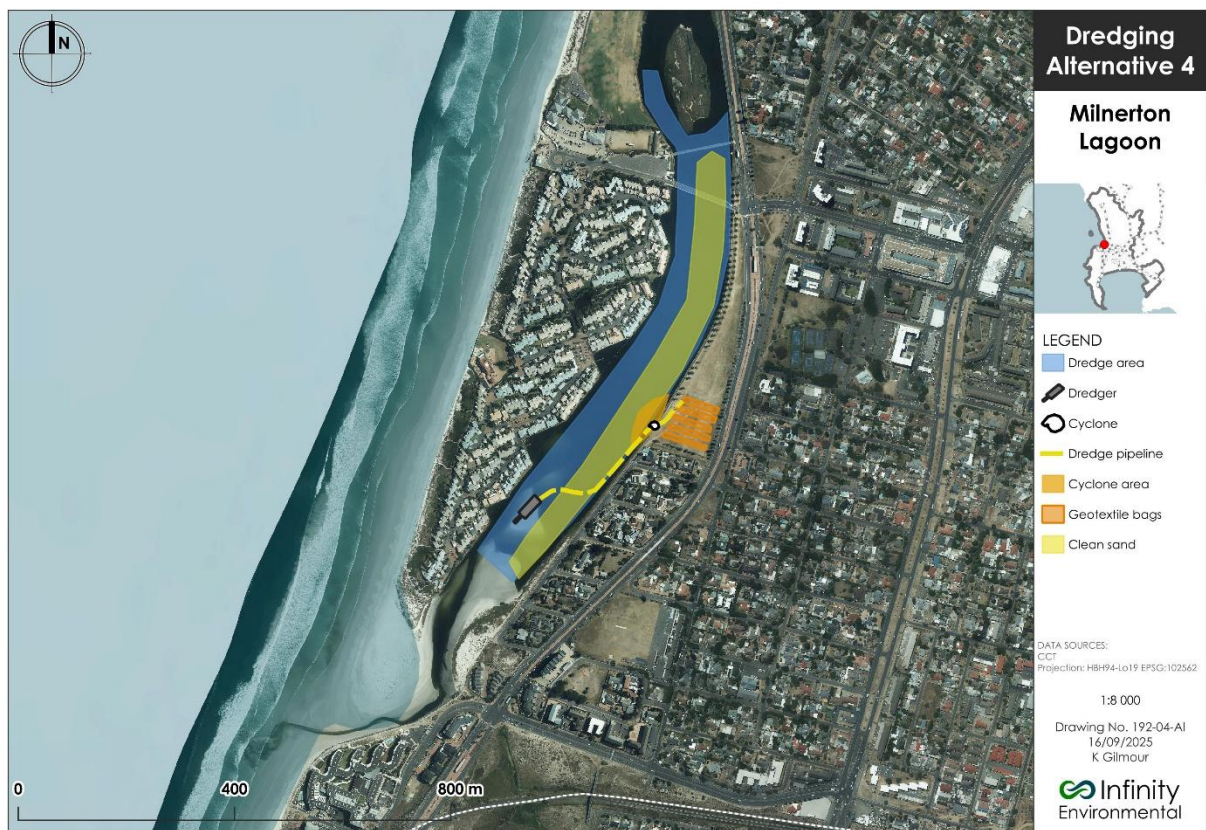


Figure 18: This schematic presents the design and layout Alternative 4 – the proposed ‘full’ dredging with separation of sand and fine sediments, off-site disposal of sediment.

Alternative 5 – Dredging of the channel with partial off-site disposal:

This option is a scaled-down version of Alternative 4, where up to 30,000 m³ of dredged material would be separated by cyclone, with clean sand returned to the lagoon (i.e., with placement of sediment particularly on the eastern bank of the channel) and only around 6 000 m³ of nutrient-enriched fine sediments dewatered and removed off-site (see **Figure 19** below). During the post-dredging phase of the project, up to 120 000 m³ of sediment will be dredged to maintain the scoured depth of the dredged channel and an open estuary mouth and placed on the eastern side of the channel within the intertidal zone. Any such maintenance to restore or maintain the channel depth and an open estuary mouth must be conducted strictly in accordance with the MMP (see **Appendix H2**), and only when necessary to sustain hydrodynamic functioning of the lower lagoon.



Figure 19: This schematic presents the design and layout Alternative 5 – the proposed dredging with off-site disposal.

Across all dredging design and layout alternatives, it was also recognised that the lagoon mouth must remain open at all times to allow tidal flushing of the system.

Only Alternatives 1 and 5 are comparatively assessed within this Basic Assessment application, with Alternative 1 being the preferred design and layout alternative and Alternative 5 being a feasible, but not preferred, design and layout alternative. Alternatives 2, 3, and 4 were not assessed further in the impact assessment as they are considered significantly more costly, logistically complex, and environmentally disruptive, requiring additional permitting, longer implementation timeframes, and offering no substantial improvement in environmental benefits compared to the preferred and alternative design and layout Alternatives 1 and 5 respectively.

Provide a motivation for the preferred design or layout alternative.

Alternative 1 is preferred as it provides a cost-effective, low-impact, and efficient approach to achieving the project objectives, which is primarily to improve the hydrodynamic function of the lower lagoon. Unlike the other options, it does not require off-site disposal or dewatering, thereby avoiding the use of scarce landfill capacity and the associated transport, handling, and loading impacts of removing sediment to a distant disposal site. It can be completed within an estimated five months, with disturbance limited to the dredged footprint and no significant loss of public space.

Reasons for why other design and layout alternatives are less preferred or were discarded altogether:

Cost and time implications

Alternative 5 (a feasible design alternative) involves some targeted removal of accumulated organic sediments. It also involves impacts such as odour, temporary use of park space, and nuisances during dewatering.

Alternatives 2, 3 and 4 were not comparatively assessed as they have higher risks and much higher costs than the preferred and least preferred design and layout alternative designs.

Permitting Requirements

Since the preferred and least preferred Alternatives 1 and 5 respectively, do not involve sediment disposal at or near the mouth (as in Alternative 2), there is no need for additional authorisations such as a Dumping at Sea Permit or a Coastal Waters Discharge Permit in terms of Section 69 of NEM:ICMA.

Socio-Economic Concerns

In contrast to the Design and Layout Alternative 1, the other design and layout alternatives (i.e., Alternatives 2, 3 and 4) carry higher costs, longer approval and implementation timeframes, and greater social and environmental disruption, including traffic, disposal permitting requirements, and extended construction periods without delivering proportional additional benefits.

Reasons for preferring Alternative 1 over Alternative 5:

a. Impacts on sense of place

Dewatering would result in the temporary occupation of a highly visible and well-used section of public open space. This area, located near Woodbridge Island and adjacent to Marine Drive, is frequented by residents, visitors, and recreational users due to its accessibility, the pedestrian footpath alongside the lagoon, this park's amenity value and the outdoor gym facility that encourages public use. Its repurposing for dewatering activities—such as the installation of geotextile tubes, delivery of flocculant chemicals, and ongoing pumping operations—would disrupt the natural and recreational character of the site, detracting from the areas' sense of place during the months-long dewatering period.

b. Exacerbated nuisance

In addition, the use of this park space introduces more pronounced risks of nuisance impacts including odour, noise from pumping equipment, and visual intrusion from sediment storage infrastructure than that of the design and layout alternatives that do not involve dewatering. These nuisance disturbances may extend beyond the immediate footprint of the dewatering operation, affecting nearby residential properties, pedestrian traffic, and tourism experiences associated with the lagoon and coastal walkway.

c. Rehabilitation requirements

The compaction of turf and damage to landscaped areas, along with the potential for accidental spills or leaks of dredge slurry, also present rehabilitation concerns that would require mitigation and post-project site restoration, adding to the total environmental footprint and cost of dewatering.

d. Increased traffic and safety concerns

The use of this site would also generate increased vehicle activity, as construction trucks and support vehicles would need regular access for the management, monitoring, and eventual removal of dewatered sediment. Given its location adjacent to Marine Drive, frequent entry and exit of heavy vehicles could lead to congestion, safety concerns for cyclists and pedestrians, and disruption of regular traffic flow. These operational movements may be particularly problematic during peak commuting hours or weekends, when both the road and surrounding public spaces experience elevated use. The cumulative effect of construction-related traffic and temporary site occupation may therefore impact not only environmental and recreational values but also urban mobility and local access.

Sediment removal cost-benefit-analysis considering recent sediment scour

Flooding in winter 2023 resulted in the natural scour and removal of approximately 110 000 m³ of sediment from the lower lagoon, and the modelling and surveyed data on which the full dredge

recommendation was based (i.e., for Design and Layout Alternatives 3 and 4), are no longer *relevant*. Offsite disposal of a large volume of sediment, including a high proportion of inorganic sand, would be cost-prohibitive and would result in an arguably unjustifiable use of limited landfill airspace and municipal expenditure given the limited expected benefits, particularly should the sources of pollution within the lagoon be left unaddressed and water quality inflows into the lagoon remain at unacceptable levels. Moreover, dredging the entire lower lagoon to below sea level (as would be the case for Design and Layout Alternatives 3 and 4) may pose a risk of contributing further to anoxic conditions in the water column, due to a 'sump' effect created by the deep depression upstream of the mouth – potentially causing water stagnation prohibiting mixing of bottom water with surface flows.

Provide a detailed motivation if no design or layout alternatives exist.

N/A – refer to the design and layout alternatives assessed above.

List the positive and negative impacts that the design alternatives will have on the environment.

The proposed dredging is a pollution remediation measure intended to achieve specific positive outcomes.

The preferred design and alternative designs (i.e., dredging with placement of material within the lagoon) are anticipated to have the following positive impacts:

- Improved tidal exchange and enhanced hydrodynamic functioning of the lower estuarine system, supporting broader ecosystem health and resilience.
- Increased dissolved oxygen levels in the water column, potentially disrupting anoxic conditions and reducing the production of hydrogen sulphide (the “rotten-egg” smell).
- Creation of new intertidal habitats and enhancing habitat diversity in the estuary.
- Reduced negative impacts associated with odour nuisance, and enhanced liveability of the lagoon for local communities.
- The preferred design and layout alternative does not require off-site disposal or dewatering, making it the least costly and least disruptive alternative.
- Implementation of the proposed dredging could be completed in approximately five months, with impacts limited to the dredged footprint and without significant loss of public space.

The significance of these positive impacts is assessed as low to very low when considered in isolation, but would increase to high positive significance if integrated with catchment-wide pollution control and remediation efforts.

Potential negative impacts are also anticipated for the design and layout alternatives, including:

- The dredging process will directly disturb and cause mortality of benthic and estuarine organisms within the dredged footprint, despite the already compromised ecological condition of the area.
- The placement of dredged sediment along channel margins may result in smothering of benthic and estuarine fauna, further affecting local biodiversity in the short-term.
- Water quality impacts are anticipated under both the preferred and least preferred design and layout alternatives as a result of dredging and the placement of sediment along the channel edges. These activities may temporarily increase turbidity, reduce water clarity, and release pollutants such as nutrients, hydrocarbons, heavy metals, and other contaminants into the water, potentially disturbing sensitive species. However, these impacts are anticipated to be short-term and limited to active dredging periods, including both the initial dredging phase and future maintenance events.
- This sediment deposition on the sides of the channel exposed to air at low tide and then covered again at high tide can result in chemical reactions that potentially mobilise metals (i.e., release metals into the water column) and result in acidification of the organic sediment that can be released into the water with submersion during high tide. The Estuarine Impact

Assessment indicates that the lower reaches of the lagoon were dominated by sandy sediment based on sampling undertaken in 2023 and also notes that while resuspension of trace metals into the water column due to dredging is a concern, the magnitude of the impact is likely tempered by lower bioavailability.

- Noise and physical disturbances associated with dredging may affect estuarine species, though these impacts are limited by the existing degraded habitat conditions.
- Avifaunal habitats will experience temporary degradation and disturbance during dredging operations; however, long-term habitat quality is expected to improve once dredging is completed and ecological recovery begins.
- Short-term implementation-related nuisances such as noise, odour (from disturbed sediment), increased activity (personnel and machinery movement), and potential of spillage beyond the site footprint (particularly during sediment placement activity along the side channels of the lagoon) will occur but are expected to be temporary, manageable, and limited to the implementation phase, with mitigation measures outlined in the EMP to reduce the significance of nuisance.

Each of these impacts is assessed as either having low negative significance, or can be effectively mitigated to negligible levels, given the lagoon's already degraded condition and the fact that the nuisance effects of dredging will be temporary and limited to the implementation phase.

1.4. Technology alternatives (e.g., to reduce resource demand and increase resource use efficiency) to avoid negative impacts, mitigate unavoidable negative impacts and maximise positive impacts.

Provide a description of the preferred technology alternative:

The proposed dredging of Milnerton Lagoon will be undertaken using proven and conventional dredging technologies that are widely applied in similar estuarine and lagoon environments. The technological alternatives have been identified based on their ability to effectively and efficiently remove accumulated sediment, support the proposed design and layout alternatives, and minimise environmental disturbance.

The final selection of technology will depend on the chosen design and layout alternative and therefore cannot be meaningfully compared in isolation. For the preferred Design and Layout Alternative 1 (dredging with placement of material on sides of the channel), amphibious or barge-based excavators are likely to be the most suitable equipment, but this will be determined by the appointed contractor to meet project needs. Should the preferred alternative be implemented, dredging will be undertaken using amphibious excavators capable of operating in shallow and intertidal conditions to mechanically or hydraulically move sand within the lagoon, or excavators operating from floating barges. This technology provides the most cost-effective, low-impact, and flexible means of achieving the project objectives while minimising environmental disturbance and avoiding off-site disposal.

Provide a description of any other technology alternatives investigated.

For Alternative 5 (dredging with placement on the eastern bank and partial off-site disposal), the cutter suction type dredger, used in combination with a hydro-cyclone for sediment separation and geotextile tubes for dewatering would likely be selected. A cutter suction type dredger is a hydraulic dredging machine equipped with a rotating cutter head that loosens and breaks up material on the lagoon bed. The loosened material is then sucked up with water by a submersible dredge pump to form a slurry, which is transported through floating and shore pipelines to a designated placement area. The dredger operates while anchored using a spud and winch system, allowing for controlled and progressive dredging. This method is efficient, well-established, and suitable for the sediment characteristics of the lower lagoon. Should cycloning and dewatering be required, a hydro-cyclone and geotextile tube system will be used. This system allows for the separation of sand from finer sediments and contaminants, with clean sand returned to the lagoon. The dredged slurry is pumped into large bags or tubes made from a permeable woven geotextile. The free water is drained from the

slurry and the material consolidates and dries in the bag/tube. The finer slurry is treated with a flocculant to speed up settling before being pumped into geotextile tubes for dewatering. This method is both space-efficient and practical, given the site constraints, and minimises handling and transport requirements.

In addition to the above technologies (amphibious excavators and cutter suction type dredger with cyclone separation and geotextile dewatering), several other dredging and dewatering technologies were identified and considered during the planning phase but found unfeasible for implementation.

Dredging Alternatives:

Dredging Technology Alternative 2: Grab / Clamshell Dredgers

This method uses a bucket or grab suspended from a crane or barge to excavate sediment from the lagoon bed. The material is lifted in discrete loads and then transferred to barges, trucks, or placement areas. It is typically applied in harbours, navigation channels, and confined waterbodies where precision excavation is required in deep channels.

Dredging Technology Alternative 3: Trailing Suction Hopper Dredgers (TSHD)

TSHDs are self-propelled dredging vessels equipped with drag arms and suction heads. They remove material from the bed and store it in an onboard hopper. Once full, the dredged material can be transported to an offshore or nearshore disposal site. This technology is commonly used for large-scale capital and maintenance dredging.

Dredging Technology Alternative 4: Mechanical Conveyor Systems / Pump and Truck Hybrid

This approach involves dredging with equipment such as amphibious excavators or pumps and then conveying the dredged slurry to a remote disposal or processing site through pipelines or conveyor belts. The material is then handled for treatment or disposal at a secondary location.

Dewatering Alternatives:

Dewatering Alternative 2: Confined Disposal Facility (CDF)

The CDF method is a conventional and widely used dewatering approach involving engineered settling ponds or containment cells designed to receive dredged slurry. Within the facility, solids are allowed to settle through gravity, while clarified water is decanted or discharged in a controlled manner. This method typically requires significant land area for construction, engineered containment structures, and a long residence time to achieve the desired solids concentration.

Dewatering Alternative 3: GeoPool Dewatering Method

The GeoPool system is a modular, free-standing dewatering structure developed in the United States. It consists of permeable wall panels lined with non-woven geotextile, forming large temporary reservoirs into which dredged slurry is pumped. Water drains through the geotextile while solids remain inside, allowing for rapid and controlled dewatering without the need for permanent infrastructure. The system is portable and reusable, making it suitable for projects requiring flexible and short-term containment solutions.

Dewatering Alternative 4: Passive Dewatering Lagoons

This method involves pumping dredged slurry into temporary containment basins or lagoons, where solids settle naturally over time through gravity, and water is decanted or evaporated. Passive dewatering lagoons are simple in design, often consisting of earth berms or temporary lined ponds, and are typically used where ample land area is available for storage and the project timeline allows extended settlement periods.

These technologies represent standard industry options for dredging and dewatering in different operational contexts. While they were identified and reviewed during project planning, the final selection of technology focused on the options best suited to the specific environmental, spatial, and operational characteristics of Milnerton Lagoon.

Provide a motivation for the preferred technology alternative.

Amphibious or barge-based excavators are the most suitable technology for implementing the proposed dredging of Milnerton Lagoon. This combination of technologies is well-established, efficient, and capable of operating effectively in shallow, dynamic estuarine environments with a minimal physical footprint. The dredging method allows for precise placement of dredged material within the intertidal zone, demonstrates flexibility under variable site conditions, and offers a cost-effective, low-impact, and practical solution aligned with the project objectives of improving hydrodynamic functioning while limiting environmental disturbance.

For dewatering, the use of a hydro-cyclone in combination with geotextile tubes has been identified as the most suitable method if partial off-site disposal is required (as in Alternative 5). This system provides an efficient means of separating sand from finer sediments and contaminants, allowing clean sand to be returned to the lagoon while minimising the footprint required for dewatering infrastructure. This method is particularly advantageous given the spatial constraints surrounding the site.

Other dredging and dewatering technologies were investigated but not considered favourable for this project:

- **Grab / Clamshell Dredgers** were excluded due to limited manoeuvrability in shallow, intertidal environments.
- **TSHD** were excluded due to deep-water access and manoeuvring space requirements, offshore disposal needs, and the resulting additional permitting and cost implications.
- **Mechanical Conveyor / Pump and Truck Systems** were excluded due to the extensive infrastructure and vehicle movements required, leading to disruption of surrounding public spaces and increased traffic impacts.
- **CDF** were excluded due to large engineered containment requirements and long settling periods incompatible with site constraints.
- **GeoPool Dewatering** was excluded due to additional logistical complexity and higher costs associated with the method.
- **Passive Dewatering Lagoons** were excluded due to insufficient space for containment basins and long settlement periods not aligned with the implementation timeline.

Geotextile tube dewatering represents a well-established, environmentally responsible method particularly suited to the nutrient-enriched fine sediments present in the lagoon. The engineered textile allows water to drain while retaining solids and contaminants, ensuring secure containment and manageable handling of the dried material. The compact footprint, adaptability, and proven contaminant retention make geotextile tube dewatering the most practical and suitable dewatering technology for this site.

The preferred technologies such as amphibious or barge-based excavators (for Design and Layout Alternative 1) and cutter suction dredger with cyclone separation and geotextile tube dewatering (for Design and Layout Alternative 5) align closely with the specific environmental, spatial, and operational conditions of the site. This alignment minimises disturbance, avoids unnecessary infrastructure requirements, and supports efficient project implementation, making these technologies the most appropriate and defensible choice for the proposed dredging of Milnerton Lagoon.

Provide a detailed motivation if no alternatives exist.

Although several dredging and dewatering technologies were considered, including grab/clamshell dredgers, trailing suction hopper dredgers, mechanical conveyor systems, CDF or GeoPool dewatering, and passive dewatering lagoons, these options were found unsuitable due to site constraints, environmental sensitivities, and higher costs and thus were not further investigated.

The preferred technologies (i.e. amphibious excavators and cutter suction dredger with hydro-cyclone and geotextile dewatering) are the only practical, efficient, and environmentally appropriate options for the lagoon. No other alternatives would achieve the same outcomes with lower impact or cost.

List the positive and negative impacts that the technology alternatives will have on the environment.

The preferred technology alternatives (amphibious excavators and cutter suction dredger with hydro-cyclone and geotextile dewatering) are anticipated to have the following positive impacts:

Positive impacts:

- The use of amphibious excavators and cutter suction dredgers allows for targeted and controlled dredging, limiting disturbance to surrounding areas.
- These methods enable efficient sediment removal, improving hydrodynamic flow and helping to reduce anoxic conditions in the lagoon.
- On-site placement of dredged material reduces landfill disposal, transport emissions, and associated traffic impacts.
- Hydro-cyclone and geotextile dewatering allows for effective separation of clean sand and nutrient-enriched fine sediments, supporting better sediment management and pollution control.

The preferred technology alternatives (amphibious excavators and cutter suction dredger with hydro-cyclone and geotextile dewatering) are anticipated to have the following negative impacts:

- Dredging operations may cause short-term increases in turbidity, reduced water clarity, and the remobilisation of pollutants in the water column.
- Use of heavy machinery may generate localised noise, vibration, and odour impacts, particularly during dewatering activities.
- Temporary occupation of public open space may limit access and create nuisance impacts such as dust and vehicle movement.
- If not carefully managed, dewatering operations can release nutrient-laden water back into the lagoon or surrounding areas.

The preferred technologies enable controlled dredging, reducing long-term impacts, but require careful management to minimise short-term construction-related disturbances.

1.5.	Operational alternatives to avoid negative impacts, mitigate unavoidable negative impacts and maximise positive impacts.
------	--

Provide a description of the preferred operational alternative.

The proposed activity does not have an operational phase; therefore, no operational alternatives are therefore proposed. The proposed dredging of the lower lagoon with placement of dredged material on the sides of the lagoon within the intertidal zone is intended to be an infrequent remediation intervention.

Rather than operational alternatives, the specialists and the EAP have made recommendations to optimise the outcomes of the proposed dredging. The key recommendations are that the dredged channel be maintained at the planned depth, and that inflowing water from the catchment as well as various point sources (including Potsdam WWTW) must be improved to realise a significant improvement in estuarine condition over the long term. It was also recognised that the lagoon mouth

must remain open at all times to allow tidal flushing of the system. Any closure would rapidly result in deposition of organic matter from upstream and critically low oxygen levels due to poor freshwater quality. The need for ongoing mouth maintenance was confirmed in the Estuarine Impact Assessment (refer to **Appendix G1**).

Whilst the proposed dredging is a less frequent remediation measure due to its high cost, it is recommended that the scoured channel depth and the estuary mouth be actively maintained into perpetuity. Relying solely on natural processes to maintain the desired depth of the scoured channel and opening of the mouth carries the risk of poor outcomes. Instead, additional hydraulic management (flow manipulation) options should be considered to enhance inflows and promote sediment movement such as the beach wells activity alternative considered in the 2023 Remediation Plan (Rose *et al.*, 2023) and described in **Section H** above, which would essentially use seawater abstracted from beach wells to flush the lagoon and can be implemented through a separate project undertaken by the Applicant.

During the implementation phase of this application, the sustained opening of the estuary mouth can be supported by careful channel scouring and strategic placement of sediment on the eastern side of the channel in the intertidal zone, although it is unlikely that these effects will be sustained over the long-term.

One of the priority management objectives and associated action items and timeframes for the Diep River Estuary presented in the 2022 Diep River Estuarine Management Plan is the development of a 'Mouth Management Plan' and accompanying 'Maintenance Management Plan' (MMP) for the manipulation of the estuary mouth in situations where upstream flooding or other circumstances require it - refer to pg. 68 of the Estuarine Management Plan. In alignment with this requirement of the Diep River Estuarine Management Plan, an MMP has been developed as part of this application to ensure the continued maintenance of both the mouth and the depth of the scoured channel – refer to **Appendix H2** to this BAR.

Where relevant, maintenance activities and addressal of any adverse post-dredging effects considering the proposed dredging and placement of sediment on the sides of the channel within the intertidal zone are provided for (where appropriate) within the EMPr (refer to **Appendix H1**).

Provide a description of any other operational alternatives investigated.

No operational alternative was considered reasonable or feasible for the proposed dredging with placement of material within the lagoon.

Provide a motivation for the preferred operational alternative.

N/A - refer to the above responses.

Provide a detailed motivation if no alternatives exist.

N/A - refer to the above responses.

List the positive and negative impacts that the operational alternatives will have on the environment.

N/A - refer to the above responses.

1.6. The option of not implementing the activity (the 'No-Go' Option).

Provide an explanation as to why the 'No-Go' Option is not preferred.

The No-Go Alternative, which entails not implementing dredging in the Milnerton Lagoon, would not involve any intervention targeting improvements to the hydrodynamic functioning of the lagoon.

While winter flooding may cause natural temporarily improved intertidal exchange, this has proven insufficient to last for the full year. Because the primary driver of water quality is the upstream inflows, dredging may not directly affect water quality or amenity value of this waterbody other than by primarily improving tidal exchange in the lower part of the lagoon. The opportunity to realise the

indirect benefits of improved hydrodynamic function within the lower lagoon would be forfeited under the no-go scenario.

From an environmental standpoint, both the avifaunal and estuarine impact assessments reinforce the unsuitability of the No-Go Alternative:

- The avifaunal specialist acknowledges that while dredging would temporarily disturb bird habitats during dredging, it would ultimately enhance habitat quality in the long term. In contrast, leaving the site un-dredged would allow the already degraded, odour-prone lower lagoon to deteriorate further, with increasing ecological decline and biotic stress.
- The estuarine specialist cautioned that without intervention, ongoing pollution and nutrient accumulation would persist, and the ecological gains from improved flushing and the formation of enriched intertidal areas would not be realised.

Given the continued impacts on the lagoon, it is not considered reasonable nor feasible to do nothing, and the Alternative 1 dredging design is recommended as the lowest-risk and lowest-impact means of achieving the required tidal interchange.

1.7.	Provide an explanation as to whether any other alternatives to avoid negative impacts, mitigate unavoidable negative impacts and maximise positive impacts, or detailed motivation if no reasonable or feasible alternatives exist.
------	---

As described above the proposed dredging preferred alternative is the outcome of extensive remediation planning and engineering design processes that have considered a variety of options and alternatives.

While the anticipated benefits are limited, it is nevertheless deemed the most feasible alternative able to produce tangible improvements in the short- to medium-term considering the complimentary maintenance activities ensuring the dredged channel depth is maintained and the estuary mouth kept open.

Refer to Responses 1.1 – 1.6 above for further detail on the preferred alternative. No other alternatives were identified as feasible; therefore, no other alternatives were investigated.

1.8.	Provide a concluding statement indicating the preferred alternatives, including the preferred location of the activity.
------	---

The preferred alternative is the proposed dredging of a channel the lower section of the Milnerton Lagoon to increase flow velocities and scour, help keep the mouth of the estuary open, maximise tidal flushing, as well as creating raised intertidal mudflats with more frequent exposure to the air to increase sediment oxygen levels and reduce sulphurous odours as shown in **Figure 14**.

Property and Site Alternative:

The preferred property and site alternative for the proposed dredging is the approximately 1.12 km lower section of the lagoon, located within Erf 20315, that extends from the lagoon mouth, south-west of Woodbridge Island, to just north of the Wooden Bridge. This section extends from the lagoon mouth south-west of Woodbridge Island to just north of the Wooden Bridge. Concentrating on this area aims to limit the spread of fine sediments across the lagoon bed, while reducing costs and environmental disruption compared to the original proposal.

Activity Alternative:

The preferred activity alternative is the proposed dredging, without off-site disposal of material, of the lower section of the Milnerton Lagoon to increase scour, help keep the mouth of the estuary open, maximise tidal flushing, as well as creating raised intertidal mudflats with more frequent exposure to the air to increase sediment oxygen levels and reduce sulphurous odours. Hydrodynamic modelling found that dredging the channel down the centre of the lower lagoon would facilitate greater saline intrusion and saline wedge development during high energy incoming and outgoing tides (refer to

Appendix G1). This is expected to increase the exchange of saline and fresh water in the lower lagoon, with the seawater bringing dissolved oxygen into the lagoon.

Other remediation interventions (ruled out, and not assessed as activity alternatives in this application) were either found to have limited impact on the lagoon system, had already been trialled with limited success, or were deemed unfeasible due to cost or technical risks.

While some of these interventions may be revisited as complementary measures in the long term, the current application focuses exclusively on dredging as the only practical intervention able to produce tangible improvements in the short- to medium-term considering the complimentary maintenance activities ensuring the dredged channel depth is maintained and the estuary mouth kept open.

Design and Layout Alternative:

The preferred design and layout alternative is the proposed dredging of a scour channel in Milnerton Lagoon at the site (i.e., the approximately 1.12 km lower section of the lagoon extending from the lagoon mouth to north of the Wooden Bridge), to reshape the channel profile and increase scour and tidal exchange, with placement of dredged material on the sides of the scoured channel within the intertidal zone of the lower lagoon.

Following this recommendation, five dredging design and layout alternatives were subsequently investigated. These design and layout alternatives concern the proposal to dredge a channel near the Loxton Road bridge to the mouth of the lagoon. In comparing the five different dredging design and layout alternatives, Alternatives 2, 3 and 4 were ruled out and not further assessed in this application.

The preferred Design and Layout Alternative 1 (i.e., dredging with placement of dredged material within the tidal zone of the lagoon) was assessed as the most practical, cost-effective, and least disruptive activity alternative. Alternative 1 provides clear, though limited, ecological benefits through improved tidal flushing and scour, should reduce odour post-dredging by indirectly addressing anoxic conditions, avoids the high costs and logistical challenges of off-site disposal, and can be implemented within a manageable five-month implementation period. Therefore, Alternative 1 is selected as the preferred design and layout alternative in this application.

Alternative 5, which involved the removal and offsite disposal of the finer organic fraction of the material, is not preferred for a number of reasons. It is not anticipated to involve a greater improvement in water quality and odour in the lower lagoon, relative to the preferred alternative, but comes at a far greater cost, both in terms of financial allocation and the negative impacts associated with the dewatering and transporting of material to landfill.

Sediment samples collected in the lower lagoon in November 2023 as part of the dredging investigations were tested for trace metals as well as a full suite of organic and other contaminants. These samples were specifically targeted to include the areas of highest accumulation of fine sediments. In these samples, six metals (arsenic, cadmium, chromium, lead, nickel, and zinc) were all detected at lower concentrations than those reported in Gihwala et al., 2021 and well below sediment quality guidelines for the BCLME region as established in CSIR (2006) and the slightly more conservative Effects Range Low thresholds set out in Long et al. (1995). Guideline values for chronic and acute ecological impact are not currently exceeded, and available data do not suggest that metal contaminants are a significant driver of ecological impact in the Milnerton Lagoon.

Sediment quality is currently a pressing ecological concern in the Milnerton Lagoon only to the extent that it impacts on water quality. Water quality in flows entering the lagoon is so poor that sediment in the lagoon is not thought to be having a significant impact on oxygen levels. The biological and chemical oxygen demand of influent pollution, including both raw and poorly treated effluent, has created conditions of high and unmet oxygen demand in water entering the lagoon. There is in fact

no oxygen in the water that could be taken up by the decomposition of organic sediments. This is supported by the fact that although two wet winters flushed much of the fine sediment from the lagoon into the sea, oxygen levels have remained at and near zero (barring brief periods of improved tidal flushing that brought oxygen rich seawater into the lagoon).

In other words, in the recent past, **the high organic content of sediments in the lower lagoon is believed to have been a significant contributor to oxygen deficiencies and resultant odour production, but water quality has now deteriorated to such a point that no amount of sediment removal can address the challenge.** Dredging therefore targets the enhancement of hydrodynamic functioning to improve water quality and reduce odour in the lower lagoon while measures to improve influent water quality are underway.

Alternative 5 is not preferred since this alternative involves dewatering operations, would use limited landfill space, and involves transport and loading to move sediment off-site to an appropriate and capacitated landfill site, as well as odour and nuisance impacts associated with the dewatering area without offering any significant, additional hydrodynamic or water quality benefits over Alternative 1.

Technology Alternative:

A cutter suction type dredger and amphibious excavator(s) have been identified as the most suitable technologies for this project. The final selection of technology will depend on the chosen design and layout alternative and therefore cannot be meaningfully compared in isolation. For the preferred Design and Layout Alternative 1 (dredging with placement of material on sides of the channel), the amphibious excavator is identified as the preferred technology alternative. For the least preferred Design and Layout Alternative 5 (dredging with placement on the eastern bank and partial off-site disposal), the cutter suction type dredger, used in combination with a hydro-cyclone for sediment separation and geotextile tubes for dewatering, together with the amphibious excavator, is identified as the least preferred technology alternative.

Although several dredging and dewatering technologies were considered, including grab/clamshell dredgers, trailing suction hopper dredgers, mechanical conveyor systems, CDF or GeoPool dewatering, and passive dewatering lagoons, these options were found unsuitable due to site constraints, environmental sensitivities, and higher costs and thus were not further investigated.

The preferred technologies – amphibious excavators and cutter suction dredger with hydro-cyclone and geotextile dewatering – are the only practical, efficient, and environmentally appropriate options for the lagoon. No other alternatives would achieve the same outcomes with lower impact or cost.

Operational Alternative:

The proposed activity does not have an operational phase; therefore, no operational alternatives are proposed. The proposed dredging of the lower lagoon with placement of dredged material on the sides of the scoured channel within the intertidal zone is intended to be an infrequent remediation intervention.

No-Go Alternative:

The No-Go Alternative, which entails not implementing dredging in the Milnerton Lagoon, would not involve any intervention targeting improvements to the hydrodynamic functioning of the lagoon.

While winter flooding may cause natural temporarily improved intertidal exchange, this has proven insufficient to last for the full year. Because the primary driver of water quality is the upstream inflows, dredging may not directly affect water quality or amenity value of this waterbody other than by primarily improving tidal exchange in the lower part of the lagoon. The opportunity to realise the indirect benefits of improved hydrodynamic function within the lower lagoon would be forfeited under the no-go scenario.

Given the continued impacts on the lagoon, it is not considered reasonable nor feasible to do nothing, and the Alternative 1 dredging design is recommended as the lowest-risk and lowest-impact means of achieving the required tidal interchange.

2. “No-Go” areas

Explain what “no-go” area(s) have been identified during identification of the alternatives and provide the co-ordinates of the “no-go” area(s).

The sand dunes on the south-eastern section of the lagoon near the mouth have been identified as a sensitive area that must not be disturbed.

The wooden pedestrian bridge is a provincial heritage site, and thus must not be altered or damaged in any way by the proposed dredging activities.

3. Methodology to determine the significance ratings of the potential environmental impacts and risks associated with the alternatives.

Describe the methodology to be used in determining and ranking the nature, significance, consequences, extent, duration of the potential environmental impacts and risks associated with the proposed activity or development and alternatives, the degree to which the impact or risk can be reversed and the degree to which the impact and risk may cause irreplaceable loss of resources.

This section outlines the impact assessment methodology, based on the (then) Department of Environmental Affairs and Tourism (DEAT) 2006 Guideline on Assessment of Alternatives and Impacts.

Impacts are defined as the changes in an environmental parameter that result from undertaking an activity. The change is the difference between the effect on the environmental parameter where the activity is undertaken compared to that where the activity is not undertaken. Impacts occur over a specific period and within a defined area.

Impacts may occur during the pre-implementation, implementation and post-dredging phases of the project, and may be direct, indirect and/or cumulative in nature. Only those impacts related to the implementation and post-dredging phases have been assessed in this BAR since the pre-implementation phase impacts, such as those related to communication channels, compliance with legislation, proper site set-up practices, can be managed ahead of commencement of the proposed dredging and thus altogether avoided.

The term ‘implementation phase’ is used to describe the otherwise construction phase, which involves the activities of site set up and active dredging and placement of dredged material on the sides of the scoured channel since the proposed dredging does not entail conventional construction or development activities.

- Direct impacts are impacts that are caused directly by the activity and generally occur at the same time and at the place of the activity. These impacts are usually associated with the construction, operation or maintenance of an activity and are generally obvious and quantifiable.
- Indirect impacts of an activity are indirect or induced changes that may occur as a result of the activity. These types of impacts include all the potential impacts that do not manifest immediately when the activity is undertaken or which occur at a different place as a result of the activity.
- Cumulative impacts, in relation to an activity, means the past, current and reasonably foreseeable future impact of an activity, considered together with the impact of activities associated with that activity, that in itself may not be significant, but may become significant

when added to the existing and reasonably foreseeable impacts eventuating from similar or diverse activities.

In order to identify potential impacts (both positive and negative) the nature of the proposed projects is interrogated so that the impacts associated with the projects can be assessed. The process of identification and assessment of impacts included:

1. Determining the current environmental conditions in sufficient detail so that there is a baseline against which impacts can be identified and measured, including by:
 - o Determination of site conditions via a visual inspection;
 - o Review of recent and historical aerial imagery; and
 - o Specialist assessments as required.
2. Determining future changes to the environment that will occur if the activity does not proceed, based on knowledge of local conditions, trends, and processes and on specialist assessment;
3. Developing an understanding of the activity in sufficient detail to understand its consequences; and
4. The determination of significant impacts which are likely to occur if the activity is undertaken.

As per the DEAT Guideline the following criteria have been applied to the prediction and assessment of impacts. Potential impacts are rated in terms of their:

- **Spatial extent** – The size of the area that will be affected by the impact:
 - o Immediate (site only);
 - o Local (<2 km from site);
 - o Regional (within 30 km of site);
 - o National; or
 - o International.
- **Intensity** – The anticipated severity of the impact:
 - o High (severe alteration of natural systems, patterns or processes);
 - o Medium (notable alteration of natural systems, patterns or processes); or
 - o Low (negligible alteration of natural systems, patterns or processes).
- **Duration** – The timeframe during which the impact will be experienced:
 - o Temporary (less than 1 year);
 - o Short-term (1 to 6 years);
 - o Medium-term (6 to 15 years);
 - o Long-term (the impact will cease after the operational life of the activity); or
 - o Permanent (reversal will not occur in such a way or in such a time span that the impact can be considered transient).
- **Reversibility** – The extent to which the impacts will be reversible when the project has reached the end of its life cycle (decommissioning phase, if applicable):
 - o High reversibility of impacts (impact is highly reversible at end of project life);
 - o Moderate reversibility of impacts;

- Low reversibility of impacts; or
- Impacts are non-reversible (impact is permanent).
- **Irreplaceability of resources lost** – the degree to which the impact causes irreplaceable loss of resources:
 - High irreplaceability of resources (project will destroy unique resources that cannot be replaced);
 - Moderate irreplaceability of resources;
 - Low irreplaceability of resources; or
 - Resources are replaceable (the affected resource is easy to replace/rehabilitate).

Using the criteria above, the impacts are further assessed in terms of the following:

Probability – The probability of the impact occurring:

- Improbable;
- Unlikely;
- Probable; or
- Very likely.

Significance – Will the impact cause a notable alteration of the environment?

- Low to very low (the impact may result in minor alterations of the environment and can be easily avoided by implementing appropriate mitigation measures, and will not have an influence on decision-making);
- Medium (the impact will result in moderate alteration of the environment and can be reduced or avoided by implementing the appropriate mitigation measures, and will only have an influence on the decision-making if not mitigated); or
- High (the impacts will result in major alteration to the environment even with the implementation on the appropriate mitigation measures and will have an influence on decision-making).

Status - Whether the impact on the overall environment will be:

- Positive - environment will benefit from the impact;
- Negative - environment will be adversely affected by the impact; or
- Neutral - environment will not be affected.

Confidence – The degree of confidence in predictions based on available information and specialist knowledge:

- Low;
- Medium; or
- High.

Impact mitigation measures have been incorporated into the EMPr, which includes where appropriate:

- Standards for measuring and monitoring mitigatory measures and enhancements, and a programme for monitoring and reviewing the recommendations to ensure their ongoing effectiveness; and

- Mitigation and management measures to avoid or reduce negative impacts.

Other aspects taken into consideration in the assessment of impact significance are:

- Impacts are evaluated for the construction and operation phases of the development.
- Impacts are evaluated with and without mitigation, stating the effectiveness of mitigation measures to reduce the significance of a particular impact;
- The impact evaluation takes into consideration the cumulative effects associated with this and other projects which are either developed or in the process of being developed in the local area; and
- The impact assessment attempts to quantify the magnitude of potential impacts (direct and cumulative) and outline the rationale used. Where appropriate, national standards are used as a measure of the level of impact.

4. Assessment of each impact and risk identified for each alternative

Note: The following table serves as a guide for summarising each alternative. The table should be repeated for each alternative to ensure a comparative assessment. The EAP may decide to include this section as Appendix J to this BAR.

The impact assessment attempts to quantify the magnitude of potential impacts (direct and cumulative) and outline the rationale used. Where appropriate, national standards are used as a measure of the level of impact.

Take Note: the Estuarine Impact Assessment (Appendix G1 of the BAR) assessed two types of “dredge activity” as follows:

- (1) the movement of sediment from the channel to the intertidal banks (referred to as ‘dredge and move’); and
- (2) both the removal of sediment, as well as dewatering and enrichment of the estuary with the clean sediment (referred to as ‘dredge, clean and move’).

At the time of specialist appointment, the estuarine specialist was directed to assess the two dredging options as described above since these were the two dredging design and layout options considered most reasonable and feasible by the Applicant. The specialist report was compiled based on the reasoned feasibility of the preferred Design and Layout Alternative 1 (**Dredging with placement of material within the lagoon**) and least preferred Design and Layout Alternative 5 (**Dredging of the channel with partial off-site disposal**) as described in greater detail within Section H of the BAR and presented below.

The various sensitivities and contextual constraints presented by the site resulted in two potential design and layout alternatives, which together with the no-go alternative were considered for this application:

- **Alternative 1 (Preferred Alternative)- Dredging with placement of material within the lagoon:** This option involves dredging approximately 30,000 m³ of sediment from the channel and placing it on the sides of the dredged area to build up sandbanks within the intertidal zone – refer to **Figure 2** below. During the post-dredging phase of the project, up to 120 000 m³ of sediment will be dredged from the channel and/or estuary mouth and placed on the sides of the channel within the intertidal zone and an open estuary mouth maintained. Any such maintenance to restore or maintain the channel depth and an open estuary mouth must be conducted strictly in accordance with the MMP (see **Appendix H2**), and only when necessary to sustain hydrodynamic functioning of the lower lagoon. These sandbanks would be naturally exposed to cycles of oxygen and ultraviolet light (UV) through wetting and drying, assisting in the breakdown of organics. Importantly, this option

does not require off-site disposal or dewatering, thereby will not take up scarce landfill space nor involve the excessive transport and loading to move sediment off-site to an appropriate and capacitated landfill site, making it the least costly and least disruptive alternative. Dredging could be completed in approximately five months, with impacts limited to the dredged footprint and without significant loss of public space.

This proposed intervention includes the creation of a berm upstream of the small island at the Wooden Bridge, using 600 m³ of dredged material, as a means to potentially concentrate flows west of the island and increase flow velocities.

- **Alternative 5 (Least Preferred) – Dredging of the channel with partial off-site disposal:** This option involves dredging of up to 30,000 m³ of material, which would be separated by cyclone, with clean sand returned to the lagoon (i.e., with placement of sediment particularly on the eastern bank of the channel) and only around 6 000 m³ of nutrient-enriched fine sediments dewatered and removed off-site (refer to **Figure 3** below). During the post-dredging phase of the project, up to 120 000 m³ of sediment will be dredged to maintain the scoured depth of the dredged channel and an open estuary mouth and placed on the eastern side of the channel within the intertidal zone. Any such maintenance to restore or maintain the channel depth and an open estuary mouth must be conducted strictly in accordance with the MMP (see **Appendix H2**), and only when necessary to sustain hydrodynamic functioning of the lower lagoon.

The specialists' sensitivity mapping/s contained in the respective report, clearly indicate the impact applicable to both the preferred and least preferred Design and Layout Alternatives (i.e., dredging with placement of sediment on the sides of the channel and **dredging of the channel with partial off-site disposal**), which is specifically captured as option 1 and option 2 respectively above, i.e., 'dredge and move' and 'dredge, clean and move', which are the only alternatives assessed in the impact tables below and within this application. Although the Estuarine Impact Assessment option 1 specifically assessed and modelled impacts associated with the placement of dredged material on the eastern side of the dredged channel, the estuarine specialist confirmed that the impacts and modelled efficacy for option 1 remain relevant to the preferred Design and Layout Alternative, which entails the placement of dredged material on both sides of the dredged channel, provided that this dredged material are placed on the banks of the channel at such a height that these banks are inundated at high tide (i.e., to create intertidal areas).

The intervention involves forming a berm upstream of the small island at the Wooden Bridge, using approximately 600 m³ of dredged material, to help direct flows to the west of the island and enhance flow velocities.

Refer to **Section H** of the BAR for a description of the various alternatives considered for this application and an explanation as to why certain alternatives were not further investigated.

No decommissioning or closure phase is relevant to the proposed dredging and has therefore not been assessed.

Estuarine Ecological Impacts

Alternative:	Preferred Alternative 1 (Dredging without offsite disposal)	Alternative 5 (Dredging with offsite disposal)	No-go Alternative
DREDGING PHASE			
Potential impact and risk:	Disturbance to and mortality of estuarine communities in the dredge footprint		
Nature of impact:	Negative	Negative	No impact
Extent and duration of impact:	Local, site-specific and short-term	Local, site-specific and short-term	Not applicable
Intensity (anticipated severity) of impact:	High	High	Not applicable
Consequence of impact or risk:	Very low	Very low	Not applicable
Probability of occurrence:	Definite	Definite	Not applicable
Degree to which the impact may cause irreplaceable loss of resources:	Resources are replaceable – area will be re-colonised by organisms outside of the project area after project completion.	Resources are replaceable – area will be re-colonised by organisms outside of the project area after project completion.	Not applicable
Degree to which the impact can be reversed:	The impact cannot be reversed, however the effects of the impact will be short term, “as communities are likely to recover from other sites in the system relatively rapidly after the impact” (refer to Appendix G1 , pg. 63).	The impact cannot be reversed, however the effects of the impact will be short term, “as communities are likely to recover from other sites in the system relatively rapidly after the impact” (refer to Appendix G1 , pg. 63).	Not applicable
Indirect impacts:	None	None	Not applicable
Cumulative impact prior to mitigation:	Low negative	Low negative	Not applicable
Significance rating of impact prior to mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	Low negative	Low negative	No Impact

Alternative:	Preferred Alternative 1 (Dredging without offsite disposal)	Alternative 5 (Dredging with offsite disposal)	No-go Alternative
DREDGING PHASE			
Potential impact and risk:	Disturbance to and mortality of estuarine communities in the dredge footprint		
Degree to which the impact can be avoided:	This impact cannot be avoided.	This impact cannot be avoided.	Not applicable
Degree to which the impact can be managed:	Impact management is possible. See mitigation measures provided below.	Impact management is possible. See mitigation measures provided below.	Not applicable
Degree to which the impact can be mitigated:	There are limited mitigation options to decrease the intensity or probability of this impact. Focus of possible mitigation is to ensure no unnecessary damage is done.	There are limited mitigation options to decrease the intensity or probability of this impact. Focus of possible mitigation is to ensure no unnecessary damage is done.	Not applicable
Proposed mitigation:	<ul style="list-style-type: none"> Constrain spatial extent of impacts to the minimum required. Ensure equipment is thoroughly rinsed/cleaned prior to use to ensure no transfer of introduced species from other systems. 	<ul style="list-style-type: none"> Constrain spatial extent of impacts to the minimum required. Ensure equipment is thoroughly rinsed/cleaned prior to use to ensure no transfer of introduced species from other systems. 	Not applicable
Residual impacts:	Despite attempted mitigation, disturbance to and mortality of estuarine fauna in the dredge footprint is inevitable.	Despite attempted mitigation, disturbance to and mortality of estuarine fauna in the dredge footprint is inevitable.	Not applicable
Cumulative impact post mitigation:	There are limited mitigation options available to reduce the intensity or probability of this impact, and therefore the impact remains of Low significance with mitigation.	There are limited mitigation options available to reduce the intensity or probability of this impact, and therefore the impact remains of Low significance with mitigation.	Not applicable
Significance rating of impact after mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	Low	Low	No Impact

Alternative:	Alternative 5 (Dredging with offsite disposal)	No-go Alternative
DREDGING PHASE		
Potential impact and risk:	Impact to estuarine habitat due to dewatering process	
Nature of impact:	Negative	No impact
Extent and duration of impact:	Local and short-term	Not applicable
Intensity (anticipated severity) of impact:	Low	Not applicable
Consequence of impact or risk:	Very-Low	Not applicable
Probability of occurrence:	Improbable	Not applicable
Degree to which the impact may cause irreplaceable loss of resources:	Resources are replaceable – area will be re-colonised by organisms outside of the project area after project completion.	Not applicable
Degree to which the impact can be reversed:	Not reversible	Not applicable
Indirect impacts:	None assessed	Not applicable
Cumulative impact prior to mitigation:	Medium negative	Not applicable
Significance rating of impact prior to mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	Low	No Impact
Degree to which the impact can be avoided:	N/A - since the low significance of the impact.	Not applicable
Degree to which the impact can be managed:	Negligible considering the low significance of the impact.	Not applicable
Degree to which the impact can be mitigated:	Negligible considering the low significance of the impact.	Not applicable
Proposed mitigation:	Not required due to very low significance of impact.	Not applicable
Residual impacts:	None	Not applicable

Alternative:	Alternative 5 (Dredging with offsite disposal)	No-go Alternative
DREDGING PHASE		
Potential impact and risk:	Impact to estuarine habitat due to dewatering process	
Cumulative impact post mitigation:	Very Low negative	Not applicable
Significance rating of impact after mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	Very Low	No Impact

Alternative:	Preferred Alternative 1 (Dredging without offsite disposal)	Alternative 5 (Dredging with offsite disposal)	No-go Alternative
DREDGING PHASE			
Potential impact and risk:	Noise disturbance on surrounding estuarine ecology due to dredging activities		
Nature of impact:	Negative	Negative	No impact
Extent and duration of impact:	Regional and short-term	Regional and short-term	Not applicable
Intensity (anticipated severity) of impact:	Medium	High	Not applicable
Consequence of impact or risk:	Low	Medium	Not applicable
Probability of occurrence:	Probable	Probable	Not applicable
Degree to which the impact may cause irreplaceable loss of resources:	Resources are replaceable – area will be re-colonised by organisms outside of the project area after project completion.	Resources are replaceable – area will be re-colonised by organisms outside of the project area after project completion.	Not applicable
Degree to which the impact can be reversed:	Not reversible	Not reversible	Not applicable
Indirect impacts:	None assessed	None assessed	Not applicable

Alternative:	Preferred Alternative 1 (Dredging without offsite disposal)	Alternative 5 (Dredging with offsite disposal)	No-go Alternative
DREDGING PHASE			
Potential impact and risk:	Noise disturbance on surrounding estuarine ecology due to dredging activities		
Cumulative impact prior to mitigation:	Medium negative	Medium negative	Not applicable
Significance rating of impact prior to mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	Low	Medium	No Impact
Degree to which the impact can be avoided:	Avoidance of this impact is not possible.	Avoidance of this impact is not possible.	Not applicable
Degree to which the impact can be managed:	Impact management is possible. See mitigation measures provided below.	Impact management is possible. See mitigation measures provided below.	Not applicable
Degree to which the impact can be mitigated:	Impact mitigation is possible. See mitigation measures provided below.	Impact mitigation is possible. See mitigation measures provided below.	Not applicable
Proposed mitigation:	<p>Essential mitigation measures:</p> <ul style="list-style-type: none"> • Mobile equipment, vehicles and power generation equipment must be suitably maintained during the project. Implement a maintenance plan to ensure all diesel motors and generators receive adequate maintenance to minimise noise emissions and potential pollution events. • Constrain spatial extent of impacts to the minimum required. • Constrain highly disturbing (light, noise) activities to daytime where possible to minimise noise and light disturbance at night. 	<p>Essential mitigation measures:</p> <ul style="list-style-type: none"> • Mobile equipment, vehicles and power generation equipment must be suitably maintained during the project. Implement a maintenance plan to ensure all diesel motors and generators receive adequate maintenance to minimise noise emissions and potential pollution events. • Constrain spatial extent of impacts to the minimum required. • Constrain highly disturbing (light, noise) activities to daytime where possible to minimise noise and light disturbance at night. 	Not applicable

Alternative:	Preferred Alternative 1 (Dredging without offsite disposal)	Alternative 5 (Dredging with offsite disposal)	No-go Alternative
DREDGING PHASE			
Potential impact and risk:	Noise disturbance on surrounding estuarine ecology due to dredging activities		
	Recommended mitigation measures: <ul style="list-style-type: none"> • Inform all staff about sensitive estuarine species and suitable disposal of waste. • Investigate and employ all feasible measures for reducing noise during dredging. 	Recommended mitigation measures: <ul style="list-style-type: none"> • Inform all staff about sensitive estuarine species and suitable disposal of waste. • Investigate and employ all feasible measures for reducing noise during dredging. 	
Residual impacts:	None	None	Not applicable
Cumulative impact post mitigation:	Very Low negative	Very Low negative	Not applicable
Significance rating of impact after mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	Very Low	Medium	No Impact

Alternative:	Preferred Alternative 1 (Dredging without offsite disposal)	Alternative 5 (Dredging with offsite disposal)	No-go Alternative
DREDGING PHASE			
Potential impact and risk:	Smothering⁷ of estuarine fauna		
Nature of impact:	Negative	Negative	No impact
Extent and duration of impact:	Local and short-term	Local and short-term	Not applicable

⁷ Smothering occurs when sediments are disturbed and settle on the seabed, covering and potentially suffocating organisms (Wilber et al., 2005). Sediments stirred up by dredging activities can settle over large areas, smothering benthic organisms (Wilber et al., 2005, Pineda et al., 2017). This can lead to decreased oxygen levels in the sediment, suffocating organisms unable to escape or tolerate the changes.

Alternative:	Preferred Alternative 1 (Dredging without offsite disposal)	Alternative 5 (Dredging with offsite disposal)	No-go Alternative
DREDGING PHASE			
Potential impact and risk:	Smothering⁷ of estuarine fauna		
Intensity (anticipated severity) of impact:	High	High	Not applicable
Consequence of impact or risk:	Low	Low	Not applicable
Probability of occurrence:	Probable	Probable	Not applicable
Degree to which the impact may cause irreplaceable loss of resources:	Resources are replaceable – area will be re-colonised by organisms outside of the project area after project completion.	Resources are replaceable – area will be re-colonised by organisms outside of the project area after project completion.	Not applicable
Degree to which the impact can be reversed:	Irreversible	Irreversible	Not applicable
Indirect impacts:	Dredging can disturb sediments that settle on the seabed, smothering benthic organisms, reducing oxygen levels, and triggering cascading impacts on ecosystem structure and function. However, the Milnerton Lagoon estuary is already degraded, relatively turbid during high flows, and has a permanently open mouth, meaning remaining communities are likely adapted and overall sensitivity to smothering is low.	Dredging can disturb sediments that settle on the seabed, smothering benthic organisms, reducing oxygen levels, and triggering cascading impacts on ecosystem structure and function. However, the Milnerton Lagoon estuary is already degraded, relatively turbid during high flows, and has a permanently open mouth, meaning remaining communities are likely adapted and overall sensitivity to smothering is low.	Not applicable
Cumulative impact prior to mitigation:	Low	Low	Not applicable
Significance rating of impact prior to mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	Low	Low	No Impact

Alternative:	Preferred Alternative 1 (Dredging without offsite disposal)	Alternative 5 (Dredging with offsite disposal)	No-go Alternative
DREDGING PHASE			
Potential impact and risk:	Smothering⁷ of estuarine fauna		
Degree to which the impact can be avoided:	This impact cannot be avoided.	This impact cannot be avoided.	Not applicable
Degree to which the impact can be managed:	Impact management is possible, though limited. See mitigation measure provided below.	Impact management is possible, though limited. See mitigation measure provided below.	Not applicable
Degree to which the impact can be mitigated:	Minimal impact mitigation is possible.	Minimal impact mitigation is possible.	Not applicable
Proposed mitigation:	Plan dredging activities to minimise duration and extent of the disturbance to water bodies.	Plan dredging and dewatering activities to minimise duration and extent of the disturbance to water bodies.	Not applicable
Residual impacts:	None	None	Not applicable
Cumulative impact post mitigation:	Low	Low	Not applicable
Significance rating of impact after mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	Low	Low	No Impact

Alternative:	Preferred Alternative 1 (Dredging without offsite disposal)	Alternative 5 (Dredging with offsite disposal)	No-go Alternative
DREDGING PHASE			
Potential impact and risk:	Impacts on estuarine water quality		
Nature of impact:	Negative	Negative	No impact
Extent and duration of impact:	Local and medium-term	Local and short-term	Not applicable
Intensity (anticipated severity) of impact:	High	High	Not applicable
Consequence of impact or risk:	Medium	Low	Not applicable
Probability of occurrence:	Probable	Probable	Not applicable
Degree to which the impact may cause irreplaceable loss of resources:	No irreplaceable loss will be caused. Water quality will only be affected negatively during dredging.	No irreplaceable loss will be caused. Water quality will only be affected negatively during dredging.	Not applicable
Degree to which the impact can be reversed:	Reversible. Stopping dredging would let sediment settle/flush, and reverse the temporary reduction in water quality.	Reversible. Stopping dredging would let sediment settle/flush, and reverse the temporary reduction in water quality.	Not applicable
Indirect impacts:	None. Water quality is already poor in the lagoon, thus no further indirect impacts will occur due to poor water quality during dredging.	None. Water quality is already poor in the lagoon, thus no further indirect impacts will occur due to poor water quality during dredging.	Not applicable
Cumulative impact prior to mitigation:	Medium	Medium	Not applicable
Significance rating of impact prior to mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	Medium	Low	No Impact
Degree to which the impact can be avoided:	Impact cannot be avoided.	Impact cannot be avoided.	Not applicable

Alternative:	Preferred Alternative 1 (Dredging without offsite disposal)	Alternative 5 (Dredging with offsite disposal)	No-go Alternative
DREDGING PHASE			
Potential impact and risk:	Impacts on estuarine water quality		
Degree to which the impact can be managed:	Impact management is possible, though limited. Land based activities that may result in erosion causing further reduction in water quality can be managed.	Impact management is possible, though limited. Land based activities that may result in erosion causing further reduction in water quality can be managed.	Not applicable
Degree to which the impact can be mitigated:	Minimal mitigation is possible.	Minimal mitigation is possible.	Not applicable
Proposed mitigation:	<p>Essential mitigation measures:</p> <ul style="list-style-type: none"> Plan dredging activities to minimize the duration and extent of disturbance to water bodies. For land-based activities that may result in erosion, contractors are to install erosion control barriers such as silt fences, sediment traps, drainage channels or sediment curtains to minimise sediment runoff into the water during the proposed activities. This is pertinent if construction is to take place during the wet season. <p>Monitoring requirements</p> <ul style="list-style-type: none"> Dissolved Oxygen monitoring must take place in the lower reaches of the system, with control sites upstream of Woodbridge Island. Should the 95 %-ile DO levels in the lower system (i.e., most of the lower lagoon system) fall below 10 % of the control sites, additional management actions 	<p>Essential mitigation measures:</p> <ul style="list-style-type: none"> Plan dredging activities to minimize the duration and extent of disturbance to water bodies. For land-based activities that may result in erosion, contractors are to install erosion control barriers such as silt fences, sediment traps, drainage channels or sediment curtains to minimise sediment runoff into the water during the proposed activities. This is pertinent if construction is to take place during the wet season. <p>Monitoring requirements</p> <ul style="list-style-type: none"> Dissolved Oxygen monitoring must take place in the lower reaches of the system, with control sites upstream of Woodbridge Island. Should the 95 %-ile DO levels in the lower system (i.e., most of the lower lagoon system) fall below 10 % of the control sites, additional 	Not applicable

Alternative:	Preferred Alternative 1 (Dredging without offsite disposal)	Alternative 5 (Dredging with offsite disposal)	No-go Alternative
DREDGING PHASE			
Potential impact and risk:	Impacts on estuarine water quality		
	(such as oxygenation) may be required.	management actions (such as oxygenation) may be required.	
Residual impacts:	None	None	Not applicable
Cumulative impact post mitigation:	Medium	Low	Not applicable
Significance rating of impact after mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	Medium	Low	No Impact

Alternative:	Preferred Alternative 1 (Dredging without offsite disposal)	Alternative 5 (Dredging with offsite disposal)	No-go Alternative
DREDGING PHASE			
Potential impact and risk:	Waste generation and improper disposal		
Nature of impact:	Negative		No impact
Extent and duration of impact:	Regional and long-term		Not applicable
Intensity (anticipated severity) of impact:	Low		Not applicable
Consequence of impact or risk:	Medium		Not applicable
Probability of occurrence:	Probable		Not applicable
Degree to which the impact may cause irreplaceable loss of resources:	Impact will not cause irreplaceable loss of resources.		Not applicable

Alternative:	Preferred Alternative 1 (Dredging without offsite disposal)	Alternative 5 (Dredging with offsite disposal)	No-go Alternative
DREDGING PHASE			
Potential impact and risk:	Waste generation and improper disposal		
Degree to which the impact can be reversed:	Not easily reversable.		Not applicable
Indirect impacts:	If poorly managed, dredging and site operations can cause pollution through runoff, spills, or waste disposal, leading to water contamination, biodiversity loss, and long-term risks to aquatic life, ecosystems, and human health.		Not applicable
Cumulative impact prior to mitigation:	Medium		Not applicable
Significance rating of impact prior to mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	Medium		No Impact
Degree to which the impact can be avoided:	Impact is avoidable.		Not applicable
Degree to which the impact can be managed:	Impact is manageable.		Not applicable
Degree to which the impact can be mitigated:	Impact is mitigable.		Not applicable
Proposed mitigation:	<p>Essential mitigation measures:</p> <ul style="list-style-type: none"> Inform and train all staff about sensitive estuarine species and the responsible disposal of construction waste. This training must be integrated into toolbox talks or onsite awareness sessions to ensure that waste management practices are understood and followed diligently. Additionally, contractors must prepare a method statement outlining specific waste management procedures, which must be approved by the resident engineer before construction activities commence. 		Not applicable

Alternative:	Preferred Alternative 1 (Dredging without offsite disposal)	Alternative 5 (Dredging with offsite disposal)	No-go Alternative
DREDGING PHASE			
Potential impact and risk:	Waste generation and improper disposal		
	<ul style="list-style-type: none"> • Suitable handling and disposal protocols must be clearly explained, and sign boarded. • Reduce, reuse, recycle. • Waste disposal at licensed landfill sites by qualified contractors is mandatory, with proof of disposal submitted to the appointed Environmental Officer. Waste management certification must be obtained, and detailed records of all stored and disposed waste, including quantity, nature, and fate, must be maintained for auditing purposes. <p>Adequate sanitary facilities and ablutions must be provided for all personnel throughout the project area. Enforcement of facility usage and cleanliness is crucial.</p>		
Residual impacts:	None	Not applicable	
Cumulative impact post mitigation:	Very Low	Not applicable	
Significance rating of impact after mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	Very Low	No Impact	

Socio-Economic Impacts

Alternative:	Preferred Alternative 1 (Dredging without offsite disposal)	Alternative 5 (Dredging with offsite disposal)	No-go Alternative
DREDGING PHASE			
Potential impact and risk:	Odour impacts on adjacent residents associated with disturbance of sediment during dredging		
Nature of impact:	Negative The disturbance of sediments during dredging may result in the temporary release of hydrogen sulphide trapped in the sediments, producing the "rotten-egg" smell.	Negative The disturbance of sediments during dredging and dewatering may result in the temporary release of hydrogen sulphide trapped in the sediments, producing the "rotten-egg" smell.	Negative Without dredging, the nuisance hydrogen sulphide smell occurs sporadically as influenced by surges of pollution into the lagoon and will persist.
Extent and duration of impact:	Short-term and local	Short-term and local	Sporadic and local
Consequence of impact or risk:	Low	Medium	Low
Probability of occurrence:	Probable	Probable	Probable
Degree to which the impact may cause irreplaceable loss of resources:	No irreplaceable loss of resources will occur because of this impact.	No irreplaceable loss of resources will occur because of this impact.	No irreplaceable loss of resources will occur because of this impact.
Degree to which the impact can be reversed:	Any increased intensity of odours should disperse shortly after dredging ceases.	Any increased intensity of odours should disperse shortly after dredging and dewatering cease.	Not applicable
Indirect impacts:	None	None	None
Cumulative impact prior to mitigation:	None	None	Increased community complaints regarding foul smells and lack of remediation measures.
Significance rating of impact prior to mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	Low	Medium	Medium

Alternative:	Preferred Alternative 1 (Dredging without offsite disposal)	Alternative 5 (Dredging with offsite disposal)	No-go Alternative
DREDGING PHASE			
Potential impact and risk:	Odour impacts on adjacent residents associated with disturbance of sediment during dredging		
Degree to which the impact can be avoided:	Moving (and thus disturbing) sediment is the goal of the project. Impact cannot be avoided.	Moving (and thus disturbing) sediment is the goal of the project. Impact cannot be avoided.	Without remediation, the impact cannot be avoided.
Degree to which the impact can be managed:	None	None	Without remediation, the impact cannot be managed.
Degree to which the impact can be mitigated:	Moving (and thus disturbing) sediment is the goal of the project. Impact cannot be mitigated.	Moving (and thus disturbing) sediment is the goal of the project. Impact cannot be mitigated.	Without remediation, the impact cannot be mitigated.
Proposed mitigation:	<ul style="list-style-type: none"> <u>Dredged material will be deposited at elevations that remain submerged at high tide, but are exposed at spring low tides to enable more effective aerobic decomposition of organic matter, thereby reducing future build-up of anoxic nutrient-enriched fine sediments in stagnant areas.</u> <u>Should odour impacts significantly intensify or result in sustained complaints, additional mitigation measures may include relocating material to a more distant or submerged location, if feasible.</u> <u>The monitoring of H₂S by City of Cape Town's Scientific Services during the implementation of dredging is recommended. Active comparison to the World Health Organisation (WHO) guideline values and any relevant health-protective thresholds, and any sustained exceedances must be communicated timeously to the AQM Unit, the Environmental Control Officer, Water and Sanitation, the contractor and the Milnerton Stakeholders forum, in order for any appropriate corrective measures to be implemented.</u> 		Not applicable to the no-go alternative
Residual impacts:	None	None	Not applicable to the no-go alternative
Cumulative impact post mitigation:	Without dredging the nuisance hydrogen sulphide smell occurs sporadically. One of the motivations for dredging is to improve this issue. Although dredging may exacerbate the issue due to the	Without dredging the nuisance hydrogen sulphide smell occurs sporadically. One of the motivations for dredging is to improve this issue. Although dredging and particularly dewatering on the	Not applicable to the no-go alternative

Alternative:	Preferred Alternative 1 (Dredging without offsite disposal)	Alternative 5 (Dredging with offsite disposal)	No-go Alternative
DREDGING PHASE			
Potential impact and risk:	Odour impacts on adjacent residents associated with disturbance of sediment during dredging		
	movement of sediment, this intensified release of odour should be limited to the implementation phase and improve post-dredging.	Woodbridge open space park area adjacent the site may exacerbate the odour issue due to the movement of sediment, this intensified release of odour should be limited to the implementation phase and improve post-dredging.	
Significance rating of impact after mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	Low	Medium-Low	Medium

Alternative:	Preferred Alternative 1 (Dredging without offsite disposal)	Alternative 5 (Dredging with offsite disposal)	No-go Alternative
DREDGING PHASE			
Potential impact and risk:	Noise impacts on adjacent residents and businesses		
Nature of impact:	Negative During implementation there will be some noise associated with the dredging activities that may pose a nuisance to adjacent residents and businesses – though this impact will be limited to the implementation phase.	Negative During implementation there will be some noise associated with the dredging and dewatering activities that may pose a nuisance to adjacent residents and businesses – though this impact will be limited to the implementation phase.	No impact
Extent and duration of impact:	Local and short-term	Local and short-term	Not applicable
Consequence of impact or risk:	Medium	Medium	Not applicable
Probability of occurrence:	Definite	Definite	Not applicable

Alternative:	Preferred Alternative 1 (Dredging without offsite disposal)	Alternative 5 (Dredging with offsite disposal)	No-go Alternative
DREDGING PHASE			
Potential impact and risk:	Noise impacts on adjacent residents and businesses		
Degree to which the impact may cause irreplaceable loss of resources:	No irreplaceable loss of resources will occur.	No irreplaceable loss of resources will occur.	Not applicable
Degree to which the impact can be reversed:	Reversible. When dredging is complete, there will be no further noise disturbance.	Reversible. When dredging is complete, there will be no further noise disturbance.	Not applicable
Indirect impacts:	None	None	Not applicable
Cumulative impact prior to mitigation:	None	None	Not applicable
Significance rating of impact prior to mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	Medium	Medium-High	No Impact
Degree to which the impact can be avoided:	Unavoidable	Unavoidable	Not applicable
Degree to which the impact can be managed:	High	High	Not applicable
Degree to which the impact can be mitigated:	High	High	Not applicable
Proposed mitigation:	<ul style="list-style-type: none"> Where practical, the Contractor should utilise lower-noise or silenced mechanical equipment and restrict noise-generating activities to daylight hours. All dredging and construction equipment utilised, and activities undertaken must be compliant with the Western Cape Noise Control Regulations, P.N. 200/2013. Restrict activities generating noise outputs of 85 dB (A) or more to the hours of 07h00 to 18h00, Mondays to Fridays. Should the Contractor need to work outside of these hours and designated workdays, the approval of the Environmental Control Officer (ECO) must be obtained and surrounding communities must be 		Not applicable

Alternative:	Preferred Alternative 1 (Dredging without offsite disposal)	Alternative 5 (Dredging with offsite disposal)	No-go Alternative
DREDGING PHASE			
Potential impact and risk:	Noise impacts on adjacent residents and businesses		
	<p>informed prior to the work taking place. A Noise Exemption Permit may be required from the local authority.</p> <ul style="list-style-type: none"> All engine powered equipment must be suitably maintained during the project to minimise excessive noise. A maintenance plan for all diesel motors and generators on site should be implemented. 		
Residual impacts:	Low	Low	Not applicable
Cumulative impact post mitigation:	Low	Medium	Not applicable
Significance rating of impact after mitigation (e.g., Low, Medium, Medium-High, High, or Very-High)	Low	Medium	No impact

Alternative:	Preferred Alternative 1 (Dredging without offsite disposal)	Alternative 5 (Dredging with offsite disposal)	No-go Alternative
DREDGING PHASE			
Potential impact and risk:	Dredging (and dewatering)-related impacts including dust generation and risk of spills		
Nature of impact:	<p>Negative</p> <p>Machinery and equipment used during lagoon dredging may generate dust and carry the risk of fuel spills.</p>	<p>Negative</p> <p>Machinery and equipment used during lagoon dredging and dewatering activities may generate dust and carry the risk of fuel spills.</p>	No impact
Extent and duration of impact:	Regional and short-term	Regional and short-term	Not applicable
Consequence of impact or risk:	Medium	Medium	Not applicable

Alternative:	Preferred Alternative 1 (Dredging without offsite disposal)	Alternative 5 (Dredging with offsite disposal)	No-go Alternative
DREDGING PHASE			
Potential impact and risk:	Dredging (and dewatering)-related impacts including dust generation and risk of spills		
Probability of occurrence:	Probable	Probable	Not applicable
Degree to which the impact may cause irreplaceable loss of resources:	This impact is not expected to cause any irreplaceable loss.	This impact is not expected to cause any irreplaceable loss.	Not applicable
Degree to which the impact can be reversed:	Mostly reversible. If the EMPr is followed, no irreversible impacts should occur.	Mostly reversible. If the EMPr is followed, no irreversible impacts should occur.	Not applicable
Indirect impacts:	None.	None.	Not applicable
Cumulative impact prior to mitigation:	Low	Medium	Not applicable
Significance rating of impact prior to mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	Medium	Medium-High	No Impact
Degree to which the impact can be avoided:	Risk of impact is unavoidable.	Risk of impact is unavoidable.	Not applicable
Degree to which the impact can be managed:	Management is possible.	Management is possible.	Not applicable
Degree to which the impact can be mitigated:	Mitigation is possible.	Mitigation is possible.	Not applicable
Proposed mitigation:	<ul style="list-style-type: none"> The impacts of dust on neighbouring urban areas and residences must be minimised and an effective system for the recording and addressing of complaints must be established. Screen site camps and laydown areas with shade cloth or similar, where possible and appropriate. 		Not applicable

Alternative:	Preferred Alternative 1 (Dredging without offsite disposal)	Alternative 5 (Dredging with offsite disposal)	No-go Alternative
DREDGING PHASE			
Potential impact and risk:	Dredging (and dewatering)-related impacts including dust generation and risk of spills		
	<ul style="list-style-type: none"> Roof and screen waste areas. Avoid unnecessary signage or advertisement on site. A method statement for the control of pollution and contamination must be compiled by the Contractor for approval by the ECO prior to any works within a watercourse. Ensure that adequate ablution facilities are provided at the site camp and all distant works areas, at a ratio of no more than 1:15 workers, are adequately secured to avoid spillage, and are regularly emptied. 		
Residual impacts:	None	None	Not applicable
Cumulative impact post mitigation:	None	Low	Not applicable
Significance rating of impact after mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	Very low	Low	No impact

Alternative:	Preferred Alternative 1 (Dredging without offsite disposal)	Alternative 5 (Dredging with offsite disposal)	No-go Alternative
DREDGING PHASE			
Potential impact and risk:	Sense of Place of park area used for dewatering, by adjacent residents during dredging and dewatering activities		
Nature of impact:	No impact	Negative The repurposing of the public open space park area near Woodbridge Island and adjacent to Marine Drive for dewatering activities (such as the installation of geotextile tubes, delivery of flocculant	No impact

Alternative:	Preferred Alternative 1 (Dredging without offsite disposal)	Alternative 5 (Dredging with offsite disposal)	No-go Alternative
DREDGING PHASE			
Potential impact and risk:	Sense of Place of park area used for dewatering, by adjacent residents during dredging and dewatering activities		
		chemicals, and ongoing pumping operations) would disrupt the natural and recreational character of the site, detracting from the areas' sense of place during the months-long dewatering period.	
Extent and duration of impact:	Not applicable	Short-term and local	Not applicable
Consequence of impact or risk:	Not applicable	Medium	Not applicable
Probability of occurrence:	Not applicable	Probable	Not applicable
Degree to which the impact may cause irreplaceable loss of resources:	Not applicable	No irreplaceable loss of resources will occur because of this impact.	Not applicable
Degree to which the impact can be reversed:	Not applicable	The detraction from sense of place will be short-lived since the dewatering area will be rehabilitated and restored post-dredging phase.	Not applicable
Indirect impacts:	Not applicable	None	Not applicable
Cumulative impact prior to mitigation:	Not applicable	None	Not applicable
Significance rating of impact prior to mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	No Impact	Medium	No Impact
Degree to which the impact can be avoided:	Not applicable	Sense of Place impacts associated with dewatering on the public open space	Not applicable

Alternative:	Preferred Alternative 1 (Dredging without offsite disposal)	Alternative 5 (Dredging with offsite disposal)	No-go Alternative
DREDGING PHASE			
Potential impact and risk:	Sense of Place of park area used for dewatering, by adjacent residents during dredging and dewatering activities		
		park area alongside the lagoon cannot be avoided for the least preferred design and layout alternative.	
Degree to which the impact can be managed:	Not applicable	None	Not applicable
Degree to which the impact can be mitigated:	Not applicable	Sense of Place impacts associated with dewatering on the public open space park area alongside the lagoon cannot be avoided for the least preferred design and layout alternative during the implementation phase. However, restoration of this park area can be achieved through effective mitigation immediately once dredging is complete.	Not applicable
Proposed mitigation:	Not applicable	None applicable to the dredging phase, but applicable to the immediate post-dredging phase.	Not applicable
Residual impacts:	No impact	None	No impact
Cumulative impact post mitigation:	Not applicable	Without dredging and dewatering activities the decreased sense of place of the lower Milnerton Lagoon will continue to decline due to lack of remediation within the lagoon to address the surges of pollution into the lagoon. Although dredging and particularly dewatering on the Woodbridge open space park area adjacent the site may detract from the area's sense of place, this intensified	Not applicable

Alternative:	Preferred Alternative 1 (Dredging without offsite disposal)	Alternative 5 (Dredging with offsite disposal)	No-go Alternative
DREDGING PHASE			
Potential impact and risk:	Sense of Place of park area used for dewatering, by adjacent residents during dredging and dewatering activities		
		release of odour and unsightly dewatering and storage activity should be limited to the implementation phase and improve post-dredging.	
Significance rating of impact after mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	Not applicable	Medium-Low	Not applicable

Alternative:	Preferred Alternative 1 (Dredging without offsite disposal)	Alternative 5 (Dredging with offsite disposal)	No-go Alternative
DREDGING PHASE			
Potential impact and risk:	Traffic disruption during dredging activities		
Nature of impact:	<p>Negative</p> <p>Traffic disruption and congestion near Marine Drive during dredging and site servicing</p> <p>Increased vehicle activity related to site setup and dredging support may temporarily affect traffic flows near the lagoon.</p>	<p>Negative</p> <p>Traffic disruption and congestion near Marine Drive due to frequent vehicle movements for dewatering and sediment removal for off-site disposal.</p> <p>Regular entry and exit of heavy vehicles managing dewatering operations and sediment transport will create congestion, safety concerns, and disruption of traffic and pedestrian routes along Marine Drive.</p>	No impact
Extent and duration of impact:	Short-term and local	Short-term and local	Not applicable

Alternative:	Preferred Alternative 1 (Dredging without offsite disposal)	Alternative 5 (Dredging with offsite disposal)	No-go Alternative
DREDGING PHASE			
Potential impact and risk:	Traffic disruption during dredging activities		
Consequence of impact or risk:	Low	Medium	Not applicable
Probability of occurrence:	Possible	Probable	Not applicable
Degree to which the impact may cause irreplaceable loss of resources:	No irreplaceable loss of resources will occur because of this impact.	No irreplaceable loss of resources will occur because of this impact.	Not applicable
Degree to which the impact can be reversed:	Impacts are short-term and will subside following dredging operations.	Impacts are short-term and reversible once dewatering and sediment removal are complete.	Not applicable
Indirect impacts:	Minor delays for local road users during the implementation phase.	Delays, detours, and reduced accessibility for park users and nearby residents.	Not applicable
Cumulative impact prior to mitigation:	Minimal when considered with other temporary construction activities.	Moderate due to overlap with dewatering operations and adjacent road use.	Not applicable
Significance rating of impact prior to mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	Low	Medium	No Impact
Degree to which the impact can be avoided:	Some vehicle activity is unavoidable but can be scheduled to reduce peak-time interference.	Traffic disruptions cannot be fully avoided due to the scale and frequency of operational vehicle movements.	Not applicable
Degree to which the impact can be managed:	High	Moderate	Not applicable

Alternative:	Preferred Alternative 1 (Dredging without offsite disposal)	Alternative 5 (Dredging with offsite disposal)	No-go Alternative
DREDGING PHASE			
Potential impact and risk:	Traffic disruption during dredging activities		
Degree to which the impact can be mitigated:	Impacts can be reduced with traffic management, signage, and controlled scheduling.	Impacts can be mitigated with effective transport management, restricted haulage windows, and on-site coordination.	Not applicable
Proposed mitigation:	Traffic management plan with clear access protocols and off-peak scheduling.	Dedicated traffic marshals, haulage schedule, and minimising use of Marine Drive entry during high-volume hours.	Not applicable
Residual impacts:	Minor, localised disruptions with low significance.	Temporary reduction in traffic flow efficiency and minor safety risks near the park.	No impact
Cumulative impact post mitigation:	Minimal cumulative impact when combined with other short-term construction disturbances.	Cumulative traffic pressures may persist during peak operations but will subside post-implementation.	Not applicable
Significance rating of impact after mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	Very Low	Low	Not applicable

Post-dredging Impacts:

It should be noted that the proposed dredging (with or without off-site disposal) does not have an operational phase *per se*, but is rather intended as an infrequent remediation measure. Although no operational alternatives are proposed, specialists recommend active long-term maintenance of the dredged channel depth and estuary mouth, as natural processes alone are insufficient.

Maintenance of the scoured channel depth and the opening of the estuary mouth as recommended post-dredging by the Estuarine Impact Assessment (as also indicated in the impact tables below) must be strictly undertaken in accordance with the MMP compiled for this application (refer to **Appendix H2** to the BAR), and only when necessary to sustain hydrodynamic functioning of the lower lagoon. The compiled MMP aligns with the priority requirement of the Diep River Estuary Management Plan (2022) provided on pg. 68 of the Estuary Management Plan to develop a Mouth Management Plan and a complementary MMP– refer to pg. 68 of the - support sustained system functioning and guide necessary maintenance activities post-dredging.

Estuarine Ecological Impacts

Alternative:	Preferred Alternative 1 (Dredging without offsite disposal)	Alternative 5 (Dredging with offsite disposal)	No-go Alternative
POST-DREDGING PHASE			
Potential impact and risk:	Impacts of dredging and dewatering on magnitude of the tidal prism		
Nature of impact:	Positive	Positive	Negative
Extent and duration of impact:	Local and medium-term	Local and medium-term	Local
Intensity (anticipated severity) of impact:	Medium	Medium	Not applicable
Consequence of impact or risk:	Low	Low	Low
Probability of occurrence:	Probable	Probable	Definite
Degree to which the impact may cause irreplaceable loss of resources:	This is a positive impact. No loss of resources will result.	This is a positive impact. No loss of resources will result.	None
Degree to which the impact can be reversed:	If appropriate catchment-scale interventions are not implemented alongside dredging, this positive impact may be reversed and only short-lived.	If appropriate catchment-scale interventions are not implemented alongside dredging, this positive impact may be reversed and only short-lived.	If appropriate catchment-scale interventions are implemented, negative impacts associated with the no-go would be significantly mitigated.

Alternative:	Preferred Alternative 1 (Dredging without offsite disposal)	Alternative 5 (Dredging with offsite disposal)	No-go Alternative
POST-DREDGING PHASE			
Potential impact and risk:	Impacts of dredging and dewatering on magnitude of the tidal prism		
Indirect impacts:	Increased magnitude of the tidal prism will have several indirect positive impacts on the lagoon such as increased salinity indicative of tidal flushing and associated positive impacts on water quality and support of estuarine communities – although the positive impacts will be limited to the lower reaches of the system.	Increased magnitude of the tidal prism will have several indirect positive impacts on the lagoon such as increased salinity indicative of tidal flushing and associated positive impacts on water quality and support of estuarine communities – although the positive impacts will be limited to the lower reaches of the system.	None
Cumulative impact prior to mitigation:	Low positive	Low positive	Low negative
Significance rating of impact prior to mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	Low	Low	Low
Degree to which the impact can be avoided:	Not applicable. Positive impact – dredging is proposed to achieve this impact.	Not applicable. Positive impact – dredging is proposed to achieve this impact.	None.
Degree to which the impact can be managed:	If appropriate management measures are implemented alongside the dredging, the positive impact of the proposed remediation will be strengthened. The specialists note that, inflow water from the catchment as well as various point sources (including the Potsdam WWTW) must be improved to realise a significant improvement in estuarine health over the long term.	If appropriate management measures are implemented alongside the dredging, the positive impact of the proposed remediation will be strengthened. The specialists note that, inflow water from the catchment as well as various point sources (including the Potsdam WWTW) must be improved to realise a significant improvement in estuarine health over the long term.	With appropriate catchment scale interventions, this negative impact of the no-go may be mostly managed.

Alternative:	Preferred Alternative 1 (Dredging without offsite disposal)	Alternative 5 (Dredging with offsite disposal)	No-go Alternative
POST-DREDGING PHASE			
Potential impact and risk:	Impacts of dredging and dewatering on magnitude of the tidal prism		
Degree to which the impact can be mitigated:	The positive impact can be further augmented by the pursuit of a suite of complementary interventions to mitigate the pollution in the lagoon.	The positive impact can be further augmented by the pursuit of a suite of complementary interventions to mitigate the pollution in the lagoon.	With appropriate catchment scale interventions, this negative impact of the no-go may be mostly mitigated.
Proposed mitigation:	There are no directly actionable mitigation measures to magnify the benefits of dredging on the tidal prism.		Catchment scale interventions including pollution prevention.
Residual impacts:	Low to high positive depending on how well the recommended management items are implemented (i.e., augmentation of proposed dredging with other remediation measures).	Low to high positive depending on how well the recommended management items are implemented (i.e., augmentation of proposed dredging with other remediation measures).	Very Low negative
Cumulative impact post mitigation:	Very Low positive	Very Low positive	Very Low negative
Significance rating of impact after mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	Very Low positive	Very Low positive	Very Low negative

Alternative:	Preferred Alternative 1 (Dredging without offsite disposal)	Alternative 5 (Dredging with offsite disposal)	No-go Alternative
POST-DREDGING PHASE			
Potential impact and risk:	Impacts of a deeper channel at the mouth of sediment settlement and flushing		
Nature of impact:	Positive	Positive	Negative
Extent and duration of impact:	Local and medium-term	Local and medium-term	Local
Intensity (anticipated severity) of impact:	Medium	Medium	Not applicable
Consequence of impact or risk:	Very low positive	Very low positive	Low
Probability of occurrence:	Probable	Probable	Definite
Degree to which the impact may cause irreplaceable loss of resources:	No loss is anticipated as this is a positive impact	No loss is anticipated as this is a positive impact	None.
Degree to which the impact can be reversed:	If the channel is not maintained at its planned depth, positive impacts will not last indefinitely.	If the channel is not maintained at its planned depth, positive impacts will not last indefinitely.	If appropriate catchment-scale interventions are implemented, negative impacts associated with the no-go would be significantly mitigated.
Indirect impacts:	This may have numerous positive indirect impacts.	This may have numerous positive indirect impacts.	None
Cumulative impact prior to mitigation:	Low positive	Low positive	Low negative
Significance rating of impact prior to mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	Very Low	Very Low	Low
Degree to which the impact can be avoided:	None	None	None

Alternative:	Preferred Alternative 1 (Dredging without offsite disposal)	Alternative 5 (Dredging with offsite disposal)	No-go Alternative
POST-DREDGING PHASE			
Potential impact and risk:	Impacts of a deeper channel at the mouth of sediment settlement and flushing		
Degree to which the impact can be managed:	The positive impact can be magnified by following the recommendations provided below – but remain limited due to the ongoing surges of pollution input into the lagoon.	The positive impact can be magnified by following the recommendations provided below – but remain limited due to the ongoing surges of pollution input into the lagoon.	With appropriate catchment scale interventions, this negative impact of the no-go may be mostly managed.
Degree to which the impact can be mitigated:	The positive impact can be magnified by following the recommendations provided below – but remain limited due to the ongoing surges of pollution input into the lagoon.	The positive impact can be magnified by following the recommendations provided below – but remain limited due to the ongoing surges of pollution input into the lagoon.	With appropriate catchment scale interventions, this negative impact of the no-go may be mostly mitigated.
Proposed mitigation:	<p><i>Since this impact is positive, the measures provided below are not mitigation of the impact, but rather recommendations for improvement.</i></p> <p>Recommendations to enhance the positive impact:</p> <ul style="list-style-type: none"> • The channel may be maintained at this depth; and • The mouth must be kept open at all times. <p>These recommendations will be undertaken in accordance with the MMP compiled with this application (see Appendix H2 of the BAR).</p>		Catchment scale interventions including pollution prevention.
Residual impacts:	Not applicable	Not applicable	Very Low negative
Cumulative impact post mitigation:	Very Low positive	Very Low positive	Very Low negative
Significance rating of impact after mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	Very Low positive	Very Low positive	Very Low negative

Alternative:	Preferred Alternative 1 (Dredging without offsite disposal)	Alternative 5 (Dredging with offsite disposal)	No-go Alternative
POST-DREDGING PHASE			
Potential impact and risk:	Impacts on estuarine health linked to new intertidal areas resulting from sediment enrichment		
Nature of impact:	Positive	Positive	Negative
Extent and duration of impact:	Local and medium-term	Local and medium-term	Local
Intensity (anticipated severity) of impact:	Low	Low	Not applicable
Consequence of impact or risk:	Very low	Very low	Low
Probability of occurrence:	Definite	Definite	Definite
Degree to which the impact may cause irreplaceable loss of resources:	This will not cause the irreplaceable loss of any resources.	This will not cause the irreplaceable loss of any resources.	None.
Degree to which the impact can be reversed:	If inflow water quality from the catchment and numerous point sources is not ameliorated, the benefits of these intertidal areas will be limited at best, or reversed at worse.	If inflow water quality from the catchment and numerous point sources is not ameliorated, the benefits of these intertidal areas will be limited at best, or reversed at worse.	None
Indirect impacts:	Low	Low	None
Cumulative impact prior to mitigation:	Low positive	Low positive	Low negative
Significance rating of impact prior to mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	Very Low positive	Very Low positive	Low
Degree to which the impact can be avoided:	With appropriate enhancement measures, the very low positive impact	With appropriate enhancement measures, the very low positive impact	None.

Alternative:	Preferred Alternative 1 (Dredging without offsite disposal)	Alternative 5 (Dredging with offsite disposal)	No-go Alternative
POST-DREDGING PHASE			
Potential impact and risk:	Impacts on estuarine health linked to new intertidal areas resulting from sediment enrichment		
	may be upgraded to a high positive impact	may be upgraded to a high positive impact	
Degree to which the impact can be managed:	Improvement of inflow water from the catchment and various point sources (including the Potsdam WWTW) would serve to extend the duration and increase the significance of this positive impact on estuarine health.	Improvement of inflow water from the catchment and various point sources (including the Potsdam WWTW) would serve to extend the duration and increase the significance of this positive impact on estuarine health.	None
Degree to which the impact can be mitigated:	The positive impact can be magnified by following the management recommendations directly above.	The positive impact can be magnified by following the management recommendations directly above.	None
Proposed mitigation:	There is no feasible mitigation to enhance the direct positive impacts of new intertidal areas resulting from sediment enrichment.		None
Residual impacts:	Not applicable	Not applicable	Low negative
Cumulative impact post mitigation:	Very Low positive	Very Low positive	Low negative
Significance rating of impact after mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	Very Low positive	Very Low positive	Low negative

SECTION I: FINDINGS, IMPACT MANAGEMENT AND MITIGATION MEASURES

1.	Provide a summary of the findings and impact management measures identified by all Specialist and an indication of how these findings and recommendations have influenced the proposed development.
<p>As part of the Basic Assessment process, the following specialist studies were commissioned to inform the environmental assessment and guide the project design:</p> <ul style="list-style-type: none">• Estuarine Impact Assessment; and• Avifaunal Compliance Statement. <p>Estuarine Impact Assessment:</p> <p>The Estuarine Impact Assessment described the modification of the Diep River Estuary by anthropogenic impacts, and its degradation in water quality, reduced biodiversity, and a near-collapse of native fish populations because of agricultural runoff, effluent from the Potsdam WWTW, and stormwater inputs. Based on the impact study's modelling results, the estuarine specialist confirmed that dredging will result in a significant improvement in tidal forcing in the Diep Estuary as a whole, but is unlikely to result in a change to the Estuarine Health Score of the system.</p> <p>Freshwater inflows greatly affect the salinity profile of the estuary. Generally, storms in the winter months bring large volumes of freshwater into the estuary that flush out the system and create an almost entirely freshwater environment. Lower rainfalls in summer introduce less freshwater into the estuarine system and allow saline intrusion further upstream, with highest salinities at the estuary mouth decreasing upstream. The Potsdam WWTW discharge makes up most of (if not all) the freshwater inflow at the head of the estuary during periods of low flow (i.e., the dry summers). Refer to Figure 20 below for an indication of the difference in flow rate within the lagoon per season.</p>	

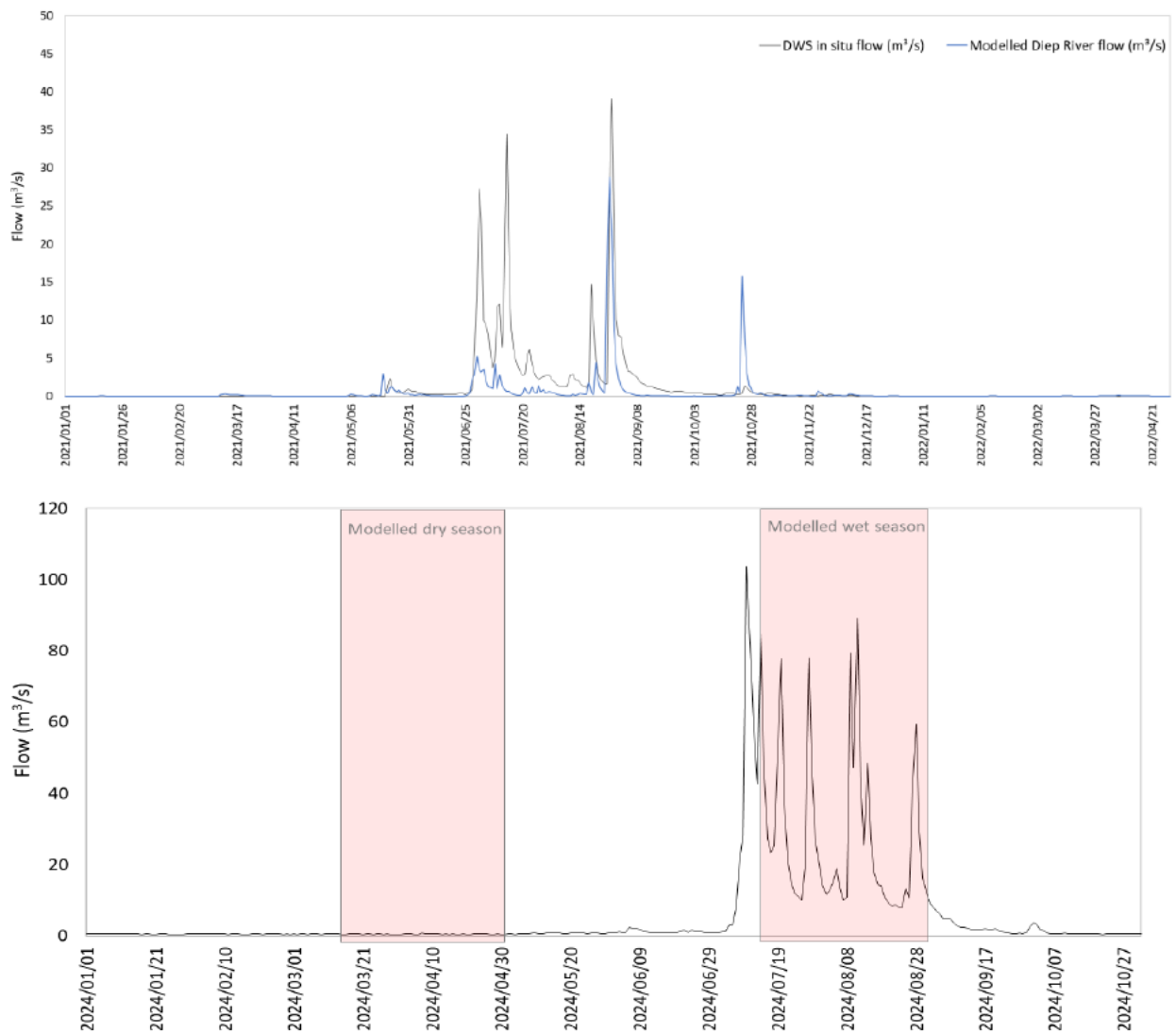


Figure 20: Extracted from Figure 4-6 of the Estuarine Impact Assessment (refer to pg. 44 of Appendix G1) demonstrating the overlap between modelled and measured data. The top figure presents measured freshwater inflow (Department of Water and Sanitation [DWS] Flow Gauge G2H042). The bottom figure shows modelled freshwater inflow at the head of the estuary (data DWS Flow Gauge Data and Potsdam WWTW flow data).

Modelled average salinities in the lower water column near the mouth (0.2 km from the mouth) pre-dredging and post-dredging are 23.8 and 26.5 respectively, yielding an increase of 11.6% (refer to **Figure 21** below). In the scenario before dredging, the salinity levels drop to ~1 twice every tidal cycle. This occurs because the freshwater inflow from the Potsdam WWTW is capable of completely replacing the saline water present in the lower system. Conversely, dredging is modelled to provide a larger volume for saline entrapment and requires more freshwater flow to reduce the salinity to the same extent as the pre-dredging scenario.

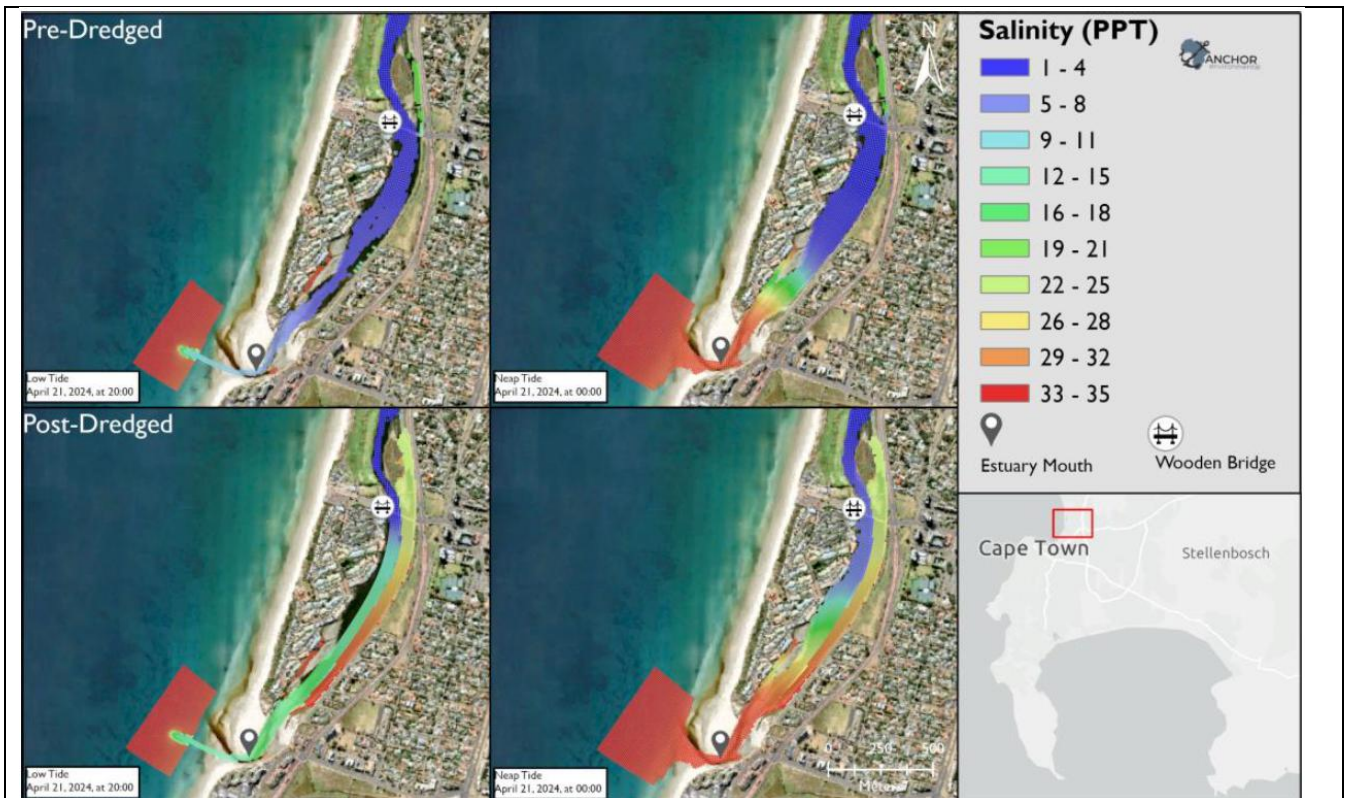


Figure 21: Extracted from Figure 4-12 of the Estuarine Impact Assessment (refer to pg. 54 of Appendix G1) providing a Snapshot modelled salinity extent in lower water column (bottom 10%) during low flow season at spring low tide (left column) and neap tide (right column) before dredging (top) and after dredging (bottom).

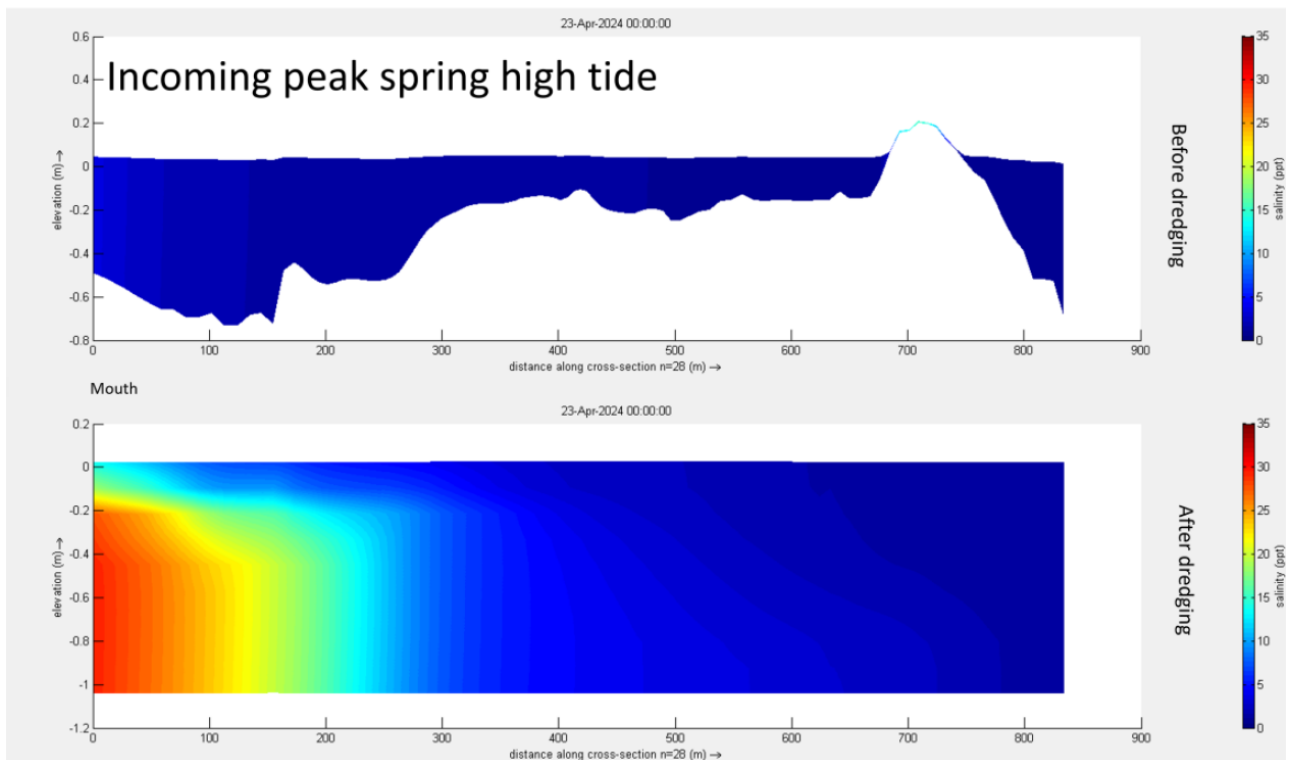


Figure 22: Extracted from Figure 4-13 of the Estuarine Impact Assessment (refer to pg. 54 of Appendix G1): Instantaneous snapshot of a salinity profile during the dry season of an incoming peak spring high tide before dredging (top) and after dredging (bottom).

While there is a constant freshwater inflow from the Potsdam WWTW during the dry season, the wet season simulations are characterised by large freshwater inflows (i.e., flood events, see **Figure 23** below). When these large flows are present, the system is modelled to be entirely fresh.

However, model results indicate that for the wet season scenario, over the period modelled, dredging resulted in a 54 % increase in salinity in the lower water column (average of 6.8 after dredging, and 3.1 before dredging). This is likely because the large flood events result in large scale mouth scour and changes to the bathymetry, allowing more saltwater penetration into the system. Despite this, the increased salinity near the mouth is not translated further up the system and there is no saline penetration at 2.9 km upstream at any point during the wet season.

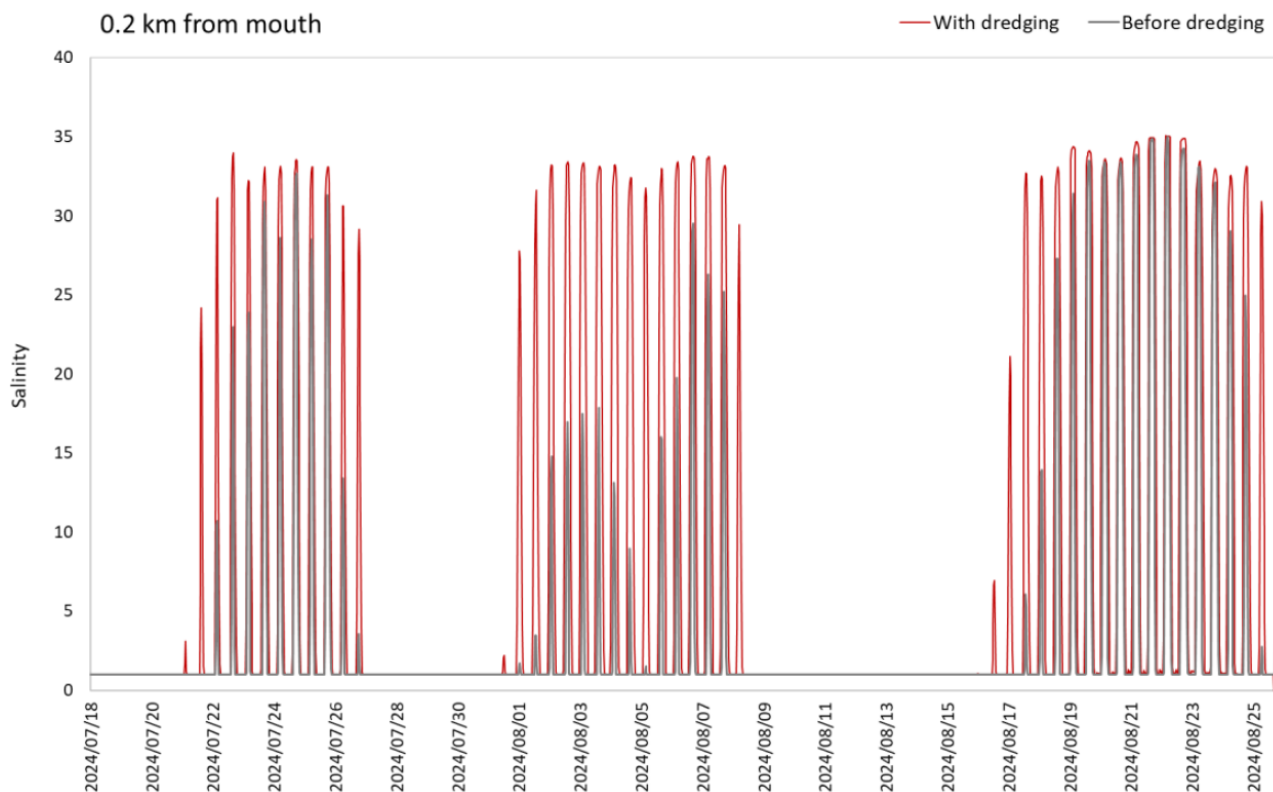


Figure 23: Modelled wet season salinity over time with dredging (red line) and before dredging (grey line) at the mouth of the estuary in the bottom layer of the model. This figure is an extract from Figure 4-17 of the Estuarine Impact Assessment (refer to pg. 57 of Appendix G1).

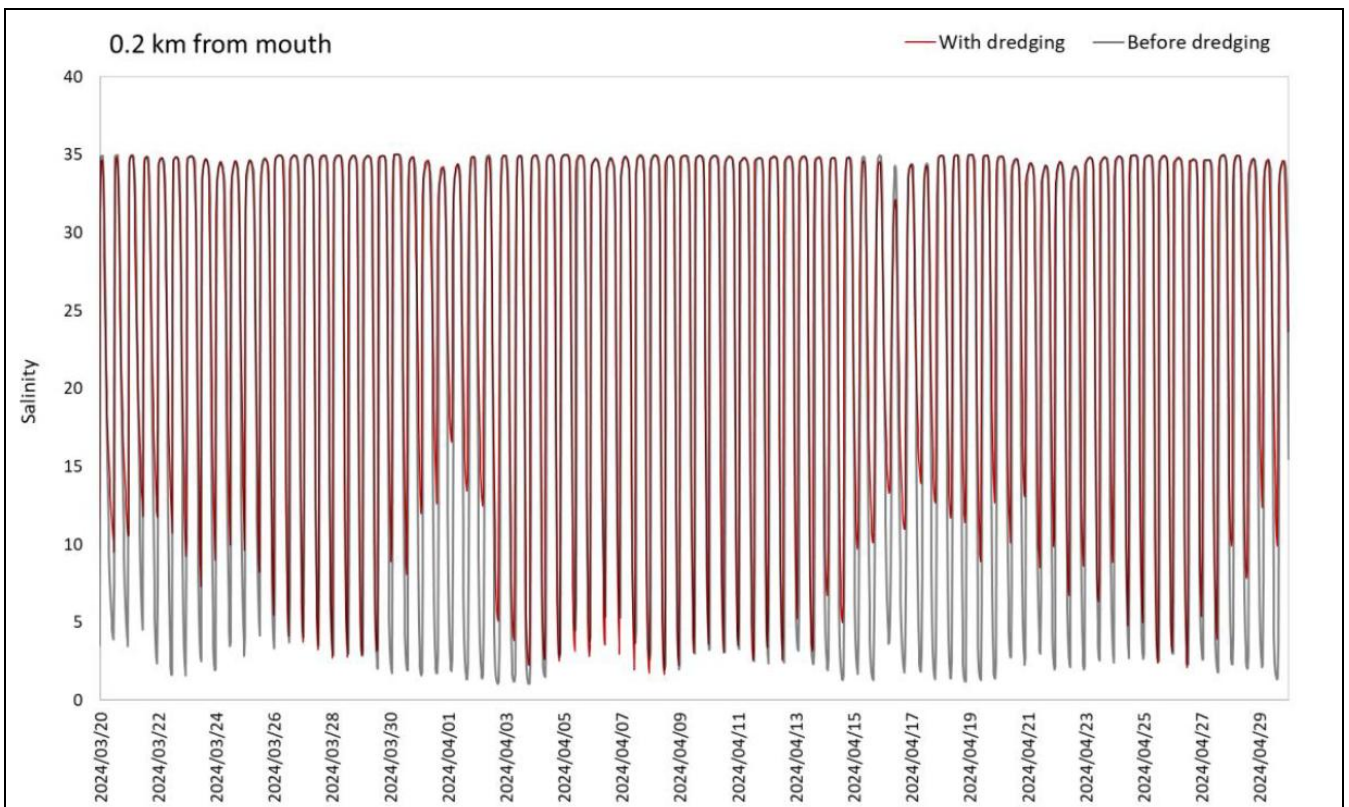


Figure 24: Modelled dry season salinity over time with dredging (red line) and before dredging (grey line) near the mouth of the estuary in the bottom layer of the model. This figure is an extract from Figure 4-15 of the Estuarine Impact Assessment (refer to pg. 55 of Appendix G1).

Based on the modelled bed shear stress results, the dredging should change how water moves through the channel, especially during different seasons. The model shows that in the wet season, when there is more freshwater flowing into the system, the combination of this flow and tidal movement increases water speed and force on the lagoon bed, which helps move built-up unwanted sediment (including organic solids) out toward the ocean. However, after dredging, the channel is deeper and consequently holds more water, which can lower the energy of water flow, especially in the dry season. This means less force may be applied to the bed, reducing the likelihood of sediment being stirred up and transported. While this can help reduce erosion, it may also lead to more sediment settling in the dredged channel over time, potentially requiring future maintenance.

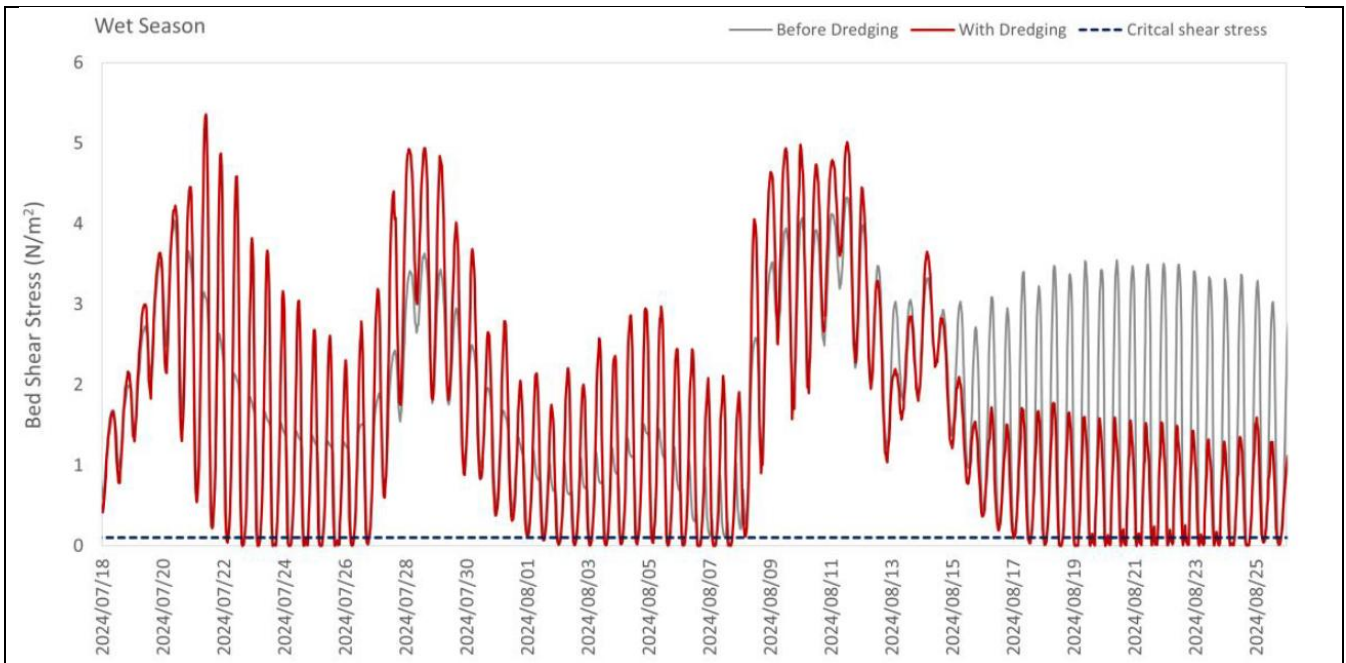


Figure 25: Modelled wet season bed shear stress over time with dredging (red line) and before dredging (grey line) in the dredge channel at the bottom layer of the model – extracted from Figure 4-19 of the Estuarine Impact Assessment (refer to pg. 59 of Appendix G1). The estimated critical shear stress (minimum required shear stress for sediment transport) is represented by the dashed dark blue line.

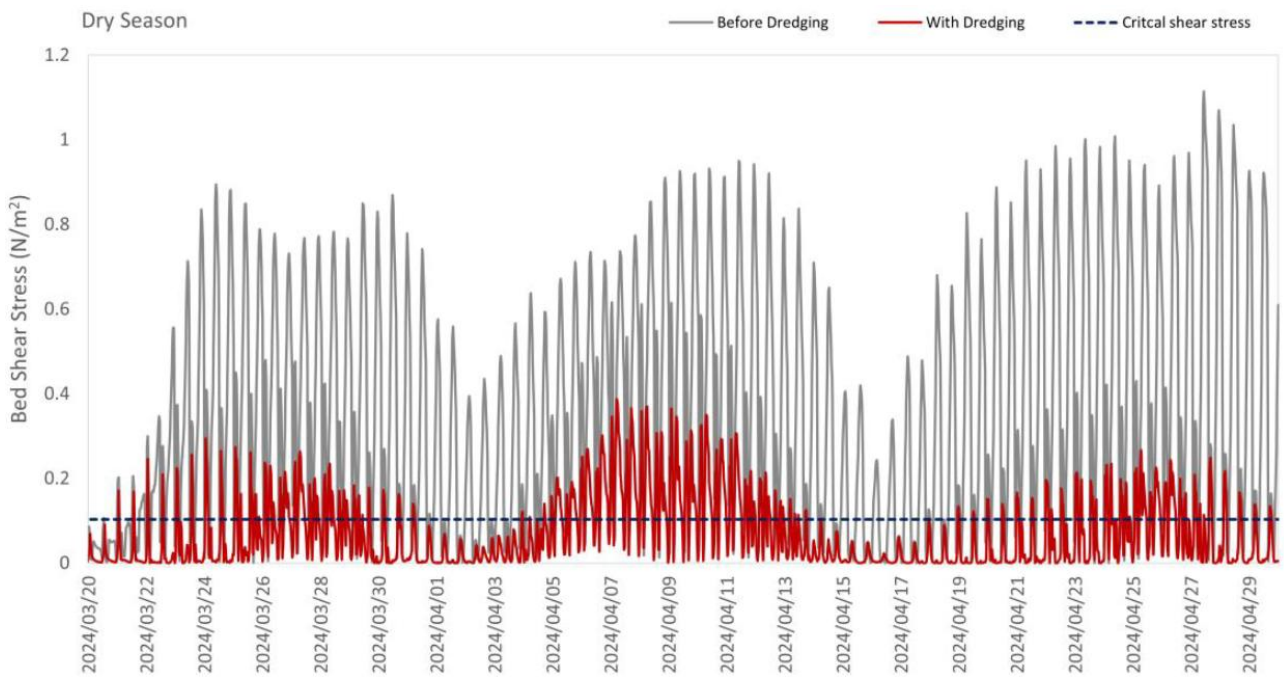


Figure 26: Modelled dry season bed shear stress over time with dredging (red line) and before dredging (grey line) in the dredge channel at the bottom layer of the model– extracted from Figure 4-21 of the Estuarine Impact Assessment (refer to pg. 60 of Appendix G1). The estimated critical shear stress (minimum required shear stress for sediment transport) is represented by the dashed dark blue line.

Overall, dredging is modelled to improve water flow and flushing during high flow periods (like the wet season) but may conversely lead to more sediment build-up in the dry season due to lower flow energy – refer to **Figures 25** and **26** above.

Further upstream at 2.9 km from the mouth, the pre-dredging and post-dredging differences in average salinity in the lower water column are modelled to be much less pronounced at 2.42 and 2.44

respectively (an increase of 0.4%). This improvement in tidal flux during the wet season (as demonstrated by saline inflow) therefore, does not appear to be translated further up the system, and thus positive impacts of the flushing should be limited to the lower reaches of the system. Therefore, **the impact of the proposed dredging on the estuarine ecosystem is assessed to be a Low, positive impact with the implementation of the recommended mitigation measures.** The specialist stressed the importance of maintaining the channel at its scoured depth as well as always keeping the estuary mouth open to ensure continued function (and associated benefit of tidal flushing) over time.

The impact study identified additional small positive impacts to the system that may be associated with the proposed dredging. For example, the new, narrow dredged channel in the lower reaches of the system may concentrate any organic material that has been transported down the system, where the enhanced tidal prism may more readily flush it out through the mouth (with the overall larger volume flow rate within the dredged area). Assuming that the additional sediment is colonised by benthic macrofauna, this has the potential to expand the feeding area available to waders and other waterbirds that feed on the intertidal mud/sandflats. In addition, the creation of larger tidal flats adjacent to the dredge area will be exposed at low tide, along with any deposited material. Exposure to air may facilitate oxygenation of these sediments.

These results modelled and presented within the Estuarine Impact Assessment suggest that dredging will not address all the challenges faced by the Milnerton Lagoon. The quality of inflow from the catchment has been identified as a critical determinant of the overall health of the estuarine system — for long term, high significance positive impacts to be realised, improvement of inflow water from the catchment and various point sources (including the Potsdam WWTW) is imperative to improve estuarine health over the long term.

Avifaunal Compliance Statement:

Following a review of the existing Estuarine Impact Assessment (**Appendix G1**), and a brief site visit (hour-long visual inspection of the inclusive impact area) conducted on 21 March 2025, the avifaunal specialist confirmed that the **post-mitigation impacts of this project on the local birdlife are likely to be of Low significance.**

The impacts on birds of the dredging project are likely to include disturbance and degradation of habitat during the implementation phase (negative), and ultimately the improvement of habitat in the long-term during operation (positive), as identified in the Estuarine Impact Assessment. Possible mitigation of negative impacts should include minimising the effective footprint of the project, minimising sources of noise and visual disturbance, and minimising the introduction of contaminants into the water system.

The affected avifauna could include at least 14 regionally and/or globally red-listed species (Table 1), the most likely and significant of which are Hartlaub's Gull *Chroicephalus hartlaubii*, Cape Cormorant *Phalacrocorax capensis*, Caspian Tern *Hydroprogne caspia*, Great Crested Grebe *Podiceps cristatus*, Grey Plover *Pluvialis squatarola*, Sanderling *Calidris alba*, and Yellow-billed Duck *Anas undulata*. Three species – African Marsh Harrier *Circus ranivorus*, Great White Pelican *Pelecanus onocrotalus*, and Caspian Tern - are identified as species of conservation concern (SCC) by the DFFE screening tool.

The avifaunal specialist concluded that provided the mitigation measures set out in the Estuarine Impact Assessment are fully adhered to, there is no reason to suspect that residual impacts of the proposed dredging will affect birdlife in an unsustainable way, and from a bird impact perspective, the specialist recommend that the project be authorised.

Influence on the Proposed Dredging

The findings and mitigation measures proposed by the specialists directly informed the design and layout of the proposed dredging. Notably:

- » The dredging alignment was selected based on its modelled success in directly addressing the large build-up of organic-rich sediments that drive oxygen depletion, sulphur-producing odours, and poor flushing within the lagoon;
- » The degraded condition of the lower lagoon, combined with the modelled performance and relative cost-effectiveness of dredging, confirmed the suitability of the preferred alternative;
- » Impact of the proposed dredging on the estuarine ecosystem is assessed to be a Low, positive overall impact with the implementation of the recommended mitigation measures, supporting approval of the intervention;
- » The specialist's recommended mitigation measures were incorporated into the EMPr to minimise ecological impacts; and
- » Although short-term disturbance to avifaunal habitat may occur during the implementation phase (active dredging), the avifaunal specialist supported the proposed dredging since the long-term habitat improvements support the dredging, provided the estuarine mitigation measures are implemented.

In conclusion, the specialist input has ensured that the proposed dredging is aligned with the best practicable environmental option (BPEO), with residual impacts reduced to primarily low significance through the implementation phase with appropriate avoidance, mitigation, and rehabilitation measures, apart from the impacts on estuarine water quality, which remain medium negative despite mitigation. Post-dredging impacts on the lower lagoon are all assessed to be positive.

2. List the impact management measures that were identified by all Specialist that will be included in the EMPr

The impact management measures (mitigation measures) recommended by the appointed specialists have been incorporated into the EMPr (refer to **Appendix H1**). These measures are aimed at avoiding, minimising, offsetting adverse impacts, or enhancing positive impacts, identified during the Impact Assessment.

Estuarine Ecological Impact Mitigation Measures:

As recommended by the estuarine specialist, the following measures will be included to reduce the project's impact on estuarine ecology:

Any equipment to be used in the estuary must be thoroughly rinsed/cleaned prior to use to ensure no transfer of introduced species from other systems.

- » All feasible measures for reducing noise during dredging should be investigated and employed. Mobile equipment, vehicles and power generation equipment must be suitably maintained during the project. A maintenance plan must be implemented to ensure all diesel motors and generators receive adequate maintenance to minimise noise emissions and potential pollution events.
- » Highly disturbing (light, noise) activities should be constrained to the daytime where possible to minimise noise and light disturbance at night.
- » The spatial extent of impacts must be constrained to the minimum required. Dredging activities should be planned to minimise the duration and extent of disturbance to water bodies.
- » For land-based activities that may result in erosion, contractors are to install erosion control barriers such as silt fences, sediment traps, drainage channels or sediment curtains to minimise sediment runoff into the water during the proposed activities. This is pertinent if construction is to take place during the wet season.
- » All staff must be informed and trained about estuarine species and the responsible disposal of construction waste. This training must be integrated into toolbox talks or onsite awareness

sessions to ensure that waste management practices are understood and followed diligently. Additionally, contractors must prepare a method statement outlining specific waste management procedures, which must be approved by the resident engineer before construction activities commence.

- » Suitable handling and disposal protocols must be clearly explained, and sign boarded. A reduce, reuse, recycle policy must be drafted and adhered to.
- » Waste disposal at licensed landfill sites by qualified contractors is mandatory, with proof of disposal submitted to the appointed Environmental Officer. Waste management certification must be obtained, and detailed records of all stored and disposed waste, including quantity, nature, and fate, must be maintained for auditing purposes.
- » Adequate sanitary facilities and ablutions must be provided for all personnel throughout the project area. Enforcement of facility usage and cleanliness is crucial.
- » Improvement of inflow water from the catchment and various point sources (including the Potsdam WWTW) is imperative to improve estuarine health over the long term.
- » It is imperative that the channel be maintained at this depth and the mouth be kept open at all times.
- » Monitoring requirements include that Dissolved Oxygen monitoring must take place in the lower reaches of the system, with control sites upstream of Woodbridge Island. Should the 95 %-ile Dissolved Oxygen levels in the lower system (i.e., most of the lower system) fall more than 10 % below the control sites, additional management actions (such as oxygenation) may be required.

Avifaunal Impact Mitigation Measures:

Possible mitigation of negative avifaunal impacts (construction) was suggested in the Avifaunal Compliance Statement to include minimising the effective footprint of the project, minimising sources of noise and visual disturbance, and minimising the introduction of contaminants into the water system.

The avifaunal specialist confirmed that there is no reason to suspect that residual impacts of the proposed dredging will affect birdlife in an unsustainable way should the recommended mitigation measures of the Estuarine Impact Assessment be fully adhered to.

3.	List the specialist investigations and the impact management measures that will not be implemented and provide an explanation as to why these measures will not be implemented.
----	--

The specialist studies undertaken are listed in **Section I(1)** above. All recommended impact management measures will be implemented and have been incorporated in the EMPr (**Appendix H1**).

4.	Explain how the proposed development will impact the surrounding communities.
----	---

The proposed dredging of the Milnerton Lagoon is expected to facilitate increased tidal flushing of the lower estuary, improve scour of sediment out of the lower lagoon, and create new intertidal habitats resulting from the relocation of sediment to create the central channel. These positive outcomes are expected to help ameliorate the impacts of poor input water quality into the lower. Increased tidal exchange should dilute and replace the poor-quality water in the lower lagoon twice daily, whilst also infusing additional dissolved oxygen into the system.

Whilst the aim of the proposed dredging is not directly focused on generating widespread socio-economic benefits, visual and odour nuisance will be reduced through targeted dredging, enhancing the aesthetic and recreational value of the lagoon and generating positive social and economic effects, particularly for the surrounding communities and tourism-related activities.

In addition, the dredging activities will create a limited number of short-term employment opportunities. Where feasible, these opportunities will be prioritised for residents from nearby communities, contributing to local income generation and socio-economic upliftment during the implementation phase.

While the socio-economic benefits of the proposed dredging may not be large-scale or long-term in isolation, the intervention supports foundational improvements in environmental quality, which are essential for promoting a healthier environment, restoring clean waterways and beaches, and encouraging safe recreational use of the lagoon. Collectively, these outcomes will strengthen the City's resilience, while supporting its social, environmental, and economic goals.

5. Explain how the risk of climate change may influence the proposed activity or development and how has the potential impacts of climate change been considered and addressed.

When considering climate change within a BA process, it is critical to grasp the difference between climate change 'mitigation' and 'adaptation'. Climate change mitigation relates to the action(s) taken to minimise the effect of the project on climate change through reducing the emissions generated by a project and/or to remove greenhouse gases from the atmosphere through the project. Whereas climate change adaptation relates to the action(s) undertaken to mitigate against the effects of climate change on the project through measures such as increasing the resilience of a project to the effects of climate change.

Proposed developments should be designed with a precautionary approach, accounting for the novelty and complexity of climate change. Tools such as the Western Cape Climate Change Response Strategy (WC CCRS) of 2014 and the Green Book developed by the Council for Scientific Research (CSIR) in 2019 and others (where available) aid an understanding of the vulnerability of a project to climate change.

The WC CCRS (2014) predicts that the province will experience rising mean and maximum temperatures, more frequent hot days and heatwaves, warmer minimum temperatures with fewer cold and frost days, a general drying trend in the west, more intense rainfall events, and rising sea levels with associated storm surges. The Green Book Adaptation Tool⁸ assesses the City of Cape Town to be at possible risk for wildfires, low risk for flooding with an increasing risk of heat extremes and heat waves.

The Smart-Agri plan builds on the WC CCRS (2014) to enhance the climate change resilience of the agricultural sector, in particular. The Smart-Agri plan divides the Western Cape Province into several climatic zones with unique climate change impacts that demand adaptation. The site falls within the Cape Town–Winelands Agro-Climatic Zone and has the following currently climatic features: winter rainfall and hot dry summers. The temperature projections for the area involve 'low range warming'.

In relation to the proposed dredging, the project is vulnerable to climate change impacts that may compromise its effectiveness and long-term sustainability. Increasing storm events could cause flooding that overwhelms drainage systems and places additional pressure on already stressed sewer and stormwater infrastructure, that may contribute to or directly input into the lower Milnerton Lagoon. Such events may also accelerate soil erosion on site, undermining the stability of intertidal banks formed from dredged material. This erosion could have negative consequences, including channel destabilisation and further contamination of water sources, but may also create positive effects by enhancing estuarine flushing, removing polluted sediments, and increasing saline intrusion in the lower lagoon.

Conversely, more frequent droughts increase the likelihood of estuary mouth closure, which would eliminate tidal flushing and worsen the lagoon's degraded condition by promoting anoxic bacterial breakdown, intensifying the release of sulphuric odours, and exacerbating socio-economic impacts. Rising temperatures may further reduce the longevity of dredging benefits, as warmer conditions and pollutant inputs favour anoxic bacterial growth and accelerated breakdown processes. It is therefore clear that climate change poses significant risks to the success of the dredging intervention,

⁸ CSIR, 2019. Green Book: Adapting South African settlements to climate change. Available at: www.greenbook.co.za. Accessed: 19 September 2025.

underscoring the need for adaptive management strategies and ongoing risk assessment to build resilience into the project.

The Applicant can adapt to climate change through:

- The proposed dredging is such that it is resilient to unpredictable weather and storm events. However, ongoing maintenance of the scoured channel depth and the estuary mouth must account for changing weather patterns and more frequent storms; otherwise, the effectiveness of maintenance efforts could be compromised.
- Maintenance of an open estuary mouth should be ensured at all times, in line with the MMP, regardless of weather influences to improve resilience of the site to the effects of climate change.
- The Applicant should ensure that the relevant improvements and corrections to pollution inputs into the Diep River Estuary are prioritised to improve estuary condition and strengthen its long-term resilience to climate change impacts.

By considering the above-mentioned factors, the proposed dredging can improve its resilience to the effects of climate change whilst maintaining its positive effect on the tidal flushing of the lower lagoon.

With regards to Climate Change mitigation, it is not foreseen that the proposed dredging will exacerbate the dependency on energy resources, however, the following actions can be implemented to ensure that the proposed dredging is resource-efficient where possible and has a limited impact on climate change.

- Contractors must be instructed on efficient energy use during the implementation phase; lights, generators, and equipment should be switched off when not in use, and all electrical installations must comply with specifications provided by the appointed electrical engineers.
- Vehicle use during the implementation phase should be minimised, and engines optimised where possible to improve fuel efficiency.
- Placement of dredged material along the channel sides must support channel stability and encourage ecological renewal in the intertidal zone, while ensuring protection of indigenous vegetation.

By integrating these mitigation strategies, the proposed dredging can contribute to greater climate resilience and sustainability in the region.

6.	Explain whether there are any conflicting recommendations between the specialists. If so, explain how these have been addressed and resolved.
----	---

There are no conflicting recommendations given by the specialists for this project.

7.	Explain how the findings and recommendations of the different specialist studies have been integrated to inform the most appropriate mitigation measures that should be implemented to manage the potential impacts of the proposed activity or development.
----	--

Refer to **Section I(2)** above for the recommended mitigation measures provided by the estuarine specialist within the Estuarine Impact Assessment and related reports, which have been incorporated into the EMPr (**Appendix H1**).

8.	Explain how the mitigation hierarchy has been applied to arrive at the best practicable environmental option.
----	---

The proposed dredging, together with the alternatives considered, must be consistent with the principles of environmental management as presented in the NEMA. Key principles relevant to the project include the following taken from Section 2 of the NEMA:

- » *Environmental management must place people and their needs at the forefront of its concern, and serve their physical, psychological, developmental, cultural and social interests equitably.*
- » *Development must be socially, environmentally and economically sustainable.*

- » Sustainable development requires the consideration of all relevant factors including ... that negative impacts on the environment and on people's environmental rights be anticipated and prevented, and where they cannot be altogether prevented, are minimised and remedied.

The EIA process gives effect to these principles by implementing the **mitigation hierarchy** (refer to **Figure 27**). Simply put, impacts must be avoided, or, where they cannot be altogether avoided, are minimised and remedied.

The DEA (2013) guideline on Need and Desirability formalises this hierarchy as follows:

- » First, alternatives must be investigated to avoid negative impacts altogether.
- » After it has been found that the negative impacts cannot be avoided, alternatives must be investigated to reduce (mitigate and manage) unavoidable negative impact.
- » Thereafter, alternatives must be investigated to remediate (rehabilitate and restore).
- » Unavoidable impact that remains after mitigation and remediation must be compensated for through investigating options to offset the negative impacts.
- » While throughout, alternatives must be investigated to optimise positive impact.

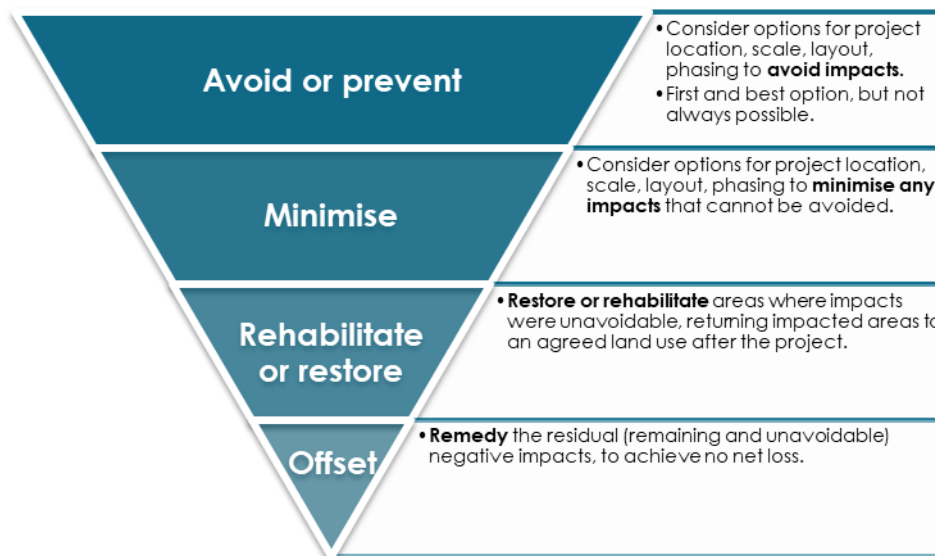


Figure 27: Mitigation Hierarchy (DEA et al., 2013).

The mitigation hierarchy has been considered in the design process followed to date, which has developed, assessed and discarded alternatives on an ongoing basis to arrive at the proposed activity as presented in **Section H** of this report. The proposed design **avoids** impacts on sensitive estuarine habitats by limiting the spatial extent of the works to the lower lagoon, rather than impacting on more sensitive salt marsh and wetland habitats upstream. Other impacts have been **minimised** through careful design and the incorporation of mitigation and management measures as recommended in the specialist assessment. As negative impacts can be successfully mitigated to acceptable levels, there is no need to consider restoration or offsetting of impacts. The proposed activity is itself a remediation project, to address the negative impacts of pollution on the lagoon. Additionally, by implementing the dredging after there has been some improvement in lagoon water quality (i.e., improved dissolved oxygen levels) and as part of a suite of complementary interventions, with a specific focus on improving tidal exchange in the lower Milnerton Lagoon, ensures that **maximum ecological benefits** of the intervention are experienced.

SECTION J: GENERAL

1. Environmental Impact Statement

1.1.	Provide a summary of the key findings of the EIA.
<p>This section presents the conclusions and recommendations from the EIA process, the key findings of specialist assessments, and a summary of impacts to enable decision-making by the competent authority (DEA&DP). Mitigation and management actions required to mitigate negative impacts or enhance positive impacts are provided, along with the EAP's recommendation as to whether the project should receive authorisation.</p> <p>Background</p> <p>The Diep River Estuary is a highly modified system affected by high levels of pollution and other human activities. Water quality in the lagoon has declined significantly in recent years due to high levels of pollution and other anthropogenic impacts. The effects of poor water quality within the estuary include a sulphurous odour and discoloured water, due to high levels of suspended solids and extremely low oxygen levels. The effects of poor water quality within the estuary include a sulphurous odour and discoloured water, due to high levels of suspended solids and extremely low oxygen levels.</p> <p>Flows in the estuary are seasonally variable, with significantly reduced or non-existent flows from the upstream catchment during summer, while constant WWTW discharge remains the majority of flows during the drier summer months. In the Diep River catchment, extensive agriculture covers more than half the land surface. This increases siltation in the river, contributes to high nutrient loads, and lowers the flow due to abstraction for irrigation purposes.</p> <p>Sewage-derived pollution is a major contributor to water quality impacts in the estuary, and includes excessive loading of organic solids from the Potsdam wastewater treatment works (WWTW). During 2024 and 2025, the lagoon has also been affected by the discharge of large volumes of untreated sewage because of the episodic failure of the Koeberg Road sewage pump station and its resulting discharges into the Theo Marais stormwater canal upstream of Otto du Plessis Drive).</p> <p>Other urban impacts include stormwater runoff with contaminant loads from roads, gardens, and industrial areas, and sewage where failing or blocked sewer pipes spill into the stormwater system.</p> <p>In addition to the ongoing effects of inflowing pollutants, water quality in the lower estuary is affected by the extent to which clean seawater can enter the lagoon during high tides, replacing polluted river flows with cooler, saline water with higher dissolved oxygen concentrations. This daily tidal exchange is dependent on the dynamics of the estuary mouth, coastal processes, and flows from the river. In general, greater tidal exchange has been associated with improved water quality in the lower lagoon (between the Loxton Road bridge and the mouth). Tidal exchange is reduced when the mouth is partially closed, which is influenced by various factors, including deposition of organic sediment(s) at the mouth. Organic sediments derived from wastewater and urban runoff accumulate on the bed of the estuary over time, and are periodically flushed out to sea during large flood events. Accumulated sediments use oxygen from the water column to decompose, and this increased oxygen demand lowers dissolved oxygen concentrations in the estuary. If there is insufficient oxygen available in the water (as has often been the case in the lagoon), anaerobic decomposition may result, producing hydrogen sulphide with its characteristic foul odours.</p> <p>Project proposal</p> <p>The proposed activity is the proposed dredging of a channel the lower section of the Milnerton Lagoon to increase flow velocities and scour, help keep the mouth of the estuary open, maximise tidal flushing, as well as creating raised intertidal mudflats with more frequent exposure to the air to increase</p>	

sediment oxygen levels and reduce sulphurous odours. Increased tidal interchange is expected to result in increased dissolved oxygen availability in the lowest reaches of the lagoon. Up to 30 000 m³ of material will be moved within the lagoon to achieve this during the dredging phase of the project, and up to 120 000 m³ during the post-dredging phase to maintain the scoured depth of the dredged channel and an open estuary mouth. Any such maintenance to restore or maintain the channel depth and an open estuary mouth must be conducted strictly in accordance with the MMP (see **Appendix H2**), and only when necessary to sustain hydrodynamic functioning of the lower lagoon.

Project Overview and Motivation

The Diep River Estuarine Management Plan (adopted in 2022) includes a set of objectives and actions, of which Objective H1 and Action 12 involve the following, '*Assess the possible cost and benefit of dredging the lower lagoon to facilitate the release of sediments and nutrient loads and emulate natural scour and enable ingress of increased volumes of seawater into the system... Implement dredging if a significant benefit is anticipated.*' (refer to pg 9. of [the Diep River EMP](#)).

The 2023 Remediation Plan (Rose *et al.*, 2023) assessed various short-, medium- and long-term remediation measures proposed for the lagoon and recommended that the primary focus of remediation of the pollution within the lagoon should be on reducing the sources of pollution into the estuary. Of the short-term remediation measures assessed in the 2023 Remediation Plan (Rose *et al.*, 2023), one that was recommended for implementation was dredging of the lagoon to remove built-up organic sediments and increase tidal exchange in the estuary.

Hydrodynamic modelling of the proposed dredging has been conducted and found that the proposed dredging would facilitate greater saline intrusion during incoming and outgoing tides in the lower part of the lagoon. The dredging is expected to increase the exchange of saline and fresh water in the lower lagoon. The increased seawater intrusion is also expected to introduce dissolved oxygen into the lagoon, reducing chemical oxygen demand and disrupting anoxic conditions. During the dry season, average salinities near the mouth of the lagoon are modelled to increase by 11.6 %. During the wet season, average salinities near the mouth are modelled to increase by 54.0 % in the lower water column.

Since 2023, multiple flood events have naturally scoured the system, flushing significant quantities of sediment from the lagoon out to sea. The removal of organic sediments has become less of a priority, and dredging is instead proposed for its potential to improve the hydrodynamics and tidal exchange as a viable remediation measure.

Sediment samples collected in the lower lagoon in November 2023 as part of the dredging investigations were tested for trace metals as well as a full suite of organic and other contaminants. These samples were specifically targeted to include the areas of highest accumulation of fine sediments. In these samples, six metals (arsenic, cadmium, chromium, lead, nickel, and zinc) were all detected at lower concentrations than those reported in 2021. Guideline values for chronic and acute ecological impact are not currently exceeded, and available data do not suggest that metal contaminants are a significant driver of ecological impact in the Milnerton Lagoon.

Sediment quality is currently a pressing ecological concern in the Milnerton Lagoon only to the extent that it impacts on water quality. Water quality in flows entering the lagoon is so poor that sediment in the lagoon is not thought to be having a significant impact on oxygen levels. The biological and chemical oxygen demand of influent pollution, including both raw and poorly treated effluent, has created conditions of high and unmet oxygen demand in water entering the lagoon. There is in fact no oxygen in the water that could be taken up by the decomposition of organic sediments. This is supported by the fact that although two wet winters flushed much of the fine sediment from the lagoon into the sea, oxygen levels have remained at and near zero (barring brief periods of improved tidal flushing that brought oxygen rich seawater into the lagoon).

In other words, in the recent past, **the high organic content of sediments in the lower lagoon is believed to have been a significant contributor to oxygen deficiencies and resultant odour production, but water quality has now deteriorated to such a point that no amount of sediment removal can address the challenge.** Dredging therefore targets the improvement of hydrodynamic functioning to improve water quality and reduce odour in the lower lagoon while measures to improve influent water quality are underway.

The alternative that includes offsite disposal of sediment is not preferred since this alternative involves dewatering operations, would use limited landfill space, and involves transport and loading to move sediment off-site to an appropriate and capacitated landfill site, as well as odour and nuisance impacts associated with the dewatering area without offering any significant, additional hydrodynamic or water quality benefits over the preferred alternative.

Limitations of dredging as a remediation measure:

It must be clearly stated that dredging of the Milnerton Lagoon is not in itself expected to contribute significantly to improving water quality or amenity value of this waterbody other than by improving tidal exchange in the lower part of the lagoon. The causes of water quality impacts are well understood and include the current inadequate treatment of wastewater at the Potsdam WWTW, the periodic discharge of substantial volumes of untreated sewage from failing pump stations and the ongoing low-level runoff of untreated wastewater from un-serviced areas of the catchment. As assessed in this report, the positive impacts of dredging as a remediation measure are likely to be limited in extent (since improvements to tidal exchange will occur mainly in the lower lagoon) and duration (as winter flooding may cause the channel to revert to its current channel). Therefore, the dredging of the lower lagoon is preferably recommended after some improvement in water quality occurs, ensuring that the intervention coincides with improvements in upstream water quality. Dredging is therefore recommended as a short- to medium-term intervention that can feasibly be implemented to help address pollution within the Milnerton Lagoon considering the complimentary maintenance activities ensuring the dredged channel depth is maintained and the estuary mouth kept open.

No-Go Alternative

The No-Go Alternative, which entails not implementing dredging in the Milnerton Lagoon, would not involve any intervention targeting improvements to the hydrodynamic functioning of the lagoon.

While winter flooding may cause natural temporarily improved intertidal exchange, this has proven insufficient to last for the full year. Because the primary driver of water quality is the upstream inflows, dredging may not directly affect water quality or amenity value of this waterbody other than by primarily improving tidal exchange in the lower part of the lagoon. The opportunity to realise the indirect benefits of improved hydrodynamic function within the lower lagoon would be forfeited under the no-go scenario.

Given the continued impacts on the lagoon, it is not considered reasonable nor feasible to do nothing, and the Alternative 1 dredging design is recommended as the lowest-risk and lowest-impact means of achieving the required tidal interchange.

1.2.	Provide a map that that superimposes the preferred activity and its associated structures and infrastructure on the environmental sensitivities of the preferred site indicating any areas that should be avoided, including buffers. (Attach map to this BAR as Appendix B2)
------	---

Appendix B2 includes the required sensitivity map.

1.3.	Provide a summary of the positive and negative impacts and risks that the proposed activity or development and alternatives will have on the environment and community.
------	---

The potential positive and negative impacts that were considered are summarised as follows:

The proposed dredging is a pollution remediation measure aimed at delivering a range of positive outcomes, including the removal of historically polluted sediments to reduce ecological risks,

enhanced tidal exchange to support estuarine functioning and resilience, creation of new intertidal habitats, increased dissolved oxygen levels to disrupt anoxic conditions and reduce odorous hydrogen sulphide emissions, and improved air quality, aesthetics, and recreational value with associated social and economic benefits. Potential negative impacts include direct disturbance and mortality of benthic and estuarine organisms, noise and physical disturbance to species, temporary water quality impact and avifaunal habitat disruption, and short-term implementation-related nuisances such as noise, odour, and increased activity; however, given the already degraded condition of the lagoon, these impacts are assessed as low in significance and can be further reduced to negligible levels through the implementation of mitigation measures set out in the EMP.

As assessed in this report, the positive impacts of dredging (with or without off-site disposal) as a remediation measure are likely to be limited in extent (since improvements to tidal exchange will occur mainly in the lower lagoon) and duration (as winter flooding may cause the channel to revert to its current channel). This measure is nonetheless recommended as one of the few short- to medium-term interventions available that can feasibly be implemented to help address pollution within the Milnerton Lagoon considering the complimentary maintenance activities ensuring the dredged channel depth is maintained and the estuary mouth kept open.

Crucially, long-term estuarine recovery is dependent on improving water inflow quality from the catchment and reducing pollution from sources like the Potsdam WWTW.

The dredging project, with mitigation, is assessed as having a low positive impact on the estuarine ecosystem, particularly by expanding benthic habitats and potentially supporting bird foraging areas. Overall, the environmental assessment concludes that with recommended mitigation measures in place, the dredging project represents the BPEO, with mostly low or very low residual impacts during the implementation phase, and positive effects in the post-dredging phase. However, impacts on water quality during dredging remain a medium negative concern despite mitigation.

Refer to **Section I** for the impact assessment tables and the table below, which presents a summary of the impacts assessed for the project.

	Preferred Alternative (Dredging without offsite disposal)		Alternative 5 (Dredging with offsite disposal)		No-Go Alternative	
	Without mitigation	With mitigation	Without mitigation	With mitigation	Without mitigation	With mitigation
	IMPLEMENTATION PHASE					
Disturbance to and mortality of estuarine communities in the dredge footprint	Low negative	Low negative	Low negative	Low negative	None	None
Impact to estuarine habitat due to dewatering process	N/A	N/A	Insignificant	Insignificant	None	None
Noise impacts on surrounding estuarine ecology due to dredging activities	Low negative	Very Low negative	Medium negative	Medium negative	None	None
Smothering of estuarine fauna from dredging activities	Low negative	Low negative	Low negative	Low negative	None	None

Impacts on estuarine water quality	Medium negative	Medium negative	Low negative	Low negative	None	None
Waste generation and improper disposal	Medium negative	Very Low negative	Medium negative	Very Low negative	None	None
Odour impacts on adjacent residents associated with disturbance of sediment during dredging	Low negative	Low negative	Medium negative	Low negative	Medium negative	Medium negative
Noise impacts on adjacent residents and businesses	Medium negative	Low negative	Medium-High negative	Medium negative	None	None
Dredging-related impacts including dust generation and risk of spills	Medium negative	Very Low negative	Medium-High negative	Low negative	None	None
	POST-DREDGING PHASE					
Impacts of proposed dredging on magnitude of the estuarine tidal prism	Low positive	Low positive	Low positive	Low positive	Low negative	Very Low negative
Impacts of a deeper channel at the mouth of fine sediment settlement and flushing	Very Low positive	Very Low positive	Very Low positive	Very Low positive	Low negative	Very Low negative
Impacts on estuarine health linked to new intertidal areas resulting from sediment enrichment	Very Low positive	Very Low positive	Very Low positive	Very Low positive	Low negative	Low negative

2. Recommendation of the Environmental Assessment Practitioner (“EAP”)

2.1.	Provide Impact management outcomes (based on the assessment and where applicable, specialist assessments) for the proposed activity or development for inclusion in the EMPr
<p>To prevent negative impacts associated with the proposed activity, all mitigation measures as proposed for each impact identified in Section I, and as stated in the EMPr (Appendix H1), should be implemented.</p> <p>The impact management outcomes included in the EMPr (Appendix H1) are as follows:</p> <ul style="list-style-type: none"> • Pre-Implementation Phase: Section 4 of the EMPr. • Implementation Phase: Section 4 of the EMPr. • Post-dredging Phase: Annexure A of the EMPr, i.e., the MMP (or Appendix H2 of this BAR). <p>The nature of the proposed dredging is such that it is an infrequent intervention that cannot be directly decommissioned and has thus not been assessed.</p>	

2.2.	<p>Provide a description of any aspects that were conditional to the findings of the assessment either by the EAP or specialist that must be included as conditions of the authorisation.</p> <p>The findings of the assessment by Infinity and specialists are generally conditional to the recommended impact management actions (mitigation measures) being implemented. These measures have been included in the EMPr and the MMP for the project (refer to Appendices H1 and H2 of this BAR).</p> <p>Most notably for the post-dredging phase of the activity, the depth of the scoured channel and an open mouth to the estuary must be maintained in accordance with the provisions of the MMP.</p>
2.3.	<p>Provide a reasoned opinion as to whether the proposed activity or development should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be included in the authorisation.</p>
	<p>Based on the findings of the specialist study and on the other factors considered in this assessment, it is recommended that the proposed dredging of the Milnerton Lagoon should receive an EA. It is the EAP's considered opinion that the proposal promotes the two constitutional imperatives relating to the environment as contained in Section 24 of the Bill of Rights:</p> <p style="padding-left: 40px;"><i>“Everyone has the right—</i></p> <p style="padding-left: 80px;"><i>(a) to an environment that is not harmful to their health or wellbeing; and</i></p> <p style="padding-left: 80px;"><i>(b) to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that—</i></p> <p style="padding-left: 120px;"><i>(i) prevent pollution and ecological degradation;</i></p> <p style="padding-left: 120px;"><i>(ii) promote conservation; and</i></p> <p style="padding-left: 120px;"><i>(iii) secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.”</i></p> <p>Remediating urban pollution impacts on the Milnerton Lagoon is an urgent priority, in light of the ecological, social, and economic impacts of the ongoing water quality and odour issues on surrounding residents and businesses. Dredging of the lower lagoon is one component of the required remedial and pollution abatement actions and is recommended as a short- to medium-term measure to improve hydrodynamic functioning and maximise the amount of tidal flushing in the lower lagoon.</p> <p>To ensure the effective implementation of the mitigation and management actions, an EMPr is included as Appendix H of this Draft BAR. The mitigation measures necessary to ensure that the project is planned, implemented, and operated in an environmentally responsible manner are listed in this EMPr and the MMP. The EMPr should be updated regularly and provide clear and implementable measures for the establishment and operation of the proposed dredging.</p>
2.4.	<p>Provide a description of any assumptions, uncertainties and gaps in knowledge that relate to the assessment and mitigation measures proposed.</p>
	<p>The primary assumption on which the recommendation to dredge the lower lagoon is based, is that the City of Cape Town's other existing projects and programmes relating to pollution abatement in the Diep River Estuary will be successful in reducing the loading of pollutants entering the lagoon. Without these, dredging alone is not expected to significantly improve the current situation.</p> <p>Moreover, the proposed dredging of a channel in the lower lagoon is recommended as a short- to medium-term remediation measure to be implemented should the water quality in the lower lagoon improve, as indicated by increased dissolved oxygen levels exceeding 2 mg/l. This is to ensure that the intervention coincides with improvements in upstream water quality to maximise the ecological benefit rather than undertaking dredging while the source of pollution and cause of ecosystem deterioration remains unchanged.</p> <p>The hydrodynamic effects of the proposed dredging have been modelled using a hydrodynamic model and recent monitoring data, to quantify the anticipated impacts. However, no model can completely account for all factors influencing water quality in the lagoon; thus uncertainties and gaps</p>

in knowledge regarding this highly dynamic system remain. It is recommended that monitoring of water quality continue during and after dredging to improve the state of knowledge of the impacts of dredging – both positive and negative.

2.5. The period for which the EA is required, the date the activity will be concluded and when the post construction monitoring requirements should be finalised.

Authorised activities should commence within five years of the date of the EA and should be completed within five years from commencement.

A close-out ECO site inspection should take place one month after implementation is complete.

3. Water

Since the Western Cape is a water scarce area explain what measures will be implemented to avoid the use of potable water during the development and operational phase and what measures will be implemented to reduce your water demand, save water and measures to reuse or recycle water.

Potable water is not required for the proposed activity. There is no water use during the post-dredging phase of the proposed dredging.

4. Waste

Explain what measures have been taken to reduce, reuse or recycle waste.

The nature of the preferred alternative is such that the dredged material will be placed on the of the channel within the intertidal zone and will not be disposed of off-site.

The EMPr includes measures for waste management during the implementation phase for the waste generated by construction personnel.

5. Energy Efficiency

8.1. Explain what design measures have been taken to ensure that the development proposal will be energy efficient.

Due to the nature of the works, no fixed power source is required. If power is needed for the implementation phase, the Contractor will make use of portable generators.

REFERENCES

City of Cape Town: Environment and Spatial Planning Directorate (2011) Table Bay Nature Reserve Integrated Reserve Management Plan. Integrated Reserve Management Plan. City of Cape Town, p. 99.

CSIR (2006) The development of a common set of water and sediment quality guidelines for the coastal zone of BCLME, South Africa. Prepared for Benguela Current Large Marine Ecosystem Programme. CSIR Report No. CSIR/NRE/ECO/2006/0011/C. Stellenbosch, 164 pp.

Gihwala, K., Dawson, J., Clark, B.M., 2021. Marine ecological monitoring of the Milnerton Lagoon (Diep River Estuary). Specialist Report no. 1954/1 prepared by Anchor Research and Monitoring (Pty) Ltd for The City of Cape Town.

Hutchings, K. & B.M. Clark, B.M. 2010. Assessment of the effects of heavy metal accumulation from land-based sources on the Diep estuary. Unpublished report prepared for Department of Environmental Affairs & Development Planning, Western Cape Government by Anchor Environmental Consultants, Cape Town. 75 pp.

City of Cape Town and Infinity Environmental (2022) Diep River Estuarine Management Plan.

Long, E.R., MacDonald, D.D., Smith, S.L., Calder, E.D., 1995. Incidence of adverse biological effects within ranges of chemical concentrations in marine and estuarine sediments. Environmental Management 19, 81-97.

Rose, J., Hojem, G., Basson, G., Day, E. (Liz), Clark, B., Winter, K. (2023) Water Quality Remediation Plan for the Milnerton Lagoon. 19041/1. Infinity Environmental, Liz Day Consulting, Anchor Environmental Consultants, ASP Tech and the University of Cape Town.

Rose, J. et al. (2025) Rehabilitation Plan for the Theo Marais Canal. Infinity Environmental & Liz Day Consulting.

SECTION K: DECLARATIONS

DECLARATION OF THE APPLICANT

Note: Duplicate this section where there is more than one Applicant.

I, Julia Wood, ID number 6504220108083 in my personal capacity or duly authorised thereto hereby declare/affirm that all the information submitted or to be submitted as part of this application form is true and correct, and that:

- I am fully aware of my responsibilities in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) ("NEMA"), the Environmental Impact Assessment ("EIA") Regulations, and any relevant Specific Environmental Management Act and that failure to comply with these requirements may constitute an offence in terms of relevant environmental legislation;
- I am aware of my general duty of care in terms of Section 28 of the NEMA;
- I am aware that it is an offence in terms of Section 24F of the NEMA should I commence with a listed activity prior to obtaining an Environmental Authorisation;
- I appointed the Environmental Assessment Practitioner ("EAP") (if not exempted from this requirement) which:
 - meets all the requirements in terms of Regulation 13 of the NEMA EIA Regulations; or
 - ~~meets all the requirements other than the requirement to be independent in terms of Regulation 13 of the NEMA EIA Regulations, but a review EAP has been appointed who does meet all the requirements of Regulation 13 of the NEMA EIA Regulations;~~
- I will provide the EAP and any specialist, where applicable, and the Competent Authority with access to all information at my disposal that is relevant to the application;
- I will be responsible for the costs incurred in complying with the NEMA EIA Regulations and other environmental legislation including but not limited to –
 - costs incurred for the appointment of the EAP or any legitimately person contracted by the EAP;
 - costs in respect of any fee prescribed by the Minister or MEC in respect of the NEMA EIA Regulations;
 - Legitimate costs in respect of specialist(s) reviews; and
 - the provision of security to ensure compliance with applicable management and mitigation measures;
- I am responsible for complying with conditions that may be attached to any decision(s) issued by the Competent Authority, hereby indemnify, the government of the Republic, the Competent Authority and all its officers, agents and employees, from any liability arising out of the content of any report, any procedure or any action for which I or the EAP is responsible in terms of the NEMA EIA Regulations and any Specific Environmental Management Act.

Note: If acting in a representative capacity, a certified copy of the resolution or power of attorney must be attached.

Julia Wood Digitally signed by Julia Wood
Date: 2026.01.28 16:33:52 +0200

28 January 2026

Signature of the Applicant:

Date:

City of Cape Town

Name of company (if applicable):

DECLARATION OF THE ENVIRONMENTAL ASSESSMENT PRACTITIONER (“EAP”)

2019/1116

I *Jeremy P. G.* EAP Registration number as the appointed EAP hereby declare/affirm the correctness of the:

- Information provided in this BAR and any other documents/reports submitted in support of this BAR;
- The inclusion of comments and inputs from stakeholders and I&APs;
- The inclusion of inputs and recommendations from the specialist reports where relevant; and
- Any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested and affected parties, and that:
- In terms of the general requirement to be independent:
 - other than fair remuneration for work performed in terms of this application, have no business, financial, personal or other interest in the activity or application and that there are no circumstances that may compromise my objectivity; or
 - ~~am not independent, but another EAP that meets the general requirements set out in Regulation 13 of NEMA EIA Regulations has been appointed to review my work (Note: a declaration by the review EAP must be submitted);~~
- In terms of the remainder of the general requirements for an EAP, am fully aware of and meet all of the requirements and that failure to comply with any the requirements may result in disqualification;
- I have disclosed, to the Applicant, the specialist (if any), the Competent Authority and registered interested and affected parties, all material information that have or may have the potential to influence the decision of the Competent Authority or the objectivity of any report, plan or document prepared or to be prepared as part of this application;
- I have ensured that information containing all relevant facts in respect of the application was distributed or was made available to registered interested and affected parties and that participation will be facilitated in such a manner that all interested and affected parties were provided with a reasonable opportunity to participate and to provide comments;
- I have ensured that the comments of all interested and affected parties were considered, recorded, responded to and submitted to the Competent Authority in respect of this application;
- I have ensured the inclusion of inputs and recommendations from the specialist reports in respect of the application, where relevant;
- I have kept a register of all interested and affected parties that participated in the public participation process; and
- I am aware that a false declaration is an offence in terms of Regulation 48 of the NEMA EIA Regulations;

Jeremy P. G.
Signature of the EAP:

29 January 2026
Date:

Infinity Environmental (Pty) Ltd
Name of company (if applicable):

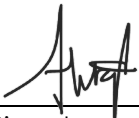
DECLARATION OF THE SPECIALIST

Note: Duplicate this section where there is more than one specialist.

Amy Wright

I , as the appointed Specialist hereby declare/affirm the correctness of the information provided or to be provided as part of the application, and that:

- In terms of the general requirement to be independent:
 - other than fair remuneration for work performed in terms of this application, have no business, financial, personal or other interest in the development proposal or application and that there are no circumstances that may compromise my objectivity; or
 - am not independent, but another specialist (the "Review Specialist") that meets the general requirements set out in Regulation 13 of the NEMA EIA Regulations has been appointed to review my work (Note: a declaration by the review specialist must be submitted);
- In terms of the remainder of the general requirements for a specialist, have throughout this EIA process met all of the requirements;
- I have disclosed to the applicant, the EAP, the Review EAP (if applicable), the Department and I&APs all material information that has or may have the potential to influence the decision of the Department or the objectivity of any Report, plan or document prepared or to be prepared as part of the application; and
- I am aware that a false declaration is an offence in terms of Regulation 48 of the EIA Regulations.



Signature

01 October 2025

Date:

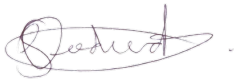
Anchor Environmental Consultants (Pty) Ltd

Name of company (if applicable):

DECLARATION OF The REVIEW SPECIALIST

I Gerhardus Diedericks....., as the appointed Review Specialist hereby declare/affirm that:

- I have reviewed all the work produced by the Specialist(s):
- I have reviewed the correctness of the specialist information provided as part of this Report;
- I meet all of the general requirements of specialists as set out in Regulation 13 of the NEMA EIA Regulations;
- I have disclosed to the applicant, the EAP, the review EAP (if applicable), the Specialist(s), the Department and I&APs, all material information that has or may have the potential to influence the decision of the Department or the objectivity of any Report, plan or document prepared as part of the application; and
- I am aware that a false declaration is an offence in terms of Regulation 48 of the NEMA EIA Regulations.



01 October 2025

Signature

Date:

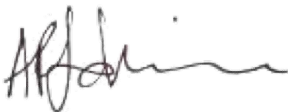
Stellenbosch University

Name of company (if applicable):

DECLARATION OF The REVIEW SPECIALIST

I Andrew Robert Jenkins, as the appointed Review Specialist hereby declare/affirm that:

- I have reviewed all the work produced by the Specialist(s);
- I have reviewed the correctness of the specialist information provided as part of this Report;
- I meet all of the general requirements of specialists as set out in Regulation 13 of the NEMA EIA Regulations;
- I have disclosed to the applicant, the EAP, the review EAP (if applicable), the Specialist(s), the Department and I&APs, all material information that has or may have the potential to influence the decision of the Department or the objectivity of any Report, plan or document prepared as part of the application; and
- I am aware that a false declaration is an offence in terms of Regulation 48 of the NEMA EIA Regulations.



Signature

09 October 2025

Date:

AVISENSE Africa (Pty) Ltd

Name of company (if applicable):