



**Environmental
Protection
Authority**

Koombana Bay Marine Structures

South West Development Commission

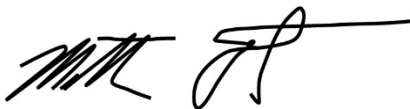
Report 1760

March 2024

This assessment report has been prepared by the Environmental Protection Authority (EPA) under s.44 of the *Environmental Protection Act 1986* (WA). It describes the outcomes of the EPA's assessment of the Koombana Bay Marine Structures strategic proposal by the South West Development Commission.

This assessment report is for the Western Australian Minister for Environment and sets out:

- what the EPA considers to be the key environmental factors identified in the course of the assessment
- the EPA's recommendations as to whether or not the proposal may be implemented and, if it recommends that implementation be allowed, the conditions and procedures, if any, to which implementation should be subject to
- other information, advice and recommendations as the EPA thinks fit.



Prof. Matthew Tonts
Chair
Environmental Protection Authority

14 March 2024

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Proposal

The Koombana Bay Marine Structures (KBMS) is a strategic proposal to upgrade marine structures in Koombana Bay. The proposal is located about 174 kilometres (km) south of Perth and in the City of Bunbury (CoB) in Western Australia.

The proponent for the strategic proposal is the South West Development Commission (SWDC). The proposal will develop new mooring facilities for commercial and recreational vessels, floating and finger jetties, a boat servicing facility, improved public ablution facilities and upgraded boat launching and storage facilities within a 56.5 ha development envelope.

The future proposals identified under the strategic proposal include the construction and operation of:

- Casuarina Boat Harbour (CBH)
- Koombana Bay Sailing Club (KBSC) marina
- Dolphin Discovery Centre (DDC) finger jetty.

Individually, the three projects are referred to as future proposals in accordance with the Environmental Protection Authority's (EPA) assessment process for the KBMS strategic proposal and terminology under the *Environmental Protection Act 1986* (EP Act).

Context and Environmental values

The proposal is located between the Central Business District of Bunbury and Port of Bunbury. The sites and surrounding areas are modified from their natural state but are valued for their current state for a variety of aesthetic, recreational, cultural and commercial values. The derived proposals are to expand existing maritime facilities and located adjacent to existing maritime developments. The proposals cater for the growing population of Bunbury and demand for small craft marine infrastructure, it does not introduce new or different activities in Koombana Bay.

The environmental values that may be impacted by the proposal are largely sea-based and include marine environmental quality, benthic communities and habitat, marine fauna (including avifauna) and coastal processes.

Consultation

The EPA published the proponent's referral information for the proposal on its website for seven days public comment. The EPA also published the proponent's environmental review document on its website for public review for 6 weeks (from 15 May – 26 June 2023). The EPA considered the comments received during these public consultation periods in its assessment.

Mitigation hierarchy

The mitigation hierarchy is a sequence of proposed actions to reduce adverse environmental impacts. The sequence commences with avoidance, then moves to minimisation, rehabilitation, and offsets are considered as the last step in the sequence.

The proponent considered the mitigation hierarchy in the development and assessment of its proposal, and as a result has:

- minimised the extent of footprints
- refined the timing of dredging operations to:
 - avoid (where possible) foraging and/or breeding times of significant marine fauna (dolphin, little penguin, and fairy tern)
 - avoid dredging related impacts to recreational and aesthetics values during the summer period
 - reduce potential impacts to seagrass
- refined management of piling to reduce impacts to marine fauna
- committed to the management of seagrass wrack and beach sediment to reduce impacts to coastal processes
- committed to the use of trestle jetty construction at the DDC to reduce impacts to coastal processes.

Assessment of key environmental factors

The EPA has identified the key environmental factors (listed below) in the course of the assessment. For each factor, the EPA has assessed the residual impacts of the proposal on the environmental values and considered whether the environmental outcomes are likely to be consistent with the EPA environmental factor objectives.

Marine Environmental Quality

Residual impact or risk to environmental value	Assessment finding
1. Temporary reduction in marine environmental quality from increased turbidity during dredging and construction	<p>Dredging, reclamation and breakwater construction will result in temporary elevation of turbidity levels during construction. Turbidity will return to background levels once dredging activities are completed.</p> <p>Zone of High Impact (ZoHI) was predicted for 'serial' construction scenarios from breakwater construction and dredging for both the 'likely worst' and 'likely best' cases.</p> <p>Zone of Medium Impact (ZoMI) was limited primarily to the western and southern margins of Koombana Bay in proximity to the construction activities.</p> <p>Zone of Influence (Zol) extended into the Leschenault Inlet, the northern and southern coastal waters from Koombana Bay and in the vicinity of the offshore disposal ground.</p> <p>Dredge modelling has only been conducted for each derived proposal and not as a cumulative impact of the strategic proposal. Construction activities such as dredging and reclamation will be staged and of short duration. The timing of dredging will avoid the December to March period when seagrass growth and recreational usage of the bay is highest.</p>

Residual impact or risk to environmental value	Assessment finding
	<p>CBH phase 2 and KBSC marina dredging will be undertaken once the breakwaters are completed to reduce the extent and spread of plumes. CBH phase 2a and KBSC marina dredging further confines turbidity through the use of silt curtains.</p> <p>CBH phase 2a sediments with elevated levels of metals and tributyltin (TBT) have been sampled and investigated. Investigations show that the mobilisation of any metals will be below water quality criteria for a moderate level of ecological protection.</p> <p>Residual impacts to marine environmental quality from a temporary increase in Total Suspended Solids (TSS) and nutrients are considered unlikely and the environmental outcome is likely to be consistent with the EPA objective for marine environmental quality.</p> <p>The EPA concludes that implementation of the recommended conditions would ensure consistency with the EPA objective for marine environmental quality.</p>
<p>2. Potential reduction in marine environmental quality due to reduced flushing in the CBH, KBSC marina and Leschenault Inlet</p>	<p>A potential reduction in environmental quality is confined to localised areas within the CBH and KBSC marina (MEPAs). Level of flushing of CBH and KBSC marina is adequate to maintain Moderate Ecological Protection Area (MEPA). Outside the MEPA a high level of ecological protection will need to be maintained where the objectives are to allow for small detectable changes in water and sediment quality and ecosystem integrity.</p> <p>Current design of KBSC marina increases the predicted median flushing time of Leschenault Inlet from 7.9 days to 9.5 days. It is uncertain if this is adequate to maintain water quality and further design modelling and contingency measures in response to potential decline of water quality in Leschenault Inlet are recommended.</p> <p>Design and operation of KBSC marina will need to demonstrate the following outcomes will be met:</p> <ul style="list-style-type: none"> • flushing regime of the inlet is maintained • maintain inlet HEPA • it will not have adverse impacts on the inlets marine environmental quality and associated values • timely implementation of viable contingency management measures to protect Leschenault Inlet marine environmental quality if HEPA is not maintained. <p>Subject to the above, impacts to Leschenault Inlet are likely to be consistent with the EPA objective for marine environmental quality. The environmental outcome is also likely to be consistent with the EPA factor objective for marine environmental quality and values of Koombana Bay subject to implementation of the recommended conditions.</p>

Benthic Communities and Habitat

Residual impact or risk to environmental value	Assessment finding
<p>1. Impacts to benthic communities and habitats due to construction activities.</p>	<p>The direct impacts resulting in changes to benthic communities and habitats is not significant when considered in both a cumulative and proposal context. Cumulative loss within the local assessment unit would be 2.76%, an increase of 0.78% over the estimated current historical losses.</p> <p>For seagrasses it is predicted that 8.64 ha would be lost from the combined implementation of the future proposals. When considered in the context of historical losses in the local assessment unit, this represents an additional incremental loss of 1.7 % of seagrass habitat. There is no predicted loss of high-value perennial <i>Posidonia</i> sp. and <i>Amphibolis</i> sp. seagrass habitat.</p> <p>No irreversible indirect loss of benthic communities and habitats outside of ZoHI are predicted from indirect impacts associated with increased suspended sediment / turbidity during dredging and construction activities. Any indirect impacts will likely recover within 5 years.</p> <p>Dredging-related impacts have been minimised through conditioned December to March exclusion period. Silt movements will be minimised via construction controls (e.g. for KBSC marina use of silt curtains and construction of breakwaters first to contain silt).</p> <p>All other impacts to benthic communities from indirect impacts (shading and sedimentation) are expected to be recoverable. The Marine Construction Monitoring and Management Plan (MCMMP) includes pre and post marine construction seagrass surveys.</p> <p>The total change of benthic communities and habitats resulting from the KBMS strategic proposal is low in a regional context. The environmental outcome is likely to be consistent with the EPA factor objective for benthic communities and habitats and values of Koombana Bay subject to the implementation of the recommended extent and dredge exclusion period conditions.</p>
<p>2. Impacts to white mangrove (<i>Avicennia marina</i>) Community.</p>	<p>No predicted impacts from the construction on the Priority 1 white mangrove (<i>Avicennia marina</i>) community (PEC) in Leschenault Inlet.</p> <p>The residual risk of ongoing impacts associated with the KBSC marina proposal to the Priority 1 white mangrove community and other benthic communities and habits in Leschenault Inlet is low. However, some uncertainty remains with the potential for indirect impacts due to changes in ecological processes to be associated with reduced flushing of the inlet.</p>

Residual impact or risk to environmental value	Assessment finding
	The environmental outcome is likely to be consistent with the EPA factor objective for benthic communities and habitats and values of Koombana Bay and the Leschenault Inlet subject to the implementation of recommended extent conditions.

Marine Fauna

Residual impact or risk to environmental value	Assessment finding
1. Direct impact to marine fauna habitat	<p>The proposal will result in a small incremental loss of benthic communities that act as key fauna habitat, particularly 8.64 ha of seagrass. This is unlikely to have a significant impact given that the habitat to be removed is a very small proportion of the habitat available in the broader Koombana Bay area. It is also well represented in the area, not restricted or rare, so the environmental outcome is likely to be consistent with the EPA objective for marine fauna.</p> <p>The expected environmental outcome is consistent with the EPA factor objective for marine fauna subject to the implementation of the recommended conditions and the Commonwealth Sea Dumping Permit.</p>
2. Reduction in marine environmental quality	<p>Areas close to construction will be temporarily affected by suspended sediments during dredging and construction.</p> <p>Implementation of the Marine Construction Monitoring and Management Plan (MCMMP) and two Marine Environmental Quality Management Plans (MEQMP) will mean that significant residual impacts to marine fauna from reduced marine environmental quality is considered unlikely. These plans are recommended to be revised for the KBSC marina to align the reduced impacts and/or improved management of those impacts.</p> <p>The expected environmental outcome is likely to be consistent with the EPA factor objective for marine fauna subject to the implementation of recommended conditions and associated monitoring and reporting.</p>
3. Potential impacts to marine fauna vessel from vessel collision, entanglement, entrainment and underwater noise	<p>Marine dredging, piling and construction activities (including piling and operation of large vessels) that have the potential to impact marine will be short-term, temporary and any impacts are likely to be localised. Low residual risk to marine fauna in Koombana Bay from vessel collision during operation of the future proposals will be managed through adherence to vessel speed limits (as designated by the Department of Transport and Southern Ports Authority).</p> <p>The proponent has incorporated industry standards, fauna observation protocols and activity exclusion periods into a Marine Fauna Management Plan (MFMP) to minimise impacts during construction.</p>

		Significant residual impacts to marine fauna from dredging, elevated underwater noise, vessel collision, entanglement and/or entrainment are considered unlikely, so the expected environmental outcome is likely to be consistent with the EPA objective for marine fauna.
4.	Potential impacts to marine fauna (avifauna) during construction activities.	<p>Potential for risk to fairy tern breeding success is associated with the temporary use of cleared land adjacent to CBH to support marine dredging and construction activities.</p> <p>The proponent has developed risk mitigating management protocols in consultation with DBCA and stakeholders, within a Koombana Precinct Avifauna Management Plan (KPAMP) to minimise and monitor impacts to key avifauna during construction. Condition for no displacement of nesting fairy terns and the implementation of the actions in the avifauna fauna management plan will mean that the environmental outcome is likely to be consistent with the EPA objective for marine fauna.</p>

Coastal Processes

Residual impact or risk to environmental value		Assessment finding
1.	Impacts to sediment transport	<p>The coastline of Koombana Bay is already heavily modified from its natural state. It is a low energy coastline, so average volume of sediment movement is low but there is sporadic storm movement. Longshore sand movement is already managed by DoT (north of and within CBH) and the City of Bunbury (Ski Beach and Koombana Beach). The priority for the proponent is to maintain beaches at a suitable state for recreational and aesthetic reasons.</p> <p>Although significant impacts on coastal processes associated with the CBH and DDC is unlikely, the KBSC marina proposal could result in the alteration of sediment transport on Ski Beach and Koombana Beach. This issue is currently managed by the City of Bunbury. Given the potential changes to coastal processes associated with the KBSC marina, additional resources, beyond what is currently implemented by City of Bunbury, may be required to maintain amenity values.</p> <p><u>CBH</u> Implementation of the Coastal Processes Management Plan will mean the environmental outcome is likely to be consistent with the EPA objective for coastal processes for Casuarina Boat Harbour.</p> <p><u>KBSC marina</u> Further revision of mitigation management within the Coastal Processes Management Plan is required for the KBSC marina to ensure that the environmental outcome is likely to be consistent with the EPA objective for coastal processes.</p>

		<p>The expected environmental outcome is likely to be consistent with the EPA factor objective for coastal processes and values of Koombana Bay subject to the implementation of the recommended conditions and associated monitoring and reporting.</p>
2.	Impacts to seagrass wrack movement	<p>The majority of seagrass wrack is to the east of KBMS proposal. A westward current transports seagrass wrack towards the proposal, but this material is mostly trapped within the port shipping channel and is transported out to sea.</p> <p>Within the footprint of each proposal, localised seagrass wrack risks exist. These risks will be managed by each of the proponents.</p> <p>The City of Bunbury currently manages seagrass wrack in Koombana Bay. Given the possible increase to wrack deposition at Ski Beach and Koombana Beach associated with the proposal, consideration is required to address potential resourcing required to manage wrack.</p> <p>To manage this the EPA recommended a review of the coastal processes management plan and the development of agreements between parties (e.g. KBSC and CoB) in relation to wrack management and disposal so the environmental outcome is likely to be consistent with the EPA objective for coastal processes.</p>
3.	Impacts to wave energy and current patterns	<p>Modelling the impact of the KBSC marina proposal indicates implementation could result in the alteration in currents in southwestern area of Koombana Bay. The alteration in currents could contribute to the reduced flushing times of inlet (see Marine Environmental Quality) and could have indirect impacts on sediment and seagrass movement, these impacts are outlined in 1. and 2. above.</p> <p>The EPA concludes that subject to regulation by other decision – making processes and implementation of the recommended conditions, the expected environmental outcome is likely to be consistent with the EPA objective for coastal processes.</p>
4.	Impacts to amenity and recreation values	<p>Impacts to amenity through seagrass accumulation and sediment transport are possible during the implementation of the proposal. These impacts can be mitigated and managed to ensure the coastal process objective is achieved to ensure the amenity and recreational values of Koombana Bay are maintained with the implementation of the proposal.</p> <p>The expected environmental outcome is likely to be consistent with the EPA factor objective for coastal subject to implementation of the recommended conditions and associated monitoring and reporting.</p>

Holistic assessment

The EPA considered the connections and interactions between relevant environmental factors and values to inform a holistic view of impacts to the whole environment. The EPA formed the view that the holistic impacts would not alter the EPA's conclusions about consistency with the EPA factor objectives.

Conclusion and recommendations

The EPA has taken the following into account in its assessment of the proposal:

- environmental values which may be significantly affected by the proposal
- assessment of key environmental factors, separately and holistically (this has included considering cumulative impacts of the proposal where relevant)
- likely environmental outcomes which can be achieved with the imposition of conditions
- consistency of environmental outcomes with the EPA objectives for the key environmental factors
- EPA's confidence in the proponent's proposed mitigation measures
- whether other statutory decision-making processes can mitigate the potential impacts of the proposal on the environment
- principles of the *Environmental Protection Act 1986*.

The EPA has recommended that the proposal may be implemented subject to conditions recommended in Appendix A.

1. Proposal

The KBMS is a strategic proposal to upgrade marine structures in Koombana Bay. The proposal is located about 174 km south of Perth adjacent to the City of Bunbury in Western Australia, (see Figure 1).

The identified future proposals under the strategic proposal for the construction and operation of:

- Casuarina Boat Harbour (CBH)
- Koombana Bay Sailing Club (KBSC) marina
- Dolphin Discovery Centre (DDC) finger jetty.

Individually, the three proposed marine structures are referred to as future proposals in accordance with the Environmental Protection Authority's (EPA) assessment process for the KBMS strategic proposal and terminology under the *Environmental Protection Act 1986* (EP Act).

Upgrades to maritime infrastructure for small craft will include new mooring facilities for commercial and recreational vessels, floating and finger jetties, a boat servicing facility, improved public ablution facilities and up upgraded boat launching and storage facilities (see Figure 2).

The proponent for the proposal is the South West Development Commission (SWDC). The proponent referred the strategic proposal to the EPA on 24 March 2015. The referral information was published on the EPA website for seven days public comment. On 15 April 2015, the EPA decided to assess the strategic proposal at the level Public Environmental Review. The EPA also published the strategic public environmental review (SPER) document (RPS 6 April 2023) on its website for public review for 6 weeks (15 May 2023 – 26 June 2023).

The strategic proposal is set out in the executive summary of the proponent's strategic public environmental review (SPER) document (RPS 6 April 2023) which is available on the EPA website.

The elements of the proposal which have been subject to the EPA's assessment are included in Table 1.

Table 1: Location and proposed extent of future proposal elements

Proposal element	Location	Maximum extent or range
Casuarina Boat Harbour - This future proposal includes dredging, piling, land reclamation and construction of a breakwater and revetment walls. The marine infrastructure includes the construction and operation of floating jetties, boat ramps and boat pens.		
<i>Physical elements</i>		
Development envelope	Figure 2	Up to 40 ha
(Indicative) Disturbance footprint	Figure 2	Up to 32 ha within Casuarina Boat Harbour disturbance footprint
Breakwater	Figure 2	Up to 3.5 ha within Casuarina Boat Harbour disturbance footprint
Reclamation	Figure 2	Up to 3.5 ha within Casuarina Boat Harbour disturbance footprint
Marine infrastructure	Within CBH	Floating jetties, boat ramps and boat pens within Casuarina Boat Harbour disturbance footprint.
Koombana Bay Sailing Club marina - This future proposal includes dredging, piling, land reclamation (including onshore dredge spoil disposal) and construction of two breakwaters. The marine infrastructure includes the construction and operation of floating jetties, boat ramps and boat pens.		
<i>Physical elements</i>		
Development envelope	Figure 2	Up to 16 ha
(Indicative) Disturbance footprint	Figure 2	Up to 10 ha within Koombana Bay Sailing Club disturbance footprint
Breakwaters	Figure 2	Up to 2.5 ha within Koombana Bay Sailing Club disturbance footprint
Reclamation	Figure 2	Up to 2.0 ha within Koombana Bay Sailing Club disturbance footprint
Marine infrastructure	Within KBSC	Floating jetties, boat ramps and boat pens within Koombana Bay Sailing Club disturbance footprint
Dolphin Discovery Centre finger jetty - This future proposal includes a finger jetty, piling and a temporary onshore construction laydown area		
<i>Physical elements</i>		
Development envelope	Figure 2	Up to 0.5 ha
(Indicative) disturbance footprint	Figure 2	Up to 0.15 ha within Dolphin Discovery Centre disturbance footprint
Marine Infrastructure	Figure 2	Trestle jetty up to 110 m long

Units and abbreviations

ha - hectare
m - metre

Proposal amendments

The original proposal is set out in section 2.2 of the proponent's referral document (RPS 2015), which is available on the EPA website.

During the assessment process the EPA encouraged the proponent to identify avoidance and mitigation measures for the proposal in addition to those included in the original proposal.

The proponent requested changes to the original proposal during the assessment, which included amendments to breakwater design, reclamation areas, jetty and boat pen numbers, revetment walling and boat ramps. The changes were assessed to be unlikely to significantly increase any impacts of the proposal. The EPA Chair's notice consenting to the change was issued on 26 April 2022.

The consolidated and updated elements of the proposal which has been subject to the EPA's assessment is included in Table 1.

Strategic proposal and process for considering future proposals

The KBMS proposal is considered a strategic proposal because it identifies future proposals which, if implemented, are likely to have a significant effect on the environment.

In assessing the KBMS as a strategic proposal, the EPA is able to consider the cumulative impacts of identified future marine infrastructure proposals by different proponents. Rather than assessing impacts on a case-by-case basis as individual marine infrastructure proposals are proposed.

The conceptual state of the design of the KBSC marina future proposal has meant the EPA is not able to assess final proposal impacts. So, the EPA has considered what environmental outcomes could be set in advance so that the EPA is satisfied the future proposal will meet the objective for each factor.

Consideration of future proposals

A proponent may refer a future proposal to the EPA and request that the proposal be declared a derived proposal under the Koombana Bay Marine Structures Strategic Proposal.

After receipt of the referral and the request, the referral is advertised for public comment. The EPA can only consider public comment in the context of its decision on whether or not to declare the proposal to be a derived proposal.

After considering public comment and the proposal documentation, the EPA then considers whether or not to declare the referred proposal to be a derived proposal. To do so, the EP Act requires that:

- the referred proposal was identified in the strategic proposal
- the strategic proposal Ministerial Statement provides that the referred proposal may be implemented, subject to any conditions.

The EPA may refuse to declare the referred proposal to be a derived proposal if it considers that:

- the environmental issues raised by the referred proposal were not adequately assessed when the strategic proposal was assessed
- there is significant new or additional information that justifies the reassessment of the issues raised by the referred proposal
- there has been a significant change in the relevant environmental factors since the strategic proposal was assessed.

Proposal alternatives

The proponent has considered alternatives to the proposal and addressed this in section 2.8 of the referral and the environmental review document. No alternative locations were identified that had less impacts. The proposed locations provide efficient use of existing public infrastructure (such as road, energy and water assets), and either upgrades existing marine infrastructure and or locates new marine infrastructure adjacent to land based facilities such as the KBSC and the DDC.

The only alternative identified to implementing the strategic proposal would be the 'do nothing' option. This would result in local demand for facilities to accommodate 350 additional boat pens and associated marine infrastructure at Casuarina Boat Harbour, as identified in the South West Region Recreational Boating Facilities Study July 2021 (DoT 2021), not being met.

The EPA considers the siting of the proposal in an area that is already heavily modified by marine infrastructure and the upgrading of existing facilities would serve to prevent impacts to otherwise undisturbed areas of Koombana Bay.

Proposal context

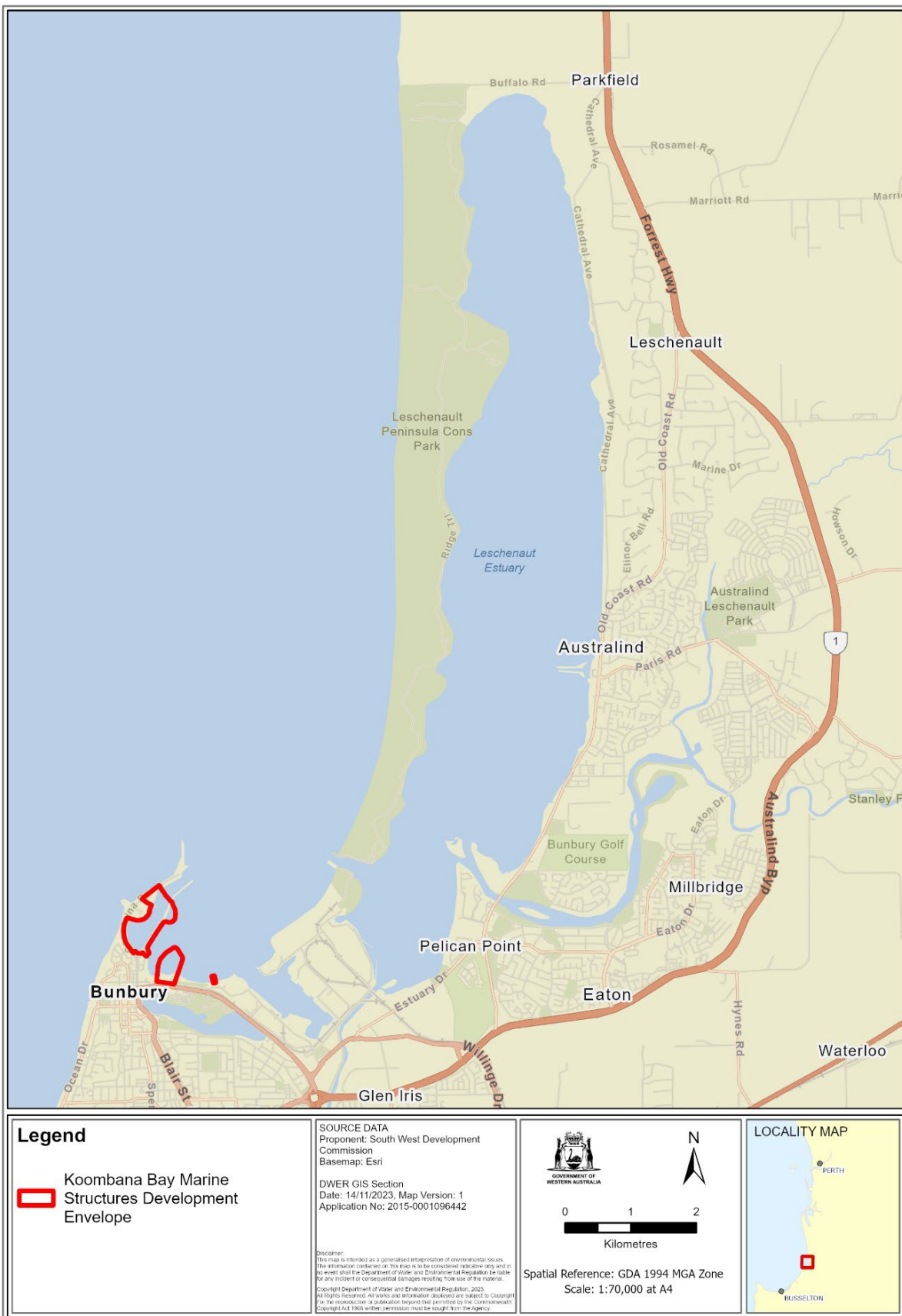
The KBMS strategic proposal is located 174 km south of Perth. It is located to the northeast of the Bunbury Central Business District and to the west of the Port of Bunbury Inner Harbour and shipping channel (Figure 2).

The proposal is situated adjacent to Leschenault Inlet which contains a community of white mangrove (*Avicennia marina*) that is listed as a Priority 1 Ecological Community (PEC) and is part of a proposed Department of Biodiversity, Conservation and Attractions (DBCA) reserve (Figure 2) which is part of the broader Kalgulup Regional Park that runs from north of Leschenault Estuary to Dalyellup, located about 7 km south of Bunbury. The Kalgulup Regional Park Management Plan was released by DBCA in 2021 and provides guidance on the future management of the park, including redevelopment of the Mangrove Cove boardwalk and path replacement to improve visitor access. The strategic proposal does not involve any development activities within the Leschenault Inlet and is not adjoining any current or proposed marine or terrestrial parks.

The strategic proposal represents Stage 3 of the proponent's Transforming Bunbury Waterfront Initiative which has a vision of vibrant water's edge, with a lively marina

featuring cafes and shops, greatly enhanced public open space and amenity, and a working harbour, all connected back to Bunbury's city centre (South West Development Commission, 2015). Stages 1 and 2 were constructed between 2018 and 2021 with the public engaged in the process and kept informed as it progressed.

The strategic proposal has a combined development envelope of up to 56.5 hectares (ha). The future proposals' development envelope includes a construction area buffer from the indicative disturbance footprint (See Figure 2). The three future proposals have a combined indicative disturbance footprint of up to 42.15 ha.



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Figure 1: Project location



Figure 2: Development envelopes, disturbance footprints and key features in Koombana Bay and Leschenault Inlet

2. Assessment of key environmental factors

This section reports the outcome of the EPA's assessment of the key environmental factors against its environmental objectives, and its recommendations on conditions, the proposal should be subject to if it is implemented.

The EPA has also considered the principles of the *Environmental Protection Act 1986* (see Appendix C) in assessing whether the residual impacts will be consistent with its environmental factor objective.

The EPA evaluated the impacts of the proposal on other environmental factors (terrestrial environmental quality, air quality, social surroundings, greenhouse gas emissions) and concluded these were not key factors for the assessment. This evaluation is included in Appendix D.

2.1 Marine Environmental Quality

2.1.1 Environmental objective

The EPA environmental objective for marine environmental quality is *to maintain the quality of water, sediment, and biota so that environmental values are protected* (EPA 2016c).

2.1.2 Investigations and surveys

The EPA advises the following investigations and surveys were used to inform the assessment of the potential impacts to marine environmental quality:

- *Groundwater into Casuarina Boat Harbour and KBSC marina* (RPS 2018)
- *Groundwater and Nutrient Flux Assessment, Leschenault Inlet* (RPS 2020)
- *Sediment and Marine Water Quality Sampling of the Leschenault Inlet – Monthly Report: #1 – January 2020*, version 0 (O2 Marine 2020)
- *Sampling and Analysis Dredge Spoil Sediment Sampling – Koombana Bay Sailing Club Marina Development*, version 0 (Cardno 2021)
- *Sampling and Analysis Plan – Implementation Report Casuarina Harbour Dredging Studies*, version 2 (Cardno 2022)
- *Review of Past Water Quality and Sediment Quality – Koombana Bay Marine Structures SPER*, version 2 (GHD 2023)
- *Baseline Water Quality Monitoring – Koombana Bay Marine Structures SPER*, version 2 (GHD 2023)
- *Marine Environmental Quality Modelling – Koombana Bay Marine Structures SPER*, version 2 (GHD 2023)
- *Marine Construction Monitoring and Management Plan*, version 4 (RPS 2024)

- *Dredge Spoil Disposal Management Plan Casuarina Harbour Dredging Studies, version 1* (Cardno 2023)
- *Marine Environmental Quality Management Plan Koombana Bay Marine Structures, version 4* (GHD 2024)
- *Marine Environmental Quality Management Plan (Only Casuarina Boat Harbour Development) Koombana Bay Marine Structures, version 4* (GHD 2024).

The surveys were generally consistent with the *Technical Guidance – Protecting the Quality of Western Australia’s Marine Environment* (EPA 2016) and *Technical Guidance – Environmental Impact Assessment of Marine Dredging Proposals* (EPA 2021).

2.1.3 Assessment context – existing environment

The proposal is located within the Koombana Bay marine environment and in proximity to a southern portion of the Leschenault catchment. The marine environment of Koombana Bay has been heavily modified by previous developments including port, shipping channel, breakwaters and foreshore developments.

The Leschenault Inlet has also been heavily modified by previous works which include river diversions, reclamation, and construction of a flood barrier at the mouth of the Leschenault Inlet, which is known as the “the plug” (Figure 2). Most of the historical impacts to marine environmental quality are from eutrophication due to changes in land use in the catchment from activities such as agriculture and urban land use. Notwithstanding the historical impacts, the EPA recognises that the inlet is locally significant as it supports recreation and aesthetic values, is a conservation category wetland, and supports a mangrove community. The significance of the mangrove community within the inlet is further discussed in section 2.2 benthic communities and habitats.

The proponent has conducted background marine environmental quality monitoring within and adjacent to the proposal (GHD 2023), assessed water quality, determined baseline values and proposed spatially defined levels of ecological protection to apply to the harbour, the marina and Koombana Bay.

For the purposes of this assessment and ongoing management, the proponent has proposed the following levels of ecological protection to apply:

- High Environmental Protection areas (HEPA) for Koombana Bay. The EPA notes that the combined pressures of boating, people and proximity to urban land uses and the Port of Bunbury Inner Harbour suggests that a maximum level of ecological protection may not be achievable, and that a high level of ecological protection as proposed by the proponent is appropriate. The objective for a high level of environmental protection is to allow for small measurable changes in the quality of water, sediment and biota, but not to a level that changes ecosystem processes, biodiversity or abundance and biomass of marine life beyond the limits of natural variation.
- Moderate Environmental Protection areas (MEPA) for marine waters within the CBH and KBSC marina proposals. The EPA notes this is consistent with its *Technical Guidance – Protecting the Quality of Western Australia’s Marine*

Environment which sets out that a moderate level of ecological protection is relevant for marinas and harbours and therefore agrees with the proponent's designation. In areas assigned a moderate level of ecological protection, moderate changes in environmental quality may be acceptable provided there are only small changes in abundance and biomass of marine life and in the rates, but not types of ecosystem processes.

- During assessment it was determined that although it is a highly modified water body, the Leschenault Inlet has a HEPA designation in recognition of the need to maintain ecological function and conservation values (e.g. dolphins, mangroves, and migratory birds) that rely on high level of environmental quality. Site specific Environmental Quality Criteria (EQCs) have been developed by the proponent for monitoring against the HEPA indicators.
- Given there are no new discharges to the marine environment, the proponent has not proposed any Low Ecological Protection Areas (LEPA).

Each of the ecological protection area areas have multiple monitoring sites to evaluate compliance with EQC. Indicative locations of monitoring sites are illustrated in Figure 5 of *Marine Environmental Quality Management Plan Kooombana Bay Marine Structures* (MEQMP) (GHD 2024) and *Marine Environmental Quality Management Plan (Only Casuarina Boat Harbour Development)* (MEQMP-CBH) *Kooombana Bay Marine Structures* (GHD 2024).

The proponent's designation of levels of ecological protection areas is shown in Figure 3 below and is consistent with the EPA's guidance provided in the *Technical Guidance – Protecting the Quality of Western Australia's Marine Environment* (EPA 2016).

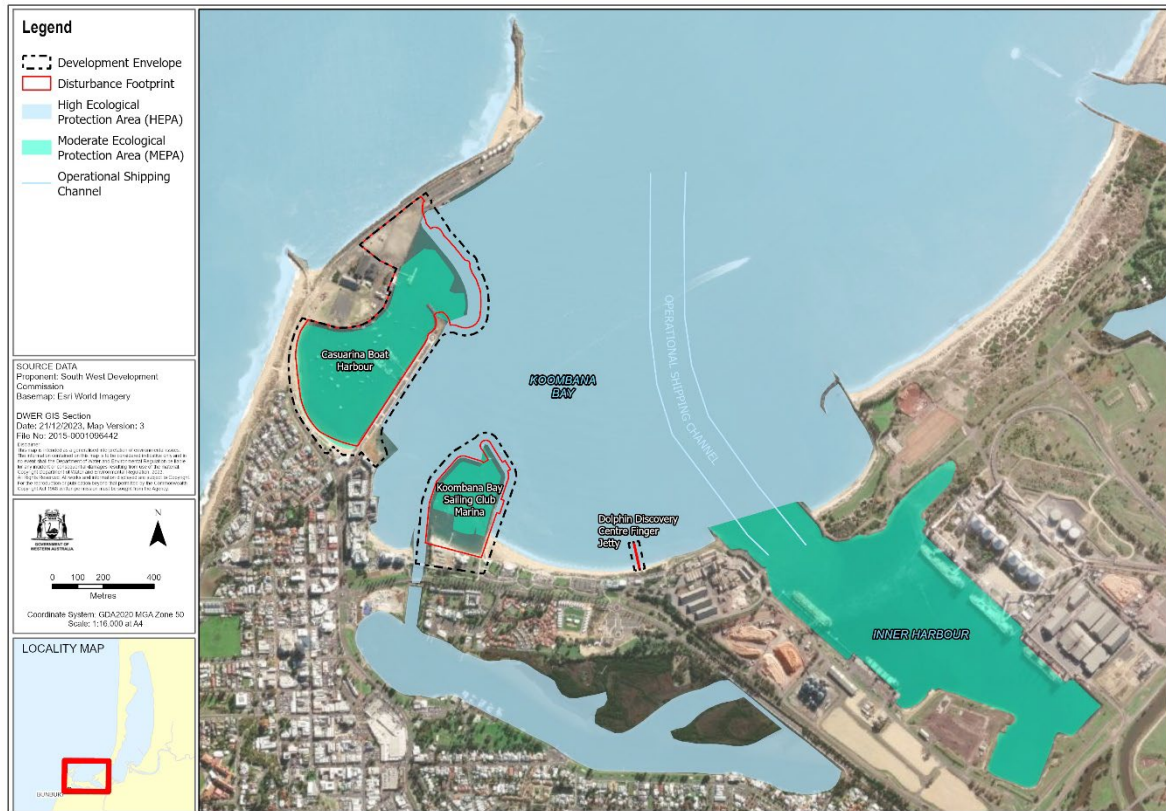


Figure 3 – Level of ecological protection areas

Koombana Bay

Locally the Preston River and Collie River (and the associated agricultural catchments) contribute inputs into the Leschenault Estuary, and the urban area catchment contribute a range of nutrient loads to the Koombana Bay.

A summary of the existing marine environmental quality of Koombana Bay is as follows:

- Turbidity in Koombana Bay is generally high compared to nearby areas due to elevated total suspended solids (TSS) caused by winter outflow from the Leschenault Estuary via 'The Cut' into the bay and broader marine environment (GHD 2023).
- Generally, nutrients and chlorophyll-a (chl-a) are also elevated after the winter river inflow events. (Wave Solutions 2012c; Plate 1). Koombana Bay flushing times are modelled to vary spatially and seasonally, ranging from 3.7 to 6.7 days.
- An assessment of the historical Koombana Bay marine water quality assessments undertaken (Oceanica 2008) and the baseline water quality monitoring (GHD 2017) concluded that the nutrient and chl-a levels of Koombana Bay has not changed significantly over the past ten years and are higher than surrounding areas.

Leschenault Inlet

The inlet was once part of the broader estuary system, but since the realignment of the Preston River, it is now a separate system. The Leschenault Inlet receives marine water from Koombana Bay with an estimated existing flushing rate of 7.9 days. Freshwater inputs are from the urban catchment water via storm water flows and groundwater seepage.

Key findings of Sediment and Marine Water Quality Sampling of the Leschenault Inlet (O2 Marine 2020) were:

- elevated concentrations of total nitrogen, total phosphorus, filterable reactive phosphorus
- chlorophyll-a concentrations generally exceed the ANZG and ASTG (2018) guideline criteria
- inlet baseline monitoring identified zinc and iron concentrations above relevant ANZG and ASTG (2018) and ANZECC and ARMCANZ (2000) criteria.

Concentrations of metals in the inlet's sediments were highest close to stormwater drains, indicating that these are influenced by catchment inflows.

2.1.4 Consultation

Matters raised during stakeholder consultation and the proponent's responses are provided in the proponent's response to submissions document (SWDC 2023). Public consultation on the proposal raised concerns about adequacy of the hydrodynamic modelling and MEQMPs.

As a result of the consultation, the proponent has developed two versions of the MEQMP. One version of the MEQMP (GHD 2024) assumes the construction of all future proposals, and an alternative MEQMP-CBH (GHD 2024) has been developed assuming only the CBH development is constructed.

2.1.5 Potential impacts from the proposal

The construction of future proposals has the potential to significantly impact marine environmental quality from:

- temporary increase in Total Suspended Solids (TSS) and turbidity
- temporary increase in nutrients from sediment release during dredging
- disturbance of sediments with elevated levels of toxicants, particularly tributyltin (TBT) within CBH.

Following the construction phase, the main determinants of marine water quality in the proposed harbour and marina are:

- the quality of external waters in Koombana Bay
- the magnitude of nutrient inputs (mainly from external sources such as groundwater and land use in the catchment)

- the flushing and mixing rates of the harbour or marina, which is largely determined by their siting and design.

If water and sediment quality in the CBH or KBSC marina are poor (due to inappropriate configuration and design, or inadequate management of nutrient inputs) this is likely to adversely affect the quality of external waters in Koombana Bay.

The extent of breakwaters associated with the KBSC marina future proposal has the potential to affect the mixing rate of the Leschenault Inlet and hence impact on marine environmental quality of the inlet.

2.1.6 Avoidance measures

The proponent for the CBH (the Department of Transport) has selected a site layout that includes the existing CBH facility, where approximately 37 ha has already been disturbed. In doing so, it has largely avoided the disturbance of new marine areas.

2.1.7 Minimisation measures (including regulation by other DMAs)

The proponent has proposed measures to minimise impacts to marine environmental quality:

- implementing measures in accordance with the Marine Construction Monitoring and Management Plan (MCMMP) (RPS 2024) to manage and mitigate potential impacts to marine environmental quality and benthic communities and habitats during the construction of future proposals. The minimisation measures include:
 - no dredging in the months of December to March
 - pre-washing of limestone rock prior to breakwater construction to minimise turbidity from fine material
 - silt curtains to retain most of the turbidity to within CBH phase 2a works and the KBSC marina.

2.1.8 Rehabilitation measures

Rehabilitation measures are not a relevant mitigation in relation to this environmental factor.

The EPA notes that the CBH future proposal includes the removal of contaminated sediments from within the harbour which will reduce potential long-term exposure of marine fauna to toxicants in sediments such as TBT.

2.1.9 Assessment of impacts to environmental values

The EPA has assessed the potential impacts of future proposals with respect to the:

- likely temporary impacts during marine construction activities
- likely long-term impacts on marine environmental quality within the proposed harbour and marina; Koombana Bay and Leschenault Inlet.

Marine construction activities

Turbidity is the key physical stressor associated with the dredging of marine sediments and the construction of marine infrastructure such as breakwaters. A temporary increase in turbidity and sedimentation during dredging and breakwater construction is expected. Potential impacts of turbidity and sedimentation on benthic communities and habitats, and marine fauna are evaluated in sections 2.2 and 2.3 of this report respectively.

Potential impacts of plumes on community use, recreation, and aesthetics

The CBH future proposal will be implemented in 2 phases. The first phase of dredging will remove soft sediments prior to rock wall construction and is the shortest (approximately 28 days) of the three dredging programs. Given this stage will be implemented before the completion of the breakwater, it is highly likely that silt and nutrients will spread outside of the development envelope and temporarily impact on water quality in Koombana Bay. This can potentially cause indirect impacts on benthic communities and habitats and marine fauna. The ecological impacts of temporary plumes on benthic communities and marine fauna are discussed in sections 2.2 and 2.3, respectively.

Phase 2 of the CBH dredging will be undertaken after the breakwater is completed, and this would serve to reduce the extent and magnitude of any temporary turbidity impacts outside the harbour footprint. The dredging for the KBSC marina future proposal will be undertaken inside breakwaters and use silt curtains to limit turbidity impacts to Koombana Bay and Leschenault Inlet.

For the CBH most of the dredge material will be carried on a barge to beyond the limits of state waters to an existing offshore spoil ground. This aspect of marine construction will be regulated via a permit under Commonwealth legislation. The *Environment Protection (Sea Dumping) Act 1981* regulates ocean waste disposal to minimise marine environmental impacts. Whilst the KBSC marina proposes to use dredge spoil onsite for reclamation.

Based on the proponent's modelling, turbid plumes would be expected to be visible from time to time and likely to temporarily affect aesthetic values in Koombana Bay. It is expected however that within one month of the completion of the marine construction activities water clarity will return to within natural levels.

The EPA notes that dredge modelling has only been conducted for each derived proposal and not as a cumulative impact of the strategic proposal. That has prompted to EPA to form that view that a clearly defined staged implementation is required to ensure that cumulative dredge impacts do not occur. The EPA has recommended condition B1-2 so as to avoid concurrent dredging programs.

The marine waters of Koombana Bay are extensively used for recreation activities such as boating, fishing and swimming, and tourism activities such as dolphin watching/interactions. The effects of these plumes on social values will depend on the timing of the dredging and reclamation. If dredging occurs in summer when background water turbidity is low and recreational usage is high, then the plumes

could impact on local amenity and aesthetic values. The MEQMPs and MCMMP will monitor and manage potential impacts to the marine environment, which will also protect social and cultural values of the area.

The EPA has recommended condition B1-2 which reflects the proponent's commitment to avoid dredging between December and March when recreational usage is at its highest.

In summary, any reductions in marine environmental quality from marine construction are likely to be localised and temporary.

Potential contaminant release

The removal of approximately 10,000 m³ of sediments containing metal and metalloid for onshore treatment is the first step of the CBH phase 2 dredge program. Sediment quality investigations indicate that TBT exceeded the ANZG (2018) default guideline value-high value in a localised area within the harbour. An assessment of elutriate release indicated that there is a low risk of the toxicant TBT in the water column during the dredging of phase 2a with regards to protecting the marine environmental quality within the MEPA (harbour) and HEPA (bay).

Precautionary management measures to mitigate any potential impacts to marine environmental quality and risks to the public during the dredging of contaminated sediments the proponent has committed to the following types of measures via the MCMMP:

- Sediment removal once the construction of the northern breakwater (phase 1) is complete to largely confine sediment plumes within the CBH.
- Land-based backhoe dredging to minimise dredge related sediment disturbance and turbidity.
- Deployment of silt curtain to confine turbidity and reduce risk of spread of metals.
- Sediments will be dewatered onshore and disposed at a licenced waste facility.
- Return water will be actively managed, including testing to determine its suitability for return to the ocean (or evaporated).
- Sampling of water within CBH to ensure water quality thresholds are not exceeded.
- Implement a communications strategy to inform stakeholders, local authorities and the public of these activities as they occur.
- Sampling undertaken to confirm contaminated sediment removal has been satisfactorily completed prior to dredging of the remaining areas of CBH.

Based on investigations and mitigating processes it is likely that the MEPA for Casuarina Boat Harbour and the HEPA for Koombana Bay can be met during construction and EPA's objectives for marine environmental quality can be met.

Potential marine environmental quality in Casuarina Boat Harbour and Koombana Bay Sailing Club marina

Casuarina Boat Harbour

Hydrodynamic modelling predicted that the addition of the northern breakwater to the existing CBH will increase the flushing time of the harbour from 2.2 to 5.8 days (GHD 2023a). The proponent predicts that while the flushing time will increase, the proposal will not result in substantial changes to the quality of water, sediments and/or biota and that a MEPA can be achieved. This is particularly the case if nutrient inputs into the harbour remains low. By way of comparison, it is noted that the Bunbury Port Inner Harbour which has an estimated average flushing period of 8.3 days and maintains water quality aligned with a MEPA.

In addition to an increase in flushing time, other threats and pressures on marine environmental quality include sources of contaminants from stormwater and the increase in boats in the harbour. Issues include nutrients, leaching of antifoulants from boat hulls and the accidental spills of fuels and sillage. The proponents have committed to implementing the MEQMP-CBH to ensure that inputs into the harbour are minimised such that a moderate level of ecological protection can be met during operations and that all relevant marine environmental values are protected.

Koombana Bay Sailing Club marina

The proposed KBSC marina is predicted to have a median flushing time of approximately 5.2 days (GHD 2023a), which will be a similar period to that predicted for the CBH. The proponent considers that the relatively small configuration of the marina promotes rapid transport and exchange with Koombana Bay waters. As there are no surface water drainage outlets into the proposed KBSC marina, it is not expected to receive significant nutrient inputs.

The proponent has committed to implementing the MEQMP (GHD 2024) to ensure that a moderate level of ecological protection (MEPA) will be achieved within the KBSC marina so that the marine environmental values are maintained. Implementation of the MEQMP (GHD 2024) and associated monitoring and adaptive management is likely to achieve the EPA's objective for marine environmental quality for the KBSC marina.

The EPA has recommended the MEQMP is reviewed in line with the final design of the marina to ensure the marine environmental quality environmental outcomes for the marina and Leschenault Inlet can be achieved, monitored, and substantiated.

Potential marine environmental quality in Koombana Bay

The proponent has predicted that the future proposals, if implemented in combination, will have no material effect on the flushing and residence time of Koombana Bay. While there are likely to be localised areas along the western shoreline of Koombana Bay that are likely to be impacted by changes in circulation and reduced flushing, the proponent predicts that this will not be at levels that would

result in significant impacts to the marine environmental quality of the broader Koombana Bay.

In addition, the proponent predicts that by maintaining a moderate level of ecological protection within the CBH and KBSC marina there should be no adverse effect to external marine water quality and in the broader Koombana Bay. Based on the available information, it is the EPA's assessment that the implementation of CBH and KBSC marina future proposals are unlikely to significantly impact the environmental quality of the remaining portion of Koombana Bay and the ability to achieve a HEPA, and that the relevant environmental objective can be met.

Potential marine environmental quality in Leschenault Inlet

The Leschenault Inlet's median flushing time is predicted to increase from 7.9 to 9.5 days due to the presence of the KBSC marina. This has the potential to have impacts on the marine water quality of the inlet at critical times of the year (e.g. summer).

The proponent does not consider the reduced flushing from the KBSC marina to pose a serious risk to the Leschenault Inlet, as monitoring data shows that the inlet does not have persistent low dissolved oxygen or a high phytoplankton biomass. However, it is noted that there are elevated levels of ammonia in the inlet that is bioavailable for phytoplankton (algae) growth, which means there is the potential for an increase in the occurrence of algal blooms under the right conditions.

Despite the proponent's investigations and predictions, there are uncertainties around design, current state of the Leschenault Inlet system, the level of impact it can sustain in the future, and the ability of contingency management measures to be effective. EPA considers the reduction in flushing from the indicative KBSC marina design poses a risk to the health of the Leschenault Inlet, especially in the longer term. The reduced flushing increases the risk of lowered dissolved oxygen levels, sediment nutrient release, recurrent algal blooms resulting in anoxic conditions and a negative feedback loop. As this phenomenon could impact on ecosystem and recreational, and aesthetic values of the inlet, the EPA considers it appropriate to set an environmental outcome consistent with the maintenance of the current flushing regime, and a requirement for the final marina design to meet this requirement.

To address the risk of potentially significant impacts to the values of Leschenault Inlet, the EPA recommends:

- the KBSC marina proposal is designed and implemented in a manner that maintains the current Leschenault flushing regime (condition B1-4)
- prior to the referral of the (future) proposal the proponent of the KBSC marina undertake additional work once it has finalised a detailed design and footprint for the marina, and submit a final design and footprint report. The additional work to accompany the final design and footprint report must include hydrodynamic modelling and incorporate the most contemporary scientific information about the condition and health of inlet, in order to demonstrate that the environmental outcomes and relevant EPA objectives can be met for the final design/footprint of the future proposal. This presents an opportunity for the proponent of the marina

to consider amendments to its design and configuration to reduce the flushing effects on the inlet and demonstrate that the current flushing regime is maintained. The final design and footprint along with the additional work must be submitted as part of the proponent's referral to the EPA (to request a declaration for a derived proposal) (condition B1-5)

- in the event the proposal is declared to be a derived proposal, then the proponent be required to revise and amend the current version of the Marine Environmental Quality Management Plan to include specific measures to be implemented should the identified thresholds for water or sediment quality within Leschenault Inlet be exceeded. The specific measures to manage any effects from reduced flushing on water quality must be proven to be effective and feasible in an operational context (condition B1-6).

On the basis that the proponent implements the above, there is a higher confidence that the EPA objective can be met. Therefore, the proposal is unlikely to be inconsistent with the EPA objective for marine environmental quality.

Summary of combined impacts of future proposals

The EPA is satisfied with the environmental quality objectives and levels of ecological protection proposed by the proponent for the CBH and KBSC marina, Koombana Bay and the Leschenault Inlet in the MEQMPs (GHD, 2024).

Cumulatively, the total area of MEPAs for the CBH future proposal (23.4 ha) and the KBSC marina (5.4 ha) amounts to 28.8 ha. This represents 11% of Koombana Bay and the rest of the bay will be designated a high level of ecological protection. The EPA considers that the implementation of future proposals can achieve all marine environmental values and environmental quality objectives that are recognised in the EPA's *Technical Guidance Protecting the Quality of Western Australia's marine Environment*.

The EPA advises that the residual impact from construction related water quality should be subject to implementation conditions B1 to ensure protection of the water quality in Koombana Bay and Leschenault Inlet and ensure that the environmental outcome is likely to be consistent with the EPA objective for marine environmental quality.

2.1.10 Summary of key factor assessment and recommended regulation

The EPA has considered the likely residual impacts of the proposal on marine environmental quality values. In doing so, the EPA has considered whether reasonable conditions could be imposed, or other decision-making processes can ensure consistency with the EPA factor objective. The EPA assessment findings are presented in Table 2.

The EPA has also considered the principles of the *Environmental Protection Act 1986* (see Appendix C) in assessing whether the residual impacts will be consistent with its environmental factor objective and whether reasonable conditions can be imposed (see Appendix A).

Table 2: Summary of assessment for marine environmental quality

Residual impact or risk to environmental value	Assessment finding or Environmental outcome	Recommended conditions and DMA regulation
<p>1. Temporary reduction in marine environmental quality from increased turbidity during dredging and construction.</p>	<p>Dredging, reclamation and breakwater construction will result in temporary but elevated levels of turbidity during construction. Turbidity will return to background levels once dredging activities are completed.</p> <p>Zone of High Impact (ZoHI) was predicted for 'serial' construction scenarios from breakwater construction and dredging for both the 'likely worst' and 'likely best' cases.</p> <p>Zone of Medium Impact (ZoMI) was limited primarily to the western and southern margins of Koombana Bay in proximity to the construction activities.</p> <p>Zone of Influence (ZoI) extended into the Leschenault Inlet, the northern and southern coastal waters from Koombana Bay and in the vicinity of the offshore disposal ground.</p> <p>Construction activities such as dredging and reclamation will be staged and of short duration. The timing of dredging will avoid the December to March period when seagrass growth and recreational usage of the bay is highest.</p> <p>CBH phase 2 and KBSC marina dredging will be undertaken once the breakwaters are completed to reduce the extent and spread of plumes. CBH phase 2a and KBSC marina dredging further confines turbidity through the use of silt curtains.</p> <p>CBH phase 2a sediments with elevated levels of metals and TBT have been sampled and investigated. Investigations show that the mobilisation of any metals will be below</p>	<p>Condition B-1(3) (Marine Environmental Quality) Implement the proposal to ensure: (3) within one month following cessation of marine construction activities required for the proposal, water quality will return to a level of High Ecological Protection and at least Moderate Ecological Protection.</p> <p>Condition B1-2 No dredging and reclamation can occur during the period of 1 December and 31 March, or at the same time as another derived proposal.</p> <p>Condition B1-3 (CBH) Implement the:</p> <ul style="list-style-type: none"> • Marine Environmental Management Plan (Only Casuarina Boat Harbour) (GHD 2024) • Marine Construction Monitoring and Management Plan (RPS 2023) <p>to achieve outcomes of B1-1.</p> <p>Condition B1-5 (KBSC) review and revise the:</p> <ul style="list-style-type: none"> • Marine Environmental Quality Management Plan (Revision 4, GHD 2024), and • Marine Construction Monitoring and Management Plan (Revision 2, RPS 2023)

Residual impact or risk to environmental value	Assessment finding or Environmental outcome	Recommended conditions and DMA regulation
	<p>water quality criteria for a moderate level of ecological protection.</p> <p>Residual impacts to marine environmental quality from a temporary increase in Total Suspended Solids (TSS) and nutrients are considered unlikely and the environmental outcome is likely to be consistent with the EPA objective for marine environmental quality.</p> <p>The EPA concludes that implementation of the recommended conditions would ensure consistency with the EPA objective for marine environmental quality.</p>	<p>to achieve outcomes of B1-1 and B1-4.</p>
<p>2. Potential reduction in marine environmental quality due to reduced flushing in the CBH, KBSC marina and Leschenault Inlet.</p>	<p>A potential reduction in environmental quality is confined to localised areas within the CBH and KBSC marina. Level of flushing of CBH and KBSC marina is adequate to maintain Moderate Ecological Protection Area (MEPA). Outside the MEPA, a high level of ecological protection will need to be maintained where the objectives are to allow for small detectable changes in water and sediment quality and ecosystem integrity.</p> <p>Current design of KBSC marina increases the predicted median flushing time of Leschenault Inlet from 7.9 days to 9.5 days. It is uncertain if this is adequate to maintain water quality and further design modelling and contingency measures in response to potential decline of water quality in Leschenault Inlet are recommended.</p> <p>Design and operation of KBSC marina will need to demonstrate the following outcomes will be met:</p> <ul style="list-style-type: none"> • flushing regime of the inlet is maintained • maintain inlet HEPA 	<p>Condition B1-1 (Marine Environmental Quality) Establishes the environmental outcomes that must be met including that:</p> <ul style="list-style-type: none"> • A 'high' level of ecological protection will be met outside the CBH and KBSC marina. <p>Condition B1-3 (CBH) Requires the implementation of the proponents Marine Environmental Management Plan (Only Casuarina Boat Harbour) (GHD 2024).</p> <p>Condition B1-5 (KBSC) The proponent must review and revise the Marine Environmental Quality Management Plan (Revision 4, GHD 2024), to include proven specific measures to apply when thresholds are not being met.</p>

Residual impact or risk to environmental value	Assessment finding or Environmental outcome	Recommended conditions and DMA regulation
	<ul style="list-style-type: none"> • it will not have adverse impacts on the inlet’s marine environmental quality and associated values • timely implementation of viable contingency management measures to protect Leschenault Inlet marine environmental quality if HEPA is not maintained. <p>Subject to the above, impacts to Leschenault Inlet are unlikely to be inconsistent with the EPA objective for marine environmental quality.</p> <p>The environmental outcome is likely to be consistent with the EPA factor objective for marine environmental quality and values of Koombana Bay if proposal subject to recommended conditions to meet marine environmental quality, and associated monitoring and reporting.</p>	<p>Condition B5-1 (Environmental Performance Report)</p> <p>Evaluate the realised direct and indirect impacts, including, and cumulative impacts on marine environmental quality, five years after the completion of construction activities.</p>

2.2 Benthic communities and habitats

2.2.1 Environmental objective

The EPA environmental objective for benthic communities and habitats is *to protect Benthic Communities and Habitats so that biological diversity and ecological integrity are maintained.* (EPA 2016).

2.2.2 Investigations and surveys

The EPA advises the following investigations, surveys were used to inform the assessment of the potential impacts to benthic communities and habitats:

- *Benthic Communities and Habitat Study Koombana Bay Marine Structures, Bunbury*, version 2 (RPS 2023)
- *Coastal Processes Impact Assessment Koombana Bay Marine Structures SPER*, version 2 (GHD 2023)
- *Marine Environmental Quality Modelling Koombana Bay Marine Structures SPER* (GHD 2023).

The surveys were consistent with the *Technical Guidance – Protection of Benthic Communities and Habitats* (EPA, 2016).

The proponent has mapped the benthic communities and habitats within a 50 km² local assessment unit (LAU) and undertaken assessments of the area of predicted permanent loss and the area where some level of temporary disturbance to benthic communities and habitats would occur if the proposal was implemented. The map for the current benthic habitat within Koombana Bay and the broader LAU is presented in Figure D and Figure E, respectively within *Benthic Communities and Habitat Study* (RPS 2023).

2.2.3 Assessment context – existing environment

The extent of benthic communities and habitats within Koombana Bay and the adjacent coastline was mapped by RPS in 2017. Using aerial imagery, field observations and historical studies, five benthic habitat classes were identified, including:

- seagrass habitat comprised of *Heterozostera* sp. and *Halophila* sp. along most of the inshore areas of Koombana Bay, excluding the Casuarina Harbour. The seagrass was predominantly found at depths between 1.0 and 3.0 m. No assemblages of *Posidonia* sp. and *Amphibolis* sp. were found within Koombana Bay in proximity to the proposal. The more ephemeral *Heterozostera* sp. and *Halophila* sp. are characterised to have quicker recovery capacities (Kilminster et al., 2015) compared to the higher conservation valued *Posidonia* sp. and *Amphibolis* sp.
- assemblages of brown, green and red macroalgae attached to the shoreline reef shore of Koombana beach adjacent to the proposed DDC finger jetty extending eastwards toward the entrance channel to the Inner Harbour at a depth of approximately 1.5 m

- areas of turf algae dispersed across shoreline area at depths of 3.0 – 4.0 m
- bare sediment habitat throughout CBH and at depths greater than 4.0 m throughout the rest of Koombana Bay
- reef with filter feeder communities in low densities (<2.5% coverage) along the coastline and area of higher density on near shore reefs, northeast of the proposal site.

The Leschenault Inlet is a conservation category wetland and supports a remnant population of white mangrove (*Avicennia marina*) community. This mangrove community is listed by the DBCA as priority 1 ecological community (PEC) and is the southernmost population of white mangroves on the Australian mainland. Mangrove Cove is located on the northern shore of the inlet and is managed by the DBCA as regional open space under the Greater Bunbury Region Scheme and part of the broader Kalgulup Regional Park. The mangroves in the Leschenault Inlet have been subject to significant historical hydrodynamic and hydrochemical modification (Semeniuk et al., 2000). The white mangrove community has been increasing in density and extent since the creation of the inlet, with substrate and salinity being the major determining factors in mangrove recruitment (DoW 2007).

2.2.4 Consultation

Matters raised during stakeholder consultation and the proponent's responses are provided in the response to submissions document (SWDC 2023). Public consultation on the proposal raised concerns regarding the capacity of seagrass communities within Koombana Bay to tolerate dredging impacts and whether communities would recover within five years of being impacted. The public consultation requested a commitment from the proponent to avoid dredging during the peak summer growing period to minimise impacts to seagrass.

The EPA notes that restricting dredging activities between December and March will minimise impacts to marine environmental quality and have the least impact on seagrass growth and reproduction.

2.2.5 Potential impacts from the proposal

The EPA have determined that the proposal has the potential to significantly impact on benthic communities and habitats from:

- direct impacts from construction of the KBSC marina and CBH water bodies and breakwaters
- indirect impacts including reduced water quality from dredging and construction
- reduction in marine environmental quality from altered sediment and water movement during the operation of the proposal.

The EPA notes that direct impacts are predicted based on the footprint of dredging and construction activities. Indirect impacts are predicted based on the modelling of potential stressors. Cumulative loss of seagrasses, turf algae and bare sediments are detailed in Section 3.3.1 and Table 10 of Benthic Communities and Habitat Study (RPS 2023).

2.2.6 Avoidance measures

The avoidance of impacts to benthic communities and habitats is unachievable given that the construction of the CBH is an extension to already existing infrastructure, where approximately 37.4 ha has already been disturbed. The movement of the KBSC marina and DDC finger jetty to alternate locations would not reduce the direct and indirect impacts to benthic communities and habitats.

2.2.7 Minimisation measures (including regulation by other DMAs)

The proponent has proposed the following measures to minimise impact to benthic communities and habitats:

- indicative disturbance footprints for derived proposals are designed to be as small as possible and where possible within previously disturbed areas whilst still servicing the needs of the growing local population
- use of existing spoil grounds located in Commonwealth waters
- undertaking dredging works outside of December to March to reduce the indirect impacts from plumes
- silt curtains will be used for KBSC marina dredging, thereby limiting the impact within Koombana Bay and minimising the indirect impact to benthic communities.

2.2.8 Rehabilitation measures

Rehabilitation measures are not a relevant mitigation in relation to this environmental factor.

2.2.9 Assessment of impacts to environmental values

The proponent has assessed the loss of benthic communities and habitats in the context of the *EPA's Technical Guidance – Protection of Benthic Communities and Habitats* (EPA, 2016) and the *EPA's Technical Guidance – Environmental Impact Assessment of Marine Dredging Proposals* (EPA, 2021).

For the purposes of the assessment, the proponent has presented scenarios of total disturbance for the implementation of the future proposals combined, as well as each future proposal including areas of direct and indirect loss.

Direct impacts on Benthic Communities

The EPA notes that the strategic proposal will result in residual impacts to benthic communities and habitats as summarised in Table 3 below. Key potential impacts are:

- the total predicted loss all future proposals on benthic habitats is up to 40.81 ha, of which 28.96 ha (or 71%) is bare sediment
- the permanent loss of up to 3.21 ha of turf algae, 80% of which is from the KBSC marina development

- the permanent loss of up to 8.64 ha of seagrass beds (*Halophila* sp. and *Heterozostera* sp.). The KBSC marina development impacts 8.17 ha of seagrass, or 1.63% of the expected total loss of benthic communities and habitats in the LAU. Historical infrastructure and ongoing maritime activities in Koombana Bay have resulted in seagrass assemblages that are of varying densities and health. The EPA note that the seagrass assemblages of *Halophila* sp. and *Heterozostera* sp. mapped to be lost as part of the implementation of the proposal are sparse and subject to a number of threats and disturbances (e.g. moorings and boat anchors). They are also characterised as having quicker recovery capacities from disturbance when compared to other perennials seagrasses.

Table 3: Benthic Communities directly impacted (ha and % of entire LAU)

Habitat type	CBH	KBSC marina	DDC finger jetty	Entire proposal (LAU)
Bare sediment	28.57	0.39	0	28.96 (2.17%)
Seagrass	0.44	8.17	0.03	8.64 (1.73%)
Turf algae	0.64	2.57	0	3.21 (6.43%)
Total	29.65	11.13	0.03	40.81 (0.78%)

When historical losses are considered, the KBMS strategic proposal would result in a cumulative loss of 2.76% of benthic communities and habitats within the LAU, which represents an incremental increase of 0.78% over the historical losses.

Construction related indirect impact on Benthic Communities

The proponent predicts there will be no additional irreversible loss of benthic communities and habitats as a result of indirect impacts from dredging and construction activities (Figure 1, RPS 2023).

Consistent with the technical guidance (EPA 2021), the proponent has presented the 'most likely best case' and 'most likely worst case' scenario for indirect recoverable losses within the Zone of Moderate Impacts. Details of indirect recoverable losses are detailed in Section 3.2.3 and Table 9 of Benthic Communities and Habitat Study (RPS 2023). The predicted worst case recoverable losses associated with the proposal is estimated at up to: 21.10 ha of seagrass habitat; 10.96 ha of sediment with turf algae; and 0.25 ha of reef with macroalgae.

The EPA note that perennial seagrass beds *Posidonia* sp. and *Amphibolis* sp. which are of high habitat value are outside Koombana Bay (see Figures D and E of Benthic Communities and Habitat Study (RPS 2023)) and are unlikely to be impacted. Predicted impacts to perennial seagrass is limited to short term sedimentation of *Heterozostera* sp. beds.

A survey of seagrass health and extent will be undertaken prior to and following completion of the CBH and KBMS derived proposals marine construction works. If the post-construction survey does not demonstrate full recovery of any impacts to seagrass health and extent, a further survey is to be undertaken within 5 years (MCMMP, RPS 2024).

The EPA advises that the residual impact to seagrass should be subject to implementation conditions to ensure protection of benthic communities and habitats and ensure the environmental outcome is consistent with the EPA objective for benthic communities and habitats.

The modelling of impact zones (RPS 2023) has determined that the white mangrove community is outside of the zones of impact and is unlikely to be indirectly impacted by sedimentation from dredge and construction works associated with implementation of future proposals.

Operation related impacts on Benthic Communities

Assessment indicates that benthic communities and habitats in proximity to the proposal areas are unlikely to be significantly impacted by operational activities. As per the assessment context a focus has been placed on the protection of the white mangrove community. The proponent predicts there will be no significant impact on the white mangrove community in the Leschenault Inlet. It is noted that mangrove communities are susceptible to changes in tidal height, water temperature and exposure to storm events and the future proposals are not expected to exacerbate those threats and pressures. However, given the PEC listing of this community the EPA recommends an outcome-based condition which requires the proponents to ensure no change to the extent and condition of the mangrove community.

Cumulative impacts to Benthic Communities

The implementation of future proposals will result in total disturbance (by way dredging, breakwaters and reclamation) of up to 40.8 ha of benthic communities and habitats within Koombana Bay. When combined with estimated historical and approved losses from other projects, this represents an irreversible loss of 2.76% of benthic communities and habitats in the local assessment unit (the area defined in the assessment within which to calculate cumulative losses).

When seagrass is considered separately, it is predicted that 8.64 ha would be lost from the combined implementation of the future proposals. When considered in the context of historical losses in the local assessment unit, this represents an additional incremental loss of 1.73 % of seagrass habitat (i.e. where 9.6% of seagrass in the local assessment unit is estimated to have been already been lost from historical developments). This small incremental loss of seagrass is unlikely to have a significant impact on the biological diversity and ecological integrity of Koombana Bay.

To minimise the risk of further losses from indirect impacts (e.g. shading and sedimentation) the proponent has committed to avoid dredging and reclamation during the key growth and reproductive season for seagrass (December to March). EPAS has recommended this be a condition on future proposals.

2.2.10 Summary of key factor assessment and recommended regulation

The EPA has considered the likely residual impacts of the proposal on benthic communities and habitats environmental values. In doing so, the EPA has considered whether reasonable conditions could be imposed to ensure consistency with the EPA factor objective. The EPA assessment findings are presented in Table 5.

The EPA has also considered the principles of the *Environmental Protection Act 1986* (see Appendix C) in assessing whether the residual impacts will be consistent with its environmental factor objective and whether reasonable conditions can be imposed (see Appendix A).

Table 4: Summary of assessment for benthic communities and habitats

Residual impact or risk to environmental value	Assessment finding or Environmental outcome	Recommended conditions and DMA regulation
<p>1. Impacts to benthic communities and habitats due to construction activities.</p>	<p>The direct impacts will result in a loss of some benthic communities and habitats which is not significant when considered in both a cumulative and proposal context. Cumulative loss within the local assessment unit would be 2.76%, an increase of 0.78% over the estimated current historical losses.</p> <p>For seagrasses it is predicted that 8.64 ha would be lost from the combined implementation of the future proposals. When considered in the context of historical losses in the local assessment unit, this represents an additional incremental loss of 1.7 % of seagrass habitat.</p> <p>There is no predicted loss of high-value perennial <i>Posidonia</i> sp. and <i>Amphibolis</i> sp. seagrass habitat.</p> <p>No irreversible indirect loss of benthic communities and habitats outside of ZoHI are predicted from indirect impacts associated with increased suspended sediment / turbidity during dredging and construction activities. Any indirect impacts will likely be recovered within 5 years.</p>	<p>Condition A1 (Limitations and extent of proposal) Limit on the extent of the proposal including the direct disturbance to seabed associated with construction.</p> <p>Condition B2-1 (Benthic Communities and Habitat) No irreversible loss to benthic communities outside of disturbance footprint for CBH.</p> <p>Condition B2-2 The CBH proposal to implement the MCMMP (RPS 2024) to ensure the environmental outcomes of Condition B2-1 are achieved.</p> <p>Condition B2-3 No irreversible loss of benthic communities outside the final disturbance footprint of the KBSC marina proposal.</p> <p>Condition B2-4 The KBSC marina proposal to review and revise the MCMMP (RPS 2023) to ensure latest baseline</p>

Residual impact or risk to environmental value	Assessment finding or Environmental outcome	Recommended conditions and DMA regulation
	<p>Dredging-related impacts minimised through conditioned December to March exclusion period. Silt movements will be minimised via construction controls (e.g. for KBSC marina use of silt curtains and construction of breakwaters first to contain silt).</p> <p>All other impacts to benthic communities from indirect impacts (shading and sedimentation) are expected to be recoverable. Marine Construction Monitoring and Management Plan (MCMMP) includes pre and post marine construction seagrass surveys.</p> <p>The total change of benthic communities and habitats resulting from the KBMS strategic proposal is low in a regional context. The environmental outcome is likely to be consistent with the EPA factor objective for benthic communities and habitats and values of Koombana Bay if proposal subject to recommended extent and dredge exclusion period conditions.</p>	<p>information is incorporated and the environmental outcomes of Condition B2-3 are achieved.</p> <p>Condition B5-1 (Environmental Performance Report) Evaluate the direct and indirect impacts, including cumulative impacts on benthic communities and habitats, five years after the completion of construction activities.</p>
2. Impacts to white mangrove (<i>Avicennia marina</i>) Community.	<p>No predicted significant impacts from the construction on the Priority 1 white mangrove (<i>Avicennia marina</i>) community (PEC) in Leschenault Inlet.</p> <p>The residual risk of ongoing impacts associated with the KBSC marina proposal to the white mangrove community and other benthic communities and habits in Leschenault Inlet is low. However, some uncertainty remains with the potential for indirect impacts due to changes in ecological processes to be associated with reduced flushing of the inlet.</p> <p>The environmental outcome is likely to be consistent with the EPA factor objective for benthic communities and</p>	<p>Condition B2-3 (Benthic Communities and Habitat) No adverse impacts to the health and extent of the Leschenault Inlet mangrove community.</p> <p>Condition B1-5(1) Maintain current Leschenault Inlet flushing regime.</p>

Residual impact or risk to environmental value	Assessment finding or Environmental outcome	Recommended conditions and DMA regulation
	habitats and values of Koombana Bay and the Leschenault Inlet if proposal subject to recommended extent conditions.	

2.3 Marine fauna

2.3.1 Environmental objective

The EPA environmental objective for marine fauna is *to prevent or minimise pollution and protect the environmental values associated with the marine environment* (EPA 2016).

2.3.2 Investigations and surveys

The proponent undertook an Invasive Marine Species survey (RPS 2022) and online searches for species using *the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)* Protected Matters search tool and DBCA's NatureMap and Threatened and Priority Fauna databases were conducted. At least 70 conservation significant species that are potentially found within or in proximity to the proposal area are listed in Tables 62, 64, 65 and 66 of the referral document.

The EPA advises the following investigations and surveys were used to inform the assessment of the potential impacts to marine fauna:

- *Invasive Marine Species Survey*, version 1 (RPS 2022)
- *Koombana Bay Marine Structures Underwater Noise Assessment*, version 0 (SVT Engineering Consultants 2018)
- *Marine Fauna Management Plan*, revision 3 (RPS 2024)
- *Avifauna Management Plan Koombana Precinct*, revision 0a (RPS 2024).

2.3.3 Assessment context – existing environment

The marine waters and coastline in proximity to the proposal area support a variety of fauna, several of which are protected under State and Commonwealth legislation. Conservation significant fauna which can occur in Koombana Bay and adjacent Indian Ocean include the New Zealand fur seal, southern right whale, humpback whale, two locally iconic species of bottlenose dolphin. Many of the conservation significant species which have the potential to occur in Koombana Bay or have overlapping biological important areas (BIA), either do not utilise the area regularly or have not been sighted in the area. Their distribution within the area changes seasonally depending on migration patterns, food availability and water temperature. Of these species, bottlenose dolphins are the most likely to regularly inhabit areas within and near the proposal area.

For the purposes of this assessment, key avifauna species have been defined as those that are protected under the *EPBC Act, Biodiversity Conservation Act 2016 (BC Act)* or breeding species that locally valued. These include the Australian fairy tern (hereafter fairy tern) and the little penguin. Fairy terns in particular have the potential to nest in the proposal area.

Based on records from the Western Australian Museum (Huisman et al. 2008) and previous surveys, 27 of the 62 invasive marine species (IMS) documented in Western Australia have been reported in Bunbury Harbour at some time (RPS 2022).

2.3.4 Consultation

Matters raised during stakeholder consultation and the proponent's responses are provided in the proponent's response to submissions document (SWDC 2023). Public submissions raised concerns about impacts to seabird/shorebird nesting and foraging areas, in particular impact to fairy tern nesting. Concerns were also raised around potential foraging ground impacts to dolphins, little penguin, and fur seals.

The proponent has undertaken significant stakeholder consultation on marine fauna which has continued following the Public Environmental Review (PER) process, particularly to address matters raised regarding potential impacts to avifauna.

The EPA notes the consultation that has been undertaken to develop the actions in the Marine Fauna Management Plan (RPS, 2024) Koombana Precinct Avifauna Management Plan (RPS, 2024) and Marine Construction Management Plan (RPS, 2023) and is of the opinion that implementation of the actions that they detail will likely mitigate risks to marine fauna associated with the proposal.

2.3.5 Potential impacts from the proposal

The proposal has the potential to impact on marine fauna from:

- disturbance of breeding and foraging during construction
- temporary behavioural responses from noise emissions during construction
- vessel strike, entanglement or entrainment during construction
- introduction of invasive marine species
- permanent loss or degradation of habitat and foraging grounds
- indirect temporary impacts to marine fauna and their habitat from turbidity.

2.3.6 Avoidance measures

The proponent's avoidance measures include of the selection of largely already-disturbed harbour and anchorage areas, the timing of dredging to avoid impacts to some foraging periods and seagrass growth during the summer period, and the timing some piling to avoid underwater noise emission impacts to bottlenose dolphin during calving months.

2.3.7 Minimisation measures (including regulation by other DMAs)

The EPA encouraged the proponent to include additional measures throughout the assessment process. Excluding dredging during December to March has minimised the impacts on marine fauna and their habitat.

A minimisation measure that can be applied to dredge and piling campaigns is timing the works to avoid key periods such as foraging, breeding, calving. The proponent has committed to not undertaking dredging works between the months of December and March with the aim of avoiding a key growth period for seagrass, with the aim of reducing potential impacts to benthic communities and habitats and associated foraging potential.

Matters raised during stakeholder consultation regarding underwater noise have been largely addressed by the proponent. The proponent has committed to not undertaking piling works in areas outside of breakwater infrastructure (CBH phase 1 works) between the months of December and March, during the dolphin calving season. Recognising that it may not be possible to avoid all potential fauna disturbing works during this period, the proponent has also set out marine fauna management protocols in the Marine Fauna Management Plan (MFMP) (RPS 2024). Such as:

- the use of marine fauna observation, and exclusions zones
- start up and stop work procedures in the event marine fauna are observed in proximity to vessels and construction activities.

The proponent is implementing measures to minimise the chance of fairy terns nesting within the CBH onshore construction layover area. These are detailed in the Koombana Precinct Avifauna Management Plan (RPS 2024) and include an application of hydro mulch to the site to deter nesting and ensuring alternative nesting habitat is available at the Outer Harbour area by coordinating with SPA on the timing of sand management activities at McKenna Point.

2.3.8 Rehabilitation measures

Rehabilitation measures are not a relevant mitigation in relation to this environmental factor.

2.3.9 Assessment of impacts to environmental values

The EPA considers that the key marine fauna values likely to be impacted by the proposal is the local and regional population levels of significant marine fauna which utilise Koombana Bay.

The residual impacts to these values are likely to arise from disturbance of breeding behaviours, impacts on benthic habitat, noise, vessel strike, fauna entrainment and introduced marine species.

Impacts to marine environmental quality, and benthic communities and habitats are addressed in sections 2.1 and 2.2.

Marine fauna and breeding

The EPA notes that the proponent has undertaken reviews of existing knowledge and stakeholder consultation to understand the breeding behaviours of key marine fauna such as dolphins, little penguins and fairy terns. They have used this knowledge to predict impacts and will manage the timing of marine construction activities that may impact on their breeding success. The December to March dredging and reclamation exclusion period discussed in marine environmental quality reduces potential impacts from turbidity to breeding success. The exclusion of some piling activities during this period also apply.

Given the short-term and temporary nature of each phase of marine construction works, and implementation of the MFMP (RPS 2024) potential impacts to significant marine fauna are likely avoidable, manageable, and not expected to be significant at local and regional population levels.

Fairy terns

The EPA in its assessment has also considered the use of land adjacent to the proposal during construction. The assessment has not extended to future uses of this land beyond the proposal and advice on potential future development is provided in section 5 Other Advice. Public and Decision-Making Authority (DMA) consultation has identified areas that have the potential to host breeding for fairy terns, and other sea and shorebirds.

As a measure to manage and mitigate potential impacts to avifauna, the EPA notes that the proponent has developed an Koombana Precinct Avifauna Management Plan (KPAMP) (RPS 2024). This plan details a number of steps to reduce the chance of fairy terns nesting on the CBH construction layover area such as application of hydro-mulch to deter nesting and ensuring alternative natural nesting habitat is available at the nearby McKenna Point. The plan also sets out a series of measures to mitigate impacts to fairy terns should they nest at the site. Finally, if construction cannot be delayed or modified to avoid or minimise disturbance to nesting terns, the plan suggests that relocation of nesting fairy terns could be considered.

The EPA note that if a fairy tern nest is proposed to be relocated away from a KBMS construction zone, a Ministerial Authorisation under section 40 of the *BC Act* would be required to take or disturb a threatened species. In recognition of the significance of the fairy tern population, the EPA has recommended a condition with an outcome that the proponent does not disturb actively nesting birds at CBH.

Underwater Noise, vessel strike and entertainment

The EPA recognises that the dredging and disposal activities are of relatively short duration. The three individual programs are expected to be about one to three months long. During this time, marine fauna could be impacted by vessel strike, entrainment in dredge equipment and noise from vessel operations.

Pile driving that is associated with the proposed construction of boat pens at CBH and KBSC marina, and the construction of the DDC finger jetty is a significant source of underwater noise which can have a physiological impact to an animal's hearing (which is either permanent or temporary) or a behavioural response (such as fleeing or moving away). Piling works will be undertaken across all proposals, with a December to March exclusion period applied for piling in waters outside of breakwaters. The proponent's modelling and underwater noise assessment concluded that construction activity will have minimal impact on the marine fauna because the likelihood of impact of injury to marine fauna can be managed with the use of a 500 m exclusion zone, consistent with standard best practice.

The EPA notes that the management measures applied by the proponent are industry standard for dredging and piling programs, and considers they are likely to minimise the risks of direct and indirect impacts to marine fauna. With the adoption of these measures, and conditions to apply the Marine Fauna Management plans and limiting the timing of certain piling activities, the impact on marine fauna is not expected to be significant at local and regional population levels.

In addition, and in recognition of the significance and iconic nature of the dolphins of Koombana Bay, the EPA has recommended a condition to minimise the risk of construction and operation displacing dolphins that are an integral part of the identity of Koombana Bay.

Invasive Marine Species

The implementation of the KBMS strategic will increase recreational boat traffic and vessels docking in CBH and the KBSC marina, which is generally associated with an increased occurrence of IMS. However, the nature of the traffic and style of vessels docking will remain largely unchanged.

Risk of introducing new species is being minimised via the use of construction and operational controls of the National Systems for the Prevention and Management of Marine Pest Incursions. Whilst the discharge of ballast water in Australian waters will be regulated by the *Biosecurity Act 2015*.

The MFMP details these IMS controls which will reduce the risk of new introductions from the proposal. This plan is recommended to be implemented as part of protection of the marine fauna.

Fishing

The Bunbury region is an important location for recreational and commercial fishing. Koombana Bay is not used directly for commercial fishing, but it has high rates of recreational fishing. Recreationally caught species targeted in Koombana Bay include tailor, Australian herring, whiting, mulloway and blue swimmer crab. Fish surveys by DPIRD indicate that the Leschenault Estuary, Koombana Bay and the Leschenault Inlet are important nursery grounds for finfish and blue swimmer crabs (Rodney Duffy, DPIRD, pers comm. 15 March 2023).

Given the short-term nature of each phase of marine construction works and the implementation of the MFMP (RPS 2024) the potential impacts to the fishing activities and fish population levels are not expected to be significant. The recommended condition on the control of the timing of dredging and reclamation will protect the amenity of Koombana Bay during the time of year with the highest recreational fishing participation rates.

The potential impacts of increase levels of fishing are discussed in the holistic assessment (Section 3) and other environmental factors (Appendix D).

2.3.10 Summary of key factor assessment and recommended regulation

The EPA has considered the likely residual impacts of the proposal on marine fauna environmental values. In doing so, the EPA has considered whether reasonable conditions could be imposed, or other decision-making processes can ensure consistency with the EPA factor objective. The EPA assessment findings are presented in Table 6.

The EPA has also considered the principles of the *Environmental Protection Act 1986* (see Appendix C) in assessing whether the residual impacts will be consistent with its environmental factor objective and whether reasonable conditions can be imposed (see Appendix A).

Table 5: Summary of assessment for marine fauna

Residual impact or risk to environmental value	Assessment finding or Environmental outcome	Recommended conditions and DMA regulation
1. Direct impact to marine fauna habitat.	<p>The proposal will result in a small incremental loss of benthic communities that act as key fauna habitat, particularly small areas of seagrass. This is unlikely to have a significant impact given that the habitat to be removed is a very small proportion of the habitat available in the broader Koombana Bay area and is well represented in the area, not restricted or rare, so the environmental outcome is likely to be consistent with the EPA objective for marine fauna.</p> <p>Environmental outcome consistent with the EPA factor objective for marine fauna if subject to recommended conditions and the Commonwealth sea dumping permit.</p>	<p>Condition A1 (Limitations and extent of the proposal) limit on the extent of the proposal including the direct disturbance associated with construction.</p>
2. Reduction in marine environmental quality on marine fauna.	<p>Areas close to construction will be temporarily affected by suspended sediments during capital dredging and construction.</p> <p>Implementation of the Marine Construction Monitoring and Management Plan (MCMMP) and the two Marine Environmental Quality Management Plans (MEQMPs) will mean that significant residual impacts to marine fauna from reduced marine environmental quality is considered unlikely.</p> <p>These plans are recommended to be revised for the KBSC marina to align with the reduced impacts and/or improved management of those impacts.</p>	<p>Condition B1-1 (Marine Environmental Quality) outcomes to avoid impacts to marine environmental values.</p> <p>Condition B1-2 no dredging and reclamation, during the period of 1 December and 31 March.</p> <p>Condition B1-3 CBH implement the environmental management plan Marine Environmental Quality Management Plan (Only Casuarina Boat harbour Development) and the environmental management plan Marine Construction Monitoring and Management Plan.</p> <p>Condition B1-5</p>

Residual impact or risk to environmental value	Assessment finding or Environmental outcome	Recommended conditions and DMA regulation
		<p>KBSC review and revise Marine Construction Monitoring and Management Plan and environmental management plan Marine Environmental Quality Management Plan to satisfy C4 and achieve condition B1-1 environmental outcomes.</p>
<p>3. Potential impacts to marine fauna vessel from vessel collision, entanglement, entrainment and underwater noise.</p>	<p>Marine dredging, piling and construction activities (including piling and operation of large vessels) that have the potential to impact marine will be short-term, temporary and any impacts are likely to be localised. Low residual risk to marine fauna in Koombana Bay from vessel collision during operation of the proposals will be managed through adherence to vessel speed limits (as designated by the DoT and Southern Ports Authority).</p> <p>The proponent has incorporated industry standards, fauna observation protocols and activity exclusion periods into a Marine Fauna Management Plan (MFMP) to minimise impacts during construction.</p> <p>Significant residual impacts to marine fauna from dredging, elevated underwater noise, vessel collision, entanglement and/or entrainment are considered unlikely, so the environmental outcome is likely to be consistent with the EPA objective for marine fauna.</p>	<p>Condition B4-1 (Marine Fauna) Objectives to minimise the risks of:</p> <ul style="list-style-type: none"> • physical injury, mortality, • behaviour changes and health impacts • displacing dolphins. <p>Condition B4-2 Implement Marine Fauna Management Plan to achieve objectives of B4-1.</p> <p>Condition B4-4 No piling at the Casuarina Boat Harbour Development (prior to the construction of the northern breakwater)</p> <p>Condition B4-5 No piling at the KBSC marina and DDC finger jetty during the period of 1 December and 31 March.</p>

Residual impact or risk to environmental value	Assessment finding or Environmental outcome	Recommended conditions and DMA regulation
4. Potential impacts to marine fauna (avifauna) during construction activities.	<p>Land-based activities, such as a laydown area, that support marine construction have the potential to impact avifauna fauna. These will be short-term, temporary and any impacts are likely to be localised.</p> <p>The proponent has developed risk mitigating management protocols in consultation with DBCA and stakeholders, within a KPAMP to minimise and monitor impacts to key avifauna during construction. Condition for no displacement of nesting fairy terns and the implementation of the actions in the avifauna fauna management plan will mean that the environmental outcome is likely to be consistent with the EPA objective for marine fauna.</p>	<p>Condition B4-3</p> <p>Outcome of no displacement of actively nesting fairy terns during construction of CBH.</p>

2.4 Coastal processes

2.4.1 Environmental objective

The EPA environmental objective for coastal processes is *to maintain the geophysical processes that shape coastal morphology so that the environmental values of the coast are protected* (EPA 2016).

2.4.2 Investigations and surveys

The EPA advises the following investigations, surveys and peer reviews were used to inform the assessment of the potential impacts to coastal processes:

- *Coastal Processes Impact Assessment Koombana Bay Marine Structures SPER*, version 2 (GHD 2023)
- *Koombana Bay Marine Structures SPER Coastal Processes Peer Review* (Seashore Engineering 2022)
- *Coastal Processes Management Plan (Only Casuarina Boat Harbour Development)*, version 1 (GHD 2023)
- *Coastal Processes Management Plan*, version 3 (GHD 2023).

The surveys were consistent with the *EPA Factor Guideline – Coastal Processes* (EPA, 2016).

2.4.3 Assessment context – existing environment

Koombana Bay

An estimated 170,000 m³ of sediment accumulates in Koombana Bay per year of which, over 50 per cent is fine silt believe to be mobilised from the Leschenault Estuary (Shore Coastal 2009).

The currents of Koombana Bay shows a prominent clockwise rotational pattern throughout much of the bay. A smaller and localised counterclockwise current (counter current) is present in the south-western areas of Koombana Bay, adjacent to the proposal.

Beaches

Koombana Bay has a number of beaches used by the local community (Figure 2). These are locally known as Koombana Beach, Koombana Bay Sailing Club Beach, Ski Beach (including the adjacent Marlston Waterfront) and the Casuarina Harbour Jetty Baths. These beaches have either a groyne or breakwater construction immediately adjacent, with the Jetty Baths Beach located wholly within Casuarina Harbour. The coastal processes at these beaches have been impacted by structures which have interrupted sediment deposition and erosion.

The net longshore sediment transport rate of marine sands along the ocean beaches within the Bunbury area was assessed as being 70,000 m³/year (Shore Coastal, 2009).

Koombana Beach

Koombana Beach surveys conducted between March 1991 and May 2008 identified (Seashore Engineering 2013):

- erosion from the eastern part of the beach in the form of an erosion scarp had occurred in response to storms
- erosion evident at the centre of the beach
- an estimated 1,650 m³/year of sand accretion at the western end of the beach, adjacent to the KBSC groyne
- accumulation offshore of Point Busaco (eastern end of Koombana Beach), likely associated with vessel-bank interactions.

Koombana Bay Sailing Club Beach

Longshore sediment transport and the shape of the beach at the KBSC are controlled by the presence of the Koombana Bay Groyne (constructed between 1971 and 1972) to the east and the Leschenault Inlet Entrance Channel Groyne (constructed between 1973 and 1974) to the west.

Ski Beach (including Marlston Waterfront)

Longshore sediment transport and the shape of Ski Beach are controlled by the presence of the Marlston Waterfront Seawall (constructed by 2001) and rock revetment to the west and the Leschenault Inlet Entrance Channel Groyne (constructed between 1983-1974) to the east. Since the Marlston Hill development (including seawalls to waterfront buildings) was completed in 2001, the beach has remained stable in shape that indicates a balance in longshore sediment transport processes.

2.4.4 Consultation

Matters raised during stakeholder consultation and the proponent's responses are provided in the response to submissions document (SWDC 2024). Public consultation on the proposal raised concerns about the adequacy of monitoring and management actions associated with potential impacts to coastal processes associated with the KBSC marina development.

The proponent has developed two Coastal Process Management Plans to address the concerns raised during public consultation. Details of these Coastal Process Management Plans are included in section 2.4.7.

2.4.5 Potential impacts from the proposal

As southern Koombana Bay is a low energy setting (due to limited waves and currents) there is a degree of uncertainty associated with potential impacts to coastal processes particularly, from the KBSC marina.

The KBSC marina is predicted to have modest impacts on the coastal processes of southern Koombana Bay (GHD 2023a) along the Marlston Waterfront / Ski Beach area due to alteration of circulation patterns and the possible alteration of the counter current.

The Koombana Bay Sailing Club Marina and Casuarina Boat Harbour breakwaters have the potential to result in:

- direct impacts to wave energy and current patterns and associated longshore sediment, and seagrass wrack transport and deposition
- indirect impacts to the morphology of the coastal zone
- potential interruption of the counterclockwise current in the south-western areas of Koombana Bay
- impacts to public amenity and recreation values associated with altered sediment and seagrass wrack movement.

The creation of semi-enclosed water bodies within Koombana Bay Sailing Club Marina and Casuarina Boat Harbour have the potential to result in:

- direct impacts to wave energy within enclosed water bodies
- indirect impacts to sedimentation and seagrass wrack transport patterns.

The DDC finger jetty is not predicted to have any measurable impact on coastal processes due to its small scale and trestle structure.

2.4.6 Avoidance measures

The proponent has proposed that the avoidance of impacts associated with coastal processes is not achievable.

2.4.7 Minimisation measures (including regulation by other DMAs)

In response to matters raised in the public consultation the proponent developed two versions of the Coastal Processes Management Plans (CPMP). One CPMP has been prepared for only the CBH development in recognition that it is intended to be implemented shortly after approval of the KBMS strategic proposal. Prior to construction of the KBSC marina, the second CPMP is required to be revised and approved by DWER.

The two CPMPs (GHD 2023) address monitoring and management of coastal processes and seagrass wrack across the KBMS strategic proposal. Risks posed to coastal processes and seagrass wrack dynamics by CBH are lower than those posed by KBSC marina.

The EPA acknowledge the proponent has committed to maintaining coastal processes and amenity values (including odour) by implementing measures to minimise impacts to coastal processes including:

- managing the KBMS strategic proposal erosion and accretion impacts
- maintaining navigation safety
- monitoring and managing seagrass wrack within and in proximity to proposals.

2.4.8 Rehabilitation measures

The EPA notes the proposed the monitoring and management framework within the Coastal Processes Management Plans to address the coastal processes changes associated with the implementation of the proposal over the long-term.

2.4.9 Assessment of impacts to environmental values

The EPA has assessed the likely impacts of the proposal on coastal processes to be:

Sediment Transport

The EPA have determined that the proposal is likely to impact sediment transport in Koombana Bay. The proposed construction of the KBSC marina breakwater may interrupt the circulation patterns and sediment transport within the south-western portion of Koombana Bay (GHD 2023). Given the final design of the KBSC marina is yet to be confirmed, the full extent of sediment transport disruption associated with the KBSC marina proposal is uncertain. Management of beach erosion and accretion already occurs, but a better understanding of changes to processes needs to be developed. This will allow clear management outcomes to be agreed upon by the relevant parties and any potential impacts can be managed via the CPMPs.

Beaches

The EPA have determined that the proposal is likely to impact the storm response at Koombana Bay beaches. The EPA particularly note that area between the Marlston Waterfront and the KBSC is likely to experience significant changes to current patterns during storm events. The alteration of the counter current could reduce the storm response capabilities of Ski Beach directly west of the KBSC marina proposal.

Ocean Currents

The EPA have determined the following impacts to ocean currents are likely to occur with the implementation of the KBSC marina proposal:

- alteration to currents after development of the KBSC marina breakwaters could increase sediment buildup to the east of the proposal and reduce sediment to the west of the proposal
- alteration of the Koombana Bay counter current due to the construction of the KBSC marina breakwaters interrupting flow. This alteration is also linked with the reduction in flushing of the inlet, and changes to wrack deposition.

Seagrass Wrack

The EPA notes that no material changes to seagrass wrack transport and deposition patterns are likely with the implementation of the proposal. Investigations have determined that minimal seagrass wrack deposition is predicted on Koombana Beach due to:

- during high energy winter periods the majority of seagrass wrack is transported offshore via the channel, whilst some accumulation will be observed in the eastern parts of Koombana Bay
- during low energy winter periods a larger portion of wrack remains within Koombana Bay. After 10 days, seagrass wrack was modelled to move offshore.

The shipping channel acts as a natural sink that prevents the westerly transport of seagrass wrack to Koombana Beach. The entrapment of wrack in the shipping channel as well as wrack deposition in the north-eastern portion of the bay is predicted to not be affected by the implementation of the proposal.

Despite the low risk of changes to seagrass wrack deposition on beaches the EPA notes that given the significant social and ecological impacts that wrack deposition can result in, any potential impacts should be managed via the CPMPs.

Amenity

The EPA notes that risks associated with seagrass wrack accumulation and localised sediment alteration can have a negative impact on the amenity and recreational value of Koombana Bay. As such, the EPA has recommended the management of these risks via the CPMP and MCMMP.

Sea Level Rise

Sea level rise has been considered as part of the proposal design consistent with relevant sections of State Planning Policy 2.6 – State Coastal Planning Policy (WAPC 2005). The objective of this policy is to:

- ensure that development and the location of coastal facilities takes into account coastal processes, landform stability, coastal hazards, climate change and biophysical criteria
- protect, conserve and enhance coastal zone values, particularly in areas of landscape, biodiversity and ecosystem integrity, indigenous and cultural significance.

The EPA notes that the design of the marine infrastructure required for the proposals has considered predicted sea level rise. The proponent has designed elements of the proposal to account for likely sea level rise using the latest scientific information available. In doing so it has considered information in the State Planning Policy 2.6 – State Coastal Planning Policy (WAPC 2005) which predicts that sea level rise for the year 2110 is 0.9 m with the addition of 0.01 m/year beyond 2110 (Bicknell 2010).

2.4.10 Summary of key factor assessment and recommended regulation

The EPA has considered the likely residual impacts of the proposal on coastal processes environmental values. In doing so, the EPA has considered whether reasonable conditions could be imposed, or other decision-making processes can mitigate potential inconsistency with the EPA factor objective. The EPA assessment findings are presented in Table 7.

The EPA recommends conditioning the implementation of monitoring and appropriate management of seagrass wrack for the Casuarina Boat Harbour proposal through the implementation of the CPMP-CBH (GHD 2023). The implementation of this provides confidence that the monitoring and management of impacts to coastal processes can be managed.

The EPA note that in the unlikely event that seagrass wrack does accumulate along Koombana Beach natural remobilisation is unlikely to occur given low wave energy properties of the beaches adjacent to the proposal. Given this, the EPA recommends that the Koombana Bay Sailing Club proposal is conditioned to review and update the CMP (GHD 2023) to better understand potential changes to coastal processes and develop clear management outcomes agreed upon by the relevant parties. The implementation of this provides confidence that the monitoring and management of impacts to coastal processes can be managed.

With the above recommendations, the EPA has confidence that the proposal is unlikely to significantly impact the geophysical processes that shape coastal morphology so that the environmental values of the coast are protected.

The EPA advises that the residual impact to coastal processes should be subject to implementation conditions (recommended conditions B3) to ensure protection of the

beach structure and seagrass wrack and ensure the environmental outcome is likely to be consistent with the EPA objective for coastal processes.

The EPA has also considered the principles of the *Environmental Protection Act 1986* (see Appendix C) in assessing whether the residual impacts will be consistent with its environmental factor objective and whether reasonable conditions can be imposed (see Appendix A).

Table 6: Summary of assessment for coastal processes

Residual impact or risk to environmental value	Assessment finding or Environmental outcome	Recommended conditions and DMA regulation
<p>1. Impacts to sediment transport.</p>	<p>The coastline of Koombana Bay is already heavily modified from its natural state. Priority of management is to maintain at a suitable state for recreational and aesthetic reasons. Low energy coastline, so average volume of sediment movement low but there is sporadic storm movement. Longshore sand movement is already managed by DoT (north of and within CBH) and the City of Bunbury (Ski Beach and Koombana Beach).</p> <p>The priority for the proponent is to maintain beaches at a suitable state for recreational and aesthetic reasons.</p> <p>Although significant impacts on coastal processes associated with the CBH and DDC is unlikely, the KBSC marina proposal could result in the alteration of sediment transport on Ski Beach and Koombana Beach. This issue is currently managed by the City of Bunbury. Given the potential changes to coastal processes associated with the KBSC marina, additional resources beyond what is currently implemented by City of Bunbury may be required to maintain amenity values.</p> <p><u>CBH</u> Implementation of the Coastal Processes Management Plan will mean the environmental outcome is likely to be consistent with the EPA objective for coastal processes for Casuarina Boat Harbour.</p>	<p>Condition B3-1 (Coastal Processes) Implement the proposal to meet the environmental outcomes of no sediment accumulation or beach erosion, within the development envelope and surrounding beaches which is substantially contributed by the implementation proposals which adversely affects amenity values.</p> <p>Condition B3-2 (CBH) Implement the Coastal Processes Management Plan (Only Casuarina Boat Harbour Development) (GHD 2023) to meet B3-1 environmental outcomes.</p> <p>Condition B3-3 (KBSC) Review and update the Coastal Processes Management Plan (GHD 2023) that satisfies the requirements of condition C4 and demonstrates how achievement of the Coastal Processes</p>

Residual impact or risk to environmental value	Assessment finding or Environmental outcome	Recommended conditions and DMA regulation
	<p><u>KBSC marina</u></p> <p>Further revision of mitigation management within the Coastal Processes Management Plan is required for the KBSC marina to ensure that the environmental outcome is likely to be consistent with the EPA objective for coastal processes.</p> <p>Environmental outcome is likely to be consistent with the EPA factor objective for coastal processes and values of Koombana Bay if the proposal is subject to the recommended conditions and associated monitoring and reporting.</p>	<p>environmental outcomes in condition B3-1 will be monitored and substantiated prior to the commencement of development.</p>
<p>2. Impacts to seagrass wrack movement.</p>	<p>The majority of seagrass wrack is to the east of KBMS proposal. The westward current does transport seagrass wrack towards the proposal, but this material is trapped within the port shipping channel and is transported out to sea.</p> <p>Within the footprint of each proposal, localised seagrass wrack risks exist. These risks will be managed by each of the proponents.</p> <p>The CoB currently manages seagrass wrack in Koombana Bay. Given the possible increase to wrack deposition at Ski Beach and Koombana Beach associated with the proposal, consideration is required the address potential resourcing required to manage wrack.</p> <p>To manage this the EPA recommended a review of the coastal processes management plan and the development of agreements between parties (e.g. KBSC and CoB) in relation to wack management and disposal so the environmental outcome is likely to be consistent with the EPA objective for coastal processes.</p>	<p>Condition B3-1 (Coastal Processes)</p> <p>Implement the proposal to meet the environmental outcome of no material seagrass wrack accumulation within the development envelope and surrounding beaches which is substantially contributed by the implementation of the proposals which adversely affects amenity values.</p>

Residual impact or risk to environmental value	Assessment finding or Environmental outcome	Recommended conditions and DMA regulation
<p>3. Impacts to wave energy and current patterns.</p>	<p>Modelling the impact of the KBSC marina proposal indicates implementation could result in the alteration currents in southwestern area of Koombana Bay. The alteration in currents could contribute to the reduced flushing times of inlet and could have indirect impacts on sediment and seagrass movement. These impacts are outlined in 1. and 2. Above.</p> <p>The EPA concludes that subject to regulation by other decision – making processes and the recommended conditions the environmental outcome is likely to be consistent with the EPA objective for coastal processes.</p>	<p>Condition A1 (Limitations and extent of the proposal) limit on the extent of the proposal.</p> <p>Condition B1-4 (Marine Environmental Quality) (KBSC) Submit an infrastructure design and footprint print report. This design and report must confirm final design of the KBSC and confirm modelled impact to flushing times within the Leschenault Inlet.</p>
<p>4. Impacts to amenity and recreation values.</p>	<p>Impacts to amenity through seagrass accumulation and sediment transport are possible during the implementation of the proposal. These impacts can be mitigated and managed to ensure the coastal process objective is achieved to ensure the amenity and recreational values of Koombana Bay are maintained with the implementation of the proposal.</p> <p>Environmental outcome is likely to be consistent with the EPA factor objective for coastal processes if the proposal is subject to recommended conditions and associated monitoring and reporting.</p>	<p>Condition B3-1 (Coastal Processes) Implement the proposal to meet the environmental outcome of no material seagrass wrack accumulation or sediment alterations within the development envelope and surrounding beaches which is substantially contributed by the implementation of the proposals which adversely affects amenity values.</p>

3. Holistic assessment

While the EPA assessed the impacts of the proposal against the key environmental factors and environmental values individually in the key factor assessments above, given the link between benthic communities and habitats, marine fauna, marine environmental quality and coastal processes, the EPA also considered connections and interactions between them to inform a holistic view of impacts to the whole environment. Although the assessment has not considered social surroundings as a key environmental factor, the EPA has had regard to social surroundings in each of the assessed key environmental factors and its connection with these factors.

Benthic Communities and Habitat – Marine Environmental Quality – Marine Fauna – Social Surroundings

There is a recognised and established scientific link between impacts to marine environmental quality and the condition of the environment for benthic communities and habitat, and marine fauna. Changes to turbidity and nutrient levels can be particularly significant to seagrass habitat which has specific growth requirements. Avoiding and minimising significant turbidity associated with dredging and marine infrastructure construction during the peak growing period of seagrass is important in protecting the ecosystem health. This in turn supports other environmental values including marine fauna such as dolphins, fish, invertebrates, and avian species which rely on good marine water quality and healthy benthic communities and habitats.

The EPA considers that by limiting the extent and timing of construction activities (dredging and reclamation), the proponent has avoided significant environmental impacts to marine fauna and benthic communities and habitats. The EPA considers that the proposed mitigation and management measures and recommended conditions for impacts to marine environmental quality will also mean the inter-related impacts to the health of other factors of the environment including the values associated with marine fauna and benthic communities and habitats are likely to be consistent with the EPA environmental factor objectives. By achieving these objectives, it will help protect the social surroundings values that the area also supports.

Coastal Processes - Marine Environmental Quality - Marine Fauna

Nearshore currents are the main driver of coastal processes as they control the sediment and nutrient transport along the shoreline. The interruption of coastal processes can have consequences on sand build up and erosion, wrack deposition, turbidity, oxygen levels and marine fauna distribution. Marine fauna are highly reliant on the maintenance of marine environmental quality via coastal processes.

The EPA considers that the proposed mitigation and management measures and recommended conditions for impacts to marine environmental quality will also mean the inter-related impacts to the health of other factors of the environment including the values associated with benthic communities and habitats, and coastal processes are likely to be consistent with the EPA environmental factor objectives.

Maintaining the key environmental factors considered in this report will ensure the protection of social surroundings values, which are interdependent on a functioning ecosystem (benthic communities and habitats, marine environmental quality, and marine fauna) and maintenance of the amenity of the beaches and water bodies (coastal processes and marine environmental quality). The assessment and recommended conditions are intended to protect these key environmental factors and in turn protects social surroundings. This will help facilitate the preservation of intergenerational equity (see Appendix C) to ensure that future generations can continue to enjoy the built environment of Koombana Bay that is in tune with natural processes and should not require significant ongoing interventionist management activities by proponents.

Marine Fauna – Social Surroundings

The EPA note that the implementation of this proposal will result in the increased number of boat pens and boat access in Koombana Bay, this will likely result in an increased number of vessels using the area for recreational purposes, particularly for fishing. Additionally, the implementation of the proposal will increase the recreational value of the area by providing increased access to land-based fishing from the CBH and possibly the KBSC marina. This increase in recreational fishing may have some localised impact of fish stocks within the Koombana Bay but it should have no broader impact on regional fish populations due to the adaptive and proactive nature of fisheries management in Western Australia.

Cumulative impacts

The EPA notes that on a bioregional scale, implementation of this proposal would contribute to cumulative impacts through fauna habitat loss of seagrass beds, and some localised declines in water quality. However, the impacts are not to a level that would alter the likely environmental outcomes for local key species or communities.

The EPA also notes that the strategic proposal is largely set in an area of previous similar coastal marine infrastructure development and historical land uses, and largely builds on existing marine infrastructure and land uses. The CBH derived proposal includes improvements to the local marine environment through the removal of historically contaminated sediments.

Catchment based activities such as agricultural and urbanisation have increased nutrient inputs into Leschenault Estuary, Koombana Bay and Leschenault Inlet. The CBH and DDC finger jetty proposals are not likely to change coastal processes or marine environmental quality beyond their direct development footprint. Modelling suggests the current KBSC marina design could reduce flushing of the Leschenault Inlet which has the potential to increase nutrient retention in this area. This will need to be managed into the future and the EPA has recommended conditions to ensure the design of the KBSC marina does not adversely impact flushing rates as well as monitoring and management of water quality to a level of a high ecological protection.

The EPA notes that periodic dredging of Koombana Bay is undertaken to maintain the shipping channel to Bunbury Port. On the basis that there are no apparent significant impacts to the Koombana Bay marine environment associated with shipping channel maintenance dredging and that the construction dredging proposed for the CBH and KBSC marina derived proposals are brief and timed to mitigate potential impacts to marine fauna, marine environmental quality, and benthic communities and habitats (seagrass). Construction impacts are unlikely to overlap and cumulative impacts from each future derived proposal are likely minimal, short-term and recoverable. On the basis that there will be no overlap with the implementation of each future derived proposal, their cumulative construction impacts have not been assessed.

The responsibility for co-ordinating ongoing monitoring, performance reporting and contingency implementation of whole of strategic proposal impacts will be the responsibility of the proponent, if they not clearly related to any specific proposal. Individual proponents of derived proposals will be responsible for their specific proposal requirements, however given the permanent nature of the structures and ongoing impacts to some factors, co-ordination and responsibility for strategic proposal impacts is required. The strategic proposal proponent is responsible for communications with other stakeholders and the community about the whole proposal area, so as to reduce the risks of issues failing to be addressed between proponents.

Condition B5-2 has been applied so that in the event that the environmental performance reports shows that the environmental outcomes are not achieved by any or all of the derived proposals, the proponent of the strategic proposal is required to coordinate the implementation of contingency actions to ensure the environmental outcomes are achieved.

Given the growing population of the Bunbury region and infrastructure required to accommodate the population growth, cumulative impacts to locally significant environmental values are likely to increase. Specifically with respect to Koombana Bay the EPA has considered future cumulative impacts to the dolphin population, mangrove communities and seagrass communities. Although the impacts associated with the implementation of the KBMS proposal are unlikely to have a significant impact on the locally significant environmental values, the EPA has considered whether there are practicable measures that can be recommended to ensure that the health and diversity of the environmental values associated with these locally significant receptors can be maintained for the benefit of future generations.

Summary of holistic assessment

When the separate environmental factors and values affected by the proposal were considered together in a holistic assessment, the EPA formed the view that the impacts from the proposal would not alter the EPA's views about consistency with the EPA's factor objectives as assessed in section 2.

4. Recommendations

The EPA has taken the following into account in its assessment of the strategic proposal:

- environmental values which may be significantly affected by the proposal
- assessment of key environmental factors, separately and holistically (this has included considering cumulative impacts of the proposal where relevant)
- likely environmental outcomes which can be achieved with the imposition of conditions
- consistency of environmental outcomes with the EPA objectives for the key environmental factors
- EPA's confidence in the proponent's proposed mitigation measures
- whether other statutory decision-making processes can mitigate the potential impacts of the proposal on the environment
- principles of the EP Act.

The EPA recommends that the proposal may be implemented subject to the conditions recommended in Appendix A.

5. Other advice

The EPA may, if it sees fit, include other information, advice or recommendations relevant to the environment in its assessment reports, even if that information has not been taken into account by the EPA in its assessment of a proposal.

The EPA provides the following information for consideration by the Minister:

Future development on fairy tern nesting area

The EPA has assessed the potential impacts of the CBH proposal on a potential nesting area for the fairy tern (*Sternula nereis nereis*) and as a result has recommended a condition to ensure construction activities do not displace actively nesting fairy terns (section 2.3.9). Potential future developments in this area (beyond the future proposals identified in this assessment) are not sufficiently defined at present to enable adequate consideration of specific environmental impacts.

The EPA advises that future development that could impact on a nesting habitat in the region should consider the following:

- avoidance and minimisation measures to apply to the nesting area or potential nesting areas
- the evaluation of potential impacts on the local fairy tern population if impacts to the area cannot be avoided
- if development in the nesting area cannot be avoided, the proponent should investigate the creation or enhancement of nesting habitat at other nesting sites in the local area with the objective of ensuring the persistence of the species in Koombana Bay area
- updates and revisions to the KPAMP (RPS 2024) to reflect new measures and contributions to its implementation.

Coordination of marine monitoring and management in Koombana Bay

In undertaking its assessment, the EPA recognises the intrinsic, and recreation and aesthetic values of Koombana Bay and Leschenault Inlet. Koombana Bay also has numerous important ecological values including the local dolphin population, fairy terns and seagrass.

It is noted that monitoring and environmental quality management of Koombana Bay and the Leschenault Inlet is currently being undertaken by several organisations and there is the opportunity for this to be better coordinated. It is recognised that this is an issue that is beyond the control of any one proposal or agency identified in the strategic proposal. There are a number of groups that undertake environmental monitoring and management Koombana Bay, Leschenault Inlet and Leschenault Estuary such as.

- City of Bunbury: Leschenault Inlet
- Southern Ports Authority: Bunbury Inner Harbour and shipping channel

-
- Dolphin Discovery Centre: Dolphin populations and behaviour
 - Department of Biodiversity, Conservation and Attractions: Fairy terns and other fauna
 - Department of Water and Environmental Regulation: Seagrass, river and estuary health
 - Department of Transport: CBH water quality
 - Department of Primary Industries and Regional Development: Fish recruitment.

The proponent of the strategic proposal, via a steering committee, has developed communications and stakeholder engagement plans. The EPA supports such processes and considers it appropriate they continue during the construction of derived proposals.

The steering committee also have an Environmental Technical Group consisting of many of the stakeholders listed above. The EPA recommends that terms of reference and membership of this group could be reviewed to provide for a coordinated approach to the environmental monitoring, reporting and management of Koombana Bay and the Leschenault Inlet during and post construction of the derived proposals. This could include representation of the multiple users of the bay such as traditional owners and stakeholders from industry, community and government.

Coordinated management arrangements have been established previously, including the Cockburn Sound Management Council and the Geographe Bay Catchment Council. Such management arrangements arose from similar multiple-use issues to those being observed in Koombana Bay and Leschenault Inlet.

Environmental Management Plans

Although the EPA prefers outcomes-based conditions, some management plans have been recommended in this case because they will be an efficient way for proponents to satisfy the EPA that their proposals, should they be approved as derived, can satisfy the EPA's environmental factor objectives. The plans will be a key tool to achieve environmental outcomes and ensure monitoring, especially for factors where specific outcomes can only be set following final and detailed design. The proponent has proposed management plans to further assess matters to do with monitoring and management measures at the time of derived proposal submission. The EPA doesn't consider it appropriate to defer assessment of impacts and setting environmental outcomes to approval of management plans at a later stage, however some flexibility is included in the conditions to encourage further KBSC marina design optimisation.

Appendix A: Recommended conditions

Section 44(2)(b) of *Environmental Protection Act 1986* specifies that the EPA's report must set out (if it recommends that implementation be allowed) the conditions and procedures, if any, to which implementation should be subject. This appendix contains the EPA's recommended conditions and procedures.

Recommended Environmental Conditions

STATEMENT THAT A FUTURE PROPOSAL(S) IDENTIFIED IN A STRATEGIC PROPOSAL MAY BE IMPLEMENTED

(Sections 40B and 45 of the *Environmental Protection Act 1986*)

KOOMBANA BAY MARINE STRUCTURES

Strategic Proposal: The identification of future proposals to construct and operate the Casuarina Boat Harbour, Koombana Bay Sailing Club Marina and the Dolphin Discovery Centre Finger Jetty as defined by the spatial coordinates referred to in Schedule 1, as listed and described in Tables 1, 2 and 3 of Part A, and represented in Figure 1.

Proponent: South West Development Commission
Australian Business Number 23 250 505 809

Proponent address: 9th Floor Bunbury Tower, 61 Victoria Street, Bunbury WA 6230

Assessment number: 2049

Report of the Environmental Protection Authority: 1760

Introduction: Pursuant to sections 40B and 45 of the *Environmental Protection Act 1986*, it has been agreed that in the event of a declaration by the Environmental Protection Authority pursuant to section 38E of the Act that it is a derived proposal, a proposal to do one or more of the Developments listed in Tables 1, 2 and 3 in Part A of this Statement and which was identified in the Strategic Proposal to which Report 1760 relates, may be implemented. Upon declaration that the proposal is a derived proposal, subject to the Minister for Environment's identification of relevant conditions under section 45B of the Act, the implementation of the proposal shall be subject to the following implementation conditions and procedures:

Conditions and procedures

Part A: Proposal extent

Part B: Environmental outcomes, prescriptions and objectives

Part C: Environmental management plans and monitoring

Part D: Compliance and other conditions

PART A: PROPOSAL EXTENT**A1 Limitations and Extent of Proposal**

Proposals referred to the **EPA** and declared to be derived proposals containing one or more of the proposal elements listed in Column 1 of Tables 1, 2 and 3, shall be confined to the locations depicted in Figure 1, and shall not exceed the description of maximum limits or extent relevant to the elements provided for in Column 3 of Tables 1, 2 and 3 within its respective table.

Table 1: Casuarina Boat Harbour (CBH)		
Proposal element	Location	Maximum limits or extent
Physical elements		
CBH disturbance footprint and development envelope	CBH depicted in Figure 1	Total disturbance footprint of up to 32 ha within the 40 ha CBH development envelope.
Construction elements		
Breakwater and reclamation (using imported rock and clean fill)		Up to 3.5 ha within CBH disturbance footprint.
Marine Infrastructure		Floating jetties, boat ramps and boat pens within CBH disturbance footprint.

Table 2: Koombana Bay Sailing Club (KBSC) marina		
Proposal element	Location	Maximum limits or extent
Physical elements		
KBSC marina disturbance footprint and development envelope	KBSC depicted by Figure 1	Total disturbance footprint of up to 10 ha within the 16 ha development envelope.
Construction elements		
Breakwater		Up to 2.5 ha within KBSC disturbance footprint.
Reclamation		Up to 2 ha within KBSC disturbance footprint.
Marine Infrastructure		Floating jetties, boat ramps and boat pens within KBSC disturbance footprint.

Table 3: Dolphin Discovery Centre Finger Jetty (DDC)		
Proposal element	Location	Maximum limits or extent
Physical elements		
DDC finger jetty development envelope and disturbance footprint	DDC depicted by Figure 1	Total disturbance footprint of up to 0.15 ha within the 0.5 ha development envelope.
DDC finger jetty infrastructure	Figure 1	up to 110 m long.

PART B – ENVIRONMENTAL OUTCOMES, PRESCRIPTIONS AND OBJECTIVES

B1 Marine Environmental Quality

B1-1 The proponent of the proposals in Tables 1 and 2 must ensure the implementation of the derived proposals achieves the following environmental outcomes:

- (1) no **adverse impacts** on the **marine environmental values** of Ecosystem Health, Fishing and Aquaculture, Recreation and Aesthetics, Industrial Water Supply, and Cultural and Spiritual outside the Moderate Ecological Protection Area;
- (2) the levels of ecological protection to be achieved inside of the:
 - (a) **Moderate Ecological Protection Area**; and
 - (b) **High Ecological Protection Area**;

are consistent with the corresponding levels of ecological protection described in Appendix 1, Table 1 of the **Marine Water Quality Technical Guidance**, including the method used to derive **Environmental Quality Guidelines** and **Environmental Quality Standards**; and

- (3) within one (1) month following **cessation** of **marine construction activities** required for proposals in Tables 1 or 2, water quality will return to a level of **High Ecological Protection** and at least **Moderate Ecological Protection** as spatially defined in Figure 2.

B1-2 The proponent of the proposals in Tables 1 and 2 shall not conduct:

- (1) dredging; or
- (2) **reclamation**,

during the period of 1 December and 31 March (inclusive) or conduct these activities on separate proposals at the same time.

B1-3 The proponent of the **Casuarina Boat Harbour Development** proposal in Table 1 must implement the environmental management plan Marine Environmental Quality Management Plan (Only Casuarina Boat harbour Development) (Revision 4, GHD,2024), and the environmental management plan Marine Construction Monitoring and Management Plan (Revision 2, RPS 2023) with the purpose of ensuring the marine environmental quality environmental outcomes in condition B1-1 are achieved, monitored and substantiated.

B1-4 The proponent of the **Koombana Bay Sailing Club Marina** proposal in Table 2 must ensure the implementation of the derived proposal achieves the environmental outcome of maintaining the current flushing regime of Leschenault Inlet, or an alternate flushing time which the CEO confirms in

writing on the basis of the information provided in condition B1-5 will not have adverse impacts on the marine **environmental values** in B1-1(1).

B1-5 The proponent of the **Koombana Bay Sailing Club Marina** proposal in Table 2 must submit an Infrastructure Design and Footprint Report at the time of the **referral** of the proposal. The Infrastructure Design and Footprint Report must demonstrate how the marine environmental quality environmental outcomes in condition B1-1 will be met during implementation, and is required to include:

- (1) a final infrastructure design and footprint that achieves an annual median flushing time of less than 8 days in Leschenault Inlet (or an alternate timeframe if it can be demonstrated that the alternate flushing time will not have adverse impacts on the marine environmental values in B1-1(1)). The final design and footprint report must show the locations, disturbance footprints and configuration of marine infrastructure required for the **Koombana Bay Sailing Club Marina** and demonstrate it is consistent with the maximum extents in Table 2 of Part A and will meet the outcomes in conditions B1-1 and B1-4, condition B2-3, condition B3-1; and
- (2) hydrodynamic modelling and an evaluation of the effects of the final design required by condition B1-5(1) which demonstrates that the flushing time of the Leschenault Inlet and maximum extents in Table 2 of Part A will be achieved, using the latest information on the health and condition of the inlet.

B1-6 The proponent of the **Koombana Bay Sailing Club Marina** proposal in Table 2 must review and revise the environmental management plan Marine Construction Monitoring and Management Plan (Revision 2, RPS 2023) and environmental management plan Marine Environmental Quality Management Plan (Revision 4, GHD 2024), that satisfies the requirements of condition C4 and demonstrates how the achievement of the marine environmental quality environmental outcomes in condition B1-1 and condition B1-4 will be achieved, monitored and substantiated, and submit to the **CEO**.

B2 Benthic Communities and Habitats

B2-1 The proponent of the **Casuarina Boat Harbour Development** proposal in Table 1 must ensure the implementation of the proposal achieves the following environmental outcome:

- (1) no **irreversible loss of benthic communities and habitats** outside the **Casuarina Boat Harbour Development** disturbance footprint shown in Figure 1.

- B2-2 The proponent of the **Casuarina Boat Harbour Development** proposal in Table 1 must implement the environmental management plan Marine Environmental Quality Management Plan (Only Casuarina Boat harbour Development) (Revision 4, GHD 2024), and the environmental management plan Marine Construction Monitoring and Management Plan (Revision 3, RPS 2024) with the purpose of ensuring the **benthic communities and habitats** environmental outcome in condition B2-1 is achieved, monitored and substantiated.
- B2-3 The proponent of the **Koombana Bay Sailing Club Marina** proposal in Table 2 must ensure the implementation of the proposal achieves the following environmental outcomes:
- (1) no **irreversible loss** of benthic communities and habitats outside the final **disturbance footprint** of the proposal; and
 - (2) no **adverse impacts** on the health and extent of the **Leschenault Inlet mangrove community**.
- B2-4 The proponent of the **Koombana Bay Sailing Club Marina** proposal in Table 2 must, review and revise the environmental management plan Marine Construction Monitoring and Management Plan (Revision 2, RPS 2023) and environmental management plan Marine Environmental Quality Management Plan (Revision 4, GHD 2024), to include the final design, modelling and evaluation in condition B1-5 and that satisfies the requirements of condition C4 and demonstrates how the achievement of the benthic communities and habitats environmental outcomes in condition B2-3 will be achieved, monitored and substantiated, and submit it to the **CEO**.

B3 Coastal Processes

- B3-1 The proponent must implement the proposal to meet the following environmental outcome;
- (1) no material wrack, sediment accumulation or beach erosion, within the development envelope and surrounding beaches compared to baseline and which is substantially contributed by the implementation of the future proposals, separately or together, which adversely affects public recreation or **amenity** values.
- B3-2 The proponent of the **Casuarina Boat Harbour Development** proposal in Table 1 must implement the environmental management plan Coastal Processes Management Plan (Only Casuarina Boat Harbour Development) (Revision 1, 30 October 2023) with the purpose of ensuring the coastal processes environmental outcome in condition B3-1 is achieved, monitored and substantiated.

B3-3 The proponent of the **Koombana Bay Sailing Club Marina** proposal in Table 2 must review and revise the environmental management plan Coastal Processes Management Plan (Revision 3, 30 October 2023) to include the final design, modelling and evaluation in condition B1-5 and that satisfies the requirements of condition C4, and demonstrates how achievement of the coastal processes environmental outcome in condition B3-1 will be monitored and substantiated, and submit it to the **CEO**.

B4 Marine Fauna

B4-1 The proponent shall implement the proposal to achieve the following environmental objectives from the derived proposals, separately or together:

- (1) minimise the risk of physical injury or mortality from vessel strike on **significant marine fauna**;
- (2) minimise the risk of behavioural changes, health impacts (including temporary or permanent hearing loss), physical injury or mortality from underwater noise emissions from construction to **significant marine fauna**; and
- (3) minimise the risk of construction displacing dolphins that sustain the dolphin tours and education in Koombana Bay.

B4-2 The proponent must implement the environmental management plan Marine Fauna Management Plan (Revision 3, January 2024) with the purpose of ensuring the environmental factor environmental objectives in condition B4-1 are achieved.

B4-3 During construction, the proponent of the **Casuarina Boat Harbour Development** proposal in Table 2 must implement the proposal to meet the following environmental outcome:

- (1) no displacement of **actively nesting** Australian fairy terns (*Sternula nereis nereis*) from within the **Casuarina Boat Harbour Development** envelope.

B4-4 Prior to the completion of the construction of the northern breakwater, the proponent of the **Casuarina Boat Harbour Development** shall not conduct piling during the period of 1 December and 31 March (inclusive).

B4-5 The proponent of the **Koombana Bay Sailing Club Marina** and **Dolphin Discovery Centre finger jetty** shall not conduct piling during the period of 1 December and 31 March (inclusive).

B5 Environmental Performance Report – Conditions and Procedure Condition

- B5-1 The proponent of the **Strategic Proposal** must within one, two and five years of the completion of construction of each proposal in Tables 1 and 2, report on the direct and indirect impacts, including cumulative impacts of the proposals on:
- (1) **Marine environmental quality** outcomes in condition B1-1
 - (2) **Benthic communities and habitats** outcomes in conditions B2-1 and B2-3
 - (3) **Coastal processes** outcomes in condition B3-1
 - (4) **Marine fauna** objectives in condition B4-1 and outcomes in B4-3
- B5-2 In the event that the environmental performance reports show the environmental outcomes are not achieved by any or all of the derived proposals, the proponent of the **Strategic Proposal** will implement contingency actions with the proponents of derived proposals to ensure the environmental outcomes are achieved as soon as practicable. These may include staging of the later derived proposals until the environmental outcomes of the existing derived proposals have been achieved.

Procedure

- B5-3 The proponent of the **Strategic Proposal** must co-ordinate the communication, information and data sharing between, and co-operation on environmental management approaches of the proponents of the derived proposals to ensure the requirements of condition B5-1 and B5-2 can be achieved.
- B5-4 The proponent of the **Strategic Proposal** must ensure there are communication and complaints procedures in place in relation to impacts from the derived proposals.

PART C – ENVIRONMENTAL MANAGEMENT PLANS AND MONITORING

C1 Environmental Management Plans: Conditions Related to Commencement of Implementation of the Proposal

- C1-1 The proponent of the **Koombana Bay Sailing Club Marina** proposal in Table 2 must not undertake **marine construction activities** until the **CEO** has **confirmed** in writing that the environmental management plans required by condition B1-6 meets the requirements of that condition and condition C4.
- C1-2 The proponent of the **Koombana Bay Sailing Club Marina** proposal in Table 2 must not undertake **marine construction activities** until the **CEO** has **confirmed** in writing that the environmental management plan required by condition B2-4 meets the requirements of that condition and condition C4.
- C1-3 The proponent of the **Koombana Bay Sailing Club Marina** proposal in Table 2 must not undertake **marine construction activities** until the **CEO** has

confirmed in writing that the environmental management plan required by condition B3-3 meets the requirements of that condition and condition C4.

C2 Environmental Management Plans: Conditions Relating to Approval, Implementation, Review and Publication

C2-1 Upon being required to implement an environmental management plan under Part B, or after receiving notice in writing from the **CEO** under condition C1-1, C1-2 and C1-3 that the environmental management plans required in Part B satisfy the relevant requirements, the proponent must:

- (1) implement the most recent version of the **confirmed** environmental management plan; and
- (2) continue to implement the **confirmed** environmental management plan referred to in condition C2-1(1), other than for any period which the **CEO** confirms by notice in writing that it has been demonstrated that the relevant requirements for the environmental management plan have been met, or are able to be met under another statutory decision-making process, in which case the implementation of the environmental management plan is no longer required for that period.

C2-2 The proponent:

- (1) may review and revise a **confirmed** environmental management plan provided it meets the relevant requirements of that environmental management plan, including any consultation that may be required when preparing the environmental management plan;
- (2) must review and revise a **confirmed** environmental management plan and ensure it meets the relevant requirements of that environmental management plan, including any consultation that may be required when preparing the environmental management plan, as and when directed by the **CEO**; and
- (3) must revise and submit to the **CEO** the **confirmed** environmental management plan if there is a material risk that the outcomes or objectives it is required to achieve will not be complied with, including but not limited to as a result of a change to the proposal.

C2-3 Despite condition C2-1, but subject to conditions C2-4 and C2-5, the proponent may implement minor revisions to an environmental management plan if the revisions will not result in new or increased **adverse impacts** to the environment or result in a risk to the achievement of the limits, outcomes or objectives which the environmental management plan is required to achieve.

C2-4 If the proponent is to implement minor revisions to an environmental management plan under condition C2-3, the proponent must provide the **CEO**

with the following at least twenty (20) business days before it implements the revisions:

- (1) the revised environmental management plan clearly showing the minor revisions;
- (2) an explanation of and justification for the minor revisions; and
- (3) an explanation of why the minor revisions will not result in new or increased **adverse impacts** to the environment or result in a risk to the achievement of the limits, outcomes or objectives which the environmental management plan is required to achieve.

C2-5 The proponent must cease to implement any revisions which the **CEO** notifies the proponent (at any time) in writing may not be implemented.

C2-6 **Confirmed** environmental management plans, and any revised environmental management plans under condition C2-4(1), must be published on the proponent's website and provided to the **CEO** in electronic form suitable for on-line publication by the Department of Water and Environmental Regulation within twenty (20) business days of being implemented, or being required to be implemented (whichever is earlier).

C3 Conditions Related to Monitoring

C3-1 The proponent must undertake monitoring capable of:

- (1) substantiating whether the proposal limitations and extents in Part A are exceeded; and
- (2) **detecting** and substantiating whether the environmental outcomes identified in Part B are achieved (excluding any environmental outcomes in Part B where an environmental management plan is expressly required to monitor achievement of that outcome).

C3-2 The proponent must submit as part of the Compliance Assessment Report required by condition D2, a compliance monitoring report that:

- (1) outlines the monitoring that was undertaken during the implementation of the proposal;
- (2) identifies why the monitoring was capable of substantiating whether the proposal limitation and extents in Part A are exceeded;
- (3) for any environmental outcomes to which condition C3-1(2) applies, identifies why the monitoring was scientifically robust and capable of **detecting** whether the environmental outcomes in Part B are met;
- (4) outlines the results of the monitoring;

- (5) reports whether the proposal limitations and extents in Part A were exceeded and (for any environmental outcomes to which condition C3-1 (2) applies) whether the environmental outcomes in Part B were achieved, based on analysis of the results of the monitoring; and
- (6) reports any actions taken by the proponent to remediate any potential non-compliance.

C4 Environmental Management Plans: Conditions Relating to Monitoring and Adaptive Management for Outcomes Based Conditions

C4-1 The environmental management plans required under conditions B1-6, B2-4, and B3-3 must contain provisions which enable the substantiation of whether the relevant outcomes of those conditions are met, and must include:

- (1) **threshold criteria** that provide a limit beyond which the environmental outcomes are not achieved;
- (2) **trigger criteria** that will provide an early warning that the environmental outcomes are not likely to be met;
- (3) monitoring parameters, sites, control/reference sites, methodology, timing and frequencies which will be used to measure **threshold criteria** and **trigger criteria**. Include methodology for determining alternate monitoring sites as a contingency if proposed sites are not suitable in the future;
- (4) baseline data;
- (5) data collection and analysis methodologies;
- (6) adaptive management methodology;
- (7) **contingency measures** which will be implemented if **threshold criteria** or **trigger criteria** are not met; and
- (8) reporting requirements.

C4-2 The environmental management plan required under condition B1-6 (marine environmental quality) is also required to include:

- (1) map(s) spatially representing any improvements in the **High Ecological Protection Areas** and/or **Moderate Ecological Protection Areas** to apply to proposal in Table 2, to the extent that improvements have been achieved as a result of the with revised design submitted in condition B1-5;

- (2) revised monitoring program that incorporates any improvements in the **High Ecological Protection Areas** or **Moderate Ecological Protection Area** in condition C4-2 (1);
- (3) specific measures to monitor environmental indicators of reduced flushing and determine whether there are **adverse impacts** on the marine **environmental values** in the Leschenault Inlet;
- (4) proven and technically feasible **contingency measures** and remediation actions that can be readily implemented in a timely manner to ensure the environmental outcomes in condition B1-1 and B1-4 are achieved; and
- (5) consultation with City of Bunbury on the implementation of the plan.

C4-3 The environmental management plans required under condition B2-4 are also required to include:

- (1) procedures to monitor the cover and extent of **perennial seagrass** in Koombana Bay, prior to and following the completion of **marine construction activities**;
- (2) monitoring at impact and reference sites;
- (3) monitoring capable of **detecting** whether there has been a statistically significant irreversible impact (loss) on the cover or extent of **perennial seagrass** in Koombana Bay;
- (4) procedures for monitoring results of (3) above to be reported at two years following the completion of **marine construction activities**; and
- (5) if impact is still evident after two years, then a further three years of monitoring is required with a report submitted five years following the completion of **marine construction activities**.

C4-4 The environmental management plan required under condition B3-3 is also required to include:

- (1) shoreline mapping and beach profiles on Ski Beach and Koombana Beach using on-ground surveys which monitor beach width and slope;
- (2) procedures to track cumulative changes in sediment distribution;
- (3) **management actions** to maintain beach profiles and minimise wrack accumulation at Ski Beach and Koombana Beach during and following construction;
- (4) specific measures for wrack disposal locations and procedures for undertaking sediment and wrack management so that impacts to seagrass and macroalgal communities are avoided;

- (5) outline of community engagement to be undertaken prior to and during implementation of the **contingency measures** and wrack disposal processes to ensure impacts on **amenity** are minimised;
- (6) detail the agreed arrangements with the City of Bunbury and roles of the proponent and the City of Bunbury in the maintenance of beach profiles and wrack at Ski Beach and Koombana Beach.

C4-5 Without limiting condition C4-1, failure to achieve an environmental outcome, or the exceedance of a **threshold criteria**, regardless of whether threshold **contingency measures** have been or are being implemented, represents a non-compliance with these conditions.

C5 Environmental Management Plans: Conditions Related to Management Actions and Targets for Objective Based Conditions

C5-1 The environmental management plan required under condition B4-2 must contain provisions which enable the achievement of the relevant objectives of those conditions and substantiation of whether the objectives are reasonably likely to be met, and must include:

- (1) management actions;
- (2) management targets;
- (3) contingency measures if management targets are not met; and
- (4) reporting requirements.

C5-2 Without limiting condition C5-1, the failure to achieve an environmental objective, or implement a **management action**, regardless of whether **contingency measures** have been or are being implemented, represents a non-compliance with these conditions.

PART D – COMPLIANCE, TIME LIMITS, AUDITS AND OTHER CONDITIONS

D1 Non-compliance Reporting

D1-1 If the proponent becomes aware of a potential non-compliance, the proponent must:

- (1) report this to the **CEO** within ten (10) days;
- (2) implement **contingency measures**;
- (3) investigate the cause;
- (4) investigate environmental impacts;
- (5) advise rectification measures to be implemented;
- (6) advise any other measures to be implemented to ensure no further impact;
- (7) advise timeframe in which contingency, rectification and other measures have and/or will be implemented; and
- (8) provide a report to the **CEO** within twenty-one (21) days of being aware of the potential non-compliance, detailing the measures required in conditions D1-1(1) to D1-1(7) above.

D1-2 Failure to comply with the requirements of a condition, or with the content of an environmental management plan required under a condition, constitutes a non-compliance with these conditions, regardless of whether the **contingency measures**, rectification or other measures in condition D1-1 above have been or are being implemented.

D2 Compliance Reporting

D2-1 The proponent must provide an annual Compliance Assessment Report to the **CEO** for the purpose of determining whether the implementation conditions are being complied with.

D2-2 Unless a different date or frequency is approved by the **CEO**, the first annual Compliance Assessment Report must be submitted within fifteen (15) months of the date of this Statement, and subsequent reports must be submitted annually from that date.

D2-3 Each annual Compliance Assessment Report must be endorsed by the proponent's Chief Executive Officer, or a person approved by proponent's Chief Executive Officer to be delegated to sign on the Chief Executive Officer's behalf.

D2-4 Each annual Compliance Assessment Report must:

- (1) state whether each condition of this Statement has been complied with, including:
 - (a) exceedance of any proposal limits and extents;
 - (b) achievement of environmental outcomes;
 - (c) achievement of environmental objectives;
 - (d) requirements to implement the content of environmental management plans;
 - (e) monitoring requirements;
 - (f) implement **contingency measures**;
 - (g) requirements to implement adaptive management; and
 - (h) reporting requirements;
- (2) include the results of any monitoring (inclusive of any raw data) that has been required under Part C in order to demonstrate that the limits in Part A, and any outcomes or any objectives are being met;
- (3) provide evidence to substantiate statements of compliance, or details of where there has been a non-compliance;
- (4) include the corrective, remedial and preventative actions taken in response to any potential non-compliance;
- (5) be provided in a form suitable for publication on the proponent's website and online by the Department of Water and Environmental Regulation;
- (6) be prepared and published consistent with the latest version of the Compliance Assessment Plan required by condition D2-5 which the **CEO** has confirmed by notice in writing satisfies the relevant requirements of Part C and Part D.

D2-5 The proponent must prepare a Compliance Assessment Plan which is submitted to the **CEO** at least six (6) months prior to the first Compliance Assessment Report required by condition D2-2, or prior to implementation of the proposal, whichever is sooner.

D2-6 The Compliance Assessment Plan must include:

- (1) what, when and how information will be collected and recorded to assess compliance;

- (2) the methods which will be used to assess compliance;
- (3) the methods which will be used to validate the adequacy of the compliance assessment to determine whether the implementation conditions are being complied with;
- (4) the retention of compliance assessments;
- (5) the table of contents of Compliance Assessment Reports, including audit tables; and
- (6) how and when Compliance Assessment Reports will be made publicly available, including usually being published on the proponent's website within sixty (60) days of being provided to the **CEO**.

D3 Contact Details

D3-1 The proponent must notify the **CEO** of any change of its name, physical address or postal address for the serving of notices or other correspondence within twenty-eight (28) days of such change. Where the proponent is a corporation or an association of persons, whether incorporated or not, the postal address is that of the principal place of business or of the principal office in the State.

D4 Time Limit for Proposal Implementation

D4-1 The proposal must be substantially commenced within five (5) years from the date of the Section 45B Notice.

D4-2 The proponent must provide to the **CEO** documentary evidence demonstrating that they have complied with condition D4-1 no later than fourteen (14) days after the expiration of period specified in condition D4-1.

D4-3 If the proposal has not been substantially commenced within the period specified in condition D4-1, implementation of the proposal must not be commenced or continued after the expiration of that period.

D5 Public Availability of Data

D5-1 Subject to condition D5-2, within a reasonable time period approved by the **CEO** upon the issue of this Statement and for the remainder of the life of the proposal, the proponent must make publicly available, in a manner approved by the **CEO**, all validated environmental data collected before and after the date of this Statement relevant to the proposal (including sampling design, sampling methodologies, monitoring and other empirical data and derived information products (e.g. maps)), environmental management plans and reports relevant to the assessment of this proposal and implementation of this Statement.

D5-2 If:

- (1) any data referred to in condition D5-1 contains trade secrets; or
- (2) any data referred to in condition D5-1 contains particulars of confidential information (other than trade secrets) that has commercial value to a person that would be, or could reasonably be expected to be, destroyed or diminished if the confidential information were published,

the proponent may submit a request for approval from the **CEO** to not make this data publicly available and the **CEO** may agree to such a request if the **CEO** is satisfied that the data meets the above criteria.

D5-3 In making such a request the proponent must provide the **CEO** with an explanation and reasons why the data should not be made publicly available.

D6 Independent Audit

D6-1 The proponent must arrange for an independent audit of compliance with the conditions of this statement, including achievement of the environmental outcomes and/or the environmental objectives and/ or environmental performance with the conditions of this statement, as and when directed by the **CEO**.

D6-2 The independent audit must be carried out by a person with appropriate qualifications who is nominated or approved by the **CEO** to undertake the audit under condition D6-1.

D6-3 The proponent must submit the independent audit report with the Compliance Assessment Report required by condition D2, or at any time as and when directed in writing by the **CEO**. The audit report is to be supported by credible evidence to substantiate its findings.

D6-4 The independent audit report required by condition D6-1 is to be made publicly available in the same timeframe, manner and form as a Compliance Assessment Report, or as otherwise directed by the **CEO**.

Table 4: Abbreviations and definitions

Acronym or abbreviation	Definition or term
Actively Nesting	From the time that nesting behaviours typical of the species on the ground are displayed until the fledged young are no longer dependent on the nest site.
Adverse impact	<p>Negative change that is neither trivial nor negligible that could result in a reduction in health, diversity or abundance of the receptor/s being impacted, or a reduction in environmental value. Adverse impacts can arise from direct or indirect impacts, or other impacts from the proposal.</p> <p>In relation to marine environmental quality in the High Ecological Protection Area this means that:</p> <ul style="list-style-type: none"> • ecosystem processes (e.g. primary production, nutrient cycles) are maintained within the limits of natural variation (no detectable change) • for the quality of water and sediment there can be small detectable changes beyond limits of natural variation, but no resultant effect on biota. <p>In relation to benthic communities and habitats, this includes but is not limited to declining measures of the extent, health and/or condition of perennial seagrass and the Leschenault Inlet mangrove community.</p> <p>In relation to coastal processes, includes but is not limited to changes in erosion/deposition/accretion and edge effects.</p>
Amenity	<p>Amenity is defined in relation to the EPA's Environmental Factor Guideline for Social Surroundings:</p> <p><i>'Amenity' means the qualities, attributes and characteristics of a place that make a positive contribution to quality of life.</i></p> <p><i>'Amenity values' include both visual amenity, the ability for people to live and recreate within their surroundings without any unreasonable interference with their health, welfare, convenience and comfort.</i></p>
Benthic Communities and Habitats	Benthic communities are biological communities that live in or on the seabed. In Koombana Bay this may include seagrass species of <i>Posidonia</i> , <i>Amphibolus</i> , <i>Heterozostera</i> and <i>Zostera</i> and reef with macroalgae benthic communities.
Casuarina Boat Harbour (CBH) Development	<p>As defined in Table 1 and Figure 1.</p> <p>The proposal includes a dredging and dredge spoil component, land reclamation and construction of breakwater and revetment walls. The marine infrastructure includes the construction and operation of floating jetties, boat ramps and boat pens.</p>

Cessation	Refers to a stop or pause of an action that is greater than 30 days.
CEO	The Chief Executive Officer of the Department of the Public Service of the State responsible for the administration of section 48 of the <i>Environmental Protection Act 1986</i> , or the CEO's delegate.
Confirmed	<p>In relation to a plan required to be made and submitted to the CEO, means, at the relevant time, the plan that the CEO confirmed, by notice in writing, meets the requirements of the relevant condition.</p> <p>In relation to a plan required to be implemented without the need to be first submitted to the CEO, means that plan until it is revised, and then means, at the relevant time, the plan that the CEO confirmed, by notice in writing, meets the requirements of the relevant condition.</p>
Contingency measures	Planned actions for implementation if it is identified that an environmental outcome, environmental objective, threshold criteria, environmental quality standard or management target are likely to be, or are being, exceeded. Contingency measures include changes to operations or reductions in disturbance or adverse impacts to reduce impacts and must be decisive actions that will quickly bring the impact to below any relevant threshold, management target and to ensure that the environmental outcome and/or objective can be met.
Detecting	The smallest statistically discernible effect size that can be achieved with a monitoring strategy designed to achieve a statistical power value of at least 0.8 or an alternative value as determined by the CEO .
Disturb/ Disturbed/ Disturbance	<p>Means directly has or materially contributes to the disturbance effect on health, diversity or abundance of the receptor/s being impacted or on an environmental value.</p> <p>In relation to benthic community and habitats (including mangroves), results in death, destruction, removal, severing or substantial damage.</p> <p>In relation to fauna, includes to have the effect of altering the natural behaviour of fauna to its detriment.</p> <p>Direct – causes or immediately has the disturbance effect.</p> <p>Indirect – materially contributes to the disturbance effect.</p>
Dolphin Discovery Centre (DDC) Finger Jetty	<p>As defined in Table 3 and Figure 1.</p> <p>The proposal includes a pilling component and temporary onshore construction laydown area. The marine infrastructure includes the construction and operation of a finger jetty.</p>
Environmental Quality Guidelines	Threshold numerical values or narrative statements which if met indicate there is a high degree of certainty that the associated environmental quality objective has been achieved.

Environmental Quality Standards	Threshold numerical values or narrative statements that indicate a level which if not met indicates there is a significant risk that the associated environmental quality objective has not been achieved and a management response is required.
Environmental value	A beneficial use, or ecosystem health condition (from <i>EP Act</i>) Particular value or uses of the environment that are important for a healthy ecosystem or for public benefit, welfare, safety or health and which require protection from the effects of pollution, waste discharges and deposits as defined in the Technical Guidance <i>Protecting the Quality of Western Australia's Marine Environment</i> , as amended from time to time, and available at www.epa.wa.gov.au
EPA	Environmental Protection Authority
Ground disturbing activities	Any activity or activities undertaken in the implementation of the proposal, including any clearing, civil works or construction.
Ha	Hectare
High Ecological Protection Area	All of the proximal coastal waters outside of areas defined as Moderate Ecological Protection Areas as shown in Figure 2, defined in spatial data in schedule 1 and as defined in the Marine Water Quality Technical Guidance .
Irreversible loss	Adverse impact which is unlikely to or does not return to pre-impact state within five (5) years following the completion of proposal related activities that are likely to have an impact on benthic communities and habitats.
Koombana Bay Sailing Club (KBSC) Marina	As defined in Table 2 and Figure 1. The proposal includes a dredging component, a piling component, land reclamation and construction of two breakwaters. The marine infrastructure includes the construction and operation of floating jetties, boat ramps and boat pens.
Leschenault Inlet mangrove community	White mangrove (<i>Avicennia marina</i>) community depicted in Figure 1.
Management action	The identified actions implemented with the intent of achieving the environmental objective.
Management target	A type of indicator to evaluate whether an environmental objective is being achieved.
Marine construction activities	Activities involved in the construction of rock walls, breakwaters, dredging, piling, pontoons and jetties in the waters below highest astronomical high tide, areas that have been or in the process of being reclaimed and near shore areas utilised for construction areas.

Marine Water Quality Technical Guidance	<i>Technical Guidance for protecting the quality of Western Australia's marine environment</i> , as amended from time to time, and available at www.epa.wa.gov.au .
Moderate Ecological Protection Area	The area shown in Figure 2 as 'Moderate Ecological Protection Area', defined in spatial data in schedule 1 and as defined in the Marine Water Quality Technical Guidance .
m³	Cubic metres
m	metres
breakwater	The breakwater structures shown in Figure 1 and described in table 1 and 2
Perennial seagrass	Seagrass which lives and grows all year round. Includes species of <i>Posidonia</i> , <i>Amphibolus</i> , <i>Heterozostera</i> and <i>Zostera</i>
Pollution	Has the meaning provided by section 3A(1) of the <i>Environmental Protection Act 1986</i> .
Reclamation	Using dredge spoil to create land or foreshore (excludes breakwater construction)
Significant marine fauna	Includes turtles, cetaceans, penguins and pinnipeds.
Strategic Proposal	Has the meaning provided by section 37B(2) of the <i>Environmental Protection Act 1986</i> .
Trigger criteria	Indicators that have been selected for monitoring to provide a warning that, if exceeded, the environmental outcome may not be achieved. They are intended to forewarn of the approach of the threshold criteria and trigger response actions.
Threshold criteria	The indicators that have been selected to represent limits of impact beyond which the environmental outcome is not being met.

Figures (attached)

Figure 1 Koombana Bay Marine Structures Development envelopes and indicative footprint, and key features in Koombana Bay and Leschenault Inlet

Figure 2 Marine Ecological Protection Areas



Figure 1: Koombana Bay Marine Structures Development envelopes and indicative footprints, and key features in Koombana Bay and Leschenault Inlet

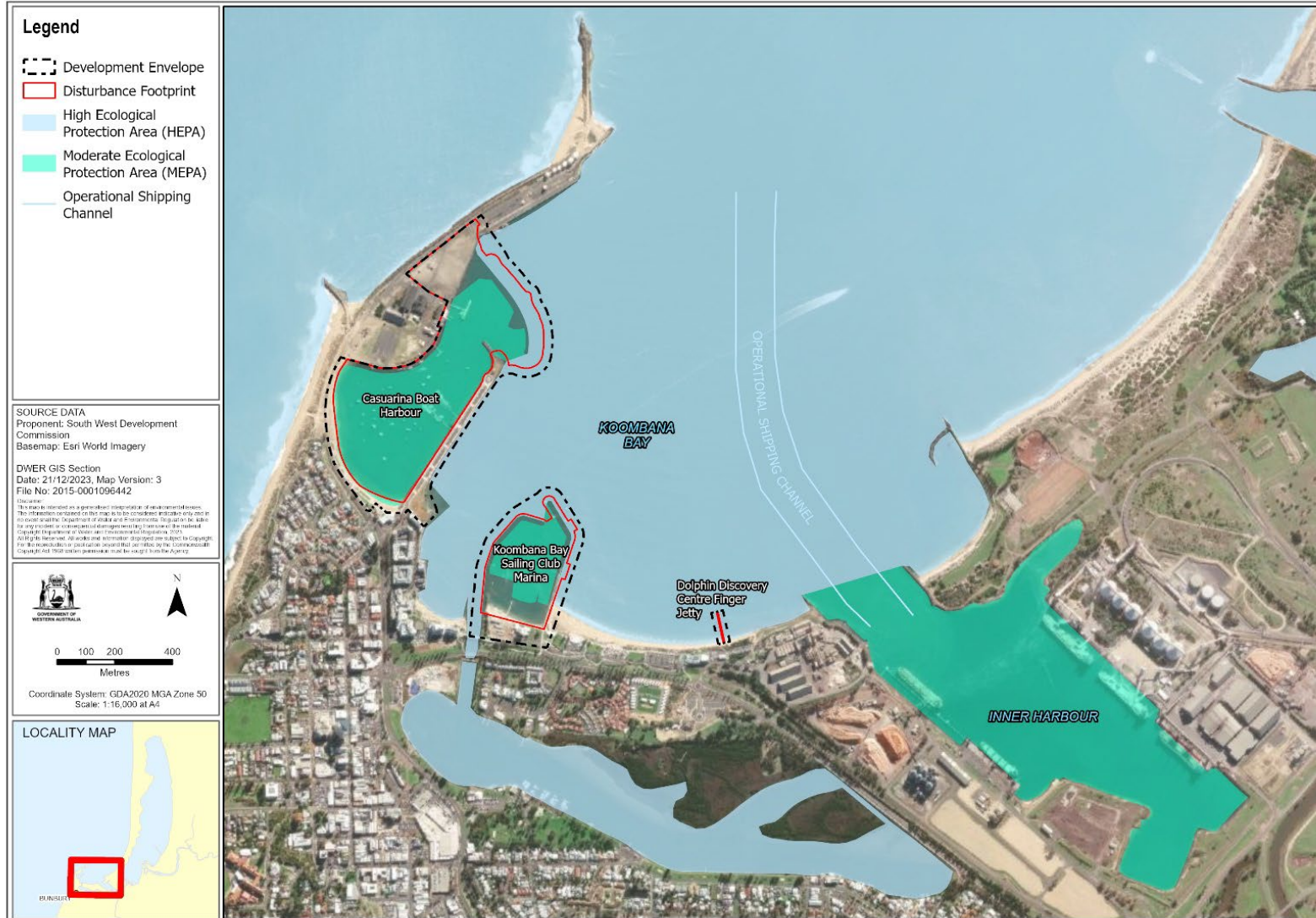


Figure 2: Marine Ecological Protection Areas

Schedule 1

All co-ordinates are in metres, listed in Map Grid of Australia Zone 50 (MGA Zone 50), datum of Geocentric Datum of Australia 2020 (GDA2020).

Spatial data depicting the figures are held by the Department of Water and Environmental regulation.

- Figure 1: Development envelopes for the proposals – DWER-801164602-324182
- Figure 2: Marine Ecological Protection Areas –DWER-801164602-324181

Appendix B: Decision-making authorities

Table B1: Identified relevant decision-making authorities for the proposal

Decision-Making Authority	Legislation (and approval)
1. Minister for Environment	<i>Biodiversity Conservation Act 2016</i> - section 40 authority to take or disturb threatened species and
2. Minister for Lands	<i>Land Administration Act 1997</i> - section 28(1) compulsory acquisition of land - section 91 licence to access crown land - creation of easements and other land access for proposal
3. Minister for Planning	<i>Planning and Development Act 2005</i> - scheme amendments
4. Minister for Transport	<i>Marine and Harbours Act 1981</i> - s. 12 seabed lease (* where land is vested in the Minister under s. 9)
5. Department of Transport	<i>Jetties Act 1926</i> - jetty licence <i>Marine and Harbours Act 1981</i> - seabed lease
6. Chief Executive Officer, Department of Water and Environmental Regulation	<i>Environmental Protection Act 1986</i> - part IV compliance (Ministerial statements) - Works Approval License Environmental Protection Regulations 1987 sch.1 category 49 ad 82 <i>Contaminated Sites Act 2003</i>
7. Director WorkSafe Petroleum Safety and Dangerous Goods Department of Mines, Industry Regulation and Safety	<i>Dangerous Goods Safety Act 2004</i> - storage and handling of dangerous goods
8. Chairman, Western Australian Planning Commission	<i>Planning and Development Act 2005</i> - development applications for station precincts - development approval for lands outside a scheme primary regional road reserve
9. Chief Executive Officer City of Bunbury	<i>Planning and Development Act 2005</i> (Greater Bunbury Region Scheme – Reserve of Port Installation and Waterways) - Northern breakwater construction
10. Southern Ports Authority	- <i>Port Authorities Regulations 2001</i>

Appendix C: Environmental Protection Act principles

Table C1: Consideration of principles of the *Environmental Protection Act 1986*

EP Act principle	Consideration
<p>1. The precautionary principle</p> <p><i>Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.</i></p> <p><i>In application of this precautionary principle, decisions should be guided by –</i></p> <p>(a) <i>careful evaluation to avoid, where practicable, serious or irreversible damage to the environment; and</i></p> <p>(b) <i>an assessment of the risk-weighted consequences of various options.</i></p>	<p>The EPA has considered the precautionary principle in its assessment and has had particular regard to this principle in its assessment of marine environmental quality, coastal processes, benthic communities and habitats, and marine fauna. The assessment of these impacts is provided in this report.</p> <p>Investigations into the biological and physical environment undertaken by the proponent have provided sufficient scientific certainty to assess the risks and identify measures to avoid or minimise impacts. The EPA notes that the proponent has identified measures to avoid potential serious or irreversible damage to the environment including:</p> <ul style="list-style-type: none"> • avoidance of areas • avoiding sensitive seasonal periods • implementation of measures to minimise mobilisation of sediment • disturbance of bird nesting. <p>Modelling of inlet flushing has identified the risk of flushing changes from the KBSC marina proposal. Various designs will need to be further modelled to consider options and potential consequences. Future EMPs have been conditioned to provide adaptive framework if thresholds of environmental outcomes are exceeded.</p> <p>The EPA notes (residual GHG emissions) that the proposal has low emission intensity and overall volume. Practices to construct using the least amount of inputs, sourcing local materials and optimising design.</p>
<p>2. The principle of intergenerational equity</p> <p><i>The present generation should ensure that the health, diversity and productivity of the environment is maintained and enhanced for the benefit of future generations.</i></p>	<p>The EPA has considered the principle of intergenerational equity in its assessment and has had particular regard to this principle in its assessment of marine environmental quality, coastal processes, benthic communities and habitats, and marine fauna.</p>

EP Act principle	Consideration
	<p>The EPA considers consistency with this principle could be achieved with the implementation of its recommended conditions, which requires the proponent to:</p> <ul style="list-style-type: none"> • not disturb seagrass beds greater than the authorised extent to protect fish nursery grounds and benthic productivity that supports predators such as dolphins • maintain a high level of marine ecological protection outside of the development footprints and medium level of MEP within marina/boat harbours • allow for adequate flushing via the plug to continue to protect the recreational and aesthetic values on of the inlet, which is directly adjacent to the Bunbury foreshore.
<p>3. The principles of the conservation of biological diversity and ecological integrity</p> <p><i>Conservation of biological diversity and ecological integrity should be a fundamental consideration.</i></p>	<p>The EPA has considered the principle of conservation of biological diversity and ecological integrity in its assessment and has had particular regard to this principle in its assessment of marine environmental quality, coastal processes, benthic communities and habitats, and marine fauna. The EPA has considered to what extent the potential impacts from the proposal to benthic communities and habitats, and marine fauna can be ameliorated to ensure consistency with the principle of conservation of biological diversity and ecological integrity,</p> <p>The EPA has recommended:</p> <p>Implementation of Marine Fauna and Avifauna Management Plans to:</p> <ul style="list-style-type: none"> • minimise disturbance of high value marine fauna habitats (seagrass beds) • minimise and avoid impacts during important growth periods for seagrass beds • minimise and avoid impacts to the breeding seasons of several key marine fauna species (such as dolphins and fairy terns). <p>The EPA has concluded that given the small scale of impacts (both spatial and temporal), though still significant, areas of benthic communities and habitats for conservation significant fauna species that will be impacted) are not so significant as to require offsets to counterbalance the impacts of the loss of biological diversity and ecological integrity.</p>
<p>4. Principles relating to improved valuation, pricing and incentive mechanisms</p>	<p>In considering this principle, the EPA notes that the proponent will bear the costs relating to implementing the proposal to achieve environmental outcomes, and management and monitoring of environmental impacts during construction, operation and decommissioning of the proposal. The EPA has had particular</p>

EP Act principle	Consideration
<p>(1) <i>Environmental factors should be included in the valuation of assets and services.</i></p> <p>(2) <i>The polluter pays principle — those who generate pollution and waste should bear the cost of containment, avoidance or abatement.</i></p> <p>(3) <i>The users of goods and services should pay prices based on the full life cycle costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any wastes.</i></p> <p>(4) <i>Environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structures, including market mechanisms, which enable those best placed to maximise benefits and/or minimise costs to develop their own solutions and responses to environmental problems.</i></p>	<p>regard to this principle in considering marine environmental quality, coastal processes, benthic communities and habitats, and marine fauna.</p> <p>The KBSC marina changes to coastal processes which could increase the impact on sand erosion/ aggregation rates at adjoining public beaches. Sand redistribution is already being managed by City of Bunbury and future agreements/funding will be required if the KBSC marina proposal is implemented.</p> <p>If the KBSC marina significantly impacts on inlet flushing and the changes to water quality are beyond what is predicted, there is the potential for ongoing operational costs or remediation costs. The EPA has recommended the design of the facility is reviewed, models updated and viable mitigation measures to manage inlet water quality.</p>
<p>5. The principle of waste minimisation</p> <p><i>All reasonable and practicable measures should be taken to minimise the generation of waste and its discharge into the environment.</i></p>	<p>The EPA has considered the principle of waste minimisation in its assessment and has had particular regard to this principle in its assessment of marine environmental quality, coastal processes, benthic communities and habitats, and marine fauna.</p> <p>The EPA notes that proponent has considered the minimisation of waste generation and its discharges to the environment during design of the future proposals and in the development of the required environmental management plans (MCMMP, MEQMP, MFMP and CPMP).</p> <p>The EPA notes the proponent is proposing to minimise the discharge of waste into the environment by:</p> <ul style="list-style-type: none"> • use of existing dredge spoil grounds for the CBH project • onshore disposal at a licenced facility for dredge spoil that has been identified as contaminated • onshore disposal of dredge spoil for the KBSC marina project. <p>The proponent is required to adhere to other statutory processes associated with waste management (for example, Environmental Protection Regulations 2002)</p> <p>The EPA has considered the principle of waste minimisation in its assessment and has had particular regard to this principle in its assessment.</p>

Appendix D: Other environmental factors

Table D1: Evaluation of other environmental factors

Environmental factor	Description of the proposal's likely impacts on the environmental factor	Government agency and public comments	Evaluation of why the factor is not a key environmental factor
Land			
Terrestrial environmental quality.	<p>Low risk of disturbing acid sulfate soils.</p> <p>No excavation of terrestrial areas or dewatering.</p>	There were no agency or public comments related to terrestrial environmental quality.	<p>Terrestrial environmental quality was not identified as a preliminary key environmental factor when the EPA set the level of assessment.</p> <p>The EPA considers it is unlikely that the proposal would have a material risk from terrestrial environmental quality. Accordingly, the EPA did not consider terrestrial environmental quality to be a key environmental factor at the conclusion of its assessment.</p>
Air			
Air quality.	<p>Potential for dust creation, mainly construction related.</p> <p>Proximity to business and residential areas.</p> <p>The small scale of terrestrial disturbance is noted.</p>	There were no agency or public comments related to air quality.	<p>Air quality was not identified as a preliminary key environmental factor when the EPA set the level of assessment.</p> <p>The EPA considers it is unlikely that the proposal would be a material risk to air quality. Accordingly, the EPA did not consider air quality to be a key environmental factor at the conclusion of its assessment.</p>
Greenhouse gas emissions.	The Strategic Proposal is estimated to emit a total of 23,105 tCO ₂ -e over the life of the asset inclusive of construction and operations, with an average of 108 tCO ₂ -e emitted during each year of operation. (GHG assessment 2022 appendix Y).	There were no agency or public comments related to greenhouse gas emissions.	<p>At the time of setting level of assessment, greenhouse gas emissions were not a key environmental factor. Generally, GHG emissions from a proposal will be considered by the EPA where they are reasonably likely to exceed:</p> <ul style="list-style-type: none"> • 100,000 tonnes CO₂-e of scope 1 emissions in any year; or • 100,000 tonnes CO₂-e of scope 2 emissions in any year.

Environmental factor	Description of the proposal's likely impacts on the environmental factor	Government agency and public comments	Evaluation of why the factor is not a key environmental factor
			<p>Cumulatively, the future proposals are predicted to emit significantly less than 100,000 tonnes CO₂-e in any year. The bulk of the project's emissions are during construction phase with a low level of emissions during operation.</p> <p>The EPA considers it is unlikely that the proposal would be a significant contributor to greenhouse gas emissions. Accordingly, the EPA did not consider greenhouse gas emissions to be a key environmental factor at the conclusion of its assessment.</p>
People			
Social surroundings.	<p>No registered Aboriginal Cultural Heritage sites identified in the proposal area.</p> <p>No indirect impacts to registered sites.</p> <p>A number of Western Heritage sites were identified and considered.</p>	There were no agency or public comments related to social surroundings.	<p>The proponents Aboriginal Cultural Heritage consultation participants did not identify Aboriginal Heritage Sites in the proposal area. It is important to note, however, that places of significance may not be registered, and there are additional areas valued and used by the Aboriginal community beyond formally protected sites.</p> <p>The SWDC will continue to meet with the Gnaala Karla Booja and their Cultural Advisory Committee (CAC) to consider cultural issues during the progression of the development.</p> <p>Proponents of derived proposals will liaise with native title holders on Activity Notices as per heritage agreements. For example, DoT works under the 20211115 Noongar Standard Heritage agreement Gnaala Karla Booja _LEG 1970, as agreed with SWALSC in 2021.</p> <p>The State Heritage Register/Heritage List identified the Bunbury Timber Jetty overlaps with the Casuarina Boat Harbour northern breakwater proposed by DoT. The jetty was demolished in 2012 but the site is still listed. The Western Australian Museum (WAM), at the request of DoT, has undertaken an underwater archaeological investigation along a section of the demolished Bunbury Timber Jetty. WAM have provided DoT with advice and conditions for the encountering items of heritage significance by dredging operations. DoT has also commissioned a landscape design for the end of Jetty Road in the harbour that will celebrate the</p>

Environmental factor	Description of the proposal's likely impacts on the environmental factor	Government agency and public comments	Evaluation of why the factor is not a key environmental factor
	<p>Amenity of the area, facilities being constructed are aligned with current and future usage.</p> <p>Construction and operation not likely to cause nuisance via noise, dust or odour.</p>		<p>Old Timber Jetty on the Jetty Road causeway and incorporate reclaimed materials from the jetty.</p> <p>A further six sites listed on the Municipal Heritage Inventory include the Casuarina Breakwater (Outer Harbour), Jetty Public Baths (site of public baths popular in the 1900s), three shipwreck sites (Midas, Solglyt and Agra) and the Dolphin Discovery Centre. (see other advice). These sites are currently covered by sediments and most of the KBSC marina works will involve filling which would not damage any remaining artefacts (but simply cover them over). Proponents should, however, monitor for heritage sites when excavating and dredging.</p> <p>Recreational usage of the area will be maintained via the provision of recreational facilities such as boat ramps, walkways, fishing platforms. Open space will be maintained consistent with previous stages of the greater Transforming Bunbury Waterfront program, which received a high level of support during public consultation and implementation. The community is kept up to date with the developments via quarterly newsletters and press releases. Activities detailed in the CPMP will maintain beach structure and seagrass wrack management to protect recreation and aesthetics.</p> <p>Many recreational craft currently access open waters by launching into the Leschenault Inlet via the Lyons Cove Road boat ramp. Provision of alternative ramps in the proposal will reduce boating traffic in this protected waterway which has a high level of usage by unpowered craft such as dragon boating, kayaking and stand-up paddle boards.</p> <p>Dredging and reclamation will not be undertaken during the December to March period when recreational usage in the bay is highest. The controls detailed in the MCMMP will further limit emissions such as dust, noise, and odour.</p>

Environmental factor	Description of the proposal's likely impacts on the environmental factor	Government agency and public comments	Evaluation of why the factor is not a key environmental factor
			The EPA considers it unlikely that the proposal will have a significant negative impact on social surroundings. Accordingly, the EPA did not consider social surroundings to be a key environmental factor at the conclusion of its assessment.

Appendix E: Relevant policy, guidance and procedures

The EPA had particular regard to the policies, guidelines and procedures listed below in the assessment of the proposal.

- *Environmental factor guideline – Benthic Communities and Habitats* (EPA 2016)
- *Environmental factor guideline – Coastal processes* (EPA 2016)
- *Environmental factor guideline – Marine Environmental Quality* (EPA 2016)
- *Environmental factor guideline – Marine fauna* (EPA 2016)
- *Environmental impact assessment (Part IV Divisions 1 and 2) procedures manual* (EPA 2021)
- *Statement of environmental principles, factors, objectives and aims of EIA* (EPA 2021)
- *Environmental impact assessment (Part IV Divisions 1 and 2) administrative procedures 2021* (State of Western Australia 2021)
- *Technical guidance – Environmental impact assessment of marine dredging proposals* (EPA 2021)
- *Technical Guidance – Protecting the Quality of Western Australia’s Marine Environment* (EPA 2016)
- *Technical guidance – Protection of Benthic Communities and Habitats* (EPA 2016).
- *State Planning Policy 2.6, Coastal Planning* (WAPC, 2006).

Appendix F: List of submitters

7-day comment on referral

No submissions were received.

Public review of proponent information

Organisations and public

- 4 public submissions were received from organisations
- 6 public submissions were received from individuals.

Government agencies

Three (3) comments from Government agencies:

- Department of Biodiversity, Conservation and Attractions (DBCA)
- Department of Primary Industries and Regional Development (DPIRD) – Fisheries Management
- Department of Water and Environmental Regulation (DWER).

Appendix G: Assessment timeline

Table G1: Assessment timeline for the Koombana Bay Marine Structures Project

Date	Progress stages	Time (weeks)
15 April 2015	EPA decided to assess – level of assessment set	
26 June 2015	EPA approved Environmental Scoping Document	10
15 May 2023	Environmental Review Document released for public review	411 (7 years, 10 months)
26 June 2023	Public review period for Environmental Review Document closed	6
25 January 2024	EPA received final information for assessment	30
30 January 2024	EPA accepted proponent's Response to Submissions	1
15 February 2024	EPA completed its assessment	2
20 March 2024	EPA provided report to the Minister for Environment	5
25 March 2024	EPA report published	3 days
15 April 2024	Appeals period closed	3

Timelines for an assessment may vary according to the complexity of the proposal and are usually agreed with the proponent soon after the EPA decides to assess the proposal and records the level of assessment.

In this case, the EPA met its timeline objective to complete its assessment and provide a report to the Minister.

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