

Fremantle Ports Inner Harbour Maintenance Dredging

Dredging Environmental Management Plan Compliance Report - 2025



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Acknowledgement Of Country

In the spirit of reconciliation O2 Marine Pty Ltd acknowledge that this project is proposed on the lands of the Whadjuk/Noongar People. We pay our respects to Elders past, present and emerging and recognise their continuing connection to land, sea, culture and community.



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Acronyms and Abbreviations

Term	Full term
BCH	Benthic Communities and Habitat
CEMP	Construction Environmental Management Plan
DEMP	Dredging Environmental Management Plan
DPIRD	Department of Primary Industries and Regional Development
EC	Environmental Criteria
EPA	Environmental Protection Authority
EPO	Environmental Protection Outcome
EPOb	Environmental Protection Objective
EQG	Environmental Quality Guideline
IMS	Introduced Marine Species
MEQ	Marine Environmental Quality
MSO	Marine Species Observer
MT	Management Target
N/A	Not Applicable
NATA	National Association of Testing Authorities
NTU	Turbidity
O2M	O2 Marine
QA/QC	Quality Assurance/Quality Control
RIU	Remote Imagery Units
SWALS	South West Aboriginal Land Services
SWASP	State-Wide Array Surveillance Program
TED	Turtle Exclusion Device
TNTM	Temporary Notice to Mariners
TSS	Total Suspended Solid
WA	Western Australia
WAMSI	Western Australian Marine Science Institution
ZoI	Zone of Influence
ZoHI	Zone of High Influence
ZoMI	Zone of Moderate Influence





Executive Summary

Fremantle Ports completed maintenance dredging of the Inner Harbour in June 2025, removing 9,353m³ of sediments. This dredging campaign followed an earlier maintenance dredging campaign in April and May 2025, during which 55,514m³ of sediment was removed. The sediment had accumulated in the Inner Harbour from the Swan River estuary since the capital dredging was undertaken in 2010. Dredged sediments were disposed of at the Gage Roads offshore disposal site in compliance with a Sea Dumping Permit (permit number: SD2022-4043) issued by the Department of Climate Change, Energy, the Environment and Water.






To ensure adequate management of potential environmental risks, Fremantle Ports developed a Dredging Environmental Management Plan (DEMP) (BMT 2024) that required implementation prior, during, and post the dredging operation.

In May 2025, Fremantle Ports engaged O2 Marine to implement the DEMP monitoring campaign and provide a DEMP compliance report. A 'Traffic Light Assessment' approach, outlined in Table 1, was used to indicate compliance with the DEMP's Environmental Protection Outcomes (EPOs) and Environmental Protection Objectives (EPObs) and associated Environmental Criteria (EC) and Management Targets (MTs), respectively. The results of this 'Traffic Light Assessment' to indicate compliance of the EPO's are presented in Table 1.

Table 1: Traffic light assessment of environmental protection outcomes and objectives in the context of key and other environmental factors specified in the DEMP.

Environmental Factor	Environmental Protection Outcomes (EPOs) & Objectives (EPObs)	Monitoring result	EPO Achieved? ¹
Marine Environmental Quality	Water column turbidity EPO 1) Maintain water clarity to meet the EC at the boundary of Zone of Moderate Impact (ZoMI)/ Zone of Influence (ZoI) to minimise social impacts on aesthetic quality from increased water column turbidity associated with dredging activity	Water column turbidity was increased due to the dredging activity and returned to baseline levels 20 days after dredging was completed. However the EC for the Total Suspended Solid (TSS) and water clarity monitoring were met during and after dredging operations, therefore the EPO was considered to have been met.	
	Sediment contaminants EPO 2) Ensure dredge sediment quality of the Inner Harbour is maintained to prevent the release of potential new contaminants.	Sediment quality of the Inner Harbour in 2025 is similar to previous years and within Fremantle Ports Marine Quality Monitoring Program (MQMP) Environmental Quality Criteria, therefore sediment quality was maintained and the EPO was achieved.	
	Hydrocarbon spills and waste generation EPOb 1) No hydrocarbon spills or release of waste into the environment from dredging and disposal	No hydrocarbon spills or waste incidents occurred during dredging and disposal activities therefore the associated EPOb was achieved.	
Benthic communities and habitats	Direct loss EPOb 2) Ensure no permanent loss of BCH outside of the Zone of High Impact (ZoHI)	There was no dredging and disposal outside of the Native Vegetation Clearing Permit areas therefore the associated EPOb to ensure no permanent loss of BCH outside of approved areas was achieved.	

¹Green (■) symbols indicate Environmental Protection Outcomes and/or Environmental Protection Objectives were met; amber (■) symbols represent the Environmental Protection Outcomes are at risk and red (■) symbols represent a non-achievement of the Environmental Protection Outcome and/or Environmental Protection Objectives.

Environmental Factor	Environmental Protection Outcomes (EPOs) & Objectives (EPObs)	Monitoring result	EPO Achieved? ¹
Social Surroundings	Public and navigational safety EPOb 3) No public or navigational safety incidents from dredging and disposal.	No public or navigational safety incidents occurred during dredging and disposal activities. As a result, the associated EPOb was achieved.	
	Visual amenity, odour generation and noise EPOb 4) Minimise social impacts from potential reduced public amenity, odour generation or noise associated with dredging and sediment disposal.	No visual amenity, odour generation and noise complaints occurred during dredging and disposal activities therefore social impacts associated with visual amenity, odour and noise were minimised.	
	Aboriginal Heritage EPOb 5) Aboriginal stakeholder dredge monitoring recommendations are implemented.	Due to the implementation of Aboriginal stakeholder recommendations Aboriginal heritage values were maintained	
Marine Fauna	Introduced Marine Species (IMS) EPOb 6) No introduction of IMS to the Project site from the arrival of the dredge and any associated support vessels.	No IMS were introduced to the Project site from the arrival of the dredge therefore the associated EPOb was achieved	
	Collision / vessel strike and entrainment EPOb 7) No collision/vessel strike or entrainment with marine fauna from the operation of the dredge.	No marine fauna collision/vessel strike or entrainment incidents occurred during dredging and disposal activities. As a result, the associated EPOb 7) was achieved.	

¹ Green (■) symbols indicate Environmental Protection Outcomes and/or Environmental Protection Objectives were met; amber (■) symbols represent the Environmental Protection Outcomes are at risk and red (■) symbols represent a non-achievement of the Environmental Protection Outcome and/or Environmental Protection Objectives.

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1. Introduction

1.1. Background

Fremantle Ports undertook maintenance dredging between 23 and 27 June 2025, to remove sediments that have accumulated in the Inner Harbour from the Swan River estuary. Prior to this campaign, Fremantle Ports undertook maintenance dredging during April and May 2024 removing 55,514 m³ of sediments that had accumulated in the Inner Harbour since capital dredging was undertaken in 2010. Maintenance dredging aimed to return the Inner Harbour and Entrance Channel to design depth to ensure navigable safety for access to the harbour and berths, and berth loading capacity is maintained. In 2025, a total of 9,353 m³ of sediments were removed over the 5-day dredging campaign. Material from the 2024 and 2025 Inner Harbour dredging campaigns was disposed at the approved Gage Roads offshore disposal area.

1.2. Dredging Environmental Management Plan

1.2.1. Overview

A Dredging Environmental Management Plan (DEMP; BMT 2024) outlines the required monitoring and management of potential environmental impacts associated with the dredging project. The following environmental factors were considered to be at risk from the project (Section 1.5; BMT 2024):

- Marine environmental quality (key environmental factor)
- Benthic communities and habitats (key environmental factor)
- Social surrounds (key environmental factor)
- Marine fauna (other environmental factor).

Key environmental factors were assigned outcome-based provisions (Environment Protection Outcomes; EPOs) and associated environmental criteria (EC) to monitor and respond to impacts the project may have on the environmental factors at risk.

The DEMP also assigned management-based provisions (Environmental Protection Objectives; EPObs) and associated management targets to help mitigate against and enable monitoring of potential impacts the project may have on the environmental factors.

This report outlines the provisions undertaken to implement EPO1 (Marine Environmental Quality [MEQ]) and EPO3 (Benthic Communities and Habitat [BCH]). To ensure that MEQ and BCH were not impacted by dredging and disposal activities, spatially presented Zones of Influence (Zoi; as shown in Figure 1 and Figure 2) were established and EPOs were defined (BMT 2024).

The specific EPOs and EPObs assigned for the protection of environmental factors are presented in Table 6 and Table 7.

1.3. This Compliance Report

The primary purpose of this report is to present a summary of compliance against DEMP marine environmental requirements for monitoring of Marine environmental quality and Benthic communities and habitats, including the outcome-based and management-based provisions.

The secondary purpose of this report is to include a summary of the findings of marine water quality sampling associated with the implementation of the DEMP and provides an assessment of the results against the defined Environmental Criteria to ascertain whether the relevant Environmental Protection Outcomes (EPOs) have been achieved. The following monitoring was implemented to meet the requirements of the DEMP and facilitate assessment against the EPOs:

- In-water plume monitoring
- Water clarity monitoring, and
- Plume monitoring via drone aerial photography and remote imagery units installed within the Inner Harbour and dredge vessel.

In addition, documentation from the contractor, proponent and environmental consultant was verified to ensure the requirements of the DEMP were met and assess compliance against the management-based provisions.

2. Methods

2.1. Monitoring Locations and Frequency

The section below provides a synopsis of methods used during the DEMP implementation campaign and aligns with Section 2.3 of the DEMP (BMT 2024). The DEMP sampling program requirements are described in Table 2. The locations of the in-water monitoring are outlined in Table 3 and presented in Figure 1, Figure 2 and Figure 3. Field sheets from the sampling efforts are presented in Appendix C.

Sampling activities were conducted between 16 June to 17 July 2025, including:

- NTU/TSS relationship on 16 June 2025 (Sampling for defining the correlation (r^2) between turbidity (NTU) and total suspended solid (TSS));
- Pre-dredge baseline monitoring on 19 June 2025
- Dredge monitoring on 24 and 27 June 2025 (day 2 and day 5 of dredging);
- Post dredge monitoring on 4 and 17 July 2025 (7 days and 20 days after dredging was completed on 27 June).

Table 2: Summary of the 2025 field implementation program

Item	Duration	Sample sites & dates
In-water plume monitoring	NTU/TSS relationship: 10 sites sampled in triplicate as follows: <ul style="list-style-type: none"> • Spring tide incoming • Spring tide outgoing 	10 sites sampled on: <ul style="list-style-type: none"> • 16 June Spring incoming tide • 16 June Spring outgoing tide
	NTU Profiling: <ul style="list-style-type: none"> • Approximately 1 week prior to dredging. • During dredging (day 2, and day 5). • Approximately 1 week and 3 week post dredging. 	10 sites sampled during: <ul style="list-style-type: none"> • Pre-dredge monitoring on 19 June • Dredge monitoring on 24 and 27 June 2025 • Post dredge monitoring on 4 and 17 July 2025
Water clarity monitoring	<ul style="list-style-type: none"> • 1 week prior to dredging • During dredging (day 2 and day 5) • Approximately 1 week and 3 week post dredging. 	13 sites sampled during: <ul style="list-style-type: none"> • Pre-dredge monitoring on 19 June 2025. • Dredge monitoring on 24 and 27 June 2025 • Post dredge monitoring on 4 and 17 July 2025
Plume monitoring via remote imagery units (RIU)	<ul style="list-style-type: none"> • One RIU installed on the dredge vessel. • Image capture every 30 minutes. • Daily range between 0700-1900 hrs. 	One RIU was installed on the dredge vessel positioned on the bridge facing towards the vessel's stern. The RIU was in place from 23 June to 27 June 2025.
Plume monitoring via drone aerial photography	<ul style="list-style-type: none"> • Approximately 1 week prior to dredging. • During dredging (day 2 and day 5). • 1 week post dredging. 	The survey area was divided in to four zones (Figure 3): <ul style="list-style-type: none"> • Zone 1 (Entrance Channel of Inner Harbour to Fremantle Traffic Bridge). • Zone 2 (Fremantle Traffic Bridge to Aquarama Marina). • Zone 3 (Aquarama Marina to base of Point Walter sand bar). • Zone 4 (Base of Point Walter sand bar to Attadale Reserve). The surveys were undertaken on: <ul style="list-style-type: none"> • Pre-dredge monitoring on 20 June 2025. • Dredge monitoring on 24 and 27 June 2025 • Post dredge monitoring on 4 and 17 July 2025



Table 3: In-water sampling activities and locations (Coordinates are UTM50, GDA94)

Site ID	Easting	Northing	Impact / Reference / Recreational	Monitoring	
				In-water plume	Water clarity
<i>Disposal Area Sites</i>					
OS	375170.4994	6459810.374	Reference	✓	✓
DI1	374557.8980	6453989.735	Impact	✓	✓
DI2	375525.0489	6455931.233	Impact	✓	✓
<i>Down River Sites</i>					
RD	379701.5461	6448172.416	Reference	✓	✓
DR1	379188.6031	6452483.597	Impact	✓	✓
DR2	382137.6848	6454321.013	Impact	✓	✓
<i>Swan River Sites</i>					
SR	386126.708	6458010.061	Reference	✓	✓
SI1	383149.433	6455322.550	Impact	✓	✓
SI2	382534.649	6455918.438	Impact	✓	✓
SI3	383808.460	6456203.435	Impact	✓	✓
<i>Recreational Sites</i>					
SD1	383026.140	6455690.263	Recreational	-	✓
SD2	384518.791	6455818.484	Recreational	-	✓
SD3	381029.579	6452414.574	Recreational	-	✓
Total site numbers				10	13

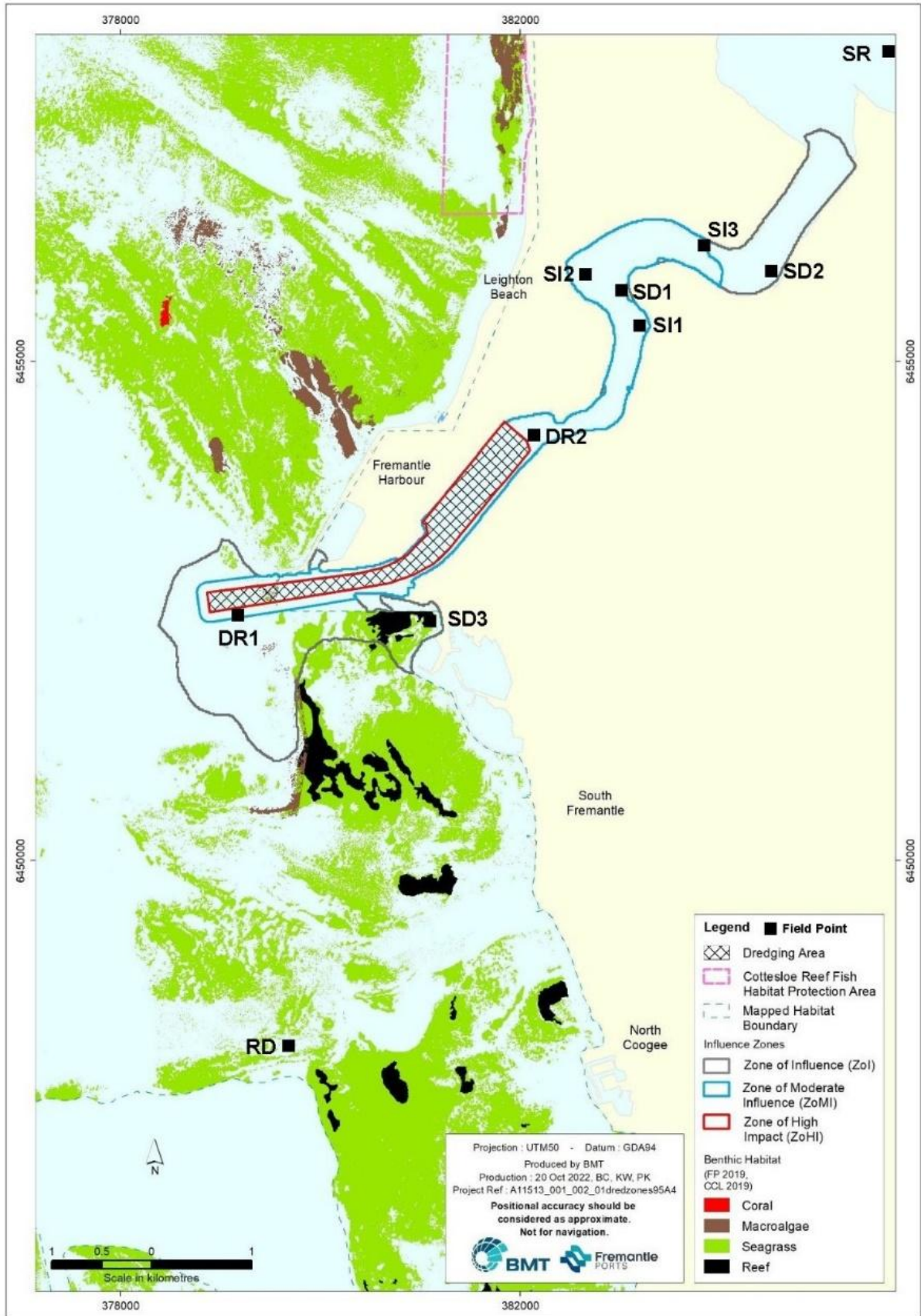


Figure 1: Marine water quality sampling locations – Down River, Swan River and Recreational sites (source: BMT 2024)

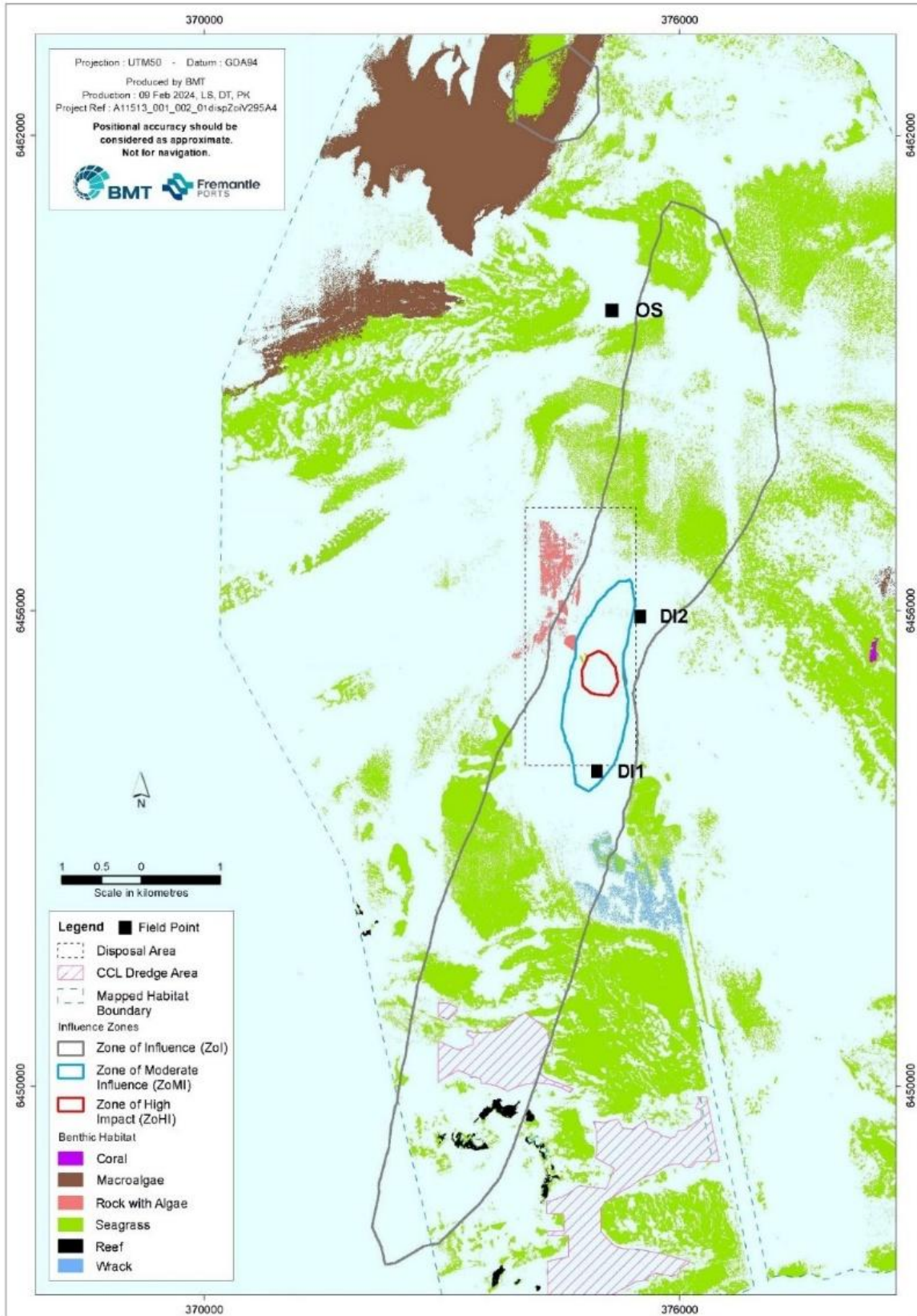


Figure 2: Marine water quality sampling locations – Disposal Area sites

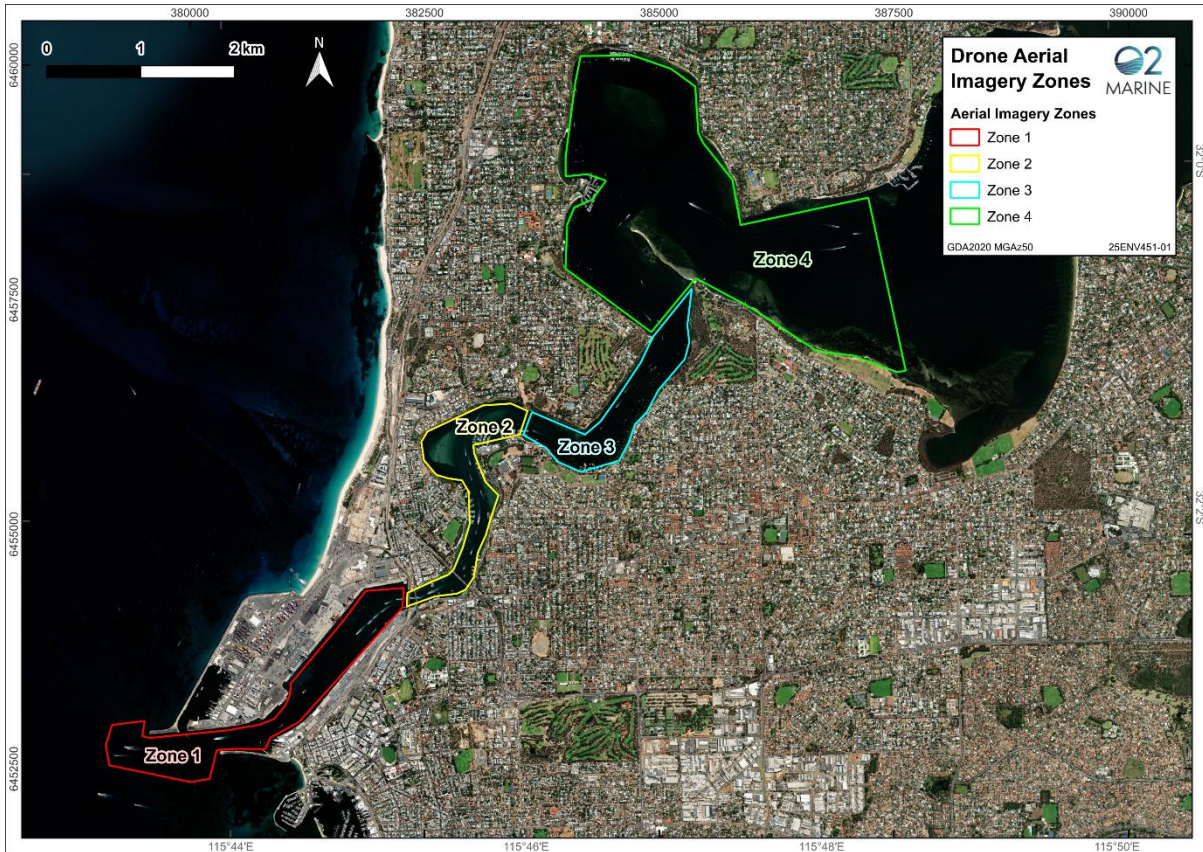


Figure 3: Drone aerial imagery Zones

2.2. Field Sampling

2.2.1. In-Water Plume Monitoring

2.2.1.1. NTU/TSS Relationship

NTU and TSS samples were concurrently collected at 10 representative locations (five in-river and five open ocean sites) using a YSI ProDSS logger and water pump. At each site, triplicate samples were collected for both parameters (~ 0.5 m below the water surface, mid water column, and ~ 0.5 m above the seabed) during both incoming and outgoing tide, resulting in a total of 60 paired TSS and NTU samples. TSS results are presented in Appendix D

To improve the representativeness of the NTU/TSS correlation coefficient (r^2), sampling data from 2024 and 2025 sampling events were pooled to inform the 2025 dredging campaign (the correlation coefficient for 2024 and 2025 was 0.84, relative to 0.77 in 2024 alone).

It is noted that in 2024, samples were stratified by tide type (spring and neap) and tide height (incoming and outgoing) to ensure suitability of the correlation to consider variability, particularly within the river mouth and estuary locations. In 2025, samples were only collected during spring tide conditions during incoming and outgoing tides; the differences in the sampling regime are not expected to confound the correlation coefficient.

2.2.1.2. NTU Profiling

Surface and seabed NTU was measured at all 10 in-water plume monitoring locations. At each of the 10 sample locations, monitoring involved lowering a YSI ProDSS multiparameter probe at a steady rate through the water column. This was completed three times at each location.

2.2.2. Water Clarity Monitoring

At each of the 13 sample locations a Secchi disk was lowered until the black quadrants were no longer visible, with the depth below surface recorded to the nearest 0.1 m in accordance with the DEMP (BMT 2024). Sampling was repeated three times at each location.

2.2.3. Remote imagery units

One remote imagery unit was installed at an elevated position on the dredge vessel. All images were time- and date- stamped and of a minimum resolution of 12 megapixels.

2.2.4. Drone aerial photography

A Civil Aviation Safety Authority Pilot and Unmanned Aerial Vehicle operator surveyed four zones extending from the Entrance Channel up to Point Walter. A series of images were collected along this extent to allow validation of the visible surface plume. At each site, the drone was flown upstream and downstream to capture imagery over the full extent of the river. Where possible, images were taken as close to high tide as possible to capture the worst-case plume dispersion.

2.3. Field QA/QC

Quality Assurance/Quality Control (QA/QC) field sampling requirements were conducted in accordance with the DEMP during all sampling activities, in summary:

- All equipment was serviced, calibrated, maintained and inspected by O2M affiliate company O2M Technautics prior to field surveys;
- All equipment was configured to the specifications required for the implementation of the DEMP;
- Competent and trained personnel attended all field survey campaigns; and
- Instrument set up following manufacturer's recommendations and project specific requirements.

2.4. Data QA/QC

2.4.1. In-water plume monitoring

All raw data collected from the YSI ProDSS multiparameter probe were subject to the standard O2M data processing QA/QC procedures. The procedures apply a tiered approach to QC and include:

1. Removal of irrelevant data from datasets (e.g. data that were not collected at the monitoring site, for example just prior or after instrument deployment or retrieval, respectively, when instruments are on the monitoring vessel).
2. Manual determination by a specialist if any abnormal data (visual inspection).

2.5. Laboratory Analysis

All laboratory analyses were completed at the Marine and Freshwater Research Laboratory and in accordance with the relevant National Association of Testing Authorities (NATA) accreditation (Appendix D).

2.6. Data Analysis

2.6.1. In-Water Plume Monitoring

To develop the correlation between NTU and TSS, triplicate water samples were collected and laboratory analysed from 10 sites (five in-river and five open ocean sites representative of the DEMP monitoring sites) and used to derive the correlation coefficient, further described in Section 3.1.1.

During the NTU profiling sampling program, the median from surface readings and the median from bottom readings was converted from NTU to TSS using the derived correlation. Once converted to TSS, the median value was then be compared to the EC presented in the DEMP and summarised below:

- Surface or bottom TSS (mg/L) at any individual impact site is 10 mg/L above the reference site data on the dredging activity sampling occasion.

Post dredge monitoring of TSS was compared to background data to determine if plumes were still 'evident' after the completion of dredging. Post dredge monitoring results were compared directly with the EC presented in the DEMP, summarised below:

- Post plume monitoring - Plumes are considered 'evident' if TSS has not returned to <80th percentile of background data for the site (or to reference levels).²

2.6.2. Water Clarity Monitoring

Secchi disk depths were compared directly with the environmental criteria presented in the DEMP, as summarised below:

- Median Secchi depth from Impact sites must not be reduced by 20% (equivalent to the Environmental Protection Authority [EPA 2017] water clarity Environmental Quality Guideline [EQG] for the maintenance of aesthetic quality) during the sampling occasion; *and*
- Median Secchi depth from Recreation sites must not be <1.6 m (equivalent to the EPA [2017] water clarity EQG for the maintenance of primary contact recreation).

2.6.3. Remote Imagery Units Monitoring and Drone Aerial Photography

There were no specific requirements for data analysis tied to management actions for RIU and Drone Aerial Photography sampling programs. However, in the event of an exceedance as detailed above, RIU and Drone Imagery data was utilized for causal determination of whether the reported exceedances were a result of dredging activities. Drone aerial imagery, and RIU imagery have been provided in Appendix A and Appendix B.

² 80th percentiles were calculated by pooling the raw data from 2024 and 2025 at each sample site into the pre-determined site groupings (Table 3).

3. Results

3.1. In-Water Plume Monitoring

3.1.1. NTU to TSS correlation

The NTU to TSS correlation equation was deemed sufficient to calculate TSS from NTU and is as follows:

$$y=2.5157x, r^2=0.84$$

Where $y=TSS$ and $x=NTU$

3.1.2. TSS

The median TSS value (i.e. correlated from NTU) for surface and bottom waters, at each site, on each day of sampling during the operational period was compared to the threshold values and are presented in Table 4. Samples from site SR were not collected during pre-dredging due to equipment malfunction. Pre-dredging data of site SR from 2024 is provided as reference. The threshold values are defined as 10 mg/L above the reference site data on the dredging activity sampling occasion. The EC is considered achieved if TSS concentrations at impact sites were lower than the corresponding threshold values.

TSS results from all samples collected over the two sampling days were below the threshold values. As a result, the EC is considered to have been achieved. Samples from site SI3 were not collected on day 2 due to equipment malfunction, which rendered the readings unusable.

Post dredge monitoring was undertaken after the completion of the dredging operation to determine if there was any evidence of a plume. During the first post dredge monitoring occasion on 4 July 2025, TSS concentrations were above the 80th percentile of background data at all impact and reference sites. Further monitoring conducted on 17 July 2025 showed that TSS concentrations at all sites were below the 80th percentile of the background data.

Table 4: Summary of TSS trigger levels for Impact sites

Site ID	Surface						Bottom					
	Pre-dredging	80th percentile	Day 2	Day 5	Post-dredging	Post-dredging	Pre-dredging	80th percentile	Day 2	Day 5	Post-dredging	Post-dredging
Date			24/6	27/6	4/7	17/7			24/6	27/6	4/7	17/7
EC: Surface or bottom TSS (mg/L) at any individual impact site is 10 mg/L above the reference site data on the dredging activity sampling occasion												
Disposal Area Sites												
<i>Reference site (Threshold = Reference site + 10 mg/L)</i>												
OS	1.26	1.28	5.20	14.04	4.43	0.64	2.86	2.94	15.69	14.21	4.56	0.64
Threshold	n/a	n/a	15.20	24.04	n/a	n/a	n/a	n/a	25.69	24.21	n/a	n/a
Impact Sites												
DI1	2.37	2.32	3.29	14.02	5.04	1.03	4.24	5.01	7.62	19.6	7.07	1.14
DI2	2.02	2.06	3.16	13.94	5.00	0.34	4.45	4.7	6.57	19.1	5.60	0.76
Swan River Sites												
<i>Reference site (Threshold = Reference site + 10 mg/L)</i>												
SR	1.30	1.43	3.89	15.25	5.23	1.21	2.89	3.43	4.84	16.33	7.99	2.19
Threshold	n/a	n/a	13.89	25.25	n/a	n/a	n/a	n/a	14.84	26.33	n/a	n/a
Impact Sites												
DR2	2.31	2.31	4.09	15.69	5.29	0.96	2.44	2.49	4.47	15.25	5.98	2.41
SI1	2.26	2.30	3.69	14.96	5.20	0.54	2.34	2.39	4.48	15.00	5.56	0.74
SI2	2.22	2.26	3.94	15.12	5.10	0.52	2.17	2.21	3.75	15.24	5.61	0.51
SI3	2.44	2.42	Null	14.93	4.89	0.61	2.61	2.72	Null	14.94	5.57	0.57
Down River Sites												
<i>Reference site (Threshold = Reference site + 10 mg/L)</i>												
RD	3.51	3.51	3.06	14.87	5.57	1.91	3.92	4.08	3.68	14.89	5.80	2.39
Threshold	n/a	n/a	13.06	24.87	n/a	n/a	n/a	n/a	13.68	24.89	n/a	n/a
Impact Site												
DR1	2.74	2.88	4.49	14.88	5.19	0.96	5.34	5.64	10.21	15.37	6.99	1.45

- Coloured cells indicate exceedances of the Environmental Criteria. Post dredging exceedances are only determined from an exceedance of the 80th percentile from pre-dredging baseline measurement from the same site.
- 80th percentiles were calculated by pooling the raw data from pre-dredge sampling in 2024 (8 April 2024) and 2025 (19 June 2025) at each sample site into the pre-determined site groupings (Table 3).
- Samples from site SR were not collected during pre-dredging due to equipment malfunction. Pre-dredging data from 2024 is provided as reference.

3.2. Water Clarity Monitoring

The median Secchi disk data from pre-dredge sampling in 2024 and 2025 was used to calculate a 20% reduction threshold value to compare against the 2025 monitoring results during the dredging period for Impact sites. To achieve the EC, Secchi disk measurements recorded during the operational sampling period (or post-dredging period) for Impact sites were required to be 20% less than the baseline data from each respective site, while Secchi disk measurements recorded at recreational sites must be greater than 1.6 m. Secchi disk results reported for Impact and Recreational sites are presented in Table 5. In summary:

- Sites DR1 and DR2 reported EQG exceedances on day 2 of monitoring, likely as a result of dredging and disposal operations.
- Site DI2 reported EQG exceedances on day 2 of monitoring; however, as exceedances were also observed at the reference site OS, this exceedance was considered to be due to natural variability as opposed to dredging and disposal operations.
- Site DI2 exceeded the EQG during post dredge sampling on 4 July, where exceedances were not observed at the reference site OS. It is unknown what caused this event however, potentially this may be the result of localised turbidity resulting from shipping or tug vessel operations.
- Site DI2 reported exceedances of the EQG during post-dredging sampling on 17 July, however, as exceedances were also observed at the reference site OS, this exceedance was considered to be due to natural variability as opposed to residual effects of dredging and disposal operations.
- Site DR1 exceeded the EQG during post dredge sampling on 4 July, where exceedances were not observed at the reference site OS. Although Secchi depth guideline values were not exceeded, depth/turbidity observations were the same at sites DR1 and the reference location.
- Site DR1 reported an exceedance of the EQG during post-dredging sampling on 17 July, where the relevant reference location (OS) did not exceed the guideline value. It is unknown what caused this event however, potentially this may be the result of localised turbidity resulting from shipping or tug vessel operations.
- At several sites, shallow water depth constrained the ability to accurately assess water clarity, thereby limiting the comparability of results against the EQG.
- Water clarity EQG were met for all recreational sites on all monitoring occasions, therefore the EC for water clarity was met.

Table 5: Secchi disk trigger values for Impact sites

Site ID	Impact / Reference / Recreational	2024 – 2025 Median Baseline Value (2025 Median Pre-dredging)	Thresholds: Impact sites: 20% of 2024 - 25 Median Baseline Value Recreational sites: <1.6m	Median			
				Day 2 24 June	Day 5 27 June	Post-dredging 4 July	Post-dredging 17 July
EC		<i>Median Secchi depth from Impact sites must not be reduced by 20% during the sampling occasion AND Median Secchi depth from Recreational sites must not be <1.6m</i>					
Disposal Area Sites							
DI1	Impact	7.1 (5.5)	5.6	7.6	7.5	7.0	6.0
DI2	Impact	9.5 (8.0)	7.6	7.5	8.3	7.0	5.0
OS	Reference	10 (9.8)	n/a (8.0)	5.7	6.3	8.0	5.0
Down River Sites							
DR1	Impact	7.4 (5.0)	5.9	5.1	6.3	5.0	5.0
RD	Reference	4.9 (4.4)	n/a (3.9)	4.9	5.0	5.0	6.0
SD3	Recreational	n/a (3.4)	1.6	2.5	4.6	5.0	1.9
Swan River Sites							
DR2	Impact	5.9 (5.3)	4.7	3.5	5.6	5.0	6.0
SI1	Impact	5.4 (5.4)	4.3	>3.1	>5.5	>2.0	>2.0
SI2	Impact	2.9 (3.0)	2.3	>2.7	>3.0	3.5	>3.2
SI3	Impact	4.2 (4.8)	3.3	>3	>3.4	4.5	6.0
SR	Reference	4.7 (3.8)	n/a (3.7)	4.8	3.9	4.0	5.0
SD1	Recreational	n/a (5.0)	1.6	>5.5	5.0	5.0	>5.9
SD2	Recreational	n/a (4.8)	1.6	4.9	5.7	4.0	>4.2

- A coloured cell indicates an exceedance of the EQG, where values have been highlighted bold these EQG exceedances represent an exceedance of the EC.
- The symbol '>' indicates that the Secchi disk reached the bottom during measurement and hence the recorded value represents the water depth, thereby limiting the comparability of results against the EQG
- Reference sites are provided for informative purposes only and not to be used to assess against the EC. Please refer to Section 6.4 for a discussion of Reference Site data.
- The median Secchi disk data from pre-dredge sampling in 2024 (8 April 2024) and 2025 (19 June 2025) was used to calculate a 20% reduction threshold value to compare against the 2025 monitoring results during the dredging period for Impact sites.

3.3. Remote Imagery Units and Drone Aerial Photography

RIUs (Appendix B) and drone aerial photography (Appendix A) was used to assess whether the exceedances from the in-water plume and water clarity monitoring may be associated with a sediment plume created by dredging activity. To understand the spatial extent of the dredge plume, the drone surveyed four zones within the Swan River as presented in Appendix A. Drone aerial photographs from Zones 1–4 taken during and post dredging (Appendix A, Figure 5 –7) were compared with pre-dredging photographs from the same zones (Appendix A, Figure 4) to provide a visual assessment of potential impacts on marine environmental quality and to support interpretation of TSS and water clarity results obtained during dredging and disposal operations.

On day 2 of dredging, plumes were observed in the Inner Harbour (Appendix A, Figure 4, Zone 1) and extended to the Entrance Channel. The plumes appeared to be contributed by a large outbound vessel. No sediment plumes were observed in post dredge monitoring on 4 July (Appendix A, Figure 7, all Zones). Post dredge drone imagery was not collected on the 17 July as plumes were not observed during sampling on the 4 July, and exceedances reported on this occasion were considered to represent natural variability in weather conditions.

It is important to note that these images are not used to confirm the extent and severity of the plume and are intended as an informal assessment and discussion point only.

4. Compliance Assessment of Outcome-based Provisions

Table 6 presents an assessment against the outcome-based provisions based on the summary of results.

Table 6: Compliance assessment of Outcome-based provisions for the Inner Harbour DEMP

Environmental Factor	Environmental Protection Outcome (EPO)	Environmental Criteria (EC)	Response	Monitoring	Reporting
Marine Environmental Quality (increased water column turbidity)	EPO 1) Maintain water clarity to meet the environmental criteria at the boundary of ZoMI/ZoI to minimise social impacts on aesthetic quality from increased water column turbidity associated with dredging activity	<i>EC: Surface or bottom TSS (mg/L) at any individual impact site is 10 mg/L above the reference site data on the dredging activity sampling occasion.</i> EC was achieved during the operation period at all sites.	No exceedances of the EC occurred during operations therefore no response was required.	TSS monitoring occurred prior to, during, and post dredging.	This report, refer Section 3.1
		<i>EC: Median Secchi depth from Impact sites must not be reduced by 20% during the sampling occasion.</i> The EC was not achieved at sites DR1 (on Day 2, Day 5 and post dredging – 17 July) and DR2 (on day 2), where the Secchi disk exceedances were considered to be attributed to the dredging operation. Exceedances also occurred at sites DI2 (day 2 and post dredging – 4 and 17 July). DI2 values only reported a slight	EC were generally met, or were considered to be natural. Exceedances reported during dredging on day 2 were in line with expectations due to the sites close proximity to predicted area of dredging impact and only slightly exceeded the EC. No TSS exceedances were reported at these sites on this occasion. No response was taken due to the low level of impact.	Water clarity monitoring occurred prior to, during and post dredging. Remote imagery units were installed on the dredge vessel, site photographs, plume sketches and drone aerial photography were completed to monitor sediment plumes.	This report, refer Section 3.2

Environmental Factor	Environmental Protection Outcome (EPO)	Environmental Criteria (EC)	Response	Monitoring	Reporting
		<p>decline while the reference site (Site OS) reported similar values. The decline was therefore considered to be natural.</p> <p>At several sites, shallow water depth constrained the ability to accurately assess water clarity, thereby limiting the comparability of results against the EQG.</p>			
		<p><i>EC: Median Secchi depth from Recreation sites must not be <1.6 m (equivalent to the EPA [2017] water clarity EQG for the maintenance of primary contact recreation).</i></p> <p>No exceedances of the EC occurred.</p>	No exceedances of the EC occurred during operations therefore no response was required.	Water clarity monitoring occurred at recreational sites prior to, during and post dredging.	This report, refer Section 3.2
Marine Environmental Quality (increased sediment contaminants)	EPO 2) Ensure dredge sediment quality of the Inner Harbour is maintained to prevent the release of	<p><i>EC: Sediments of Inner Harbour sites sampled as part of the annual Marine Quality Monitoring Program (MQMP) are within Environmental Quality Criteria. The sediments are tested for nitrogen, phosphorus, heavy metals, tributyltin, hydrocarbons and organochlorine pesticides. The Environmental Quality Criteria adopted for review of the</i></p>	Sediment physical and chemical characteristics were similar to previous years and were within the MQMP Environmental Quality Criteria therefore no response was required.	Sediment quality monitoring completed in March 2025 in line with Fremantle Ports 2025 MQMP.	2025 MQMP Report (O2M 2025a) Fremantle Ports Record 2105642

Environmental Factor	Environmental Protection Outcome (EPO)	Environmental Criteria (EC)	Response	Monitoring	Reporting
	potential new contaminants.	<p><i>sediment results are the same as implemented for the MQMP.</i></p> <p>The EC was met as the sediments were similar to previous years monitoring and within Environmental Quality Criteria.</p>			

5. Compliance Assessment of Management-based Provisions

Table 7 presents an assessment against the management-based provisions based on the verification of evidence.

Table 7: Compliance assessment of management-based provisions for the Inner Harbour DEMP

Environmental Factor	Environmental Protection Objective (EPOb)	Management Target	Management Action	Monitoring Action	Reporting
Marine Environmental Quality (Hydrocarbon spills and waste generation)	EPOb 1) No hydrocarbon spills or release of waste into the environment from dredging and disposal	<p><i>MT: No reported hydrocarbon spills or release of waste into the environment from dredging and disposal</i></p> <p>No hydrocarbon spills or waste incidents occurred during dredging and disposal operations.</p>	A clean and tidy work area was observed with all hazardous substances safely stored.	A weekly inspection was undertaken on Day 3 (25 June 2025)	Inspection records verified Fremantle Ports Record 2101296
			Fuels and oils were stored in contained areas and fuelling occurred within a bunded area.	A weekly inspection was undertaken on Day 3 (25 June 2025)	Inspection records verified Fremantle Ports Record 2101296
			A mobile spill kit was observed on the dredge with all necessary materials for mitigating an accidental hydrocarbon spill.	A weekly inspection was undertaken on Day 3 (25 June 2025)	Inspection records verified Fremantle Ports Record 2101296
			The Contractor prepared a Construction Environmental Management Plan (CEMP) that includes oil spill contingency procedures to be implemented in the event of an accidental hydrocarbon spill.	Review of the CEMP provided by the Contractor verified inclusion of oil spill contingency procedures in section 5.3 Hydrocarbon spills and waste generation.	CEMP verified Fremantle Ports Record 2099403

Environmental Factor	Environmental Protection Objective (EPOb)	Management Target	Management Action	Monitoring Action	Reporting
			<p>All work areas observed were clear of waste/rubbish. On shift change waste bins were situated on the berth to receive waste collected from the dredge operation.</p> <p>The Modi R dredge vessel obtained a green light from the Department of Primary Industries and Regional Development (DPIRD) risk assessment tool prior to mobilising to site from an interstate or international location (pers. comm. RN dredging) however the DPIRD Vessel check system has been closed therefore records cannot be retrieved.</p>	<p>A weekly inspection was undertaken on Day 3 (25 June 2025)</p> <p>Modi R hull was inspected and clear of Invasive Marine Species in February 2023, prior to returning to Australia from Singapore.</p>	<p>Inspection records verified Fremantle Ports Record 2101296</p> <p>Modi R hull inspection records February 2023 and DPIRD vessel check system green light confirmation (pers comm RN dredging) Fremantle Ports Records 2099406 & 2099407</p>
Benthic communities and habitat (direct loss)	EPOb 2) Ensure no permanent loss of BCH outside of the zone of high impact (ZoHI)	<p><i>MT: No dredging and sediment disposal outside of the defined areas of the Native Vegetation Clearing Permit (NVCP) and Sea Dumping Permit (SDP) areas.</i></p> <p>No dredging or disposal of sediment occurred</p>	The dredge will have an accurate positioning system installed and the position of the dredge will be monitored during dredging operations.	The dredge position data was provided to Fremantle Ports in daily reports. The dredge track logs were provided to Fremantle Ports on completion of the project.	<p>Daily reports verified Fremantle Ports Records 2101200 to 2101204</p> <p>Dredge position data verified Fremantle Ports Records 2122181 & 2122963</p>

Environmental Factor	Environmental Protection Objective (EPOb)	Management Target	Management Action	Monitoring Action	Reporting
		outside of the NVCP or SDP therefore the MT was met.	Disposal position logs including details of the timing and position will be maintained.	The disposal position logs including details of the timing and position was provided to Fremantle Ports in daily reports.	Daily reports verified Fremantle Ports Records 2101200 to 2101204 Disposal position data verified Fremantle Ports Record 2102041
			The green valve was observed to be fitted to the dredge and in operation during 30-minute overflow periods of dredging.	A weekly inspection was undertaken on Day 3 (25 June 2025)	Inspection records verified Fremantle Ports Record 2101296
			A targeted disposal area was provided to the Contractor. The targeted disposal area was positioned within the Native Vegetation Clearing Permit (NVCP) and the Sea Dumping Permit (SDP) areas.	The disposal position logs provided by the Contractor were mapped and all logs were within the target disposal area (and therefore within the NVCP and SDP areas).	Disposal position logs map verified Fremantle Ports Record 2102041
			Dredging of the Inner Harbour was undertaken from 23 June 2025 to 27 June (5 days) within the dredging window (1 April to 31 August).	Dredging was undertaken from 23 to 27 June 2025 (5 days). Dredging was completed within the	Daily reports verified Fremantle Ports Records 2101200 to 2101204

Environmental Factor	Environmental Protection Objective (EPOb)	Management Target	Management Action	Monitoring Action	Reporting
				dredging window (1 April to 31 August).	
Social surroundings (public and navigational safety)	EPOb 3) No public or navigational safety incidents from dredging and disposal	<p><i>MT: Any / all reported community concerns about a potential safety hazard, near miss, or incident as a result of public or navigational safety issues associated with dredging and disposal are addressed in-line with the Communications Plan.</i></p> <p>No community concerns were raised during the dredging operation therefore the MT was met.</p>	A public complaints register was developed and maintained during the dredging operation.	No public complaints were received during the dredging operation related to dredging or disposal activities.	Fremantle Ports CGR incident and feedback database records verified.
			A Temporary Notice to Mariners (TNTM) from DoT's Marine Safety Branch was obtained prior to the commencement of works to inform the public of potential navigational hazards associated with dredging and disposal.	Review of the Navigation Warning (i.e. TNTM) published on DoT's website was completed once-off prior to the commencement of dredging operations.	Inner Harbour Maintenance Dredging Communications Plan Fremantle Ports Record 1898201. Navigation Warning Fremantle Ports Record 2091143.
			The dredge and associated support vessels were fitted with the appropriate marine safety equipment, markers and lighting to the satisfaction of Fremantle Ports' Harbour Master.	A weekly inspection was undertaken on Day 3 (25 June 2025)	Inspection records verified Fremantle Ports Record 2101296

Environmental Factor	Environmental Protection Objective (EPOb)	Management Target	Management Action	Monitoring Action	Reporting
			The Contractor complied with the relevant requirements in Fremantle Ports' Port Information Guide (Fremantle Ports 2018) while operating in Fremantle Ports' limits.	A weekly inspection was undertaken on Day 3 (25 June 2025)	Inspection records verified Fremantle Ports Record 2101296
Social surroundings (reduced visual amenity, odour generation and noise)	EPOb 4) Minimise social impacts from potential reduced public amenity, odour generation or noise associated with dredging and sediment disposal	<p><i>MT: Any / all community concerns raised in relation to reduced public amenity, odour generation or noise associated with dredging and sediment disposal are addressed in-line with the Communications Plan.</i></p> <p>No community concerns were raised during the dredging operation therefore the MT was met.</p>	A public complaints register was developed and maintained during the dredging operation.	No public complaints were received during the dredging operation related to dredging or disposal activities.	Fremantle Ports CGR incident and feedback database records verified.
			Change management provisions were not required as there were no public complaints received during the dredging operation.	No public complaints were received during the dredging operation related to dredging or disposal activities.	Fremantle Ports CGR incident and feedback database records verified.
			The Contractor's CEMP includes noise management controls.	Review of the CEMP provided by the Contractor verified inclusion of noise management in section 5.8 Reduced Visual Amenity, Odour Generation and Noise.	CEMP verified Fremantle Ports Record 2099403

Environmental Factor	Environmental Protection Objective (EPOb)	Management Target	Management Action	Monitoring Action	Reporting
			The Contractor's CEMP includes noise mitigation measures including maintenance, inspection and operation of the dredge and any associated support vessels and equipment.	Review of the CEMP provided by the Contractor verified inclusion of noise mitigation measures in section 5.8 Reduced Visual Amenity, Odour Generation and Noise.	CEMP verified Fremantle Ports Record 2099403
			The Contractor's CEMP includes plume, odour and noise contingency procedures to be implemented in response to a community complaint to minimise social impacts associated with reduced public amenity.	Review of the CEMP provided by the Contractor verified inclusion of contingency procedures to be implemented for reduced visual amenity, odour generation and noise in section 5.8. No public complaints were received during the dredging operation related to dredging or disposal activities.	CEMP verified Fremantle Ports Record 2099403 Fremantle Ports CGR incident and feedback database records verified

Environmental Factor	Environmental Protection Objective (EPOb)	Management Target	Management Action	Monitoring Action	Reporting
Social surroundings (disturbance to Aboriginal heritage)	EPOb 5) Aboriginal stakeholder dredge monitoring recommendations are implemented	<p><i>MT: Aboriginal representative's dredge monitoring recommendations are implemented in-line with stakeholder consultation as documented in the Communications Plan.</i></p> <p>The dredge monitoring recommendations were implemented therefore the MT was met.</p>	A Whadjuk Aboriginal representative undertook a smoking ceremony adjacent to the dredge vessel prior to commencing dredging works in 2024.	Not applicable to the 2025 dredging campaign.	Not applicable to the 2025 dredging campaign.
			A Whadjuk Aboriginal Monitor undertook dredge works monitoring onboard the dredge throughout the operation (during daylight hours).	A Whadjuk Aboriginal Monitor monitored the dredge works during dredging operations (during daylight hours) from 24 to 27 June 2025	<p>South West Aboriginal Land Services (SWALS) formally appointed by WAC to manage all operational matters relating to heritage, monitoring, and cultural engagement.</p> <p>Fremantle Ports Records 2122183 & 2122182</p> <p>Verified by payment forms to SWALS.</p> <p>Fremantle Ports Records 2122961</p> <p>Inner Harbour Maintenance Dredging Communications Plan</p> <p>Fremantle Ports Record 1898201.</p>

Environmental Factor	Environmental Protection Objective (EPOb)	Management Target	Management Action	Monitoring Action	Reporting
			A Whadjuk Aboriginal Monitor undertook dredge plume monitoring onboard the scientific vessel during in-water monitoring events.	A Whadjuk Aboriginal Monitor monitored the dredge plume during in-water monitoring events on three occasions during the dredging operations. Although planned a Whadjuk Aboriginal Monitor did not undertake pre-dredge plume monitoring due to delays in onboarding Whadjuk Aboriginal Corporation's service provider (SWALS) nor undertake post dredge monitoring as SWALS did not provide a monitor on the requested date.	SWALS formally appointed by WAC to manage all operational matters relating to heritage, monitoring, and cultural engagement. Fremantle Ports Records 2122183 & 2122182 Verified by payment forms to SWALS. Fremantle Ports Records 2122961 Inner Harbour Maintenance Dredging Communications Plan Fremantle Ports Record 1898201.
Marine Fauna (Introduced)	EPOb 6) No introduction of IMS to the project	<i>MT: No reported observations of IMS on the dredge and any associated</i>	The Modi R dredge vessel obtained a green light from the Department of Primary Industries and Regional Development	Modi R hull was inspected and clear of Invasive Marine	Modi R hull inspection records February 2023 and DPIRD vessel check system green

Environmental Factor	Environmental Protection Objective (EPOb)	Management Target	Management Action	Monitoring Action	Reporting
Marine Species (IMS)	site from the arrival of the dredge and any associated support vessels.	<i>support vessels at the Project site</i>	(DPIRD) risk assessment tool prior to mobilising to site from an interstate or international location (pers. comm. RN dredging) however the DPIRD Vessel check system has been closed therefore records cannot be retrieved.	Species in February 2023, prior to returning to Australia from Singapore.	light confirmation (pers comm RN dredging) Fremantle Ports Records 2099406 & 2099407
		No IMS were observed on the dredge vessel or support vessels therefore the MT was met.	The Modi R dredge was mobilised to Fremantle from Fremantle and has remained in WA waters (traveling only to Bunbury from Fremantle return) since its arrival from Singapore in February 2023.	Modi R was imported to Australia in February 2023. Modi R has since worked in Bunbury and Fremantle and was mobilised from February for the project. (pers. comms. RN Dredging)	Modi R's location in WA waters Fremantle Ports Record 2099407
		<i>MT: No new IMS identified at the Project site attributed to the project</i>	No new IMS were identified at the Project site that were attributed to the dredging project therefore the MT was met.	No new IMS were identified in the Inner Harbour therefore no management action was required.	The State-Wide Array Surveillance Program (SWASP) was implemented Winter 2025.

Environmental Factor	Environmental Protection Objective (EPOb)	Management Target	Management Action	Monitoring Action	Reporting
Marine Fauna (marine fauna collision/ vessel strike or entrainment)	EPOb 7) No collision/ vessel strike or entrainment with marine fauna from the operation of the dredge.	<p><i>MT: No reported collision/vessel strike or entrainment incidents with marine fauna from the operation of the dredge</i></p> <p>No marine fauna collision/vessel strikes or entrainment incidents occurred during the dredging operation therefore the MT was met.</p>	<p>a) Vessel Masters responsible for operating the dredge were suitably trained to understand marine fauna behaviours, actions and reporting requirements in the event of marine fauna injury or mortality and provisions under Environmental Protection and Biodiversity Conservation Regulations Part 8 Division 8.1:Interacting with cetaceans.</p> <p>b) Turtle Exclusion Device (TED) was fitted to the Dredge vessel.</p> <p>c) No marine fauna collision/vessel strike or entrainment incidents occurred in relation to the operation of the dredge.</p>	<p>a) Training was undertaken by RN dredging by delivering the Marine Species Observer (MSO) general training module to the Vessel Masters on 27 April 2025 & 1 May 2025. MSO refresher training was delivered to the Vessel Masters by O2M on 24 June 2025.</p> <p>b) The TED was observed to be fitted to the dredge prior to dredge operations commencing and during operation the TED was observed in weekly inspections completed on Day 3 (25 June 2025).</p>	<p>a) Marine Species Observer Program 2025 Report (O2M 2025b)</p> <p>Fremantle Ports Record 2101256.</p> <p>RN dredging training records Fremantle Ports Records 2099404 & 2099405</p> <p>b) Inspection records verified Fremantle Ports Record 2101296.</p> <p>c) Fremantle Ports CGR incident and feedback database records verified.</p>

Environmental Factor	Environmental Protection Objective (EPOb)	Management Target	Management Action	Monitoring Action	Reporting
		<p><i>MT: Monitor fauna behaviour and movement:</i></p> <ul style="list-style-type: none"> <i>If fauna proceeds towards dredge, cease dredging until fauna is outside of monitoring zone</i> <i>Implement soft-start procedures on commencement of dredging</i> <p>Marine fauna behaviour and movement was monitored by a suitably qualified Marine Species Observer and corrective actions were implemented to ensure no marine fauna collision/vessel strikes or entrainment incidents occurred therefore the MT was met.</p>	<p>A dedicated and suitably qualified Marine Species Observer (MSO) was on board the dredge vessel whilst undertaking dredging and disposal activities, and the MSO documented observations and interactions with marine fauna (within a 300m radius from the dredge) and documented the corrective actions taken.</p> <p>Additionally, the Vessel Masters were suitably trained to understand marine fauna behaviours, required actions and reporting requirements and documented the corrective actions taken in daily reports.</p>	<p>c) No marine fauna incidents were recorded during the dredging operation.</p> <p>The MSO was dedicated observer on the dredge vessel at all times including in low light operations. The Vessel Masters responded to MSO observations and implemented corrective actions.</p> <p>The MSO maintained observation and interaction logs.</p> <p>The Vessel Master documented marine fauna stops or delays in daily reports.</p>	<p>Marine Species Observer Program 2025 Report (O2M 2025), including MSO interaction and observation logs.</p> <p>Fremantle Ports Record 2101256.</p> <p>Daily Reports verified Fremantle Ports Records 2101200 to 2101204</p>

Environmental Factor	Environmental Protection Objective (EPOb)	Management Target	Management Action	Monitoring Action	Reporting
		<p><i>MT: Monitor fauna behaviour and movement:</i></p> <ul style="list-style-type: none"> • <i>Delay commencement of dredging until fauna is outside of monitoring zone</i> <p>Marine fauna behaviour and movement was monitored by a suitably qualified Marine Species Observer and corrective actions were implemented to ensure no marine fauna collision/vessel strikes or entrainment incidents occurred therefore the MT was met.</p>	<p>A dedicated and suitably qualified MSO was on board the dredge vessel whilst undertaking dredging and disposal activities, and the MSO documented observations and interactions with marine fauna (within a 300m radius from the dredge) and documented the corrective actions taken.</p> <p>Additionally, the Vessel Masters were suitably trained to understand marine fauna behaviours, required actions and reporting requirements and documented the corrective actions taken in daily reports.</p>	<p>The MSO was dedicated observer on the dredge vessel at all times including in low light operations.</p> <p>The Vessel Masters responded to MSO observations and implemented corrective actions.</p> <p>The MSO maintained observation and interaction logs.</p> <p>The Vessel Master documented marine fauna stops or delays in daily reports.</p>	<p>Marine Species Observer Program 2025 Report (O2M 2025), including MSO interactions and observation logs.</p> <p>Fremantle Ports Record 2101256.</p> <p>Daily Reports verified Fremantle Ports Record 2101200 to 2101204</p>
Marine Environmental Quality (plume management (for dredging campaigns of	EPOb 8) No visible plume caused by dredging or disposal operations during the subsequent dredge	No visible plume occurs outside of the Inner Harbour dredging area and the Gage Roads offshore disposal area during the subsequent dredge campaigns from	Not applicable to the 2025 dredging campaign	Not applicable to the 2025 dredging campaign.	Not applicable to the 2025 dredging campaign.

Environmental Factor	Environmental Protection Objective (EPOb)	Management Target	Management Action	Monitoring Action	Reporting
5,000m ³ /year from 2026 to 2029)	campaigns from 2026 to 2029.	2026 to 2029 that are caused by dredging or disposal operations.			

6. Discussion

6.1. In-Water Plume Monitoring

The EC for TSS concentration was achieved at all sites during the operational period, where all sites were reported within their respective thresholds on both day 2 and day 5. TSS levels were greater than the 80th percentile of background at all sites including reference sites during post dredge monitoring undertaken on the 4 July, while drone imagery indicated that there was no visible plume present at any of the sampling locations. In accordance with the terminology specified in the DEMP, these results suggested that a plume was 'evident', although assessment of drone imagery collected during this event did not suggest evidence of a sediment plume. As reference sites were also elevated above their respective thresholds and drone imagery did not provide evidence of a sediment plume, it was considered more likely that these results were naturally elevated as a result of inclement weather experienced in the days prior to this survey.

As a conservative measure, post dredge monitoring was repeated on 17 July to further investigate the TSS exceedances reported on the 4 July. No repeat exceedances of relevant 80th percentile thresholds were reported for TSS, providing additional confidence that TSS concentrations had returned to natural levels, and the previous sampling event was unlikely to be associated with dredging activities. Sampling on the 17 June was initially planned the week prior in accordance with the DEMP, however was postponed due to poor weather conditions considered unsuitable for safe vessel operations.

Sampling results reported during this sampling event demonstrate compliance with EPO1, where TSS concentrations were reported below the EC in all instances during operations. Post dredge investigations confirmed that results had returned to background levels following completion of dredging operations demonstrating compliance with EPO1.

6.2. Water Clarity Monitoring

Several EQG exceedances were reported during monitoring on day 2, day 5, and during post dredge monitoring (Section 3.2). To constitute an EC exceedance for water clarity, both Impact and Recreational sites must exceed their respective EQG thresholds. No EQG exceedances were reported at recreational sites throughout the duration of dredging operations, therefore the EC for water clarity was considered to have been achieved.

Water clarity monitoring results demonstrate compliance with EPO1, where only minor impacts that constituted exceedances of the EQG were observed.

6.3. Remote Imagery Units and Drone Aerial Photography

Imagery from both the RIUs and drone were used to aid in a visual assessment of water clarity. Images from Appendix A and Appendix B portray a visual plume on day 2 of dredging which appeared to be confined within the Inner Harbour and partially into the Entrance Channel. It was assumed that the plume was caused by a large outbound vessel rather than by dredging operations. Water clarity result and the images obtained during the last drone flight event (4 July) demonstrated improved water clarity

within the Inner Harbour and provided no evidence of a plume. Drone imagery was not during the last post dredge survey on the 17 July as results from the post dredge survey on the 4 July indicated that no plume was present.

6.4. Limitations of Survey

The Fremantle Port waters are an active waterway with high commercial and recreational traffic occurring often throughout pre, during and post dredging activity. This activity can contribute to suspended sediments in the water column and present similarly to a dredging plume, causing a false interpretation of plume and water clarity results. Further to this, natural environmental phenomenon such as storms or tides, can contribute to naturally elevated TSS and turbidity, which may confound assessment against the EQG, EC and post dredge assessment criteria, where exceedances may potentially be flagged in cases where weather conditions have resulted in natural elevations.

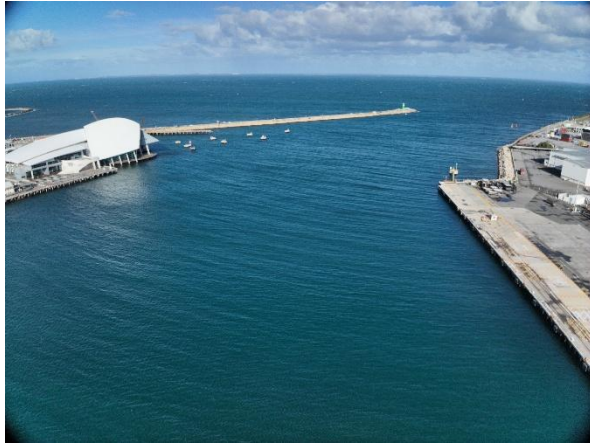
7. Future Recommendations

Future dredging campaigns undertaken by Fremantle Ports would benefit from alignment with contemporary EPA Technical Guidance: Environmental Impact Assessment of Marine Dredging Proposals (EPA 2021) and use of modern monitoring techniques. For dredging campaigns of this scale, it is also recommended that the modelling report be reviewed and that reference sites are carefully selected to ensure suspended sediments do not influence reference site conditions.

8. References

- BMT (2025) Inner Harbour Maintenance Dredging – Environmental Management Plan. Prepared for Fremantle Ports by BMT Commercial Australia Ltd Pty, Report No. R-11513-6 Perth, Western Australia, May 2025.
- EPA (2017) Environmental Quality Criteria Reference Document for Cockburn Sound – A Supporting Document to the State Environmental (Cockburn Sound) Policy 2015. Environmental Protection Authority, Perth, Western Australia, April 2017.
- EPA (2021) Technical Guidance – Environmental impact assessment of marine dredging proposals, EPA, Western Australia, September 2021.
- Fremantle Ports (2018) Port Information Guide 2018. Fremantle Ports.
- O2 Marine (2024) Fremantle Ports Inner Harbour Maintenance Dredging, Dredging Environmental Management Plan Compliance Report. Prepared for Fremantle Ports by O2 Marine, WA Marine Pty Ltd, Report No. R240150. Fremantle, Western Australia, September 2024.
- O2 Marine (2025a) Fremantle Ports Marine Quality Monitoring Program. Prepared for Fremantle Ports by O2 Marine, WA Marine Pty Ltd, Report No. 2105642. Fremantle, Western Australia, July 2025.
- O2 Marine (2025b) Fremantle Ports Inner Harbour Dredging Marine Species Observer Program 2025. Prepared for Fremantle Ports by O2 Marine, WA Marine Pty Ltd, Report No. 2101256 Fremantle, Western Australia, July 2025.

Appendix A. Drone Aerial Imagery



Zone 1



Zone 2



Zone 3



Zone 4

Figure 4: Drone aerial imagery from pre-dredge baseline flight – 20 June 2025



Zone 1



Zone 2

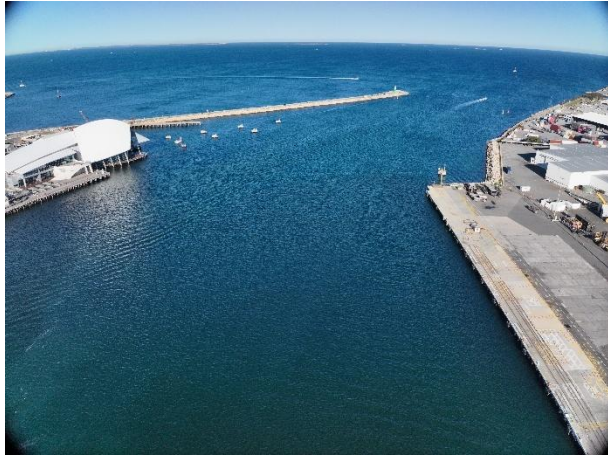


Zone 3



Zone 4

Figure 5: Drone aerial imagery from Day 2 – 24 June 2025



Zone 1



Zone 2

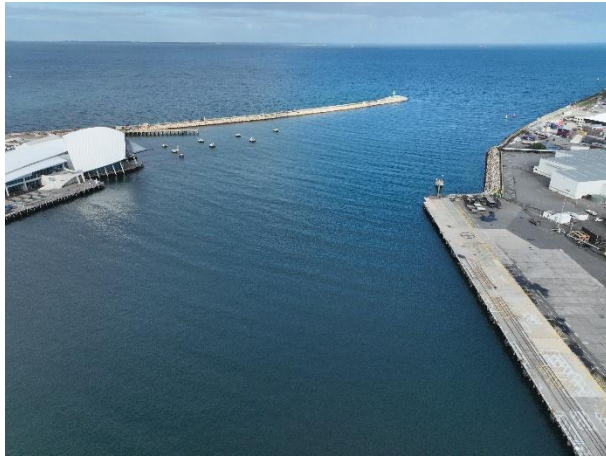


Zone 3



Zone 4

Figure 6: Drone aerial imagery from Day 5 – 27 June 2025



Zone 1



Zone 2



Zone 3



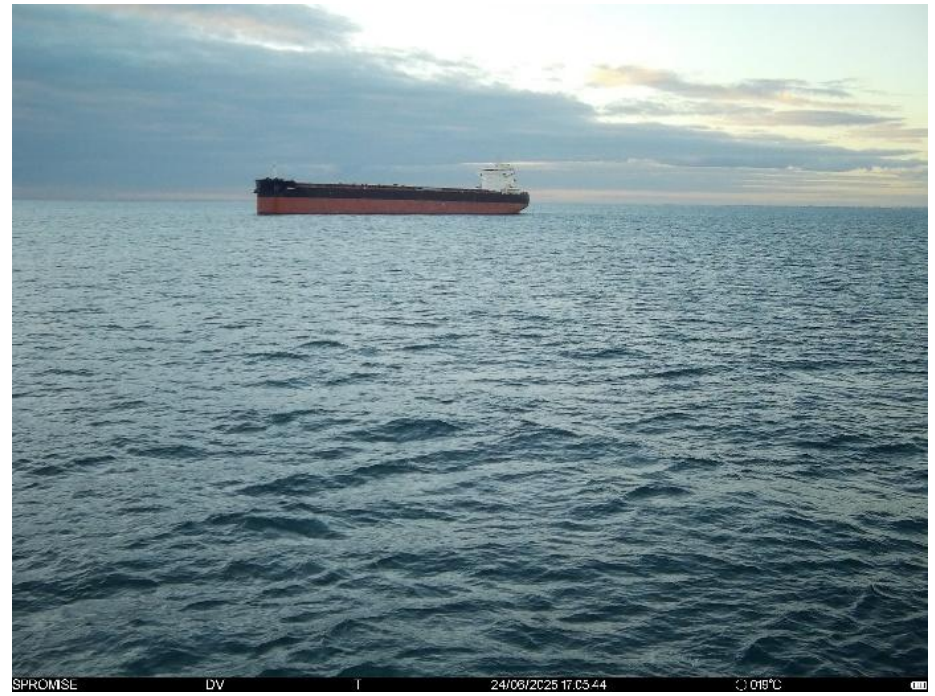
Zone 4

Figure 7: Drone aerial imagery from post dredging – 4 July 2025

Appendix B. RIU Imagery

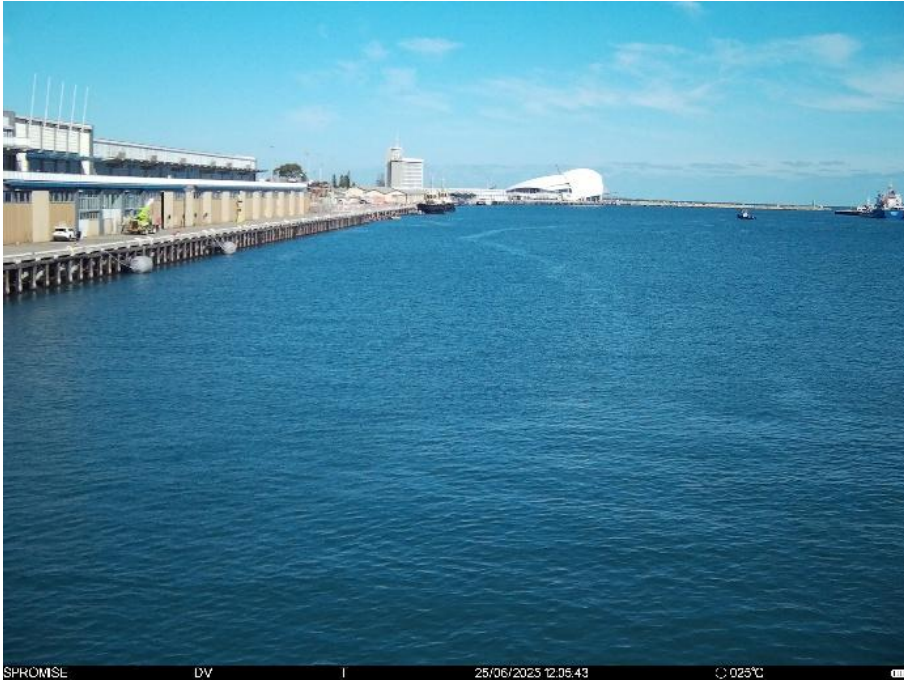


Dredge area



Disposal area

Figure 8: RIU images from dredge (Day 2 - 24 June 2025)

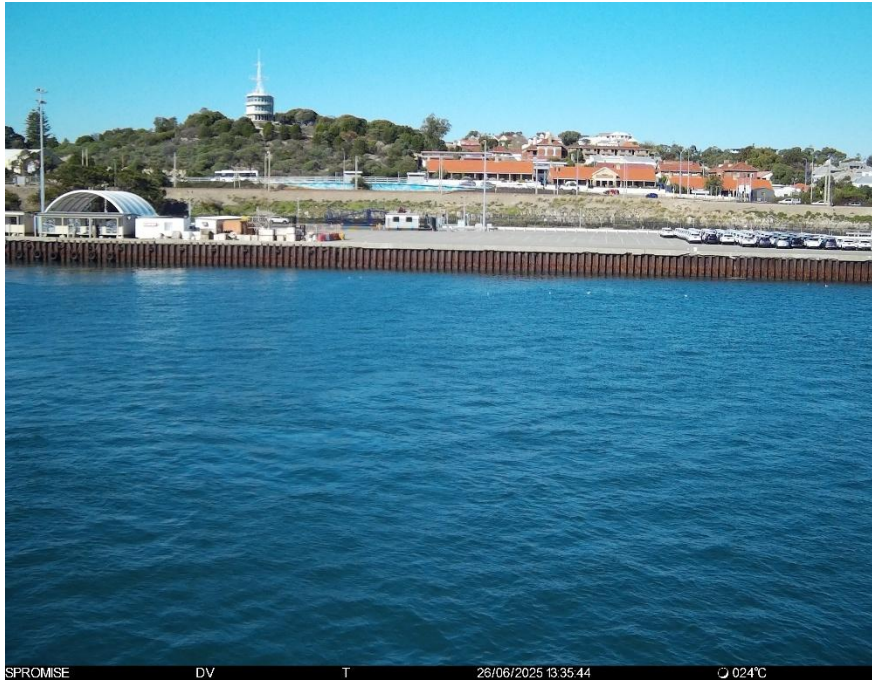


Dredge area



Disposal area

Figure 9: RIU images from dredge (Day 3 - 25 June 2025)



Dredge area



Disposal area

Figure 10: RIU images from dredge (Day 4 - 26 June 2025)



Dredge area



Disposal area

Figure 11: RIU images from dredge (Day 5 - 27 June 2025)

Appendix C. Field Sheets

Client: EPA

Project: 25ENV

Date: 16/06/25

Tide: Flood (1.2m)

Conditions: Calm, low cc

GPS	Location	Depth	Surface	Time Mid	Bottom
227	IH1 FLO	12.8m 12.8m	0939	0945	0950
228	IH2 FLO	9.6m	1006	10:07:13	10:14:00
229	IH3 FLO	7.9m	1031	103244	1033:53
230	IH4 FLO	6.8m	104741	1053	105447x2
231	IH5 FLO	7.8m	111720	Y51 1124	112707
232	OH1 FLO	12.8m	1145	1146	114830
233	OH2 FLO	16.5m	115930	120142	120625
234	OH3 FLO	17.2m	1214	121600	121930
235	OH4 FLO	12.8m	1233:00	123600	123930
236	OH5 FLO	7m	124905	1251	125740

Client: FPA

Project: FPA DEMP

Date: 16/06

Tide: EBB >

Conditions: Calm

GPS	Location	Depth	Surface	Time Mid	Bottom
237	1H1 EBB	12.9m	135845	140040	140320
238	1H2	7.4m	141535	141739	142004
239	1H3	5.7m	14303	1435	143813
240	1H4	5.1m	144546	144730	145015
X	1H5	6.6m	152040	152240	152509
241	OH1	12.8m	153715	153910	154438
242	OH2 ↓	16.5m	155430	155710	155838
243	OH3	16.9m	160700	160930	161250
244	OH4	12.4m	162050	162424	162638 *
-	OH5 ↓	7.0m	163425	163630	163850

SECCHI DISK FIELD SHEET

PROJECT	ZSENN451	CLIENT	Fremantle Ports
FIELD CREW	NA, SB	DATE	19.6.25
VESSEL	Freedom	LOCATION	Swan River / Free Ports.

SITE	TIME	GPS	DISTANCE EYE - WATER (m)	WATER DEPTH (m)	BEAUFORT	SECCHI DISK DEPTH (0.1 m)			COMMENTS
						D1	D2	D3	
OS	10:34		2m	14.6m	3	10.1	9.8	9.3	Started raining
DR1	09:49		2m	12.7	3	5.1	4.6	5	Kinda cloudy
DS2	11:00		2M	20.0m	3	7.5	8	9	Started cloudy - got clearer Raining
DI1	11:41		2M	19.0m	4	5.5	6.2	5.5	Shofter sharper swell Slashing against boat no cloud can see bottom.
RD	12:05		2m	4.8m	3	4.7	4.4	4.4	cloud to start
SD3	12:32		2M	4.0M	3	2.8	3.4	3.4	
DR2	12:50		2M	5.85m	2	5.3	5.2	5.5	Sun out No cloud
S11	13:08		2m	85.4M	1	>5.4	>5.4	>5.4	
S12	13:35		2M	3.0M	1	>3	>3	>3	
SD1	13:20		2M	5.6M	1	5	5.1	5	
S13	13:43		2M	6.0M	1-2	5.1	4.8	4.5	went from BS1 to BS2
SD2	14:00		2M	9.0M	2	4.9	4.8	4.5	
SR	14:26		2M	12.9M	2	4.5	3.8	3.7	



SECCHI DISK FIELD SHEET

PROJECT		CLIENT	
FIELD CREW		DATE	24/06
VESSEL		LOCATION	

SITE	TIME	GPS	DISTANCE EYE - WATER (m)	WATER DEPTH (m)	BEAUFORT	SECCHI DISK DEPTH (0.1 m)			COMMENTS
						D1	D2	D3	
SD3	0848	J47	1.8m	4.4m	1	2.6	2.5	2.5	fine particles
RD	0904	549	1.8m	4.9m	1	4.9	4.9	5.0	real secchi value (not depth clipped)
DI1	0930	549	1.8m	20.6m	1	7.6	7.5	7.6	
DI2	0944	550	1.8m	20.1	2	7.5	7.5	7.5	
OS	1001	551	1.8m	14m	2	5.7	5.7	5.8	
DR1	1022	552	1.8m	12.3	2	5.1	5.1	5.1	
DR2	1046	553	1.8m	6.7m	1	3.8	3.5	3.5	
SI1	1059	554	1.8m	3.1m	1	3.1	3.1	3.1	(bottom)
SI2	1108	555	1.8m	2.7m	1	2.7	2.7	2.7	bottom
SD1	1116	556	1.8m	5.5m	1	5.5	5.5	5.5	bottom
SI3	1151	Josh 055	1.8m	6.1	1	3.0	3.0	3.0	bottom (5m in open water)
SD2	1200	036	1.8m	7.5	1	4.8	4.9	4.9	
SR	1255	057	1.8m	12.3	1	4.8	4.8	4.9	tannin water less salt

Client FPA

Date 27.6.23

Project 25 ENV 481

Conditions OK



Site	Easting	Northing	GPS	Water Depth	Time	Distance Eye-Water	Beaufort	YSI Profile Taken	NTU Surface (0.5m)	NTU Bottom (0.5m)	Secchi Disk Depth (m)			Comments
											D1	D2	D3	
OS	375170	6459810		14	09:06	2M	2	✓		5.61	6.1	6.3	6.5	
DI1	374927	6453949		12 20	10:30 09:30	2M	3	✓	5.71	7.58	8	8.3	8.7	
DI2	375525	6455931		20	10:00	2M	4	✓	5.63	7.77	7.5	6.8	8.3	
RD	379701	6448172		5	10:30	2M	3	✓	5.83	5.91	5	7.5	4.8	
DR1	379188	6452483		12	11:00	2M	3	✓	5.87	5.88	6.3	6.2	6.4	
DR2	382137	6454321		12.8	11:20	2M	2	✓	6.07	6.12	5.5	5.9	5.6	
SI1	383174	6455322		5.5	12:00	2M	1	✓	5.59	6.0	7.5	7.5	7.5	
SI2	382534	6455918		3	12:15	2M	1	✓	5.90	6.03	7.3	7.3	7.3	
SI3	383808	6456203		3.4	12:30	2M	1	✓	5.87	5.82	7.4	7.4	7.4	
SR	386126	6458010		12.5	13:00	2M	1	✓	6.04	6.48	3.5	4	3.9	
SD1	383171	6455831		5.5	12:10	2M	1	x	NA	NA	5	5	5	
SD2	384518	6455818		5.8	12:45	2M	1	x	NA	NA	5.6	5.7	5.8	
SD3	381029	645241		4.8	10:45	2M	2	x	NA	NA	4.5	4.6	4.7	

3x

SECCHI DISK FIELD SHEET

SITE	TIME	GPS	DISTANCE EYE - WATER (m)	WATER DEPTH (m)	BEAUFORT	SECCHI DISK DEPTH (0.1 m)			COMMENTS
						D1	D2	D3	
PROJECT		25ENU451			CLIENT		FPA		
FIELD CREW		DT, RF			DATE		04/07/25		
VESSEL		FREEDOM 11			LOCATION		Inner harbour		
OS	09:15	0143	2	14	5	8	9	8	
D12	09:40	0144	2	20.5	5	7	7	7	
D11	10:00	0145	2	20.7	5	5	7	7	initially cloudy
RD	10:30	0146	2	5	6	5	5	5	
SD3	10:50	0147	2	4.5	4	5	5	5	
DR1	11:00	0148	2	13	5	5	5	6	
DR2	11:30	0149	2	15	2	5	6	5	
SI1	11:50	0150	2	2	2	2	2	2	
SD1	12:00	0151	2	5	2	5	5	5	
SI2	12:10	0152	2	3.5	2	3.5	3.5	3.5	
SI3	12:20	0153	2	4.5	2	4.5	4.5	4.5	
SD2	12:30	0154	2	4	2	4	4	4	
SR	12:50	0155	2	13	3	3	4	4	

NTU FIELD SHEET

PROJECT		25 EIU 457			CLIENT		FPA	
FIELD CREW		DT, RF			DATE		04/07/25	
VESSEL		FREEDOM II			LOCATION		Inver Harbour - locations	
REP	SITE	YSI LOG NAME	GPS	DEPTH (m)	TIME	NTU		
						Surface	Bottom	
1	OS		0143	14	09:15			
2	D12		0144	20.5	09:40			
3	D11		0145	20.7	10:00			
1	RD		0146	5	10:30			
2	DR1		0148	13	11:00			
3	DR2		0149	15	11:30			
1	S11		0150	2	11:50			
2	S12		0152	3.5	12:10			
3	S13		0153	4.5	12:20			
1	SR		0155	13	12:50			
2								
3								

Client EPA
 Date 17/07/25

Project 25 ENVA SI
 Conditions Calm



Site	Easting	Northing	GPS	Water Depth	Time	Distance Eye-Water	Beaufort	NTU Surface (0.5m)	NTU Bottom (0.5m above seabed)	Secchi Disk Depth (m)			Comments
										D1	D2	D3	
OS	375170	6459810	X	~1.4m	0847	~2m	4	~0.25	~0.4	5	5	5	
DI1	374927	6453949	X	20.2m	0903	~2m	4	~0.2	~0.4	6	6	6	
DI2	375525	6455931	X	20.3m	0915		4	~0.35	~0.45	5	5	5	
RD	379701	6448172	X	4.6m	0940		4	~0.7	~0.8	6	5	6	
DR1	379188	6452483	X	15	0955		3	~0.4	0.5	5	5	5	
DR2	382137	6454321	X	9m	1020		3	0.35	0.83	5	6	6	
SI1	383174	6455322	X	2m	1045		2	0.25	0.3	>2	>2	>2	Bottom
SI2	382534	6455918	X	3.2m	1100		2	0.2	0.2	>3.2	>3.2	>3.2	Bottom
SI3	383808	6456203	X	9.8m	1120		2	0.25	0.25	5	6	6	
SR	386126	6458010	X	12.7	1150		2	0.3	0.8	5	5	5	
SD1	383171	6455831	X	10.50	15.9m		2	NA	NA	>5.9	>5.9	>5.9	Bottom
SD2	384518	6455818	X	4.2	11.25		2	NA	NA	>4.2	>4.2	>4.2	Bottom
SD3	381029	645241	>	10/10	4m		3	NA	NA	2	1.8	1.9	

Appendix D. Laboratory Results



**Marine and Freshwater
Research Laboratory**

Tel: 08 93602907 Address: 90 South St, Murdoch, WA, 6150



Accreditation Number: 10603
Accredited for compliance with ISO/IEC 17025 - Testing.

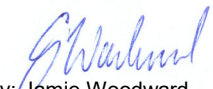


WATER QUALITY DATA

Contact: Cameron Holder
Customer: O2 Marine
Address: 20 Mews Rd, Fremantle 6160

Date of Issue: 20/06/2025
Date Received: 16-17/06/2025
Our Reference: O2M25-18
Your Reference: 25ENV451

METHOD SAMPLE CODE	Sampling Date	Sample Type	2540D TSS mg/L
Reporting Limit			<0.5
Analysis Date File		18/06/2025 250618	
FLO_IH1_B	16/06/2025	Marine	2.9
FLO_IH1_M	16/06/2025	Marine	3.4
FLO_IH1_T	16/06/2025	Marine	1.9
FLO_IH2_B	16/06/2025	Marine	1.9
FLO_IH2_M	16/06/2025	Marine	1.9
FLO_IH2_T	16/06/2025	Marine	2.1
FLO_IH3_B	16/06/2025	Marine	2.3
FLO_IH3_M	16/06/2025	Marine	2.0
FLO_IH3_T	16/06/2025	Marine	1.7
FLO_IH4_B	16/06/2025	Marine	2.7
FLO_IH4_M	16/06/2025	Marine	2.0
FLO_IH4_T	16/06/2025	Marine	2.2
FLO_IH5_B	16/06/2025	Marine	3.0
FLO_IH5_M	16/06/2025	Marine	2.6
FLO_IH5_T	16/06/2025	Marine	2.3
FLO_OH1_B	16/06/2025	Marine	3.1
FLO_OH1_M	16/06/2025	Marine	2.0
FLO_OH1_T	16/06/2025	Marine	2.2
FLO_OH2_B	16/06/2025	Marine	3.6


Signatory: Jamie Woodward
Date: 20/06/2025

The results only apply to the sample as received and to the sample tested.
Spare test items will be held for two months unless otherwise requested.

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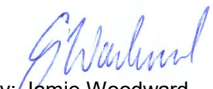


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Reporting Limit			<0.5
Analysis Date File		18/06/2025 250618	
FLO_OH2_M	16/06/2025	Marine	2.6
FLO_OH2_T	16/06/2025	Marine	1.7
FLO_OH3_B	16/06/2025	Marine	5.1
FLO_OH3_M	16/06/2025	Marine	3.7
FLO_OH3_T	16/06/2025	Marine	1.8
FLO_OH4_B	16/06/2025	Marine	2.8
FLO_OH4_M	16/06/2025	Marine	2.6
FLO_OH4_T	16/06/2025	Marine	2.3
FLO_OH5_B	16/06/2025	Marine	2.1
FLO_OH5_M	16/06/2025	Marine	3.6
FLO_OH5_T	16/06/2025	Marine	1.8
EBB_1H1_B	16/06/2025	Marine	3.0
EBB_1H1_M	16/06/2025	Marine	2.9
EBB_1H1_T	16/06/2025	Marine	2.3
EBB_1H2_B	16/06/2025	Marine	1.8
EBB_1H2_M	16/06/2025	Marine	1.8
EBB_1H2_T	16/06/2025	Marine	1.9
EBB_1H3_B	16/06/2025	Marine	1.7
EBB_1H3_M	16/06/2025	Marine	2.0


Signatory: Jamie Woodward
Date: 20/06/2025

The results only apply to the sample as received and to the sample tested.
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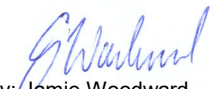


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EBB_1H3_T	16/06/2025	Marine	1.9
EBB_1H4_B	16/06/2025	Marine	1.9
EBB_1H4_M	16/06/2025	Marine	1.5
EBB_1H4_T	16/06/2025	Marine	2.1
EBB_1H5_B	16/06/2025	Marine	2.6
EBB_1H5_M	16/06/2025	Marine	2.4
EBB_1H5_T	16/06/2025	Marine	2.2
EBB_OH1_B	16/06/2025	Marine	2.3
EBB_OH1_M	16/06/2025	Marine	2.1
EBB_OH1_T	16/06/2025	Marine	1.5
EBB_OH2_B	16/06/2025	Marine	3.0
EBB_OH2_M	16/06/2025	Marine	1.7
EBB_OH2_T	16/06/2025	Marine	1.3
EBB_OH3_B	16/06/2025	Marine	3.4
EBB_OH3_M	16/06/2025	Marine	2.9
EBB_OH3_T	16/06/2025	Marine	1.5
EBB_OH4_B	16/06/2025	Marine	2.5
EBB_OH4_M	16/06/2025	Marine	1.6
EBB_OH4_T	16/06/2025	Marine	1.4


Signatory: Jamie Woodward
Date: 20/06/2025

The results only apply to the sample as received and to the sample tested.
Spare test items will be held for two months unless otherwise requested.

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**Marine and Freshwater
Research Laboratory**

Tel: 08 93602907 Address: 90 South St, Murdoch, WA, 6150



Accreditation Number: 10603
Accredited for compliance with ISO/IEC 17025 - Testing.




WATER QUALITY DATA

Contact: Cameron Holder
Customer: O2 Marine
Address: 20 Mews Rd, Fremantle 6160

Date of Issue: 20/06/2025
Date Received: 16-17/06/2025
Our Reference: O2M25-18
Your Reference: 25ENV451

METHOD SAMPLE CODE	Sampling Date	Sample Type	2540D TSS mg/L
Reporting Limit			<0.5
Analysis Date File		18/06/2025 250618	
EBB_OH5_B	16/06/2025	Marine	1.8
EBB_OH5_M	16/06/2025	Marine	1.4
EBB_OH5_T	16/06/2025	Marine	1.6

Note: For results for compliance purposes uncertainty of measurement (MU) will sometimes affect the interpretation whether the result passes or fails the compliance limit.
Tables for measurement uncertainty are available online at www.mafrl.murdoch.edu.au


Signatory: Jamie Woodward
Date: 20/06/2025

The results only apply to the sample as received and to the sample tested.
Spare test items will be held for two months unless otherwise requested.

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