Koombana Bay Marine Structures

Environmental Review Document
Assessment No. 2049

COMMENTS FROM EPA SERVICES

This document provides the comments from EPA Services regarding the Environmental Review Document for the Koombana Bay Marine Structures proposed by South West Development Commission.

Comments	Proponent response
EPA Services	
Benthic Communities and Habitat	
EPA Services notes that the capacity of seagrass in Koombana Bay to tolerate dredging impacts and/or to recover within five years of being lost, is likely to be compromised. Studies in the Leschenault Estuary have found that Halophila species have not recovered after 5 years of impact (DWER 2022, Kilminster per comm 2023). EPA Services considers that dredging in winter will have the least impact on seagrass growth and reproduction within Koombana Bay. However, noting key windows for marine fauna, May is considered the optimal time to minimise impacts to both seagrass, dolphins, and little penguins. **Actions** Please commit to dredging in winter months. If this is not possible, then a more rigorous monitoring and management framework will be required noting the likely recovery ability of affected seagrass.	SWDC will not undertake dredging in the summer months – December to March — to minimise impacts to seagrass and marine fauna (see final item).
Coastal Processes	
The Coastal Process Management Plan (CPMP) does not currently provide confidence that potential impacts on coastal processes will be adequately monitored and managed. A fundamental concern is that it does not appear to have been developed in consultation with the different entities which are identified as responsible for the monitoring and management of coastal processes in the different water bodies. There are concerns that the City of Bunbury, which will be responsible for the monitoring and management of Koombana Bay has not been consulted, which is where the greatest impacts are predicted to occur. Further specific details on the components of the CPMP which need to be strengthened are provided below. • Methodology: There is no information included in the CPMP about the methodology for assessing beach profiles, hydrographic surveys, and	Please see attached letter in relation to the comment about consultation with the City of Bunbury, which also outlines their position on the implementation of the CPMP. Updates to the CPMP in terms of methodology, survey locations, monitoring frequency, triggers and management have used the Ocean Reef CPMP as a guide — as requested during a clarification meeting with representatives from EPA Services, SWDC, DoT, RPS and GHD on 17 August 2023.

Comments	Proponent response
photographic monitoring. To ensure that the monitoring is undertaken in an accurate and consistent manner there needs to be specific descriptions of how each of the monitoring components will be undertaken. • Survey locations: The CPMP does not include any information about the location where the monitoring will be undertaken. The repetition of monitoring at specific locations is fundamental to detecting and managing change. • Frequency: The frequency of some of the monitoring parameters, for example beach profiles is annually at the start of summer. It may also be appropriate for some of the monitoring to be undertaken twice year, once in winter and once in summer. • Triggers: There are no specific triggers included in the CPMP. The triggers identified in the CPMP simply relate to whether or not the management targets have been met. The triggers should relate to specific and measurable parameters, e.g., beach erosion causing greater than X m recession of the 0 m AHD contour from the pre-development position. • Management: The management options identified in the CPMP relate to the *Koombana Bay Coastal Erosion and Design Report* (Seashore engineering 2013). This report was written prior to the Koombana Bay Sailing Club proposal and therefore will not adequately address the increased impacts on coastal processes associated with the Koombana Bay Sailing Club proposal. The Seashore engineering (2013) report also does not describe monitoring methodology and associated triggers for management decisions. **Action:** Please update the CPMP to address issues raised above.	During the 17 August 2023 meeting the EPA recommended submission of a second MEQMP that assumes only the Casuarina Boat Harbour Development (CBHD) future proposal occurs (discussed further in Comment #4) because: • It is likely that the CBHD will be constructed and completed well before (years) the Koombana Bay Sailing Club (KBSC) marina. In this case the CBHD only MEQMP will be in force until the development of the KBSC marina. • There is the possibility the KBSC marina may not be constructed, in which case the CBHD only MEQMP will remain in force. • The justification for a CBHD only MEQMP is because the potential MEQ impacts (risks) to the Leschenault Inlet (inlet) were due to increased flushing from the presence of the KBSC marina. If the KBSC marina is not constructed (i.e., not present) then the CBHD only MEQMP is appropriate with no monitoring and management of the inlet. Applying the same rationale, a second CPMP that assumes only the CBHD future proposal is constructed has been developed. Like the MEQMP, most of the potential coastal processes impacts (risks) to Koombana Beach, KBSC Beach and Ski Beach will be due to the presence of the KBSC marina. If the KBSC marina is not constructed (i.e., not present) then the CBHD only CPMP is appropriate with no monitoring and management of coastal processes and seagrass wrack at these locations, with the focus on coastal processes and

Comments	Proponent response
	seagrass wrack dynamics in the immediate locale of CBHD. Provision of a CBHD only CPMP was communicated with EPA services during a meeting on 13 October 2023. Subsequent to the 13 October 2023 meeting, DoT has confirmed that it is already their responsibility to manage (maintain) all their facilities to a safe navigable depth. Hence, two of the six management triggers in the CPMP are not applicable to the CBHD. A third management trigger regarding beach erosion/accretion management of Koombana Beach and Ski Beach is not applicable to CBHD as potential impacts/effects are only associated with the KBSC marina future proposal. Both CPMP versions are now compatible with this DoT position. The original intent of the EPA was for the CPMP only to be applicable following construction of the KBSC marina future proposal. Though a CPMP version only for the CBHD future proposal with no KBSC future proposal has been provided, its need should be considered as per the original intent of EPA Services (i.e. no CPMP for the CBHD future proposal without the KBSC marina future proposal).

Marine Environmental Quality	
Hydrodynamic modelling and long-term flushing of Leschenault Inlet EPA Services has previously provided comments and recommendations to assist with strengthening the hydrodynamic modelling and notes that modelling in the ERD has been updated to largely address these comments. However, whilst the model is suitable, the model set up and the parameters selected to run the model are not appropriate. The use of inappropriate parameters skews the interpretation of changes to flushing. Based on the incorrect model set up (figure 82 of the ERD), the flushing rate for the inner Leschenault inlet is around 9-10 days. In comparison, under a corrected model set up, the flushing time for the Leschenault Inlet is >15 days for the inner parts of the Leschenault Inlet. It is important to note that the flushing time could be greater than 15 days (but this is not possible to determine based on an upper limit set at >15 days). EPA Services considers that the estimated change in Leschenault inlet flushing time poses a serious risk of lowering dissolved oxygen concentration and increasing nutrients (resulting in recurring algal blooms) within the Inlet, which subsequently may be expected to result in a negative feedback loop and anoxic conditions over the long term. This has been observed to occur in natural and constructed waterbodies throughout the world including Western Australia (Carstensen et al. 2007, DWER 2023, Froelich et al. 1979, Howarth et al. 2011, Paerl 1988 and 2006). Further explanation can be provided outlining how EPA Services considers this a risk. EPA Services considers that it is plausible that: (i) the new breakwaters for the Koombana Bay Sailing Club are likely to result in a significant increase in water residence times of the deeper reaches of Leschenault Inlet; and that, (ii) this expected decrease in the flushing rate and reduced oxygen levels and poses a high degree of risk of triggering a negative feedback loop that is	With respect to the EPA Services comment regarding choice of control volumes to compute the flushing time scale, in our view it is a moot point. The increased flushing time associated with the control volume of Koombana Bay simply reflects the time for 'water outside of the control volume' to penetrate the inlet. The inlet control volume removes this 'penetration time scale' and gives a more accurate reflection of the change in flushing time. Hence, no additional analysis is required to characterise the flushing time of the existing and future proposals. Regardless of the control volume that is utilised to calculate the flushing time, there is a predicted increase of 1-2 days in the flushing of the entire inlet due to the creation of the embayment between the KBSC marina and the existing Jetty Road causeway. As described in the MEQ modelling technical report the creation of this embayment is predicted to retain a greater proportion of recently discharged inlet waters than the existing condition (i.e., the future embayment is predicted to increase the recirculation of inlet waters and thereby cause increased residence time). It is important to note that the volumetric flux into and out of the inlet through the Plug during flood and ebb tides, respectively, does not change. We do not share the EPA Services view that the degree of increased flushing poses a 'serious' risk of lower dissolved oxygen to the inlet. Ongoing (GHD 2023), recent (O2 Marine 2021) and past (Oceanica 2008) monitoring does not support low DO conditions have occurred or currently occur in the

expected to result in a long-term ongoing deterioration in marine environmental quality with potential ecological flow-on effects. These risks do not appear to have been recognised and/or appropriately addressed. In addition, it is important to note that once these issues present themselves there are no obvious practical mitigation measures that can be adopted to resolve the situation. The management plan currently does not provide confidence that the problem, if and when it occurs, can be effectively managed and resolved.	inlet's bottom waters. Rather, it supports that due to the shallowness of the inlet there is insufficient depth to support persistent multi-day thermal stratification, and hence nighttime convective mixing replenishes oxygen levels over the sediments so as not to pose a material low DO risk. We agree that low DO poses a risk to increased internal loading of nutrients from the sediments generally (i.e., as per EPA Services references), but not for the inlet setting due to its shallow nature. We do acknowledge that the ~10-20% increase in flushing of the entire inlet may increase nutrients by ~10-20% (i.e., an increase due to hydrodynamics) and thereby potentially cause a small increase in chl-a levels. However, we do not characterise these potential changes as a 'serious' risk unless the inlet is near a tipping point due to past effects (e.g., Preston River realignment). Based on several previous reviews and discussions (and resultant updates to the MEQ Modelling Report) with the EPA Services Unit on this matter, SWDC is of the view that the additional re-analysis of model predictions regarding flushing requested by the EPA Services Unit will not modify the 'serious risk' rating. Nonetheless, EPA Services Unit require a credible and feasible management action(s) to mitigate the 'serious' risk from the predicted ~10-20% increase in inlet flushing by the KBSC marina future proposal if unacceptable inlet MEQ eventuates. Management action(s) to mitigate the occurrence of unacceptable MEQ in the inlet from a reduction in flushing is described in the next review comment.

Marine Environmental Quality Management Plan (MEQMP)
 	
EPA Services notes that the MEQMP has largely addressed review comments previously provided by EPA Services. However, some fundamental concerns remain unaddressed, particularly in relation to trigger and threshold levels, and monitoring methodology.
 	
For example, EPA Services notes that the MEQMP proposes the following management actions to address marine environmental quality issues in Leschenault Inlet:
 	
• "*Evaluate applicable management measures Including:*
  ○ *Pumping to reduce flushing time of eastern inlet embayment(s)*
  ○ *Temporary extension of the Plug's breakwaters to inject ebb inlet waters further into Koombana Bay to reduce recirculation.*
  ○ *Application of additive (e.g., PhosLock) to eliminate/reduce nutrient release.*
  ○ *Pumping to reduce flushing time of eastern inlet.*
  ○ *Deployment of oxygen unit*
• *Determine further management responses".*
 	
While adaptive management is an important component of a MEQMP, an understanding about whether the measures are practical, implementable, and effective, and of themselves have environmental impacts, is required. EPA Services is of the view that an evaluation of potential management measures does not ensure any of these measures will be implemented and/or will be effective.
 	
EPA Services further notes that:
 	
• Extension of the Plug's breakwaters will be expensive and needs to be a long-term measure. There is no modelling or information to support that this will be an effective measure.
	SWDC agrees with EPA Services that the following management actions are not likely to be practicable, effective and/or affordable:
	
	• Temporary extension of Plug's breakwaters
	• Application of sediment additive (e.g., PhosLock)
	• Deployment of oxygen unit.
	
	These management action options have been removed from Section 5.1.
	
	Though perhaps cost-prohibitive, SWDC are of the view that pumping of the inlet's eastern embayment may be an effective and practicable mitigation action if the inlet's MEQ is compromised by decreased flushing due to the future presence of the KBSC marina. A high-level concept of such a pumping scheme is to pump water 'from' the eastern embayment to the Inner Harbour with:
	
	• A ~500 m pipeline from the eastern inlet embayment to the SPA Inner Harbour
	• A pump house housing the pump and controls.
	• Other associated infrastructure including:
	  ○ Inlet intake structure
	  ○ Inner Harbour outlet structure.
	
	Alternative designs for the KBSC marina are also being considered that will maintain (or have a much lower reduction in the inlet's flushing) the baseline flushing of the inlet.
	
	Regarding this matter SWDC suggests that EPA Services conditions the approval and construction of the KBSC marina future proposal on the following basis:

• Extension of the Plug's breakwaters will have significant impacts to the southwest corner of Koombana Bay which is a key waterfront development area. • The ability to pump the eastern inlet effectively is unproven and will be expensive. • The deployment of an oxygen unit is likely to require several large units, which will also be expensive. • The use of *Phos-lock* does not address the key nutrient of concern in the system which is ammonia. • The use of Phos-lock within an ecosystem supporting protected mangroves may require further assessment for potential for stress induced nutrient limitation (phosphate) to result. EPA Services recommends that the MEQMP requires clearly defined management actions that may reasonably be expected to resolve environmental quality issues in Leschenault Inlet, the Koombana Bay Sailing Club marina and the adjacent 'plug' and areas of Koombana Bay (should these eventuate). Consistent with Coastal Processes comments, EPA Services recommends that this should include consultation with the City of Bunbury and demonstration that each responsible entity has the ability and the financial capacity to implement all actions into perpetuity. **Action:** Revise the MEQMP to address the effectiveness, practicability, and implementation of the proposed management actions.	• Demonstration that pumping mitigation action concept design will meet the performance objective to maintain existing flushing conditions of the eastern inlet should the need arise. • Construction and testing of the pumping scheme. • Financial assurance from the KBSC (or other entity) for operation and maintenance of the pumping scheme to ensure it will be operational in the event it should be needed. Alternatively, SWDC suggests that EPA Services condition the approval of the KBSC marina future proposal through demonstrating that re-design of the KBSC marina will reduce (or eliminate) changes to the baseline inlet flushing to an acceptable level of risk to the MEQ. In an email on 16 October 2023 EPA Services provided informal advice on an example of a condition that could be utilised for the KBSC marina in this context. Essentially, rather than conditions on the process, the conditions would be on the outcome. An example for the KBSC Marina future proposal conditioning might be 'The marina will not have an adverse impact on the flushing and MEQ of Leschenault Inlet'. SWDC supports outcome-based conditioning for this element of KBSC Marina future proposal. This will allow flexibility to provide for the EPA Services' consideration an acceptable mitigation action(s) and/or marina re-design to achieve the outcome-based conditioning.
Koombana Bay Sailing Club Based on the available information, EPA Services is concerned that the Koombana Bay Sailing Club will not meet the EPA's objective for Marine Environmental Quality and recommends that alternate designs and/or locations are explored with a view to	As part of the marine future proposal development, KBSC evaluated alternate locations and designs. The KBSC marina future proposal was referred on this basis.

mitigating potential deleterious impacts to Marine Environmental Quality that are currently associated with the design and proposal.	Alternate marina locations along Koombana Beach are not possible due to land tenure. An alternate design for the marina with a smaller footprint than the original design (see figure 3 of CPMP) was adopted that yielded modest improvements to the flushing of the inlet.
Additional MEQMP EPA Services review comments The revised MEQMP has largely addressed EPA Services comments to date, however a few fundamental issues remain outstanding. • *Section 3.2.2 Environmental Quality Criteria - Reference sites* EPA Services notes that comments provided in December 2022, relating to two reference sites being situated in approximately 6m of water. EPA Services recommends that more eastern reference site should be located further inshore, in approximately 2-3m so that there is representation of the inner parts of Koombana Bay. • *Section 4.2.2 Site specific chlorophyll-a EQG for HEPA and MEPA* This section describes the *interim* EQG's for chlorophyll-a for the MEPA and HEPA areas. The *interim* EQG's are based on inappropriate data which is more than five years old, and it has not been collected on a regular basis. Advice on the derivation of the EQG's on modern baseline data collected over a two-year period was previously provided and an agreed approach was determined in consultation with the proponent through several meetings. The agreement was formalised in a letter from Jose Romero, Technical Director of GHD, dated 29/11/2022. The use of *interim* values with no commitment to deriving the EQG on baseline data is not acceptable. EPA Services recommends that Section 4.2.2 is updated to state that the EQG will be derived using the agreed approach which is 80th percentile (HEPA's) and 95th percentile (MEPAs) of baseline data. The baseline data is to be collected from reference sites in Koombana Bay and within the Leschenault Inlet.	As requested by the EPA Services Unit, the eastern reference site (site Ref-2) has been moved east to inshore waters of ~2-3 m depth. Commitment added in Section 4.2.2 that states that updates to the 'interim' chl-a EQG values will be made upon completion of the acquisition of additional baseline monitoring data as outlined in Section 4.2.1.1. The EQG for chl-a changed from interim numeric value to method for deriving guideline value. EQG MEPA 4 for toxicants in sediments changed to ANZG (2018) default guideline value (as EQG HEPA 4). DO saturation is >80% for MEPA DO EQG for Cockburn Sound (EPA 2017). Nonetheless changed to >90% as requested by EPA Services. Section 4.1.1 states that replicate samples are to be collected at each site, however this was not stated in Table 8 under routine monitoring specifications. The collection of five (5) samples at each monitoring site is seemingly excessive and costly. The number of samples collected at each site has been increased from two (2) to three (3), which allows a median to be determined at each monitoring site for a monitoring round. This has been explicitly added to

• *Table 8 Routine monitoring program for the EQO maintenance of ecosystem integrity* EQG for Chlorophyll-a - Table 8 currently lists the interim EQG's for chlorophyll-a, based on the *interim* values identified in Section 4.2.2. It is recommended the i*nterim* values are also removed from this section and instead the method for deriving the guideline is stated. For example, EQG EI HEPA 1KB: the median concentration of chlorophyll-a *at any site* does not exceed the 80th percentile of the reference sites on any occasion. EQG MEPA 4 - The EQG for contaminants in sediments are based on the ANZG (2018) upper guidelines. This is not consistent with the EPA (2016) Guidelines which recommend the EQG for MEPAs to be based on the ANZG (2018) low trigger guidelines. EQG EI MEPA 3 - The median value is currently stated as > 80% saturation. This is inconsistent with previous advice which recommended the EQG is based on > 90% saturation. • *Routing monitoring specifications – sample replication* There appears to be no sample replication at each monitoring site. EPA Services recommends that at each site there are five replicate samples. A minimum of five is recommended to calculate the median of the site for comparison against the EQG. • *Comparison of data against the EQG* The MEQMP appears to use the median from samples collected from several *different* sites within an Area of Ecological Protection to assess if an EQG has been met. This approach is incorrect, the median of the data from *each* site should be compared to the EQG. Spatial variation is likely across water bodies, especially in enclosed systems and it is important to identify areas of concern. • *Section 5.0 Reactive monitoring and management for EQG non-compliance* Section 5.1 EQO maintenance of ecosystem integrity The EQS for chlorophyll-a for the HEPA in Koombana Bay currently relates to Chlorophyll-a only. EPA Services recommends that the EQS should also relate to light	the Table 8 column (routine monitoring specifications). EQG have been modified to compare each site to the relevant EQG rather than the defined area. Seagrass impacts are not predicted due to the operations of the two future proposals. The CEMP monitors and manages construction-related impacts of the future proposals on seagrass. No EQG or EQS for daily light integral or seagrass health are included in this MEQMP update as it is not warranted. Rather, a substantive increase in chl-a levels is an indicator of increased shading, which has been specifically identified as an example of a risk for evaluation in the EQS. EPA Services recommendations of updates to MEPA and HEP EQS for median DO has been updated in the MEQMP. Addition of section 3.3.5 to MEQMP to specify NATA laboratory LoR requirements.

and impacts on seagrass. For example, Daily Light Integral and a measure of seagrass health. The EQS chlorophyll-a for the Leschenault Inlet and the Casuarina Boat Harbour, Koombana Bay Sailing Club and Inner harbour will be different to Koombana Bay (as specified above) as there is no seagrass in these water bodies. EPA Services recommends that the EQS for the HEPA in the Leschenault inlet should be: The median dissolved oxygen concentrations at a site, calculated over a period of no more than one week, is greater than the 60% saturation. EPA Services recommends that for MEPAs (Casuarina Boat Harbour, Koombana Bay Sailing Club, and Inner Harbour) that the EQS for chlorophyll-a should be: The median dissolved oxygen concentrations at a site, calculated over a period of no more than one week, is greater than the 60% saturation. • *Analyses* EPA Services recommends analysis is conducted by a NATA accredited laboratory using limit of reporting that suitable reflect each assessment (this is particularly important for bioavailability analyses). **Action:** Please update the MEQMP to address the above comments.	
Marine Fauna	
Marine Fauna Management Plan (MFMP) – Timing of dredging <u>Bottlenose Dolphin</u> EPA Services notes that dolphin research has identified that calving and breeding activity peaks in the warmer months and then dolphins disperse in the cooler months, with the abundance in Koombana Bay decreasing from May onwards (Renaldo pers comm 2023, Smith et al. 2013 and 2016, Sprogis 2016). <u>Little Penguins</u>	**Bottlenose Dolphins** As identified by EPA services, dolphin calving in Bunbury waters peaks in late February to March (Smith 2012, 2016). The density of adult females in the inner waters of Koombana Bay is highest during summer and autumn, coinciding with calving (Smith 2016). Studies by Smith (2012, 2013) showed that males are more broadly distributed within Bunbury waters but tend to concentrate in the inner waters

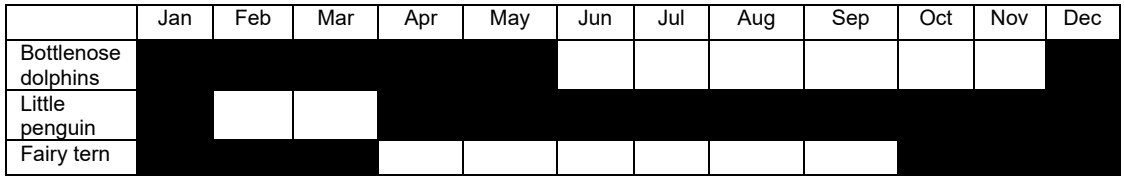
EPA Services notes that satellite tagging has identified Bunbury to be one of the key foraging areas during egg incubation (Cannell pers comm. 2023, Cannell 2016 and 2019) and that the winter months are the key foraging periods whilst Little Penguins are incubating eggs.

Fairy Tern

EPA Services notes that Fairy Terns have been recorded to establish colonies at sites throughout the Bunbury region. The breeding period for fairy turns is between October and March, with nesting observed in the area in summer,

EPA Services recommends that dredging is performed outside of key breeding times for conservation significant species. Key reproductive periods occur at different times of the year for Bottlenose Dolphins and Little Penguins making it difficult to identify the best time for dredging.

Important breeding times for bottlenose dolphins, little penguins and fairy tern as identified in the ERD.



during the warmer seasons, particularly summer, coinciding with female habitat use of the same area.

Little Penguins

The closest little penguin breeding colonies occur to the north of Bunbury at Penguin Island and Garden Island. Breeding and individual nesting is variable among years (April to December), but typically peaks in egg-laying occurring in June and September (Dunlop et al. 1998, Wienecke 1993; Nicholson 1994).

The duration and distance of foraging trips varies widely between the breeding and non-breeding periods. During the breeding season, little penguin foraging is constrained by the need to return to the nest site to brood eggs and feed chicks.

Little penguins typically remain within close proximity of their breeding colonies during the incubation (< 50.0 km, Collins et al.) and chick-rearing periods (< 20-36.0 km, Cannell 2017; Hoskins et al. 2008), compared to the non-breeding period (≤ 500 km). Data from Western Australia shows that little penguins foraged mainly in Comet Bay and Cockburn Sound while breeding, with evidence that breeding success decreases with increasing foraging range (Cannell 2001; 2017).

After egg hatching, the small young need to be kept warm continuously and fed every night, thus the adults switch to a routine alternating a day at the nest with a day foraging (Collins et al. 1999). Therefore, little penguin foraging activity is likely to be lower in Koombana Bay (at least for breeding adults) during the breeding period (April to December), compared to the non-breeding period

	(December to March), due to its considerable distance from the breeding grounds (>130 km, Penguin Island and Garden Island). **Australian Fairy Terns (hereafter Fairy Tern)** On the lower west coast of Western Australia, fairy tern breeding occurs from October to February, although the timing of colony formation varies from year to year (Greenwell et al. 2021). Post-breeding and in late summer/early autumn, fairy terns aggregate on the Peel-Harvey Estuary and Rottnest Island, before returning to the Houtman Abrolhos Islands for their non-breeding period (March-September) (Dunlop & Greenwell 2021).

Table 1. Proposed peak habitat use for Bottlenose Dolphin, Little Penguin and Fairy Tern

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	References
Bottlenose Dolphin	■	■	■									■	Smith (2012), Smith et al. (2013, 2016)
Little Penguin	■	■	■									■	Collins et al. (1999); Hoskins et al. (2008)
Fairy Tern	■	■								■	■	■	Dunlop & Greenwell (2021); Greenwell et al. (2021)

Action Commit to a period of dredging to minimise impacts to marine fauna (and seagrass as discussed above).	Considering the peak periods of habitat use of marine receptors within Koombana Bay (see Table 1), dredging activity will not occur between December and March, when habitat use of Koombana Bay by bottlenose dolphin, little penguin and fairy tern is highest. Implications for fairy terns in relation to potential dredging during October and November and any resulting management actions will be addressed in the *Avifauna Management Plan*

ANON-BJR9-SPDB-Z, Forza Dragon Boat Club

Forza Dragon Boat Club is a paddling Club, we use the Leschenault Inlet which has protected calm waters suitable for paddle craft. We share the waters with the Rowing Club, Surf Life Saving Club, Sea Scouts, Outriggers and many general public that have paddle boards, canoes and kayaks. The inlet has two boat ramps that attract many power boats of various sizes. The larger boats cause large wakes and can capsize a Dragon Boat. These large boats, most of which launch their boats and then simply travel through the plug into the Bay. If possible, these should be encouraged to move to launch facilities in the bay at the new development. One item that we believe encourages power boat use in the Inlet is the wash-down facility at the boat ramp. We (Forza Dragon Boat Club) would like to see fewer power boats, particularly the larger ones, using the inlet, making the inlet a safe calm waterway for paddling and sail craft. The new proposal should include the removal of facilities such as the wash-down at the existing boat ramp which may not be constructed to the latest standards.	The boat ramp and trailer parking have recently been upgraded in Casuarina Boat Harbour (CBH) which will provide more viable options, especially for larger boats. This should relieve some congestion from the Inlet's boat ramps. A washdown facility at the upgraded CBH is currently being investigated. The washdown facility at the power boat club is owned and managed by the City of Bunbury (CoB) and the TBW project team will continue to collaborate regarding these facilities across Bunbury. The CoB notes that it is a Department of Transport (DoT) responsibility to enforce boat speeds and have subsequently raised the Dragon Boat Club's concerns about boat speeds with DoT.
ANON-BJR9-SPDJ-8, WA Fairy Tern Conservation Network, WA Seabird Conservation Network	
The threatened Australian Fairy Tern establishes breeding colonies within the outer harbour area in years when prey availability is high within about 2km of the nesting location. Last season October - January there was a productive colony on the flat, reclaimed land adjacent to the proposed northern breakwall. In 2018 a colony nested successfully on the western beach at the tip of the outer harbour breakwall. Breeding Fairy Terns could be impacted either by turbidity from dredging and other marine construction activities or from colony disturbance. Should nesting coincide with construction activities a Section 40 Ministerial Approval will be required under the WA Biodiversity Conservation Act. This may cause significant delays.	Dredging activities could impact fairy terns if conducted during the breeding season, either through turbidity or loss of seagrass. The fairy tern is a 'blue or clear water' foraging species, that plunge dives into clear, shallow waters to depths of up to ~30 cm to collect small forage fishes such as sandy sprat *Hyperlophus vittatus*, blue sprat *Spratelloides robustus*, and Southern Sea garfish *Hyporhamphus melanochir* (Greenwell et al. 2021). Any dredging activities should be conducted outside of the known peak habitat use period for fairy tern (i.e., October to February).

The best away to protect the Fairy Terns and avoid project delays would be establish and manage a Fairy Tern conservation area at the outer harbour (there is a similar area set aside at the Fremantle Port. Habitat improvement and social facilitation techniques can be used to attract the terns to the managed area. Alternatively, dredge-spoil could be used to create a new breeding island in the area. Bridled Terns have now established a breeding colony in the outer harbour rock-wall and are likely to colonise the new structures.	Consideration of a dedicated breeding site requires further consultation among stakeholders but could be provided for in an *Avifauna Management Plan* and associated stakeholder workshops, with the potential for very positive outcomes — noting the Casuarina Boat Harbour development area will be fully developed as part of the current proposal and unable to support fairy terns. For further details, see the response to DBCA below. Breeding activities of bridled terns, which are listed as marine and migratory, could be disturbed during construction. Observations of breeding sites are needed to confirm the exact locations of nesting sites. Bridled terns arrive to breed in south-western Australia from mid-September and remain in the region until mid-April, when they depart on mass, toward the north Sulawesi Sea. Therefore, coinciding dredging/construction activities in April–September will also reduce impacts for this species (see response to EPA services for detail on timing of dredging).
ANON-BJR9-SPDY-Q	
Comments relate to silt build-up, dredging and Bunbury tourism. Refer to attached submission.	(i) Flushing: Flushing of Casuarina Boat Harbour (CBH) following the construction of the northern breakwater has been modelled and the outcome is that the rate of water exchange within the harbour will remain within environmentally acceptable limits. (ii) Siltation: The siltation that occurs in the outer harbour is a result of the natural movement of sand north

	along the outer edge of the existing breakwater, with some of that material moving around the head of the breakwater and then south into Southern Port Authority's outer harbour berths. The dredging being carried out by the port to maintain the outer harbour berths, combined with the presence of the new northern breakwater, will limit the amount of siltation in the new CBH entrance channel. We anticipate periodic maintenance dredging of the harbour entrance channel may eventually be required, but that quantities will be small. Consequently, the environmental impact of any future harbour entrance dredging is expected to be small. (iii) Contaminated dredge spoil: The estimated 10,000 m^3 of contaminated dredge spoil is to be taken onshore within CBH, placed into lined, bunded holding ponds or geotextile tubes where it will be dewatered and then removed from the harbour and disposed of in a licensed disposal facility. This will be carried out in accordance with environmental approval conditions and relevant legislation. Removal and disposal of this material will reduce the risk of future environmental harm. - Siltation in the new harbour entrance is not expected to be a significant issue but may be impacted by decisions made concerning the outer harbour berths i.e., if they continue to be dredged then we don't expect much siltation in the harbour entrance. And confirming that environmental impacts of any future CBH dredging are expected to be minor.

	- The 10,000 m^3 of contaminated dredge spoil is to be taken onshore within CBH, dewatered, and then disposed of in a licensed disposal facility. The SWDC acknowledge the feedback provided on Bunbury and Bunbury's tourism. The State Government is committed to delivering the transformation of Bunbury's waterfront project for the purpose of stimulating the growth of marine and tourism industries, and to further revitalise Bunbury as a place to live, work and invest. The proposal will generate economic development that will benefit Bunbury and the South West region by supporting and complementing existing recreation and marine commercial activity, attracting new businesses, creating jobs, and promoting new growth in the area.
ANON-BJR9-SPD7-N	
The entire northern end of Casurina Drive, Point McKenna needs to be left as it is, with no human or feral predator access, it needs protection, not development. The west side beach is a nesting site for Fairy Terns, which are listed as 'vulnerable' in Western Australia under the Environmental Protection and Biodiversity Conservation Act (1991) and under the International Union for Conservation of Nature (IUCN) Red List (Birdlife International), 2008. Any disturbance will cause the Terns to abandon their nesting activity, ferals will predate the eggs and chicks. The east side rock wall is a roosting site for all sorts of sea birds. I have seen (from a kayak) hundreds of Sanderlings, many Terns of various types, Sandpipers of various types and many other birds on the rock wall. Safe, quiet places for birds to roost is just as critical as feeding habitat. Migratory shorebirds are threatened everywhere they go, they fly from Siberia and the Arctic to feed on the Leschenault Estuary mud flats over summer, disturbance from fishers and dogs there is bad enough, but at least it's shallow water, so they have some chance to get away. Sea birds,	See detailed response to DBCA regarding disturbance of fairy terns. The eastern rock wall is not likely to support sanderlings - their non-breeding habitat in Australia is, primarily, sand beaches. However, other migratory species such as common sandpiper and grey-tailed tattler may occasionally use the rock wall. greater crested terns and bridled terns, listed as marine and migratory, may be using the sea wall for roosting and breeding, respectively. Observations could be conducted to understand better habitat use and bird abundance, including roosting, by migratory/marine species. Also see comment to WA Seabird Conservation Network regarding potential future observations.

particularly the migratory shorebirds, must have a place to roost for rest, but also when the tide comes in and they cannot be out on the mud flats. McKenna Point is the only place near the estuary where they can roost without disturbance. Many birds which use McKenna Point are listed as vulnerable or threatened, all the birds that use the point have nowhere else to go. In the scheme of things this point is a tiny spit of land which humans don't need, we have survived perfectly well without developing it up until now, but the birds do need it, why can't we just leave a little bit for nature?	Greater crested terns breed on islands off Perth from late spring to early summer. Therefore, undertaking dredging/construction activities during the same window as previously recommended for fairy terns, bridled terns, bottlenose dolphins, and little penguin, will likely lead to less disturbance of this species. It is likely that any disturbance during construction will result in birds moving to alternative locations. In the instance that disturbance occurs repeatedly, this may lead to effective habitat loss.
ANON-BJR9-SPD6-M	
I would like ot make a submission related to the Koombana Bay proposal. 1. I have a concern in relation to vehicle parking. The proposal provides little detail to the actial workings of the project. Presently on any given summer afternoon parking is very difficult in the proposed area and with increase traffic and in particular vehicles with boat trailers the level of congestion would be extream. A comment could be made that there is ample parking accross the other side of koombana bay drive, however this is impractical for the vast majority of beach attendees as the the beach is predomitly used by mothers with young children under school age. Having very young children with their parent crossing a major road with the excitment of going to the beach and/or the fatigue of an afternoon of fun at the beach is a receipe for disaster. 2.Tidal exchange is an issue in particicular around the koombana bay club proposal area the area now has issues related to poor exchange in particular on the southern side of the current temporary groin /bridge 3. Protection of infastructure. the area is subject to severe weather conditions with trapped tidal surges contributing to severe damage to infastructure such as the various attempts to extend the outer harbour wharf , destruction of the jetty baths	1)The Koombana Bay Sailing Club (KSBC) have advised the car parking required to fulfil demand generated by the marina through its various phases of development will be provided within the KBSC site. Phase 1 of the marina (based on engineering drawings) provides for redevelopment of the existing KBSC parking area and inclusion of an additional 38 car parking bays. The reclamation proposed in the development provides significant opportunity for additional parking as the marina develops. It will be the responsibility of the City of Bunbury to assess parking requirements and nominate the number of car parking bays to be developed as each stage of the marina proceeds. 2) The proposed KSBC marina is predicted to have a e-folding flushing time (time for 67% of the volume to

many years ago, damage to the jetty at the coffee shops site, severe damage to the jetty at the boat club. the proposal appears not to address tidal volitility. This volatility will have significant impact to the natural environment creating greater issues.	be flushed) of ~5 days, well below values that may become of concern (~10 days). 3) Surge from storms can cause large rapid increases in water levels above typical tidal variations. The new breakwaters associated with both proposals will provide surge protection during storms that will reduce risks to infrastructure.
ANON-BJR9-SPDS-H	
Comments relate to birdlife, seals and sea lions. Please refer to the attached submission.	**Birds** See comments to DBCA and WA Seabird Conservation Group regarding fairy terns and bridled terns. There is no evidence that fairy terns have decreased in the region, but rather there is variability in site among years. The stakeholder comments regarding controls to improve outcomes for birds utilising the area could be considered in an *Avifauna Management Plan* (see DBCA response). **Pinnipeds** The Marine Fauna Management Plan (App R) has MFOs to protect sea lions from noise and vessel disturbance and it was intended that these procedures would apply to seals as well, so the documents will be amended to ensure this is clarified. Control measures identified in the Marine Construction Monitoring and Management Plan (App L) refer to marine fauna in general and therefore include seals and sea lions.
ANON-BJR9-SPDR-G	

Comments relate to marine birdlife, particularly little penguins and fairy terns, and Leschenault Inlet. Please refer to the attached submission.	**Fairy Terns** The stakeholder claims that fairy terns are nationally and locally in decline. While the population is decreasing in the eastern states of Australia, in Western Australia "The population (~5000–6000 mature individuals) is considered stable in the evidence of any time series to the contrary (Commonwealth of Australia 2020; Dunlop & Greenwell 2021; Greenwell et al. 2021e) (Greenwell & Dunlop 2023)". However, the loss of breeding habitat due to intense recreational activity, development and rising sea levels has resulted in recurrent breeding failure at some sites over the past decade and most breeding colonies require some protective measures to reduce threats and increase the chance of breeding success (Greenwell & Dunlop 2023). Ongoing coordinated multi-agency and community volunteer efforts are occurring at Bunbury Outer Harbour [jurisdiction of Southern Ports Authority (SPA)], with monitoring, largely, supported by DBCA, BirdLife Bunbury volunteers and the WA Fairy Tern Network. A request to DBCA should be made to assist with monitoring at the Casuarina Boat Harbour development area (the 2022/23 nesting site, Security Zone currently managed by SPA, that will eventually become part of Casuarina Boat Harbour to be managed by the Department of Transport) in case Fairy Terns return to this site in 2023/24. Management of the sand trap, including maintenance dredging is required. This could be facilitated through an *Avifauna Management Plan* (see response to DBCA comment for details) with

	consideration for the existing maintenance dredging program. Concerns regarding dredging and the potential impacts related to successful foraging are addressed in the comment above to the WA Seabird Conservation Network. Suggestions regarding the creation of a dedicated breeding habitat are addressed in the comment response to DBCA. **Little Penguins** The stakeholder raises the issue of the increased risk of boat strikes with little penguins and the use of propeller guards. Propeller guards are a very effective measure for reducing impacts to penguins, but in most cases, the use of guards is the responsibility of individual boat owners. There may be an opportunity to promote the use of propeller guards to reduce the impacts to penguins and dolphins through stakeholder engagement. To reduce potential impacts associated with dredging, any dredging activity should be conducted during the breeding period, when little penguins remain close to their colonies. For further details, see the response to EPA services. **Inlet** The MEQMP provides to measures to ensure inlet flushing is maintained to an acceptably low level of risk: 1) Construction and maintenance of a pumping scheme that pumps water from the inlet to

	Koombana Bay to reduce the flushing time of the eastern inlet. 2) A re-design of the KBSC marina that reduces the changes in the inlet's flushing to acceptable and tolerable risk levels.

ANON-BJR9-SPD8-P, Bunbury Dolphin Discovery Inc.	
We have been engaged with the process throughout in our capacity as marine stewards for Koombana Bay and the resident wild dolphin population for over 30 years. TBW3 offers a significant opportunity to establish in water structures that will help provide safe harbour for vessels and economic opportunity for the region. Our main concern is that the safety of dolphins and other marine animals is assured during the construction process through Marine Fauna Observation (MFO) as was the case with other marine projects in the region such as the deconstruction of the Bunbury Jetty. This process worked well and did not cause any significant delays in the project process. We would hope that for such a significant project this will again be a significant focus. Secondly, we see that with the installation of rock wall structures we will in fact be establishing new marine habitat that underwater becomes an artificial reef where over time flora and fauna will become established and become a part of the local ecosystem potentially delivering a nett positive for animals higher up the food chain. We would recommend that studies be undertaken to monitor this over time so that the data can be used for the assessment of future projects of this type across the State.	**Marine Fauna** As described in the Marine Fauna Management Plan (App R) and Marine Construction Monitoring and Management Plan (App L) dedicated MFOs will be used for dredging at Casuarina Boat Harbour and the KBSC marina and silt curtains will be used during dredging for the KBSC marina to ensure impacts to dolphins and other marine fauna are minimised. As described in the response to the EPA dredging should be undertaken in winter to avoid the seasonal presence of dolphins. **Rock wall habitat** Rock wall habitats are already present in Koombana Bay, and it would not be necessary to monitor colonisation, as it is likely that the rock wall would be colonised in the same manner as predicted by the existing structures.
ANON-BJR9-SPDD-2, Birdlife Bunbury (Convener)	
Comments relate to birdlife, particularly fairy terns and banded lapwings. Please refer to attached submission.	See detailed response to DBCA below regarding fairy terns. Banded lapwings regularly utilise the Bunbury Outer Harbour (managed by SPA) for nesting (and not the Casuarina Boat Harbour Area to be managed by the Department of Transport) and as identified by the stakeholder, suitable breeding habitat for the species is decreasing. Co-existence between commercial/ recreational uses and banded lapwing nesting could be facilitated through the development of an *Avifauna Management Plan*, with consideration for

	habitat allocation, educational signage, and temporary fencing during the breeding season.
ANON-BJR9-SPDQ-F, Department of Primary Industries and Regional Development - Fisheries Management	
Relevant fisheries in the proposed area of development include the South West Beach Seine Managed Fishery (SWBSMF), which primarily targets sandy sprat (*Hyperlophus vittatus*) and the WA recreational fishery. Both shore and boat-based recreational fishers operate in Koombana Bay, targeting blue swimmer crab (*Portunas armatus*), herring, tailor, southern garfish, school whiting and other nearshore finfish species. Whilst it does not appear that the proposed development would have significant impacts on nearshore finfish indicator species within the area, including Australian herring and yelloweye mullet, removal of seagrass may impact upon seagrass dependent species including the commercially important sandy sprat and southern garfish, particularly when considered in the context of more regional changes to seagrass coverage in the South West of WA. It is recommended that more recent seagrass monitoring data is collected to better understand potential impacts to seagrass communities, as the cited literature is primarily greater than ten years old and therefore not considered sufficient to assess potential risk to both the habitat and other species. In addition to impacting finfish and crab spawning and juvenile feeding in the area, dredging activities and sediment movement may impact the health of blue swimmer crabs, who have shown increased susceptibility to chitin clastic shell disease when subject to stressors such as decreased water quality. Any outbreak in this naturally occurring disease is likely to be acute, subsiding once water quality improves. Concerns about overfishing due to recreational pressure are unlikely to occur, especially as many of the key species are highly connected, with state-wide distributions. Localised overfishing may occur from increased recreational vessel	**Blue swimmer crabs** Blue swimmer crabs have been detected with chitin clastic shell disease, which is a caused by a naturally occurring bacterium in Bunbury Harbour in 2016 (Bunbury Harbour crabs found with bacterial shell disease (fish.wa.gov.au) and 2021 (South West students claw shell disease - Department of Education). DPIRD identifies in their comments that the disease is naturally occurring and that it will subside once water quality improves. The proposed dredging program is for six and a half non-consecutive months (one month, 3.5 months and a 2-month period) and therefore it is anticipated that water quality will improve during dredging intervals to enable recovery. **Seagrass** A ground truthing survey of Koombana Bay was undertaken by RPS scientists on 16 March 2017, which was in late summer when seagrass meadows in temperate regions tend to exhibit their highest cover, to provide a conservative estimate of seagrass loss from the development. High quality aerial imagery from 2016-2017 was used as the basis for the survey design. During this survey *Halophila sp*. and *Heterzostera sp*. seagrass habitats were recorded, but there was no evidence of *Posidonia sp*. and *Amphibolis sp*. seagrass habitats. These surveys were undertaken more recently than the literature referred to in the comments and

activity, however, lowered catch rates may encourage fishers to fish elsewhere. Such fisher avoidance behaviour may lead to the overfished areas repopulating. As both recreational and commercial fishing activities occur within Koombana Bay the Department encourages the proponent to initiate and maintain communication with the Western Australian Fishing Industry Council (WAFIC), which represents the commercial fishing industry and Recfishwest, the peak sector body for WA recreational fishers over the lifetime of the project. Please refer to attached submission.	included in the supporting documents to the PER (App O. Benthic Communities and Habitat Study RPS 2023) and therefore it is anticipated that further surveys are not required.
ANON-BJR9-SPDZ-R, Fairy Tern Conservation Network volunteer	
Comments relate to marine fauna. Please refer to attached submission.	See comments to EPA Services regarding the most appropriate timing for dredging and that timing of habitat use by bottlenose dolphin, little penguin, and fairy tern. As per comments to WA Seabird Conservation Network, dedicated observations of marine/migratory species.
Department of Biodiversity, Conservation and Attractions	
Please refer to attached submission, and additional information provided below. The Department of Biodiversity, Conservation and Attractions (DBCA) has undertaken a review of the published ERD and supporting documentation and provides the following supplementary comments on matters relevant to the department's Biodiversity Conservation Act 2016 (BC Act) related responsibilities. Based on the ERD and other available information, a nesting area for the threatened fairy tern *Sternula nereis* (ranked vulnerable) has been identified within the disturbance footprint of the Proposal. Although not typical habitat for the species, the	The lower west coast (Perth to Bunbury) supports one of the largest known breeding populations of fairy tern in Australia (i.e., 700 breeding pairs). Site selection varies from year to year, likely dependent on a range of factors including food availability and habitat availability/stability (Greenwell et al. 2021). Fairy terns have attempted to breed within the Bunbury Outer Harbour on four occasions in the past six years (Greenwell & Dunlop 2023, DBCA 2023),

nesting site comprises suitable substrate that attracted the colony as nesting habitat following the disturbance of another important nesting site at the adjacent McKenna Point. Approximately 80 breeding pairs of the migratory fairy tern used this area during the 2022-23 breeding season (DBCA, 2023). The Koombana Bay area is regionally significant for the fairy tern species in WA, and all previously utilised nesting sites within the region are subject to threats, including, interactions with the public, pets and feral animals. The Koombana Bay area is regionally significant for the fairy tern species in WA, and all previously utilised sites within the region are subject to threats that contribute to hurdles to breeding success each year. With the ongoing necessity for maintenance sand removal at Mckenna Point, and potential interactions with the public, pets, and feral animals, the loss of a successful breeding area has the potential to impact on the local population. DBCA acknowledges that the new nesting site is within an operational port, and the area is identified for future development. The impact assessment should take into consideration the potential impacts on the local Fairy Tern population if impacts to the site cannot be avoided. Should the proposal receive approval from the EPA to proceed, consideration could be given to investigating the creation or enhancement of nesting habitat in the local area. Protection measures such as, but not limited to, restricting public access during breeding seasons, potential fencing of sites and feral animal control should also be considered. It should be noted that while the ERD identifies several broad nesting sites within Koombana Bay, including McKenna Point, Barr Island, Point Douro and the Leschenault Peninsula, the available habitat within these areas is limited, rather than contiguous over the site, potentially leading to an overestimation of suitable habitat. Based on the information provided, the level and significance of the impact of the Proposal on the fairy tern population remains uncertain. Any approval should consider avoiding disturbance to the site during the fairy tern nesting season (October to March). Any approval conditions should consider appropriate mitigation,	and therefore the area may be considered regionally important for the terns. As identified by DBCA, the Casuarina Boat Harbour development area was utilised by fairy terns in 2022/23 supporting about 80 breeding pairs, of which many fledged chicks. The site offered a stable, open, complex substrate, which would have appeared attractive to the terns, even in the presence of abundant sand at McKenna Point. Furthermore, access to the site was limited to the public, reducing the potential for disturbance. Given the success of fairy terns at the development site in 2022/23, observations should be made from October 2023, to determine whether the site is likely to be used by fairy terns in the coming season and beyond. Any development activities that have the potential to constitute a disturbance to normal behaviours would require a Ministerial Authorisation under section 40 of the *Biodiversity Conservation Act 2016*. As discussed on 3/10/2023 with the Department of Transport and South West Development Commission, the site will be monitored for the presence of fairy terns over the 2023/24 summer. Actions should be taken in the lead up to the 2024/25 summer to prevent fairy terns from nesting (i.e., hydro-mulching the site with a dark colour). DBCA Bunbury has long been involved with the monitoring of fairy terns in the region and plays a critical role in supporting the management of the species, including at the Bunbury Outer Harbour. A request to DBCA Bunbury could be made to facilitate observations in 2023/24 at both the development area and the beach at McKenna Point. Observations

management and monitoring actions to ensure the persistence of the species in the area; these actions may include the creation or enhancement of other nesting sites. Any disturbance to threatened fauna could be considered the take under section 40 of the BC Act and may require Ministerial authorisation. For the fairy tern, if the site is proposed to be disturbed during nesting season, DBCA considers that further consultation is required.	should also include a description of the current substrates at each site such as vegetation/weed growth and the beach width above the highest astronomical tide. Such observations would be valuable to better understand fairy tern site selection, particularly in the instance that both sites are available. As identified by DBCA, site threats vary among sites and historically important breeding areas (e.g., Point Douro, Barr Island, and Leschenault Peninsula) outside the fenced outer harbour are likely subject to much higher levels of disturbance (e.g. Greenwell & Dunlop 2023). Therefore, the Bunbury Outer Harbour is likely to remain an important breeding area for fairy terns. However, ongoing dedicated site management is needed, which may be facilitated through the development of a multi-stakeholder management plan. Consideration of a dedicated breeding site could be provided for in the management plan and associated stakeholder consultation workshops. "Dedicated managed sites may offer long-term solutions for coastal birds like fairy terns. Managed sites such as North Fremantle (see Greenwell et al. 2019b) show the potential of dedicated nesting areas to maintain breeding aggregations and support reproductive success by overcoming a lack of natural habitat." (Greenwell et al. 2021b). "The maintenance and establishment of multiple sites, whether natural or artificially created, in areas of high human activity, is important. The availability of multiple sites will allow for periodic shifting of colony locations over the years in response to changes in site suitability (e.g., food availability, habitat stability, disturbance,

	predation), which is an important behavioural characteristic of fairy terns (Greenwell et al. 2021a, Dunlop & Greenwell 2021) (Greenwell et al. 2021b)."

REFERENCES

Cannell, B.L., 2001. Status of Little Penguins in Western Australia: A management review. *Report prepared for the Department of Conservation and Land Management, Western Australia, 33pp*.

Cannell, B., 2017. Understanding the toll of consecutive years of warm waters on Little Penguins and refining their capacity as bioindicators of the marine coastal ecosystem. *Report prepared for the City of Rockingham and Fremantle Ports by Murdoch University*.

Collins, M., Cullen, J.M. and Dann, P., 1999. Seasonal and annual foraging movements of little penguins from Phillip Island, Victoria. *Wildlife research*, *26*(6), pp.705-721.

Dunlop, J.N. and Greenwell, C.N., 2021. Seasonal movements and metapopulation structure of the Australian fairy tern in Western Australia. *Pacific Conservation Biology*, *27*(1), pp.47-60.

Dunlop, J.N., Klomp, N.I., and Wooller, R.D., 1988. Seabird Islands No. 188. Penguin Island, Shoalwater Bay, Western Australia. *Corella 12,* 93–98.

GHD, 2023. Koombana Bay Marine Structures – Additional Baseline Marine Monitoring (December 2022-April 2023). Prepared for South West Development Commission. 10 July 2023.

Greenwell, C.N., Born, K.S., Admiraal, R., Hodgson, A., Dunlop, J.N. and Loneragan, N.R., 2021b. Social facilitation for conservation planning: understanding fairy tern behavior and site selection in response to conspecific audio-visual cues. *Endangered Species Research*, *45*, pp.147-157.

Greenwell, C.N. and Dunlop, J.N., 2023. Drivers of colony failure in a vulnerable coastal seabird, the Australian Fairy Tern (Sternula nereis nereis). *Pacific Conservation Biology*.

Greenwell, C.N., Dunlop, J.N., Admiraal, R. and Loneragan, N.R., 2021a. The secret life of Fairy Terns: breeding chronology and life history observations of *Sternula nereis nereis* in south-western Australia. *Pacific Conservation Biology*, *27*(2), pp.143-154.

Greenwell, C.N., Tweedley, J.R., Moore, G.I., Lenanton, R.C.J., Dunlop, J.N. and Loneragan, N.R., 2021c. Feeding ecology of a threatened coastal seabird across an inner shelf seascape. *Estuarine, Coastal and Shelf Science*, *263*, p.107627.

Hoskins, A.J., Dann, P., Ropert-Coudert, Y., Kato, A., Chiaradia, A., Costa, D.P. and Arnould, J.P., 2008. Foraging behaviour and habitat selection of the little penguin *Eudyptula minor* during early chick rearing in Bass Strait, Australia. *Marine Ecology Progress Series*, *366*, pp.293-303.

Nicholson, L. (1994). Annual variation in the pre-laying attendance, breeding phenology and behaviour of the Little Penguin *Eudyptula minor* in Western Australia. (Honours Dissertation, Murdoch University).

O2 Marine, 2021. Sediment and Marine Water Quality Monitoring of the Leschenault Inlet. Prepared for Department of Primary Industries and Regional Development. Report No. R200188Rev2.

Oceanica, 2008. Bunbury Waterfront Project: Stage 1 Marine and Coastal Baseline Studies – Baseline Water Quality. Prepared for Strategen. Report No 580_002/1. September 2008.

Smith, H., 2012. Population dynamics and habitat use of bottlenose dolphins (*Tursiops aduncus*), Bunbury, Western Australia (Doctoral dissertation, Murdoch University).

Attachment 1

Smith, H., Frère, C., Kobryn, H. and Bejder, L., 2016. Dolphin sociality, distribution and calving as important behavioural patterns informing management. *Animal Conservation*, *19*(5), pp.462-471.

Smith, H.C., Pollock, K., Waples, K., Bradley, S. and Bejder, L., 2013. Use of the robust design to estimate seasonal abundance and demographic parameters of a coastal bottlenose dolphin (*Tursiops aduncus*) population. *PloS one*, *8*(10), p.e76574.

Wienecke, B.C., 1993. The size and breeding patterns of Little Penguins *Eudyptula minor* in Australia: a comparative study. (Doctoral dissertation, Murdoch University).