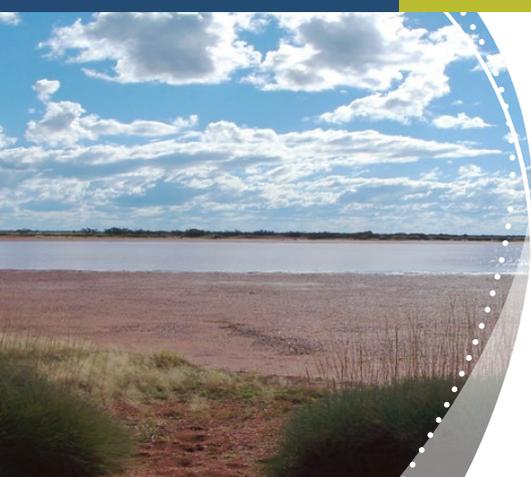




Report and recommendations of the Environmental Protection Authority



Ocean Reef Marina

Western Australian Land Authority (T/A LandCorp)

Report 1629

February 2019

Environmental impact assessment process timelines

Date	Progress stages	Time (weeks)
6/6/2014	EPA decides to assess – level of assessment set	
25/9/2014	EPA approved Environmental Scoping Document	16
18/10/2016	EPA accepted Environmental Review Document	107
22/11/2016	Environmental Review Document released for public review	5
24/2/2017	Public review period for Environmental Review Document closed	13
25/10/2018	EPA accepted Proponent Response to Submissions	86
13/12/2018	EPA completed its assessment	7
20/2/2019	EPA provided report to the Minister for Environment	9
25/2/2019	EPA report published	3 days
11/3/2019	Close of appeals period	2

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

In this case, the EPA did not meet its timeline objective to complete its assessment and provide a report to the Minister.



Dr Tom Hatton
Chairman

20 February 2019

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Executive Summary

The Ocean Reef Marina Proposal (the proposal) was referred to the Environmental Protection Authority (EPA) by the proponent Landcorp on 26 May 2014.

The proposal includes the redevelopment and enlargement of the existing Ocean Reef Boat Harbour and will include two new breakwaters, dredging of sand and rock, construction of jetties to support piled boat mooring pens and piling works for approximately 750 new boat pens.

The EPA conducted an Environmental Impact Assessment on the proposal, which included a 13-week public review period, and has concluded the proposal is environmentally acceptable and can be implemented subject to certain conditions.

The EPA has assessed the impacts of the Ocean Reef Marina in the context of the environmental and social values of the Marmion Marine Park, particularly the loss of sensitive reef habitats that support diverse marine life and abalone.

The EPA examined potential impacts on four key environmental factors: Marine Environmental Quality, Benthic Communities and Habitats, Coastal Processes and Social Surroundings.

The EPA has recommended conditions (listed in Appendix 4) which include requirements for monitoring and management plans to ensure the proposal will avoid or minimise impacts to marine habitats and beaches outside the marina. To mitigate the loss of nearshore reef habitats the EPA has recommended a condition that requires the proponent to prepare an offsets strategy which includes improving the management and protection of similar marine habitats in the Marmion Marine Park consistent with findings of previous audit of the Marmion Marine Park Management plan.

Recommended Management Plans will also ensure the environmental values of the Marmion Marine Park will be protected and there will be no adverse impacts on the marine water quality outside of the marina.

As abalone is an important recreational fishery, the EPA recommends the proponent will need to continue to work closely with government (via the Department of Primary Industries and Regional Development) and stakeholders to ensure impacts to the fishery are further minimised and future management decisions ensure long term sustainability of the fishery.

1. Introduction

This report provides advice and recommendations of the Environmental Protection Authority (EPA) to the Minister for Environment on the outcomes of the EPA's environmental impact assessment of the proposal by the Western Australian Land Authority (Trading as Landcorp¹). The proposal is to redevelop the existing Ocean Reef Boat Harbour to provide for the development of approximately 750 boat pens.

The EPA has prepared this report in accordance with section 44 of the *Environmental Protection Act 1986* (EP Act). This section of the EP Act requires the EPA to prepare a report on the outcome of its assessment of a proposal and provide this assessment report to the Minister for Environment. The report must set out:

- what the EPA considers to be the key environmental factors identified during the assessment;
- the EPA's recommendations as to whether or not the proposal may be implemented and, if the EPA recommends that implementation be allowed, the conditions and procedures to which implementation should be subject.

The EPA may also include any other information, advice and recommendations in the assessment report as it thinks fit.

The proponent referred the proposal to the EPA on 26 May 2014. On 6 June 2014 the EPA decided to assess the proposal and set the level of assessment at Assess: Public Environmental Review with an eight-week public review period. The EPA approved the Environmental Scoping Document (ESD) for the proposal on 25 September 2014. The Environmental Review Document (ERD) was released for public comment from 22 November 2016 to 24 February 2017.

The EPA has concluded the proposal is environmentally acceptable and therefore recommends that the proposal may be implemented subject to the conditions recommended in Appendix 4.

EPA procedures

The EPA introduced a new suite of environmental impact assessment procedures on 13 December 2016. The EPA approved the ESD under the *Environmental Impact Assessment (Part IV Divisions 1 and 2) Administrative Procedures 2012*.

The EPA followed the procedures in the *Environmental Impact Assessment (Part IV Divisions 1 and 2) Administrative Procedures 2016* and the *Environmental Impact Assessment (Part IV Divisions 1 and 2) Procedures Manual 2016*, to the extent that it was appropriate and practicable. The EPA consulted the proponent on the application of the current procedures to its assessment of the proposal.

¹ The City of Joondalup was revoked as the proponent and Landcorp nominated as the proponent responsible for the Proposal by the EPA on 8 November 2018.

2. The proposal

Proposal summary

The proponent, Landcorp, proposes to develop a recreational, residential, boating and tourist development, located at Ocean Reef, approximately 29 kilometres (km) north of the Perth central business district (Figure 1).

The Ocean Reef Marina proposal (the proposal) includes the redevelopment and enlargement of the existing Ocean Reef Boat Harbour to provide for the development of approximately 750 boat pens. Figure 2 shows the concept plan that was published by the City of Joondalup in 2016.

The proposal includes:

- construction of two new outer breakwaters;
- removal of the existing breakwaters from the boat launching harbour;
- dredging of sand and rock inside the new outer breakwaters;
- disposal of dredge spoil into land reclamations inside the breakwaters;
- construction of jetties to support piled boat mooring pens; and
- piling works for new boat mooring pens.

The proposal footprint and Development Envelope is outlined in Figure 3.

A portion of the marine component of the Ocean Reef Marina proposal occurs within the Marmion Marine Park which is vested in the Conservation and Parks Commission under the provisions of the *Conservation and Land Management Act 1984* (CALM Act).

The terrestrial component of the proposal is being progressed through a Metropolitan Region Scheme (MRS) Amendment and does not form part of this proposal. In May 2014, Amendment No. 1270/41 was referred to the EPA under section 48A of the EP Act. The purpose of the MRS amendment is to rezone the various lands and reserves (including Bush Forever Site 325) to facilitate the Ocean Reef Marina. The MRS amendment coincides with a portion (26 hectares (ha)) of Bush Forever site 325. Eight hectares of this site is degraded due to the existing boat harbour and associated infrastructure. Approximately 19.5 ha of native vegetation is expected to be cleared for the development. This area represents a linkage between the adjacent bushland north, south and east.

In June 2014, the EPA decided the MRS amendment for the Ocean Reef Marina did not require formal assessment (an Environmental Review) and provided public advice on the amendment.

Before final approval of MRS Amendment 1270/41 is issued, the Western Australian Planning Commission will require a Negotiated Planning Outcome that secures an appropriate conservation outcome. This outcome would also address impacts to

Flora and Vegetation and Terrestrial Fauna. It is intended that the MRS Amendment 1270/41 be finalised in the event the Minister for Environment decides that the proposal can proceed, subject to conditions.

The key characteristics of the proposal are summarised in Tables 1 and 2 below. A detailed description of the proposal is provided in section 2 of the ERD (City of Joondalup, November 2016).

Table 1: Summary of the proposal

Proposal title	Ocean Reef Marina Proposal
Short description	<p>The proposal is for the redevelopment and enlargement of the existing Ocean Reef Boat Harbour, located at Ocean Reef, approximately 29 km north of the Perth central business district. The Ocean Reef Marina proposal includes the development of 750 boat pens.</p> <p>The proposal includes:</p> <ul style="list-style-type: none"> • construction of two new outer breakwaters; • removal of existing breakwaters from the boat launching harbour; • dredging of sand and rock inside the new outer breakwaters; • disposal of capital dredge spoil into land reclamations inside the breakwaters; • construction of jetties to support piled boat mooring pens; and • piling works for new boat mooring pens. <p>The proposal also includes the ongoing management and maintenance of the marina water body.</p>

Table 2: Location and proposed extent of physical and operational elements

Column 1	Column 2	Column 3
Element	Location	Authorised extent
Development envelope	Figure 3	61 ha
Marine construction activity		
Dredging	Figure 3	No more than 4.5 ha within the Indicative Dredging Area
Reclamation and construction of breakwaters	Figure 3	No more than 28.5 ha within the Development Envelope

Column 1	Column 2	Column 3
Element	Location	Authorised extent
Removal of existing breakwaters	Figure 3	Within the Proposal Footprint
Physical marine infrastructure		
Proposal Footprint	Figure 3	Not more than 28.5 ha within the Development Envelope
Jetties and associated structures	To be constructed within the Development Envelope	No more than 750 boat pens within the marina in the Development Envelope

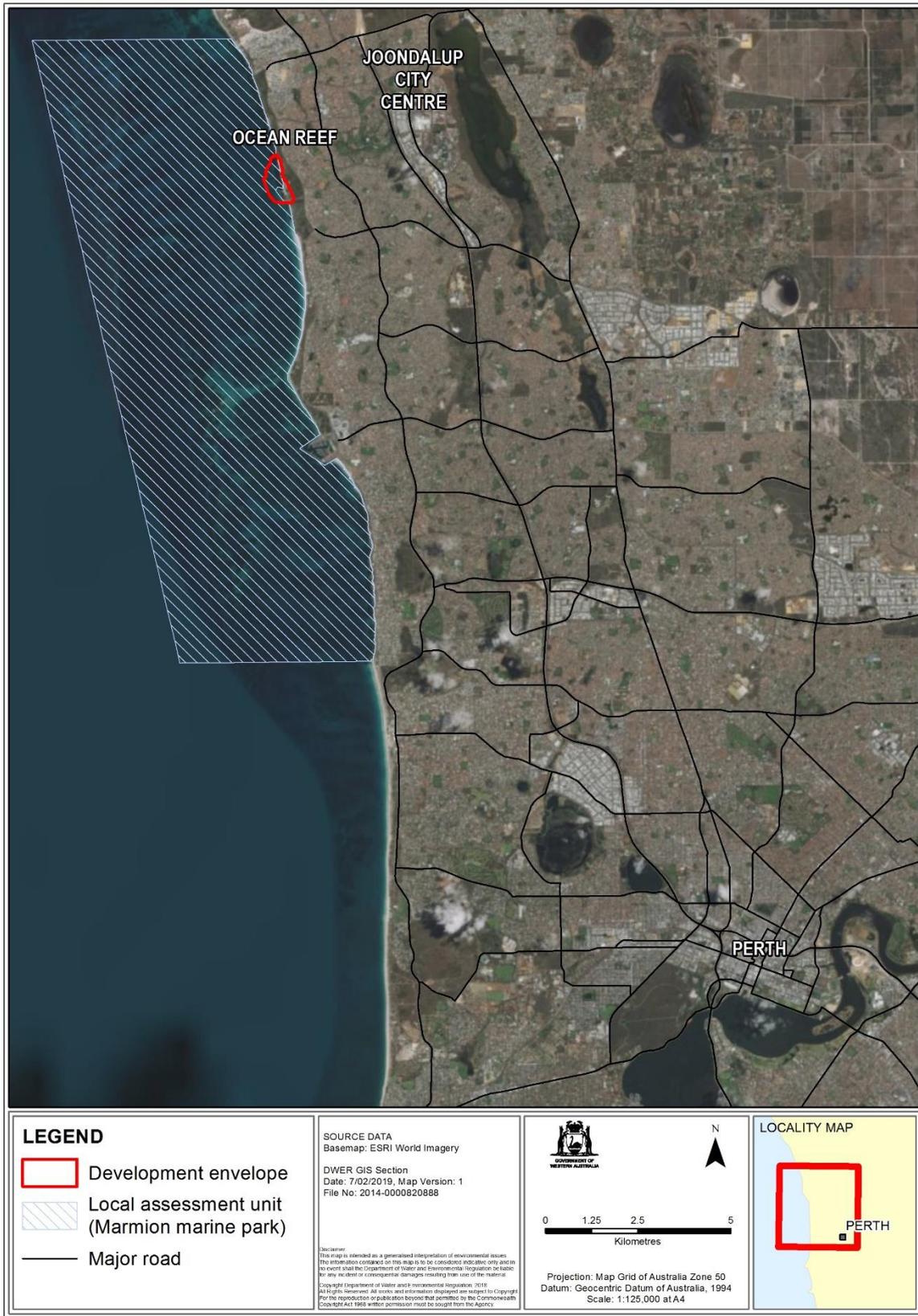


Figure 1: Regional location



Figure ES2: Ocean Reef Marina concept plan



Figure 2: Ocean Reef Marina Concept Plan



Figure 3: Ocean Reef Marina Development Envelope

Context

The proposal is located within the Marmion Marine Park. The marine park was established in March 1987 as an “A” class reserve. The marine park lies within Western Australian waters, between Trigg Island and Burns Beach and covers approximately 9,500 ha (Figure 1).

The marine park is vested in the Conservation and Parks Commission under the provisions of the CALM Act. Management of the Marmion Marine Park is undertaken by the Department of Biodiversity, Conservation and Attractions (DBCA) on behalf of the Conservation and Parks Commission, in accordance with the guidance and action in the Marmion Marine Park Management Plan 1992-2002 (CALM and NPNCA, 1992). The purpose of the Marine Park is: *“to fulfil so much of the demand for recreation by members of the public as is consistent with the proper maintenance and restoration of the natural environment, the protection of indigenous flora and fauna and the preservation of any feature of archaeological, historic or scientific interest”*.

In relation to marinas, the Marmion Marine Park Management Plan states; *“All proposed marina developments would be subject to environmental impact assessment in accordance with the Environmental Protection Act 1986”*. Any modifications to the Marine Park boundary (and associated “A” class reservation) would require separate Parliamentary approval.

Following discussions between the proponent and the DBCA about the proposed tenure, DBCA advised the proposal will require an excision from the Marmion Marine Park, consistent with section 13 of the CALM Act.

The proposed excision can only be finalised and submitted to the Ministers for Fisheries and Environment (and subsequently to Parliament) after the EPA completes its Assessment Report and the Minister for Environment makes his decision on whether the proposal should be implemented. The excision also needs to have regard to the planning MRS amendment process.

The EPA notes that potential impacts resulting from the proposal will have associated impacts on the values of the Marmion Marine Park. The potential impacts are discussed further in section four of this report. The EPA notes the interconnected nature of the environmental factors and the recognised values of the Marmion Marine Park, as documented in the *Marmion Marine Park Management Plan* (NPNCA and CALM, 1992) and has referred to these values, where relevant, in the assessment.

3. Consultation

The EPA advertised the referral information for the Ocean Reef Marina proposal for public comment in May 2014 and received 26 submissions:

- Six submissions requested 'Do Not Assess'.
- Four submissions requested 'Assess – Assessment of Proponent Information category A (no public review)'.
- Nine submissions requested 'Assess – Assessment on Proponent Information category B (environmentally unacceptable)'.
- Seven submissions requested 'Assess – Public Environmental Review'.

The proponent consulted with government agencies and key stakeholders during the preparation of the ERD. The agencies and stakeholders consulted, the issues raised and the proponent's response are detailed in Table 3.1 of the proponent's ERD (City of Joondalup, 2016).

The ERD was released for public comment from 22 November 2016 to 24 February 2017.

Seven agency submissions and sixty-one public submissions were received during the public review period. The key issues raised relate to:

- The proponent's water quality modelling and predicted marina water quality.
- Best practice design options for the northern and southern breakwaters.
- Investigations and outcomes for marina design and management, including clear contingency measures, should be reflected in the relevant environmental management plans.
- Benthic communities and habitat impacts and assessment.
- Sediment transport and wrack movement modelling.
- Seagrass/algal wrack accumulation.
- Abalone habitat loss and impacts on abalone stocks and fishers (both commercial and recreational).
- Proposed management and monitoring strategies.
- Significant residual impacts of the proposal on the Marmion Marine Park.
- Offsets.

The proponent addressed the issues raised in the Response to Submissions document (City of Joondalup, October 2018).

The EPA considers that the consultation process has been appropriate and that reasonable steps have been taken to inform the community and stakeholders about the proposed development. Relevant significant environmental issues identified from this process were taken into account by the EPA during its assessment of the proposal.

4. Key environmental factors

In undertaking its assessment of this proposal and preparing this report, the EPA had regard for the object and principles contained in s.4A of the EP Act to the extent relevant to the particular matters that were considered.

The EPA considered the following information during its assessment:

- the proponent's referral information and the ERD;
- public comments received on the referral, stakeholder comments received during the preparation of the proponent's documentation and public and agency comments received on the ERD;
- the proponent's response to submissions raised during the public review of the ERD;
- the EPA's own inquiries;
- the EPA's *Statement of environmental principles, factors and objectives*; and
- the relevant principles, policy and guidance referred to in the assessment of each key environmental factor in sections 4.1 to 4.4.

Having regard to the above information, the EPA identified the following key environmental factors during the course of its assessment of the proposal:

- **Marine Environmental Quality** – impacts to water quality due to increased turbidity and the release of nutrients and contaminants in sediments;
- **Benthic Communities and Habitat** – direct and indirect impacts due to permanent loss of communities and habitat and altered sediment and water movement and flows;
- **Coastal Processes** – construction and operation of the marina may cause alteration of wave dynamics and sediment transport and may trap algae and seagrass wrack; and
- **Social Surroundings** – impacts to the abalone fishery (commercial and recreational) associated with direct and indirect impacts to abalone.

The EPA considered other environmental factors during the course of its assessment of the proposal. These factors, which were not identified as key environmental factors, are discussed in the proponent's ERD (City of Joondalup, 2016). Appendix 3 contains an evaluation of why these other environmental factors were not identified as key environmental factors.

Having regard to the EP Act principles, the EPA considered that the following principles were particularly relevant to its assessment of the proposal:

1. **Precautionary principle** – The EPA notes the proposal could have a significant impact on nearshore macroalgal habitat and has recommended a condition to ensure the proposal does not result in increased impacts to these communities.

2. **Principle of intergenerational equity** – The EPA notes the proponent has taken measures to avoid and minimise impacts and this (together with the recommended conditions) will ensure the quality of marine environment is maintained for future generations.
3. **Principle of the conservation of biological diversity and ecological integrity** – The EPA has concluded that provided the recommended conditions are imposed on the implementation of the proposal, the proposal will not significantly compromise the biological diversity and ecological integrity of the surrounding areas.

Appendix 2 provides a summary of the principles and how the EPA considered these principles in its assessment.

The EPA's assessment of the proposal's impacts on the key environmental factors is provided in sections 4.1 – 4.4. These sections outline whether or not the EPA considers that the impacts on each factor are manageable. Section 6 provides the EPA's conclusion as to whether or not the proposal as a whole is environmentally acceptable.

Changes to EPA environmental policy and guidance

The EPA introduced a new suite of environmental guidance for environmental impact assessment on 13 December 2016. This replaced EPA policy and guidance that were current at the time of preparation of the ERD.

In its assessment of the proposal, the EPA considered and gave due regard to, where relevant, its current environmental impact assessment policy and guidance documents, unless otherwise stated. The EPA consulted the proponent on the application of the current suite of environmental impact assessment policy and guidance documents relevant to its environmental review and the EPA's assessment of the proposal.

4.1 Marine Environmental Quality

EPA objective

The EPA's environmental objective for this factor is *to 'maintain the quality of water, sediment and biota so that environmental values are protected'*.

Relevant policy and guidance

The EPA considers that the following current environmental policy and guidance is relevant to its assessment of the proposal for this factor:

- *Environmental Factor Guideline – Marine Environmental Quality* (EPA, 2016a).
- *Technical Guidance – Protecting the Quality of Western Australia's Marine Environment* (EPA, 2016b).
- *Technical Guidance - Environmental Impact Assessment of Marine Dredging Proposals* (EPA, 2016c).
- *WA Environmental Offsets Policy* (Government of Western Australia 2011).
- *WA Environmental Offsets Guidelines* (Government of Western Australia 2014).

The considerations for environmental impact assessment for this factor are outlined in *Environmental Factor Guideline – Marine Environmental Quality* (EPA, 2016a).

EPA assessment

Surrounding environment

The proposal is situated in a high-energy coastline, with high water and sediment quality. The proposal overlaps the existing smaller Ocean Reef Boat Harbour, which has some historical impacts on Marine Environmental Quality. The Beenyup Wastewater Ocean Outlet is located approximately 1.6 kilometres (km) offshore, however, associated changes in Marine Environmental Quality from this discharge are not expected to impact on this proposal. The adjacent land use is mostly urban and the groundwater inflow is the only significant discharge within and near the proposed marina.

Potential impacts to Marine Environmental Quality

In its assessment, the EPA identified the following potential significant impacts from the proposal on Marine Environmental Quality.

During Construction

The construction of the marina involves removal of the existing breakwater and marina infrastructure, construction of the new breakwaters and dredging of sand and

rock inside the new breakwaters. These activities have the potential to affect Marine Environmental Quality through:

- increased suspended sediment concentrations and deposition rates; and
- the release of nutrients and other contaminants from the original marina sediments during dredging.

Operational Phase

After completion, the proposal may have the following potential impacts:

- reduced environmental quality within the marina from elevated nutrient levels and excessive algal growth, low dissolved oxygen levels and leaching of metals and antifoulants;
- changes in the quality of adjacent marine waters caused by the outflow of marina water;
- pollution from incidents (such as accidental spills and leakages) and increased boat usage; and
- changes in water quality associated with maintenance dredging.

Proponent investigations

To inform its assessment, the EPA considered the proponent's investigations to characterise the existing environment and potential impacts from the proposed marina. These included:

- a review of historical water quality monitoring in the Burns Beach area, including the Water Corporation Ocean Reef ocean outfall monitoring and the Department of Health human health water quality assessments for metropolitan beaches;
- water quality monitoring in the vicinity of the proposed marina over a 10-month period covering all seasons;
- assessment of sediments within the proposed marina for quality and particle size distribution;
- geotechnical testing of sediments to be dredged;
- assessment of groundwater flows, quality and discharge to the marina;
- hydrodynamic modelling to predict the fate of suspended sediments and contaminants during construction and to predict water quality and water exchange within the marina once completed; and
- a draft Marine Construction Monitoring and Management Plan and draft Marine Environmental Quality Management Plan which were developed from the baseline monitoring and modelling outputs. These plans identify the Environmental Values to be protected and spatially define the Environmental Quality Objectives and levels of ecological protection the proponent aims to achieve (Figure 4).

Predicted impacts

During construction

- a temporary decline in Marine Environmental Quality near the proposed marina, extending to 70 metres (m) beyond the breakwater wall, due to increased suspended sediments and sedimentation associated with the breakwater construction and dredging;
- the development envelope (shown in Figure 4) includes the indicative proposal footprint and the 70m construction halo around the marina; and
- no significant contaminant release is anticipated as sediment contaminants were found to meet the relevant sediment quality criteria.

No significant residual impact on Marine Environmental Quality, as a result of construction activities, is predicted beyond the development envelope.

The EPA considers it acceptable that Marine Environmental Quality will be reduced temporarily during marina construction, and that this will be constrained to a zone no greater than 70m from the breakwater.

After construction (operational phase)

- the proponent's modelling suggests that all the relevant Environmental Values and Environmental Quality Objectives, both ecological and social, for the ongoing marina operations should be achieved;
- the predicted Marine Environmental Quality is expected to meet a 'moderate' level of ecological protection inside the marina and a 'high' level of ecological protection beyond the mouth of the marina;
- Marine Environmental Quality within the marina is predicted to be suitable for swimming, the consumption of seafood and to preserve the aesthetics of the general area;
- the ecological modelling results indicate that during summer and autumn, when nutrient levels are highest, the marina will be sufficiently well flushed to prevent significant algal growth; and
- maintenance dredging will be required periodically and will have short term localised impacts on Marine Environmental Quality.

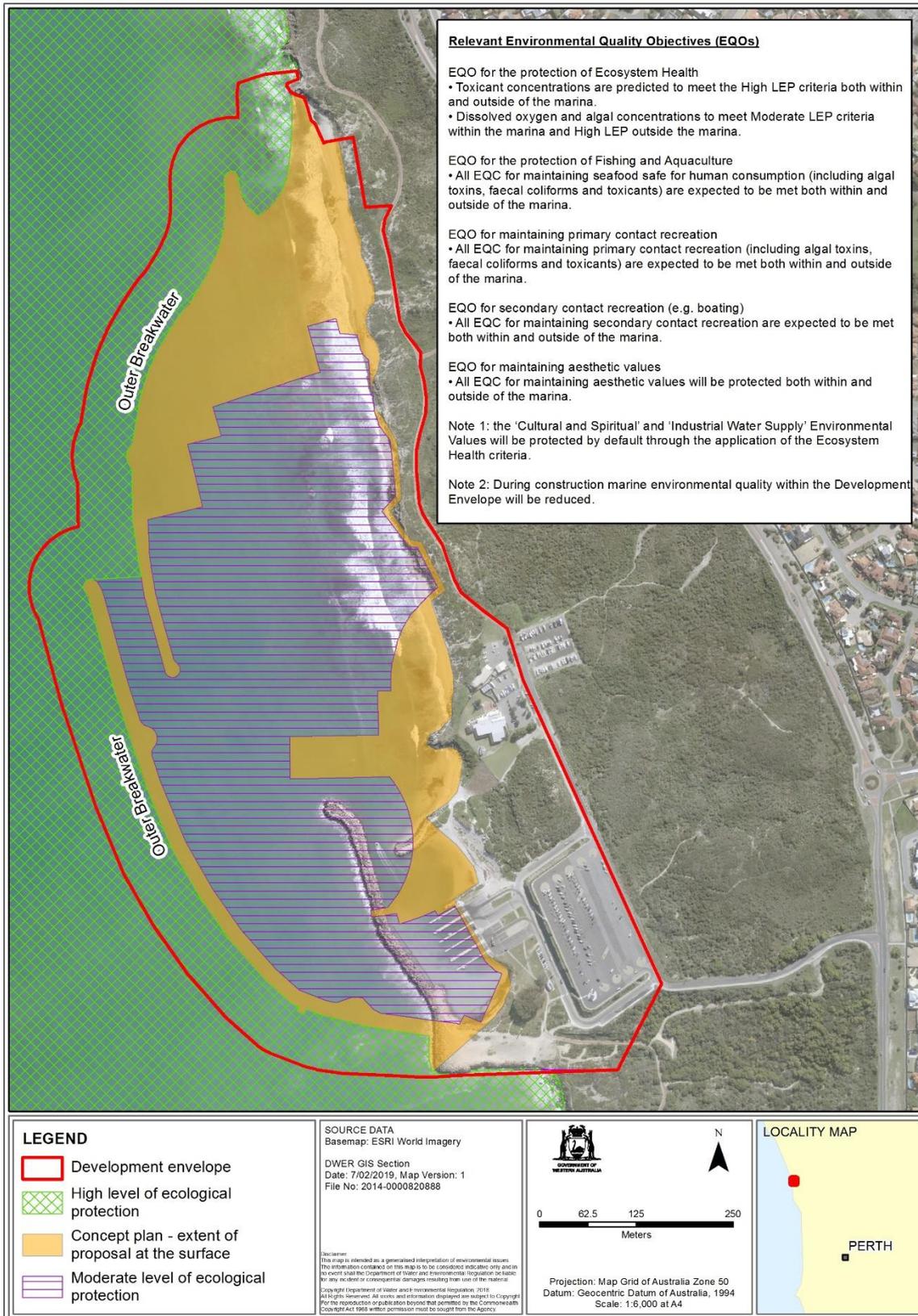


Figure 4: Operational Environmental Quality Plan

The EPA notes that the best and worst-case scenarios have been captured in the hydrodynamic modelling which includes flushing and water quality impact predictions for a range of weather conditions and seasons. The proponent considers that its assessment of impacts to Marine Environmental Quality has used conservative assumptions regarding nutrient inputs and algal growth to ensure the assessment includes a reasonable worst-case scenario.

The proponent has a high level of confidence the Environmental Quality Objectives and levels of ecological protection for the proposed marina will be achieved and that, as part of the marina design, steps have been taken to enhance the flushing potential of the marina and mitigate against water quality issues (e.g. significant freshwater groundwater inflow, sloped bathymetry and diverting stormwater run-off).

Proponent's application of the mitigation hierarchy

The proponent has committed to the following, to minimise the potential for impacts to Marine Environmental Quality:

- construction of breakwaters prior to dredging to contain sediment during operations;
- the use of silt curtains to manage the increased turbidity and sedimentation during dredging and to contain the suspended sediments within the marina;
- to ensure Marine Environmental Quality remains at an acceptable level during construction and for ongoing operations the proponent has prepared:
 - A draft Marine Construction Monitoring and Management Plan.
 - A draft Marine Environmental Quality Management Plan.
- preparation of a Maintenance Dredging Management and Monitoring Plan in advance of maintenance dredging.

Assessment of impacts

The EPA is satisfied with the Environmental Quality Objectives and levels of ecological protection assigned for the proposed marina and surrounding waters in the draft Marine Environmental Quality Management Plan, for the on-going operation of the marina. A 'high' level of ecological protection is also appropriate given the location of the Marmion Marine Park. It should be noted that EPA *Technical Guidance – Protecting the Quality of Western Australia's Marine Environment* (EPA, 2016b) advises that it would be unreasonable to apply a 'maximum' level of ecological protection (normally applied to marine parks) within 5 km of large commercial/population centres (e.g. large towns, cities or industrialised ports) because of the constraints it would apply to discharges and other activities.

The EPA acknowledges the proponent's confidence in the modelling undertaken to predict long-term water quality in the marina, however notes that model outputs can only provide a best estimate, often with limited confidence. The EPA is aware that other marinas along the Perth metropolitan coast with similar flushing levels have

recorded higher measured concentrations of phytoplankton than has been predicted for this proposal.

The EPA is of the view that the implementation of adequate Environmental Management Plans for marina construction and operation is critical for ensuring the Environmental Quality Objectives and levels of ecological protection are met and that the environmental values of the Marmion Marine Park are maintained.

The EPA notes that the proponent has prepared a draft Marine Environmental Quality Management Plan and a draft Marina Construction and Monitoring Management Plan. As these are not finalised, the EPA proposes to condition these Environmental Management Plans requiring further development and implementation in consultation with the Department of Water and Environmental Regulation (DWER), the Department of Transport (DoT), the DBCA and the Department of Primary Industries and Regional Development (DPIRD).

To improve confidence that the relevant Environmental Quality Objectives and levels of ecological protection can be met inside and outside the marina, the EPA recommends the proponent further investigate best practice design and management options for the marina, with the objectives of increasing sea water exchange, reducing nutrient levels and minimising algal growth potential. These should be included as contingency management options in the final Marina Construction Monitoring and Management Plan.

Summary

The EPA has paid particular attention to the:

- relevant EP Act principles, policies and the environmental objective for Marine Environmental Quality;
- potential impacts of the proposal on Marine Environmental Quality;
- avoidance and minimisation measures implemented by the proponent;
- high level of confidence that the Environmental Quality Objectives and levels of ecological protection for the proposed marina will be achieved;
- monitoring, management and mitigation measures proposed including the draft Marina Construction and Monitoring Management Plan and the Marine Environmental Quality Management Plan; and
- the proponent's commitment to develop a Maintenance Dredging Management and Monitoring Plan.

The EPA considers, having regard to the relevant EP Act principles and environmental objective for Marine Environmental Quality that the impacts to this factor are manageable and would no longer be significant, provided there is:

- control through the authorised extent in schedule 1 of the Recommended Environmental Conditions (Appendix 4);

- implementation of condition 6-1 of the Recommended Environmental Conditions (Appendix 4) outlining the Environmental Protection Outcomes to be achieved; and
- further development and implementation of the Marina Construction Monitoring and Management Plan and the Marine Operations Management Plan as required by conditions 6-2 to 6-10 of the Recommended Environmental Conditions (Appendix 4).

4.2 Coastal Processes

EPA objective

The EPA's environmental objective for this factor is *to maintain the geophysical processes that shape coastal morphology so that the environmental values of the coast are protected.*

Relevant policy and guidance

The EPA considers that the following current environmental policy and guidance is relevant to its assessment of the proposal for this factor:

- *Environmental Factor Guideline – Coastal Processes* (EPA, 2016d).

The considerations for environmental impact assessment for this factor are outlined in *Environmental Factor Guideline – Coastal Processes* (EPA, 2016d).

EPA assessment

Surrounding environment

The proposal is located on a predominately rocky shoreline which extends around 5 km in total length, starting around 1km south of the proposal and extending north to Burns Beach. Small transient, embayed beaches have formed along the rocky shoreline and are fronted by a mixture of shallow rock platforms, nearshore reefs and rocks. North of the rocky shoreline lies a continuous sandy beach that extends to the Mindarie Marina.

This nearshore reef system is the dominant influence on nearshore coastal processes as it significantly affects the rate and magnitude of longshore transport, wave energy hitting the shoreline and ocean currents.

In addition to the influence of the reef, the existing Ocean Reef Boat Harbour creates an impediment to the movement of waves, currents and sediment along the coastline. The proposal is for the upgrade and expansion of this existing boat harbour.

Potential impacts to Coastal Processes

In its assessment, the EPA identified the following potential significant impacts on coastal processes from the proposal:

- construction of the marina breakwaters and marina waterbody may alter wave dynamics and interrupt longshore sediment transport and wrack movement; and
- construction of the breakwaters may trap sediment and wrack which can accumulate both inside and adjacent to the marina.

Proponent investigations

To inform its assessment, the EPA has considered the proponent's investigations of potential impacts from the proposed marina on coastal processes. These include:

- a Coastal Processes Assessment to model local wave conditions to simulate the effect of the proposal on coastal processes and the effect of any changes to coastal processes on the coastline;
- a Beach Wrack Management Assessment to estimate the timing and accumulation of wrack around the proposed marina and provide advice on management practices;
- a Coastal Hazard and Vulnerability Assessment to assess the vulnerability of the shoreline to storm erosion and sea level rise over the short and longer (50 and 100-year)_ timeframes; and
- a Coastal Hazard and Risk Management Adaptation Plan to confirm the specific extent of coastal hazards, evaluating the risks associated with the proposal and to establish and provide guidance on the present and future risk management and adaption measures.

Predicted impacts

The existing Ocean Reef Boat Harbour creates an impediment to the movement of waves, currents, wrack and sediment along the coastline. The proposed breakwaters extend significantly further (than the existing breakwaters) into deeper water and across the active surf zone (wave breaking) where intensive sediment transport occurs. As a result, additional blockage/impact to sediment transport and wrack movement is expected.

The EPA notes, based on the proponent's investigations, that this may result in a sediment accumulation of approximately 2000 cubic metres (m³) per year within the marina entrance and an additional 2000 m³ immediately south of the southern breakwater. This would result in a sediment deficit on the shoreline north of the proposal footprint.

The EPA also notes that the proposal is predicted by the proponent to result in an increase (from 35 tonnes to 60 tonnes) in the amount of wrack that enters the marina waterbody, but that the amount of wrack accumulating on the shoreline surrounding the marina is not expected to change.

Although the proponent is confident in its predictions, the EPA notes that there is always a level of uncertainty in modelling sediment transport and wrack movement. In this regard the EPA supports recommendations by the DoT for a detailed coastal monitoring and management program. The DoT have been nominated by the State Government as the preferred Marina Operator for the proposal, subject to the finalisation of a Marina Management Arrangement.

Proponent's application of the mitigation hierarchy

The EPA acknowledges that accumulations of sediment already occur as a result of the existing Ocean Reef Boat Harbour and are removed regularly. In relation to sediment that accumulates in the marina entrance, maintenance dredging will continue as it does currently.

The proponent has committed to a new detailed coastal monitoring and management program, as requested by the DoT, to monitor sediment accumulation on adjacent beaches. The requirement for sand bypassing/nourishment will be determined adaptively based on the results of the coastal monitoring program and application of appropriate trigger values.

The EPA notes that the proponent estimates that 10,000m³ to 20,000m³ will be required to be moved to the north of the marina every five years. Sand bypassing would likely be completed by excavating accreted beach sand from the shoreline south of the proposal, loading into trucks and transporting the material to the northern shoreline. If this management is not possible, the proponent has committed to sourcing alternative sources to supplement the sediment deficit in the northern littoral system.

The proponent advises that as per the existing management measures at the Ocean Reef Boat Harbour and similar boat harbours and marinas within Perth metropolitan waters, any wrack accumulations within or surrounding the proposal footprint will be mitigated through regular monitoring and management measures. If the accumulations are large enough then they will be removed by mechanical means and relocated to appropriate discharge locations.

In response to the requirements from DoT, and to ensure that the impacts associated with the development are both understood and manageable, the proponent has prepared a draft Coastal Processes and Wrack Management Plan.

Assessment of impacts

The EPA notes that any wrack accumulations within or surrounding the proposal footprint will be mitigated through regular monitoring and management measures. If the accumulations are large enough then they will be removed by mechanical means and relocated to appropriate discharge locations. The EPA recommends that these discharge locations should be positioned to avoid impacts on benthic seagrass or reef habitats. The EPA is confident that wrack accumulations can be mitigated through regular monitoring and subsequent removal.

As the DoT has been nominated as Marina Operator, all future coastal maintenance operations (within its management boundary), such as wrack removal, maintenance dredging, bypassing and sand nourishment works, will be undertaken in accordance with the DoT's environmental policies and frameworks. This improves the EPA's confidence that potential impacts will be adequately managed.

The EPA has reviewed the proponent's draft Coastal Processes and Wrack Management Plan. Given the project is in the draft concept design phase, the plan will need refinement as further coastal engineering work is undertaken and knowledge is gained through the preliminary and detailed design phases.

The DoT will be provided an opportunity to review subsequent required updates to this plan to ensure appropriate monitoring strategies, management and mitigation measures are in place as well as appropriate governance arrangements for the ongoing management of impacts. The EPA is supportive of this approach. To this end, the EPA recommends a condition to require the finalisation and implementation of the Coastal Processes and Wrack Management Plan in consultation with the DoT. This provides confidence that the monitoring and management of impacts to coastal processes will be appropriate and reflect best practice. With the above recommendations, the EPA has confidence that impacts to Coastal Processes from this proposal can be managed to an acceptable level.

Summary

The EPA has paid particular attention to the:

- relevant EP Act principles, policies and environmental objective for Coastal Processes;
- potential impacts of the proposal on Coastal Processes;
- proponent's modelling and predictions of impacts to Coastal Processes;
- proposed draft monitoring, management and mitigation measures for sediment and wrack transport and accumulation including the Coastal Processes and Wrack Management Plan; and
- nomination of the DoT to take on the responsibility of marina operator.

The EPA considers, having regard to the relevant EP Act principles and environmental objective for Coastal Processes that the impacts to this factor are manageable and would no longer be significant, provided there is:

- further development and implementation of the Coastal Processes and Wrack Management Plan as required by conditions 7-1 to 7-6 of the Recommended Environmental Conditions (Appendix 4).

4.3 Benthic Communities and Habitat

EPA objective

The EPA's environmental objective for this factor is *to protect benthic communities and habitats so that biological diversity and ecological integrity are maintained.*

Relevant policy and guidance

The EPA considers that the following current environmental policy and guidance is relevant to its assessment of the proposal for this factor:

- *Environmental Factor Guideline – Benthic Communities and Habitat* (EPA, 2016e).
- *Technical Guidance – Protection of Benthic Communities and Habitat* (EPA, 2016f).
- *Technical Guidance – Environmental Impact Assessment of Marine Dredging Proposals* (EPA, 2016c).
- *Technical Guidance – Protecting the Quality of Western Australia's Marine Environment* (EPA, 2016b).
- *WA Environmental Offsets Policy* (Government of Western Australia 2011).
- *WA Environmental Offsets Guidelines* (Government of Western Australia 2014).

The considerations for environmental impact assessment for this factor are outlined in *Environmental Factor Guideline – Benthic Communities and Habitat* (EPA, 2016e).

EPA assessment

Surrounding environment

Benthic habitat mapping was undertaken by the proponent to predict the potential impacts of the proposal both during construction and when operational. The benthic communities and habitat within and adjacent to the proposal were described based on mapping for the greater Marmion Marine Park (CALM and NPNCA, 2002) in which the proposal is located. The proponent mapped the proposal area and surrounds in greater detail and corrected and updated the marine park mapping where appropriate (City of Joondalup, 2016).

The benthic habitat of the development envelope predominately near-shore macroalgal reef habitats and mobile sand as shown in Figure 5. There is a complex mosaic of macroalgal reef habitats types, characterised as either intertidal or subtidal, high, or low relief. Perennial seagrass is present adjacent to the proposal and within the development envelope, of which 0.6 ha is located in the proposed disturbance footprint.

The macroalgal reefs provide an important habitat for many fish and invertebrate species. Of particular note are the nearshore macroalgal reefs, which are a key habitat for Roe's abalone.

Potential impacts to Benthic Communities and Habitats

The proposal has the potential to affect Benthic Communities and Habitat during the construction and operational phases.

During construction

- direct impacts (permanent loss) of subtidal and intertidal Benthic Communities and Habitat associated with marina construction; and
- indirect impacts (irreversible loss and recoverable impacts) of Benthic Communities and Habitat within a 70m zone surrounding the proposed marina (Figure 5) caused by increased sedimentation associated with construction activities.

After construction (operational)

- indirect impacts (irreversible loss and recoverable impacts) of Benthic Communities and Habitat within a 70m zone surrounding the proposed marina (Figure 5) caused by increased sedimentation associated with hydrodynamic changes caused by the breakwaters;
- indirect impacts of Benthic Communities and Habitat due to changes in marine environmental quality associated with the marina and increased boat traffic;
- indirect impacts to Benthic Communities and Habitat north of the marina due to the loss of a key species, Roe's abalone which may result in ecosystem changes; and
- indirect impacts to Benthic Communities and Habitat during maintenance dredging.

Proponent investigations

Consistent with the EPA's technical guidance on *Protection of Benthic Communities and Habitat* and *Environmental Impact Assessment of Marine Dredging Proposals*, the proponent has undertaken the following investigations to predict the impacts of the proposal on Benthic Communities and Habitat:

- a detailed habitat survey within the proposed marina and surrounding areas;
- hydrodynamic modelling to predict the fate of suspended sediments and contaminants during construction and to predict water quality and water exchange within the marina once completed;

- dredge plume modelling and prediction of the Zone of High Impact (ZoHI) and the Zone of Influence (Zol) and the associated impacts to Benthic Communities and Habitat (permanent loss, irreversible or recoverable);
- assessment of the loss of Benthic Communities and Habitat within the Local Assessment Unit (Figure 6), which for this proposal is specified as the area contained within the Marmion Marine Park. The Local Assessment Unit is defined as a specific geographical area which provides an agreed boundary for the EPA's assessment of cumulative environmental impacts on benthic communities and habitats (EPA, 2016f); and
- preparation of a draft Marine Environmental Quality Management Plan which identifies the Environmental Values to be protected and spatially defines a level of ecological protection to be achieved outside the marina that will protect the macroalgal communities.

Predicted impacts

During construction

Direct and indirect impacts

The proponent has predicted a 100% permanent loss of Benthic Communities and Habitat within the development envelope to allow for the construction of the marina waterbody and breakwaters.

The proponent has also predicted that changes in hydrodynamics and suspended sediment in the waters surrounding the marina during construction is likely to result in smothering of the underlying habitat. The proponent has predicted that this 'halo-effect' may extend up to 70m beyond the marina breakwaters. The predicted total impact to all types of Benthic Communities and Habitat including within the development area is 45.9 ha (Table 3).

The benthic communities within the development envelope includes mobile sand, subtidal and intertidal macroalgae and a small amount of seagrass. The area of mobile sand that will be affected by the marina is relatively large, however, it represents only a small percentage of the Local Assessment Unit. Different types of macroalgal reef habitat will be permanently removed as a part of the marina development, representing between 6.4 and 9.6 per cent (%) of the Local Assessment Unit (Table 3).

The nearshore macroalgal reefs (intertidal and subtidal low and high relief reef), form an important habitat for Roe's abalone and these communities are the most significantly affected by this proposal. The abalone habitat, defined as 'near-shore reef with Roe's abalone', was mapped as a separate habitat type and estimated to occupy 12.4 ha within the development envelope, representing approximately 9.35% of this habitat in the Local Assessment Unit. The loss of abalone and abalone habitat, both direct and indirect, is assessed under the factor Social Surroundings in Section 4.5.



Figure 5: Benthic habitat description within and adjacent to the proposal footprint



Figure 6: Benthic habitat distribution within the Local Assessment Unit

Table 3: Benthic habitat types within the development envelope and the percentage of each within the Marmion Marine Park

Benthic Habitat Type	Development envelopment and related BCH loss (direct & indirect) (ha)	Area of habitat in MMP (ha)	Percentage (%) of each habitat within the development envelope in the marine park
Mobile sand lagoonal	32.9	4474	0.63
Macroalgae (subtidal) low relief offshore	0	2286	0
Macroalgae (subtidal) low relief shoreline	1.5	14.5	9.6
Macroalgae (subtidal) high relief offshore	0	1146	0.0
Macroalgae (subtidal) high relief shoreline	8.2	126	6.43
Seagrass perennial	0.6	1159	0.05
Mobile sand offshore	0	239	0.0
Macroalgae (intertidal)	2.8	40.70	6.63
Bare reef (intertidal) offshore	0	6.52	0.0
Total marine habitats	45.9	9491.7	0.48

In addition to the above benthic habitat types, the proponent has also mapped the extent of Roe's abalone reef habitat (shown in Figure 7) in the Local Assessment Unit. A large proportion of the mapped Roe's Abalone habitat type overlaps with the Macroalgae shoreline habitat types listed above. The loss of Roe's abalone habitat is further discussed in section 4.4.

The proponent's dredge plume modelling predicted the following zones of impact associated with the marina construction.

- The Zone of Influence (Zol) was defined as the area where the dredge plume is visible (defined as 2 mg/L above background) at any time during the total construction period. The predicted Zol extends 244.2 ha outside of the development envelope. No detectable impacts to Benthic Communities and Habitat are predicted within the Zol.
- The Zone of High Impact (ZoHI) is predicted to occur within the 70m 'halo' around the marina. As the ZoHI is contained within the 70m 'halo-effect' the loss of Benthic Communities and Habitat has already been determined and presented in Table 1.

The EPA notes that construction activities will result in the unavoidable loss of Benthic Communities and Habitat associated with direct and indirect impacts within the development envelope, which includes the indicative proposal footprint and a 70m 'halo-effect' beyond the breakwater walls.

The EPA notes that the Zol will extend well beyond the development envelope and expects the proponent to include, in the final Marina Construction Monitoring and

Management Plan, a commitment to monitor and map the spatial extent of the plume and make this information publicly available on its website in real time to inform the community and users of the impacted marine waters.

Post construction

Altered sediment and water movement caused by the breakwaters is expected to increase sedimentation rates in the waters surrounding the marina which is likely to result in further smothering of the underlying habitat. As a result, the EPA considers it unlikely that the Benthic Communities and Habitat within the 70m halo, lost as a result of construction impacts described above, will recover. The EPA considers it appropriate, therefore, that the development envelope, which includes the indicative proposal footprint and a 70m halo, is determined to be a Zone of High Impact within which there will be irreversible loss of Benthic Communities and Habitat.

The proponent has developed a draft Marine Environmental Quality Management Plan for the marina and surrounding area. The EPA notes that under the Marine Environmental Quality Management Plan a high level of ecological protection is to be met outside the development envelope. The EPA is satisfied that this should protect all the existing benthic communities outside of the development envelope from changes in marine environmental quality.

The proponent has predicted that changes in hydrodynamics caused by the proposed marina could result in loss of abalone up to 500m north of the proposal as a worst case. The EPA considers that Roe's abalone are a dominant fauna on these nearshore reefs and understands that they are likely to have some influence on the macroalgal communities present. The EPA also understands that abalone is dependent on crustose non-geniculated coralline algae (NCA) for recruitment and that the presence of limpets and chitons is essential for maintaining the NCA.

The EPA, therefore, consider that the proponent should monitor the abalone, limpet and chiton abundance and the macroalgal communities in the predicted area of abalone loss to identify any potential changes to the ecosystem of Burns Beach Reef.

The proponent does not predict any impacts to Benthic Communities and Habitat from maintenance dredging outside of the marina.

Predicted cumulative loss

The proponent has predicted the cumulative loss of Benthic Communities and Habitat associated with the proposal at a broad classification level and these are presented in Table 4. The highest cumulative loss is 2.2% for seagrass, however, the proposal only contributes 0.05%. Overall, the EPA does not consider the contribution of the proposal to the cumulative loss of Benthic Communities and Habitat within the Local Assessment Unit to be significant at this broad level.

Table 4: Predicted cumulative loss of Benthic Communities and Habitat from the proposal and estimates from Hillarys Boat Harbour and ocean outfalls

Benthic habitat type	Current habitat area (ha)	Estimated loss from Hillarys Boat Harbour (ha)	Estimated loss from ocean outfalls (ha)	Historical loss (%)	Predicted loss from Proposal (ha)	Predicted loss from Proposal (%)	Estimated cumulative loss in LAU (%)
Seagrass	1159	25	0.1	2.2	0.6	0.05	2.2
Macroalgae	3613	0	0	0	12.5	0.34	0.34
Mobile sand	4721	13	0.3	0.3	32.9	0.69	1.0

The EPA notes however, that the proponent has calculated the loss of macroalgae collectively for all macroalgal habitats (i.e. subtidal, intertidal, shoreline, offshore, high and low relief) rather than for each individual macroalgal habitat type. The EPA notes that for the individual habitat type mapped as *‘Macroalgae (subtidal) low relief shoreline’* the losses associated with this proposal are up to 9.6% of the Local Assessment Unit (Table 3).

Proposed monitoring and management

The proponent has made the following commitments to minimise the potential for impacts to Benthic Communities and Habitat:

- construction of breakwaters prior to dredging to contain sediment during dredging;
- the use of silt curtains to manage the increased turbidity and sedimentation during construction and to contain the suspended sediments within the marina;
- to ensure water quality and impacts to Benthic Communities and Habitat are at acceptable levels the proponent has developed;
 - a draft Marina Construction and Monitoring Management Plan;
 - a draft Marine Environmental Quality Management Plan;
- the proponent has committed to the preparation of a Maintenance Dredging Management and Monitoring Plan in advance of maintenance dredging;
- the proponent has committed to determining the extent of the 70m ‘halo-effect’ around the proposal after construction for a period of two years. Seagrass will be monitored through high resolution aerial imagery; and
- the proponent has committed to funding the development and implementation of a long-term monitoring program, to be led by the DPIRD, to investigate abalone biomass and/or habitat during and post construction.

Assessment of impacts

The EPA notes that the proponent has predicted 100% loss (approximately 46 ha) of Benthic Communities and Habitat within the development envelope which includes a 70m 'halo-effect' zone (development envelope) surrounding the proposed marina caused by increased sedimentation associated with construction activities and hydrodynamic changes. The EPA also notes that due to the altered sediment and water movement caused by the breakwaters this loss is expected to be irreversible.

The EPA has reviewed the draft Marina Construction and Monitoring Management Plan and Marine Environmental Quality Management Plan. These plans require finalisation with the relevant agencies. The EPA therefore recommends conditions 6-2 to 6-10 (Appendix 4) to require the finalisation and implementation of the Marina Construction Monitoring and Management Plan and Marine Operations Management Plan in consultation with the DWER, the DBCA, the DPIRD and the DoT.

The EPA recommends monitoring to confirm that any loss of seagrass and macroalgal communities does not extend beyond the development envelope. The EPA also recommends monitoring to determine the extent of changes to hydrodynamics north of the marina and any subsequent changes in the cover and composition of macroalgal communities, including non-geniculated coralline algae, as well as changes in the abundance of key invertebrate grazers including abalone, limpets and chitons.

These monitoring programs should be detailed in the final Marina Construction and Monitoring Management Plan and Marine Operations Management Plan. This will provide confidence that the monitoring and management of impacts to Benthic Communities and Habitat will be appropriate and linked to management responses, where relevant and appropriate. The EPA also recommends mechanisms within these plans to provide the public with details of any exceedances of management triggers and contingency actions.

The EPA is of the view that the nearshore macroalgal reefs, within the Local Assessment Unit, are the most sensitive to threats and pressures from the proposal. Collectively, the loss of nearshore macroalgal habitat types amount to 12.5 ha and this is considered significant because the habitats support a high diversity of primary producers and refuges for fish and a range of marine invertebrates.

The EPA notes that the proponent considers that within the development envelope it was not possible to avoid impacts to nearshore macroalgal reefs as it is almost continuous, both north and south of the existing Ocean Reef Boat Harbour, and furthermore it is not possible to rehabilitate the loss of the complex mosaic of intertidal and subtidal reef communities and habitats.

In considering the scale and extent of the predicted loss it is also noted that there is approximately 167 hectares of nearshore macroalgal reefs remaining in the Local Assessment Unit, which will continue to be protected and managed in the Marmion Marine Park.

Notwithstanding the relatively large area of nearshore Macroalgal reefs remaining in the Local Assessment Unit, the EPA is of the view that the residual impacts to nearshore macroalgal reef habitats are significant and will require an offset consistent with the *WA Environmental Offsets Guidelines* or further mitigation through Ministerial conditions.

The EPA considers that the significant residual impact should ideally be directly counterbalanced by the addition of an area with equivalent habitat types to the WA marine reserve system. The EPA acknowledges that the process of making additions to the WA marine reserve system will involve substantial consultation, management planning, approval by relevant decision-making Ministers and a Parliamentary amendment process. Most of these steps are beyond the control of the proponent and of the EPA. This is further discussed in section 7 Other Advice.

Given that the proponent does not have full control for implementing additions to the marine park, the EPA considers that the significant residual impact to nearshore macroalgal habitats from the proposal should be counterbalanced by the development and implementation of an Offset Strategy by the proponent with the objective of maintaining the ecological integrity of the nearshore macroalgal habitats and other similar habitats through improvements in management and protection in the Local Assessment Unit.

The Offsets Strategy is discussed further in section 5 and Appendix 4 of this report.

With the implementation of the above recommendations, the EPA has confidence that impacts to Benthic Communities and Habitat from this proposal can be managed to an acceptable level.

Summary

The EPA has paid particular attention to the:

- relevant EP Act principles, policies and environmental objective for Benthic Communities and Habitat;
- proponent's plans for the application of avoidance and mitigation measures to minimise impacts to Benthic Communities and Habitat to an acceptable level in the context of the surrounding marine environment, including the Marmion Marine Park, and its values;
- the extent and scale of predicted impacts to a range of Benthic Communities and Habitat types in Table 1, with a focus on predicted irreversible loss to 12.5 ha of nearshore macroalgal reef habitats within the Local Assessment Unit; and
- the proponent's commitment to prepare an environmental offsets strategy to mitigate potential impacts.

The EPA considers, having regard to the relevant EP Act principles and environmental objective for Benthic Communities and Habitat that the impacts to this factor are manageable and would no longer be significant, provided there is:

- control through the authorised extent in schedule 1 of the Recommended Environmental Conditions (Appendix 4);
- implementation of condition 6-1 of the Recommended Environmental Conditions (Appendix 4) outlining the Environmental Protection Outcomes to be achieved;
- further development and implementation of the Marina Construction Monitoring and Management Plan and the Marine Operations Management Plan as required by conditions 6-2 to 6-10 of the Recommended Environmental Conditions (Appendix 4);
- monitoring the extent of the predicted 'halo effect' including both seagrass and macroalgal communities as required by condition 6-4 of the Recommended Environmental Conditions (Appendix 4); and
- an Offsets Strategy is prepared and implemented by the proponent as required by condition 9 of the Recommended Environmental Conditions (see section 5 and Appendix 4).

4.4 Social Surroundings

EPA objective

The EPA's environmental objective for this factor is *to protect social surroundings from significant harm*.

Relevant policy and guidance

The EPA considers that the following current environmental policy and guidance is relevant to its assessment of the proposal for this factor:

- *Environmental Factor Guideline – Social Surroundings* (EPA, 2016g).

The considerations for environmental impact assessment for this factor are outlined in *Environmental Factor Guideline – Social Surroundings* (EPA, 2016g).

EPA assessment

For this assessment, the EPA recognises that there are inherent links between the social surroundings factor and the other key environmental factors, in particular benthic communities and habitats and marine fauna, as there are clear links between the physical and biological aspects of the environment and the social and recreational associations. Some of the benthic habitats and communities and marine fauna species are recognised as being important to recreational and commercial fisheries which contribute to the social significance of the proposal area.

Surrounding environment

The EPA notes that a key ecological value of the Marmion Marine Park is exploited species and communities. Marmion Marine Park is important for commercial fishers targeting abalone, western rock lobster and a variety of finfish species.

Recreationally, pelagic and reef finfish species are targeted, while crabs, western rock lobster and abalone form the invertebrate recreational catch (MPRA 2012). Of these species, abalone is the key species likely to be impacted by the proposal, and therefore other commercially and recreationally important species are not discussed further.

The proposal is located on the Burns Beach Reef, which is approximately 3km long, and runs parallel to the coastline (Figure 7). The reef extends from the shoreline to approximately 300m offshore and at depth of approximately 2-6m (City of Joondalup, 2016), and provides habitat for Roe's abalone (*Haliotis roei*).

Within the Local Assessment Unit shown in Figure 6, approximately 131 ha of near-shore reef is known to support populations of Roe's abalone at both Burns Beach Reef, and at an area approximately 1 km south of Hillary's Boat harbour from Sorrento Beach to Trigg Island.

The EPA notes that Roe's abalone is widely distributed along intertidal and subtidal limestone reefs and is not considered to be a conservation significant species. The species is targeted by commercial, recreational and customary fishers with the abalone resource in Western Australia managed under the *Fish Resources Management Act 1994*.

Each year an annual Sustainable Harvest Level is set for the abalone fishery and the total allowable catch is for both the commercial and recreational sectors is determined proportionally between the two sectors based on the distribution of Roe's Abalone spawning biomass, and sectorial fishing effort by habitat (subtidal or platform reef).

From a fisheries management perspective, the proposal is located within Area 7 of the commercial Abalone Managed Fishery which extends from the mouth of Moore River to Cape Bouvard (Figure 8). The fishery is managed primarily through controls in the form of the total allowable catch, set annually for each management area, and allocated to licence holders as individually transferable quotas.

The annual commercial catch fluctuates around 100 tonnes over the history of the fishery although recent catches have been lower since a marine heatwave in 2011 caused large scale mortalities in the northern parts of its geographical range (DOF, 2017).

The proposal is located within Zone 1 of Western Australian Recreational Fishery which extends from the Greenough River to the mouth to Busselton Jetty (Figure 9), where most of the fishing effort is focused on Roe's abalone (DOF, 2017). Recreational abalone fishers require a licence which is subject to bag and size limits, and spatial and temporal controls.

In 2016-2017 there were 22 vessels commercially fishing for Roe's abalone, employing approximately 45 people across WA, and 18,002 licences issued that would have allowed fishers to participate in the recreational abalone fishery (Strain *et al* 2018). The EPA understands that there are currently 12 commercial abalone licences in Zone 7 of the commercial Abalone Managed Fishery.

The Burns Beach Reef is the most popular Roe's abalone recreational fishery in the Perth metropolitan area and is a significant source for the commercial fishery (City of Joondalup, 2016). There is evidence that Aboriginal people have traditionally taken abalone for food and continue to do so, however customary catches of abalone are considered to be negligible (DOF, 2017).



Figure 7: Abalone monitoring zone

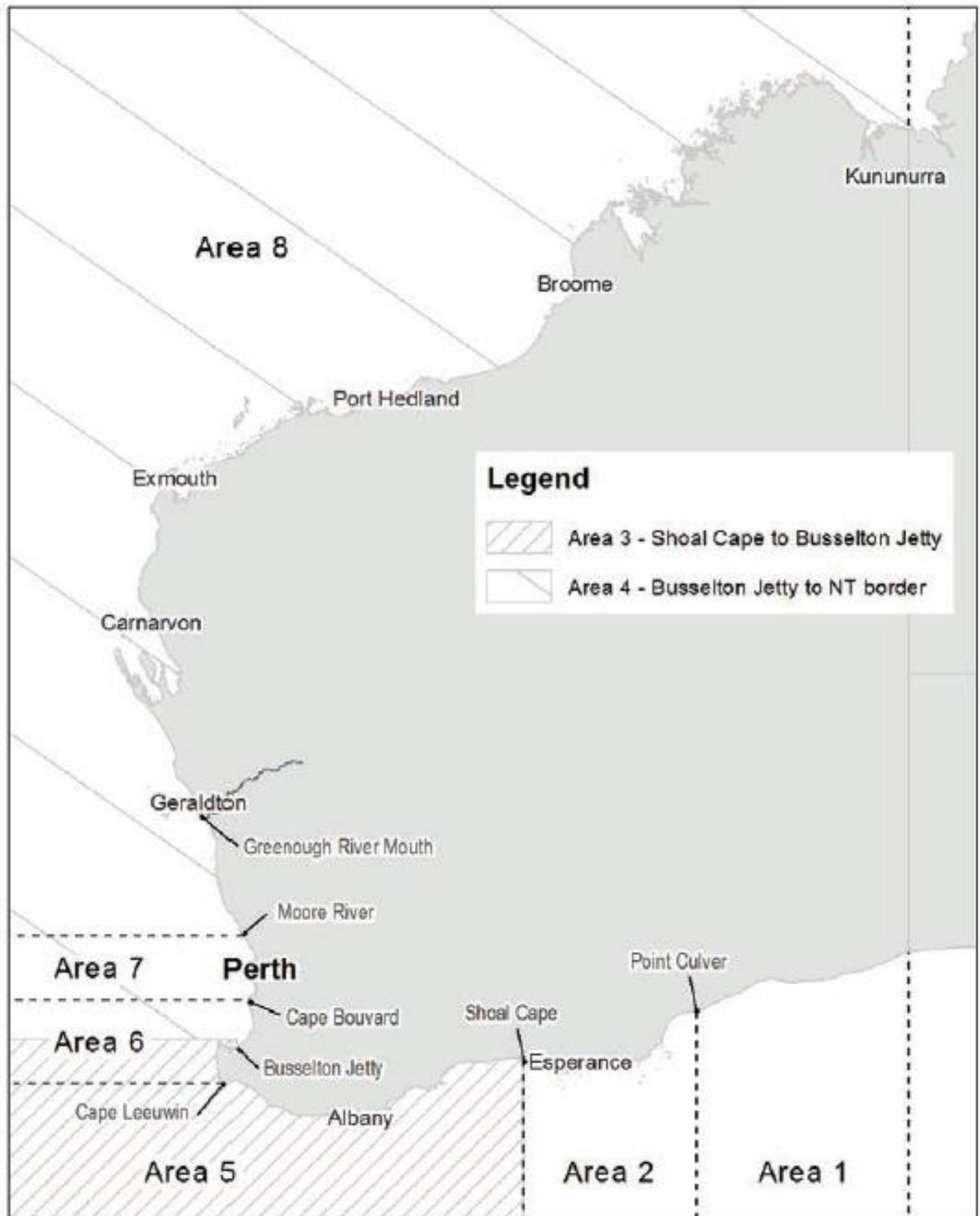


Figure 8: Western Australian Commercial Abalone Managed Fishery

Source: Department of Fisheries 2017, Fisheries Management Paper No. 283 Abalone Resource of Western Australia Harvest Strategy 2016-2021, Perth Western Australia



Figure 9: Western Australian Recreational Fishery

Source: Department of Fisheries 2017, Fisheries Management Paper No. 283 *Abalone Resource of Western Australia Harvest Strategy 2016-2021*, Perth Western Australia

Proponent investigations

To inform its assessment, the EPA has considered the proponent's investigations to characterise the existing environment and potential impacts from the proposed marina. In addition to the environmental studies undertaken for Benthic Habitats and Communities, Coastal Processes and Marine Environmental Quality, the proponent has undertaken studies specific to abalone and consideration of Social Surroundings. These studies include:

- a review of existing environment and information on the local population of abalone adjacent to the Ocean Reef Boat Harbour;
- baseline studies collect additional data on the relative abundance and distribution of abalone at Burns Beach Reef;
- a literature review of abalone biology and ecology to determine environmental sensitivity to sedimentation plumes, reef scale hydrodynamic, freshwater fluxes and changes to wrack deposition; and
- consideration of the social and ecological values of the Marmion Marine Park.

Predicted impacts to Social Surroundings

The EPA's *Environmental Factor Guideline – Social Surroundings* (EPA, 2016g) states that for social surroundings to be considered in environmental impact assessment there must be a clear link between the proposal's impact on the physical or biological surrounds and the subsequent impact on a person's aesthetic, cultural, economic or social surroundings.

Loss of abalone and its habitat as a result of the proposal has the potential to interfere with the economic surroundings of commercial abalone fishers and the convenience of people to recreate in their surroundings with respect to recreational abalone fishing.

With respect to recreation more generally the EPA notes that the proposal will introduce a range of recreational and tourist facilities, including boating and marina facilities, and that people will be able to continue to enjoy the natural marine and terrestrial environment outside the development envelope. As such the EPA considers that the proposal is unlikely to significantly affect the ability of people to live and recreate in their surroundings and this has not been discussed further in this report.

Abalone habitat loss

Implementation of the proposal would result in the permanent loss of 12.4 ha of nearshore reef habitat that supports Roe's abalone (abalone habitat) within the development envelope. Of the predicted loss within the development envelope, 5.8 ha is of a direct result of the construction of the breakwaters, reclamation and dredging in the marina water body, and a further 6.6 ha is indirect impacts due to the 'halo-effect' as a result of changes to sedimentation and wave energy adjacent to the breakwater as discussed above in Benthic Habitats and Communities. This equates

to the permanent loss of 28.6% of the local Burns Beach Reef and 9.35% of abalone habitat within the Local Assessment Unit (Table 3).

Table 5: Predicted loss of Abalone Habitat as a result of the proposal

Impacts	Loss (hectares)	% Loss within Local Assessment Unit
Direct loss proposal footprint	5.8 ha	4.4%
Indirect loss 'halo effects' – 70m	6.6 ha	5%
Total predicted loss	12.4 ha	9.4%

While the proponent has predicted some changes to reef scale hydrodynamics in an area up to 500 metres north of the proposed marina footprint (which could affect sediment deposition, wrack deposition, drift algae load and abalone larvae dispersion) the changes will not be significant enough to cause changes in abalone biomass in this area.

Notwithstanding this prediction, due to some uncertainty around cause and effect pathways from marina construction effects and consequences on abalone abundance, the proponent proposes monitoring annually for at least 5 years to confirm there is no impact on the abalone abundance in this 500 metre abalone monitoring zone, as shown in Figure 7.

The EPA notes that DPIRD considers these predictions of indirect impacts to abalone and abalone habitat to be reasonable and supports the proposed long-term monitoring program to validate the predictions.

If changes to the habitats north of the development envelope are greater than predicted, then up to an additional 5.6 ha of abalone habitat could be at risk. The EPA notes that the proponent considers this additional potential impact and loss of abalone habitat outside of the development envelope is unlikely to occur.

The EPA notes the concerns raised in submissions that the predicted impacts of the proposal on abalone have been underestimated based on anecdotal evidence that abalone fishing grounds have been lost post construction of marinas at Two Rocks, Ocean Reef Harbour, Mindarie Quay and Hillary's. The EPA also notes that there has been significant loss of abalone north of Two Rocks due to marine 'heatwave' events along the WA coast in recent years.

DIRPD has advised that records of abalone stocks pre- and post-development of the Two Rocks Marina, Mindarie Keys or Ocean Reef Harbour are not available, and that the fine-scale resolution required to identify any impacts to adjacent abalone reefs was not available before 1989 when these developments were constructed.

However, DPIRD has advised that monitoring undertaken by DPIRD does indicate that:

- some recreational abalone fishing is still undertaken on the reef to the north of Two Rocks Marina;
- the reef north of Mindarie Quay has supported a sustainable abalone population and has been a popular recreational fishing location since at least 2004. DPIRD records from the region, including Mindarie Keys, indicates that commercial abalone catch was higher in the ten years post construction of Mindarie Keys compared to the ten years prior to construction; and
- the waters immediately north of the constructed Ocean Reef Harbour breakwater supports a sustainable abalone population and has been a popular recreational abalone fishing location since at least 2000.

Economic and Social Impacts

The EPA notes that any reduction in the Roe's abalone population at Burns Beach Reef will have an effect on the fishery for both commercial and recreational licence holders.

The DPIRD is of the view that the abalone habitat loss estimates appear to be reasonable, however the estimates of impacts on the abalone stock and fishers (both commercial and recreational) associated with this loss requires further work in order to form a robust discussion around compensation. The EPA notes that the proponent has committed to working with DPIRD to develop and implement a monitoring program to investigate abalone habitat and biomass during and post construction.

Based on the available information, the proponent has predicted that the loss of abalone biomass due to the implementation of the proposal would equate to 9.3 tonnes of Roe's abalone (around 15% of the Perth Metropolitan Fishery 10-year average catch).

DPIRD has advised that this equates to 4.8 tonnes of the commercial catch and 4.5 tonnes of the recreational catch. The EPA notes that the current allowable catch of abalone for both the commercial and recreational sector has been reduced as Roe's abalone stocks are currently in recovery.

The DPIRD has advised that the current commercial allowable catch for the 2018/19 season is 24 tonnes and the long-term allowable catch is 36 tonnes. As such a loss of 4.8 tonnes of Area 7 commercial Roe's abalone catch predicted in the PER equates to a loss of around 20% of the current allowable catch and around 13% of the long-term allowable catch.

The DPIRD has advised that if the implementation of the proposal results in an overall biomass reduction, the department would likely reduce the total allowable catch of abalone in the Perth Metropolitan area.

The EPA notes that for the commercial licence holders this would likely result in a reduction of allocated quotas, and for the recreational fishery this would likely result

in a change to temporal controls to reduce fishing effort, in that the allowable period for recreational abalone fishing would be reduced.

Proponent's application of the mitigation hierarchy

The EPA notes that the proponent considers that within the development envelope it was not possible to avoid impacts to abalone habitat as the nearshore reef is almost continuous, both north and south of the existing Ocean Reef Boat Harbour, and it is not possible to rehabilitate the loss of the complex mosaic of intertidal and subtidal reef communities and habitats.

The proponent is of the view that outside the development envelope it is unlikely that the proposal will result in a significant residual impact on abalone or its habitat and therefore offsets are not relevant in this case.

The proponent has committed to working with the DPIRD to develop and implement a long-term monitoring program to investigate abalone habitat and biomass during and following construction.

The proponent has committed to avoid construction of sections of the breakwater, between June and end of October to minimise impacts during abalone spawning period.

The proponent has advised that the DPIRD intends to establish a Voluntary Fisheries Adjustment Scheme under the *Fisheries Adjustment Act 1987* to determine and implement commercial compensation for licensed fishers impacted by the proposal.

Assessment of impacts

In considering Social Surroundings, the EPA may assess the impacts of a proposal on the economic surroundings of a proposal, that is, economic impacts related to the physical area involved in a proposal. This may involve consideration of the economic impacts to the Perth Metropolitan and Western Australian Abalone fisheries overall, and the economic impacts on licence holders who have quotas within the management area affected by the physical or biological impacts caused by the proposal.

The EPA considers that the impacts to social surroundings, being commercial and recreational fishing as a result of the implementation of the proposal is significant due to the high values of Burns Beach Reef, being the most productive Roe's abalone habitat in WA, the extent of predicted abalone habitat loss and the quantum of catch taken from this area.

The EPA notes there is some uncertainty, and concern, regarding the potential indirect impacts to abalone populations due to the complex nature of the marine ecosystem. To ensure that the impacts of the proposal are not greater than predicted and to give effect to commitments made by the proponent, the EPA has recommended condition 8-1, which requires the proponent to submit an Abalone

Habitat and Biomass Baseline Survey and Monitoring Plan, in consultation with the DPIRD and the DBCA, prior to the commencement of construction activities.

If monitoring in the Abalone Monitoring Zone (in Figure 7) indicates that the indirect impacts to abalone habitat or biomass are beyond those predicted (i.e. outside the development envelope), the EPA has recommended condition 8-7 which requires that the proponent to immediately implement the contingency management actions specified in the approved Abalone Habitat and Biomass Baseline Survey and Monitoring Plan, with the objective of counterbalancing any additional significant impact.

The EPA has also recommended condition 8-6 that restricts the proponent from undertaking any construction of the outer breakwaters within 70 m of the existing Abalone habitat during the Abalone spawning period between 1 June and 31 October.

The EPA acknowledges the DPIRD advice that if the implementation of the proposal results in overall biomass reductions, the DPIRD would likely reduce the total allowable catch of abalone in the Perth Metropolitan area. This will provide confidence that the species will continue to be sustainably harvested, and does not represent a risk to the conservation status of this species.

The EPA considers that the proposal will result in an impact to the economic viability of the abalone licence holders within Zone 7 of the commercial Abalone Managed Fishery.

The EPA notes advice from the DPIRD confirming that the Minister for Fisheries has provided support for the establishment of a Voluntary Fisheries Adjustment Scheme under the *Fisheries Adjustment Schemes Act 1987* to provide commercial compensation to Abalone Managed Fishery Licence holders for the impacts of the proposed Ocean Reef Marina development. The Voluntary Fisheries Adjustment Scheme would be facilitated by the DPIRD. An independent committee will be established to oversee the process. The Minister for Fisheries has directed the DPIRD to engage with LandCorp, Abalone Managed Fishery licence holders and other key stakeholders to develop objectives for the establishment of a Voluntary Fisheries Adjustment Scheme, for his consideration.

The EPA considers that the Voluntary Fisheries Adjustment Scheme will address commercial compensation for licensed fishers impacted by the proposal.

The EPA also notes the advice from DPIRD that if monitoring (as required by recommended condition 8, Appendix 4) demonstrates that impacts are greater than predicted, another Voluntary Fisheries Adjustment Scheme could be established to fund further compensation, subject to funding by the proponent.

With regard to the impacts to recreational fishers, the EPA notes that the impacts from the proposal may result in a loss of amenity to recreational fishers. However, the extent of impacts on recreational abalone fishers would depend on a number of

other variables and management decisions by the DPIRD on catch limits. This is further discussed in Other Advice in section 7.

Summary

With the implementation of the recommended conditions to avoid construction of sections of outer breakwaters during the abalone spawning period, develop and implement a long-term abalone monitoring program to confirm that impacts are not greater than predicted, and provisions to compensate the commercial fishers in the event that impacts exceed predictions, the EPA has confidence that impacts to Social Surroundings from this proposal can be managed to an acceptable level.

The EPA has paid particular attention to the:

- relevant EP Act principles, policies and environmental objective for Social Surroundings;
- the clear link between the physical and biological environment and the economic and recreational associations with these aspects of the environment that may be impacted by the proposal;
- proponent's modelling and predictions of impacts; and
- the processes for the management of the abalone fishery under the *Fisheries Adjustment Act 1987*.

The EPA considers, having regard to the relevant EP Act principles and environmental objective for Social Surroundings that the impacts to this factor are manageable and would no longer be significant, provided there is:

- control through the authorised extent in schedule 1 of the Recommended Environmental Conditions (Appendix 4);
- submission of an Abalone Habitat and Biomass Survey and Monitoring Plan, prior to construction as required by condition 8-1 of the Recommended Environmental Conditions (Appendix 4); and
- avoidance of construction of certain sections of outer breakwater during abalone spawning period (condition 8-6).

In addition, the EPA considers that the Voluntary Fisheries Adjustment Scheme under the *Fisheries Adjustment Act 1987* will address commercial compensation for licensed fishers impacted by the proposal.

The EPA supports the further evaluation of mitigation measures for recreational abalone fishing by the proponent, in consultation with the DPIRD, to help ensure the long-term sustainability of abalone stocks for the public and recreational amenity. It will be important for key stakeholders, including Recfishwest, to be involved in this project. The EPA has therefore provided advice to the Minister for Environment pursuant to section 44(2a) of the EP Act on this issue. This is further discussed in Other Advice in section 7.

5. Offsets

Relevant policy and guidance

The EPA considers that the following policy and guidance is relevant to its assessment of offsets for the proposal:

- *WA Environmental Offsets Policy* (Government of Western Australia 2011).
- *WA Environmental Offset Guidelines* (Government of Western Australia 2014).
- *Environmental Impact Assessment (Part IV Divisions 1 and 2) Procedures Manual 2016* (EPA 2016).

EPA Assessment

Consistent with **Principle 1** (Offsets considered after avoidance and mitigation) of the WA Environmental Offset Policy (Government of WA 2011), the proponent has applied the mitigation hierarchy to avoid, minimise and mitigate the proposal's potential impacts on the environment. These mitigation measures are discussed under the heading of *the proponent's application of the mitigation hierarchy* under the relevant factors in section 4 of the report. The proposal is also expanding on outdated existing infrastructure at the Ocean Reef Boat Harbour to meet the needs of present and future generations rather than proposing at a new greenfield site. However, following the implementation of all mitigation measures the EPA considers that a significant residual impact remains by way of the irreversible loss of nearshore macroalgal habitats within the Local Assessment Unit.

While noting this significant residual impact, the EPA does not consider that the proposal will significantly affect the regional representation of any of the marine habitats and environmental values impacted by the proposal, but notes that the impacts to habitats are in an area reserved and managed for the purpose of conservation (i.e. the Marmion Marine Park). The EPA is of the view that the significant residual impact requires an offset consistent with **Principle 2** (appropriateness of offsets) of the WA Environmental Offsets Policy (Government of WA 2011) and the Residual Impact Significance Model in the WA Environmental Offsets Guidelines (Government of Western Australia 2014).

The proponent has proposed an Offset Strategy, which broadly consists of the following:

- 1) funding for research and investigations into threats and pressures;
- 2) monitoring of habitats and water quality; and
- 3) support for an education and interpretation program.

Recommended Offsets Strategy

Having considered the relevant information from the ERD, the proponent's commitment above, the advice received from the DBCA and the principles in the WA

Environmental Offsets Policy (Government of WA 2011), the EPA has recommended a condition which requires the preparation of an Offset Strategy (recommended condition 9 in Appendix 4) to be approved by the EPA, prior to the commencement of construction activities.

The EPA recommends that the objective of the Offset Strategy should be to maintain the ecological integrity of the nearshore macroalgal habitats and other similar habitats through improvements in management and protection, in order to counterbalance significant residual impact that will occur within the Local Assessment Unit due to the proposal (condition 9-1, Appendix 4).

The EPA has recommended condition 9-2, Appendix 4, to require the proponent, prior to construction activities of the proposal, to prepare and submit an Offset Strategy to achieve the objective above.

It is expected the proponent would undertake substantial consultation with relevant stakeholders, including the Conservation and Parks Commission, the DBCA and the DPIRD about the Offset Strategy prior to submitting it to the EPA for approval. The EPA has determined that condition 9, requiring the preparation of the Offset Strategy by the proponent, shall be to the satisfaction of the EPA.

The EPA recommends that the Offset Strategy shall:

- (1) identify management actions that can be implemented based on findings from the *Report on Ten-Year Audit of Marmion Marine Park Management Plan*;
- (2) include a research and monitoring program to update the findings of the *Report on Ten-Year Audit of Marmion Marine Park Management Plan* (including any revisions of this document) addressing the current threats and pressures to the nearshore macroalgal reef habitats and other similar habitats in the Local Assessment Unit to improve current understanding of environmental values being affected;
- (3) having regard to (2) above, identify further management actions to apply to nearshore macroalgal reef habitats and other similar habitats to achieve the objective of condition 9-1.
- (4) demonstrate how the actions and research above complement the strategies and recommendations in the *Marmion Marine Park Management Plan* (including any updates of this document);
- (5) identify the nature, timing and quantum of resources to support the implementation of the management actions in (3) above. Including documented agreements with any relevant management body and a timeframe or schedule for implementation of actions.
- (6) provide a monitoring plan (using measures for ecological integrity of marine habitats) to be implemented to determine the effectiveness of the management in (3) to achieve the objective in condition 9-1; and
- (7) include an education and interpretation program for marine park users.

The recommended Offset Strategy requires a combination of *direct* and *indirect* offsets. In terms of direct offsets, the Offset Strategy includes the identification of on-ground management actions to marine habitats and is consistent with **Principle 3** (relevant and proportionate) of the WA Environmental Offsets Policy (Government of WA 2011).

Furthermore, Principle 3 identifies that offsets should be relevant and proportionate to the environmental values being impacted, and notes that the required Offset Strategy is focused on improving the overall ecological integrity of nearshore macroalgal communities (the habitats impacted by the proposal) and other similar habitats in the marine park (e.g. offshore macroalgal reef) through further management in the Local Assessment Unit (the Marmion Marine Park).

In identifying areas of the marine park to receive additional management actions to improve ecological integrity, the EPA notes from marine benthic habitats surveys and maps, the occurrence of remaining nearshore reefs and other similar marine habitat types and relevant environmental values in the marine park.

Allowing management actions to apply to other similar marine habitats (not just the nearshore macroalgal reefs) means there are further opportunities to improve ecological integrity of environmental values in the marine park, in the vicinity of the proposal. In this regard, it is noted that Principle 3 acknowledges that *in some instances it may be necessary to offset a value with a similar, but not identical, value*.

The EPA has considered **Principle 4** (environmental offsets will be based on sound environmental information and knowledge) of the WA Environmental Offsets Policy (Government of WA 2011) as on-ground management actions would also assist in achieving the objective of the Marmion Marine Park Management Plan as it would aid in abating threats and pressures to nearshore and other reefs.

The EPA has had regard to the environmental information in the *Report on Ten-Year Audit of Marmion Marine Park Management Plan* (MPRA, 2012) and the Western Australian Auditor General's Report *Management of Marine Parks and Reserves* (June 2016) and the recommendations within these reports for impending issues that relate to the management of the Marmion Marine Park. The information and findings from these reports suggest that on the basis of current knowledge, macroalgal reefs in the Marmion Marine Park are under increasing threats and pressures from activities such as people accessing reef platforms (trampling), fishing and extraction, vessel anchoring and water quality degradation. These pressures are likely to increase further should the proposal be implemented and as the population increases and therefore a need exists for targeted management actions.

The EPA considers it is appropriate for the specific management actions and the specific areas to receive management to be identified after the proponent's research into the current threats and pressures. This allows for a more adaptive framework based on contemporary research and information and is consistent with **Principle 5** (adaptive) of the WA Environmental Offsets Policy (Government of WA 2011).

Once management actions have been identified, the proponent is then required to set out the resources and funding required to implement these actions. It is intended the management actions would be undertaken by DBCA (the managers of the marine park) in accordance with its strategies in Marmion Marine Park Management Plan (and its approved updates), which are adapted over time in accordance with developments in environmental knowledge. This is also consistent with **Principle 5** (adaptive management).

Condition 9-7 requires the proponent to review and revise the Offset Strategy as and when directed by the EPA, in consultation with the Conservation and Parks Commission and the DBCA. This further provides for adaptive management of the offset and will ensure that the objective will be achieved if initial management actions are found to be ineffective and is also consistent with Principle 5 of the WA Environmental Offsets Policy (Government of WA 2011).

Having regard to **Principle 6** (long term) the EPA considers that undertaking management actions in the existing Marmion Marine Park, which is managed for conservation purposes, in a manner which complements existing management plans (or its updates) will ensure that the offset provides a secure and long-term benefit.

In considering how the Offset Strategy has applied the six principles above, the EPA recommends a condition that requires an Offset Strategy to be prepared and submitted prior to construction of the proposal (condition 9, Appendix 4).

Summary

The EPA recommends that an offset (condition 9, Appendix 4) is imposed that requires an Offset Strategy to be prepared and submitted by the proponent prior to construction of the proposal.

6. Conclusion

The EPA has considered the proponent's proposal to develop the Ocean Reef Marina proposal, approximately 29 km north of the Perth central business district.

Application of mitigation hierarchy

Consistent with relevant policies and guidance, the proponent has addressed the mitigation hierarchy by identifying measures to avoid, minimise and rehabilitate environmental impacts including:

- construction of breakwaters prior to dredging to contain sediment during operations;
- the use of silt curtains to manage the increased turbidity and sedimentation during dredging and to contain the suspended sediments within the marina;
- committing to a new detailed coastal monitoring and management program;
- committing to the development and implementation of long-term monitoring programs for seagrass and macroalgae communities and abalone abundance;
- committing to avoiding certain sections of outerbreakwater construction between June and the end of October to minimise impacts during abalone spawning period;
- preparation of a draft Coastal Processes and Wrack Management Plan;
- preparation of a draft Marine Construction Monitoring and Management Plan and a draft Marine Operations Management Plan to ensure impacts to Marine Environmental Quality and Benthic Communities and Habitat are at acceptable levels; and
- preparation of a Maintenance Dredging Management and Monitoring Plan in advance of maintenance dredging.

Offsets

The EPA considers the proposal would have a significant residual impact from the following:

- the irreversible loss of nearshore macroalgal habitat within the Local Assessment Unit.

The EPA considers that the significant residual impact to nearshore macroalgal habitat from the proposal should be directly counterbalanced by the:

- development and implementation of an Offset Strategy by the proponent with the objective of maintaining the ecological integrity of the nearshore macroalgal habitats and other similar habitats through improvements in management and protection in the Local Assessment Unit.

The EPA has recommended condition 9, Appendix 4, to require the proponent to prepare and submit an Offset Strategy, prior to construction, to achieve the objective above.

Conclusion

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

- impacts to all the key environmental factors;
- relevant EP Act principles;
- EPA's environmental objectives for Marine Environmental Quality, Coastal Processes, Benthic Communities and Habitats and Social Surroundings;
- EPA's confidence in the proponent's proposed mitigation and management measures; and
- EPA's view that the impacts to Marine Environmental Quality, Coastal Processes, Benthic Communities and Habitats and Social Surroundings are manageable, provided the recommended conditions are imposed.

Given the above, the EPA has concluded the proposal is environmentally acceptable and therefore recommends that the proposal may be implemented subject to the conditions recommended in Appendix 4.

7. Other advice

Section 44(2a) of the *Environmental Protection Act 1986* provides that the EPA may, if it thinks fit, include other information, advice and recommendations in the assessment report. Pursuant to section 44(2a) the EPA submits the following advice for the Minister for Environment's consideration.

Additions to the Marmion Marine Park or the WA marine reserve system

The EPA notes that the DBCA and the Conservation and Parks Commission have advised that the development of the Ocean Reef Marina proposal would necessitate an excision from Marmion Marine Park, resulting in a reduction in area of the marine park and reduction in the representation of intertidal and subtidal nearshore habitats within the WA marine reserve system. The DBCA has advised that to mitigate the reduced area and habitat representation in the marine reserve system, the proponent should support the reservation of additional areas with equivalent habitat types impacted by the marina and the associated potential excision to the park.

The EPA supports the recommendation to evaluate areas to add to the marine reserve system. In supporting this however, the Authority understands that the process of making additions to the Marmion Marine Park or WA marine reserve system must involve substantial consultation, management planning, approval by relevant Ministers, followed by a Parliamentary amendment process. Most of these steps are beyond the control of the proponent and ultimately rests with government.

The EPA notes that the proponent, in its Response to Submissions document (City of Joondalup, 2018), has committed to resource investigations to identify additional areas of habitat or values that have been reduced in representation as a result of the proposal. This commitment is supported by the EPA as a means of the proponent making contributions towards the process.

The EPA advises that, should the State government be of a mind to approve the proposal, then there should be a commitment to initiate and implement the addition of an area greater than the proposed marina excision area to the WA marine reserve system within the Perth metropolitan coastal waters. The additions should include comparable marine habitat types that will be lost as a result of the proposal. The EPA considers that additions to the marine reserve system would further protect and enhance macroalgal reef habitats and the marine ecosystem more broadly.

Potential implications on ongoing management of Marmion Marine Park

The DBCA and the Conservation and Parks Commission have advised that a potential consequence of the proposal proceeding is that the marina is likely to lead to increased boating activity and human use of surrounding areas in the Marmion Marine Park (post excision), potentially causing an increase in associated pressures on marine park values. This would impose additional management requirements on the DBCA to avoid impacts on marine park values and ensure the continued

enjoyment and appreciation by residents and visitors. DBCA advises that additional resources would be required to manage and minimise these impacts.

The proponent considers that the proposal is responding to an already increasing population growth in the northern Perth metropolitan area and the associated increase in boating and coastal recreational demand and that the proposal will facilitate the management of increased numbers of Marmion Marine Park users. The proponent's view is although it will facilitate increased use of the Marmion Marine Park, the proposal is not the primary cause of this increase.

The potential implications of the proposal on the Marmion Marine Park more broadly are difficult to anticipate, particularly in terms of changes in visitation patterns and levels of use. However, it is highly likely that a new marina, which provides for up to 750 boat pens, will bring about additional pressures and management requirements to the Marmion Marine Park in areas proximate to the proposal.

The EPA recommends LandCorp continues to liaise with DBCA to identify the best opportunities and mechanisms to make contributions for managing increased visitation and recreational use within the marine park, where it can be clearly linked to the proposal proceeding.

Mitigation of proposal impacts on the amenity of recreational abalone fishers

In addition to considering the potential significant impact to abalone commercial licenced fishers in section 4.4, it is also recognised there is the potential for the proposal to impact on the amenity of recreational abalone fishers by potential reductions in their catch. Abalone fishing is a popular recreational activity, with about 18,000 recreational licences issued each year. The abalone stocks in the West Coast Zone are vulnerable because they are located in populated areas, including off the Perth metropolitan coast, and easily accessible.

The DPIRD is responsible for setting recreational catch allocations for the West Coast Zone and regulates recreational catch through size and bag limits, as well as closed areas and seasons. To help keep stocks sustainable, fishing is only permitted for one hour a day on four Saturdays annually. The length of the open recreational fishing season for abalone may be adjusted each year to ensure recreational catch is consistent with the set allocation and managed in a sustainable manner.

The DPIRD has advised that the long-term recreational catch is 40 tonnes a year. Due to poor recruitment of juvenile Roe's abalone following the marine heatwave in 2011, the current recreational catch allocation is set at 20 tonnes.

The overall implications of the proposal on abalone fishing amenity are unknown at this stage, however it is understood that the DPIRD may make management decisions to help ensure the long-term sustainability of abalone stocks. An example might be an adjustment by DPIRD to the duration of the open season (i.e. loss of a day of fishing). Such decisions would be based on information from a range of

sources including environmental conditions, adjustment schemes, catch records and stock assessment.

The DPIRD has discussed with the proponent a number of measures to mitigate impacts including abalone restocking, stock enhancement and habitat enhancement. The EPA supports these types of measures.

The EPA supports the further evaluation of these measures and recommends the proponent continue to work with the DPIRD on a project to progress the measures recommended by the DPIRD so it can make management decisions for recreational abalone fishing and help ensure the long-term sustainability of abalone stocks. It will be important for key stakeholders, including Recfishwest, to be involved in this project.

8. Recommendations

The EPA recommends the Minister for Environment notes:

1. The proposal assessed is for the redevelopment of the existing Ocean Reef Boat Harbour to provide for approximately 750 boat pens.
2. The key environmental factors identified by the EPA in the course of its assessment are Marine Environmental Quality, Coastal Processes, Benthic Communities and Habitats and Social Surroundings, set out in section 4.
3. The EPA has concluded that the proposal may be implemented, provided the implementation of the proposal is carried out in accordance with the recommended conditions and procedures set out in Appendix 4. Matters addresses in the conditions include the following:
 - a) Preparation and implementation of a Marina Construction Monitoring and Management Plan and a Marine Operations Management Plan (condition 6) to minimise impacts to Marine Environmental Quality and Benthic Communities and Habitats.
 - b) Preparation and implementation of a Coastal Processes and Wrack Management Plan (condition 7) to minimise impacts to Coastal Processes.
 - c) Preparation of an Abalone Habitat and Biomass Baseline Survey and Monitoring Plan (condition 8) to demonstrate that indirect impacts to abalone are not greater than predicted.
 - d) Preparation of an Offset Strategy (condition 9) to counterbalance the significant residual impact of the loss of nearshore macroalgal habitat within the Local Assessment Unit.
4. Other advice and recommendations provided by the EPA, set out in section 7.

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Appendix 1: List of submitters

Organisations:

Bluewater Wild Abalone
Conservation and Parks Commission WA
Department of Biodiversity, Conservation and Attractions (formerly Department of Parks and Wildlife)
Department of Fisheries
Department of Planning
Econets Australia
Leeuwin Abalone Producers
Mullaloo Beach Community Group
Ocean Reef Sea Sports Club
South West Aboriginal Land and Sea Council
The Department of Transport
Water Corporation
West Australian Fishing Industry Council and Abalone Industry Association of WA.
West Coast Abalone Diver's Association
Western Australian Museum

Individuals:

Alan Brennan
An L
Brian Macauley
Brian Yearwood
Carel Lucas
Catherine Till
Celine Dubois
Cheryl Gray
Chris Forde
Craig Melbourne
David Hancock
Deborah Hodgson
Dora and Ron Lindsay
Doris Macdonald
Dr Majorie Apthorpe
Evette Baldock
Fangjun Li
Frank Vincent
Gary McCallum
Geoffrey James
Jane Axford
John Brindle
John Harrison
Ian Manning
Jack Moore

Jade Donovan
Jay Still
Jennie Wood
Karin Shugrue
Kerry Nichols
Kim Allen
Laura Monghan
Lesley Solly
Lisa Manning
M Sideris
Martha Allen-Byatt
Melanie Leather
Rachael Turner
Rainer Repke
Robert Adams
Robert Reverzani
Robert Whyman
Ron Cutten
Rose Wood
Ross Hack
Sharon Mcarthur
Steve Parin
Susan Boylan
Sylvia Tetlow
Tegan Benfell
William Greene
William Windle

Appendix 2: Consideration of principles

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. In application of this precautionary principle, decisions should be guided by –</i></p> <p><i>a) careful evaluation to avoid, where practicable, serious or irreversible damage to the environment; and</i></p> <p><i>b) an assessment of the risk-weighted consequences of various options.</i></p>	<p>In considering this principle, the EPA notes that the nearshore macroalgal communities could be significantly impacted by the proposal. The assessment of these impacts is provided in this report.</p> <p>The EPA notes that the proponent undertook investigations to predict the impacts of the proposal on Marine Environmental Quality and Benthic Communities and Habitat. The proponent has also undertaken investigations on the biological and physical environment to assess risks and identify measures to avoid or minimise impacts.</p> <p>To provide further confidence to minimise the potential for impacts to Marine Environmental Quality and Benthic Communities and Habitat the proponent has developed a draft Marine Construction Monitoring and Management Plan and draft Marine Environmental Quality Management Plan. These Plans identify the Environmental Values to be protected and spatially define the Environmental Quality Objectives and levels of ecological protection the proponent aims to achieve.</p> <p>The proponent will be undertaking long-term monitoring to confirm that any loss of macroalgal communities does not extend beyond the development envelope.</p> <p>The EPA has recommended conditions to ensure that environmental protection outcomes are achieved, the Management Plans are finalised (in consultation with relevant agencies) to the satisfaction of the CEO of DWER and effective long-term monitoring is undertaken for the macroalgal communities.</p> <p>The EPA has also recommended an offsets strategy be prepared by the proponent to counterbalance the significant residual impact to the</p>

EP Act Principle	Consideration
	<p>nearshore macroalgal community. The EPA is confident that the proposed offsets strategy, to be prepared and submitted within 3 months of the issue of the Ministerial Statement will counterbalance the significant residual impact.</p> <p>From its assessment of this proposal the EPA has concluded that there is no threat of serious or irreversible harm.</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>In considering this principle, the EPA notes that Benthic Communities and Habitat and Social Surroundings could be significantly impacted by the proposal. The assessment of these impacts is provided in this report.</p> <p>In assessing this proposal, the EPA has recommended conditions to manage impacts to the Benthic Communities and Habitat, in particular the nearshore macroalgal community types as discussed in Principle 1.</p> <p>The EPA has had regard to the loss of abalone and its habitat as a result of the proposal and that it has the potential to interfere with the economic surroundings of commercial abalone fishers and the convenience of people to recreate in their surroundings with respect to recreational abalone fishing.</p> <p>The EPA acknowledges the DPIRD advice that if the implementation of the proposal results in overall biomass reductions, the DPIRD would likely reduce the total allowable catch of abalone in the Perth Metropolitan area. This will provide confidence that the species will continue to be sustainably harvested, and does not represent a risk to the conservation status of this species.</p> <p>The EPA considers that the Voluntary Fisheries Adjustment Scheme is the appropriate process to determine and implement commercial compensation for licensed fishers impacted by the proposal.</p>

<p style="text-align: center;">EP Act Principle</p>	<p style="text-align: center;">Consideration</p>
	<p>The EPA has recommended that the proponent continue to work with the DPIRD on a project to progress the measures recommended by DPIRD with regards to recreational abalone fishing so it can make effective management decisions and help ensure the long-term sustainability of abalone stocks.</p> <p>From its assessment of this proposal the EPA has concluded that that the environmental values will be protected and that the health, diversity and productivity of the environment will be maintained for the benefit of future generations.</p>
<p>3. The principle 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 principle of the conservation of biological diversity and ecological integrity was a fundamental and relevant consideration for the EPA when assessing and considering the impacts of the proposal on the environmental factors of Benthic Communities and Habitat. This principle is also relevant to the EPA consideration of the proposed offset package.</p> <p>In considering this principle, the EPA notes that Benthic Communities and Habitat, in particular the nearshore macroalgal habitat community types, could be significantly impacted by the proposal. The assessment of these impacts is provided in this report.</p> <p>In assessing the proposal, the EPA has considered these impacts and has taken into account measures proposed by the proponent to minimise impacts to the affected species, communities and habitat in the marine. See Principle 1.</p> <p>The EPA has concluded that the proposal would not compromise the biological diversity or ecological integrity within the proposal area and surrounds if the proposed and recommended management measures are implemented.</p>

EP Act Principle	Consideration
	<p>Through this assessment, the EPA has demonstrated that the conservation of biological diversity and ecological integrity was a fundamental consideration.</p>
<p>4. Principles relating to improved valuation, pricing and incentive mechanisms</p> <p><i>(1) Environmental factors should be included in the valuation of assets and services.</i></p> <p><i>(2) The polluter pays principles – those who generate pollution and waste should bear the cost of containment, avoidance and abatement.</i></p> <p><i>(3) 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 waste.</i></p> <p><i>(4) Environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structure, including market mechanisms, which enable those best placed to maximise benefits and/or minimize costs to develop their own solution and responses to environmental problems.</i></p>	<p>In considering this principle, the EPA notes that the proponent would bear the cost relating to waste and pollution, including avoidance and containment. The proposal is not expected to generate any significant pollution or waste.</p> <p>The EPA has demonstrated due regard to this principle during the assessment of the proposal.</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>This principle is a fundamental and relevant consideration for the EPA when assessing and considering the impacts of the proposal on Benthic Communities and Habitat, Marine Environmental Quality and Coastal Processes.</p> <p>The EPA notes that the proponent has applied the mitigation hierarchy to reduce the impacts of the proposal on Benthic Communities and Habitat, Marine Environmental Quality and Coastal Processes.</p>

EP Act Principle	Consideration
	<p>In considering this principle, the EPA notes that the proposal will not generate any significant amount of waste.</p> <p>The EPA notes that the proponent has committed to a Marine Environmental Quality Management Plan and Maintenance Dredging Management and Monitoring Plan to manage any potential waste.</p> <p>The EPA has demonstrated due regard to this principle during the assessment of this proposal.</p>

Appendix 3: 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
SEA			
Marine Fauna	<ul style="list-style-type: none"> • Construction activities may cause temporary displacement of marine fauna through noise impacts, vessel strikes and entanglement. • Increased public access may result in increased interactions between humans and marine fauna. • Increased boat numbers causing increased fishing pressure and the potential for boat strikes. • Increased risk of introduced marine species. • Potential impacts to species from changes to water and nutrient flows and processes. 	<ul style="list-style-type: none"> • Marine Construction Monitoring and Management Plan - construction procedures and protocols to minimise impacts to marine fauna outlined in the Marina Construction Monitoring and Management Plan should be further refined in consultation with the DBCA to adopt a best practice approach. • predicted impacts to the abalone fishery and abalone habitat as well as fish and fish habitat. • Impacts to the habitat of the Australian Sea Lion. • biosecurity issues. • potential release during construction of debris wedged into the sea walls of the current boat harbour poses serious risks to marine fauna. 	<p>Marine Fauna was initially identified as a preliminary key environmental factor when the EPA decided to assess the proposal and in the ESD.</p> <p>Having regard to:</p> <ul style="list-style-type: none"> • Commitments and management procedures within the Marine Construction Monitoring and Management Plan that will ensure potential impacts to marine fauna are sufficiently avoided and minimised, including through the protection of water quality • Commitments within the Marine Construction Monitoring and Management Plan for monitoring programs, response actions and reporting provisions for any potential or actual impacts on conservation significant species • With the exception of abalone (addressed in Benthic Communities and Habitat and Social Surroundings), no significant residual impacts are

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>expected from the proposal on marine fauna</p> <ul style="list-style-type: none"> • comments on the proposal • the significance considerations in the <i>Statement of Environmental Principles, Factors and Objectives</i>, <p>the EPA considers it is unlikely that the proposal would have a significant impact on Marine Fauna and that the impacts to this factor are manageable.</p> <p>Accordingly, the EPA did not consider Marine Fauna to be a key environmental factor at the conclusion of its assessment.</p>
Social Surroundings			<p>Social Surroundings was not identified as a preliminary key environmental factor when the EPA decided to assess the proposal. Through the course of the assessment, the EPA determined that loss of abalone and its habitat as a result of the proposal had the potential to interfere with the economic surroundings of commercial abalone fishers and the convenience of people to recreate in their surroundings with respect to recreational abalone fishing. The EPA has assessed this aspect of Social Surroundings in the EPA Report.</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
Social Surroundings (Amenity)	<ul style="list-style-type: none"> Noise and vibration, and dust from construction may impact on surrounding residences. 	No comments received.	<p>Social Surroundings (Amenity) in terms of potential impacts from dust and noise emissions during construction was not identified as a preliminary key environmental factor in the ESD.</p> <p>Construction dust will be temporary in its duration of impacts and can readily be managed subject to stringent, proven and feasible dust control measures. This should be provided for by the proponent via a dust management plan during the development application process.</p> <p>In terms of noise and vibration, the proponent has advised that noise and vibration will be highest during breakwater construction. However, the majority of the construction material will be sourced from within the Ocean Reef Marina Development site and this will limit construction traffic outside of the proposal footprint.</p> <p>The natural coastal topography of the site will also offer noise mitigation.</p> <p>Construction activities will need to be undertaken in accordance with the <i>Environmental Protection (Noise) Regulations 1997</i>.</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>In accordance with Regulation 13 of the Noise Regulations, any construction noise made between 7.00 a.m. and 7.00 p.m. Monday to Saturday (excluding public holidays) is exempt from assigned noise limits in the Noise Regulations, provided the works are being carried out in accordance with the Australian Standard 2436:2010 <i>Guide to noise and vibration control on construction, demolition and maintenance sites</i>. Noise and vibration impacts would be localised and temporary during the construction phase, and the proponent has indicated that a noise management plan will be developed and submitted for approval to the CEO of the City of Joondalup, should work be planned outside of the permissible hours as required by Regulation 13 of the Noise Regulations. The proponent considers that, with appropriate management and mitigation measures, noise and vibration impacts are expected to be manageable and meet the requirements of the Noise Regulations.</p> <p>Having regard to:</p> <ul style="list-style-type: none"> • construction being undertaken consistent with the <i>Environmental</i>

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><i>Protection (Noise) Regulations 1997;</i> and</p> <ul style="list-style-type: none"> the significance considerations in the <i>Statement of Environmental Principles, Factors and Objectives</i>, <p>the EPA considers that it is unlikely that the proposal would have a significant impact on Social Surroundings (Amenity) and that the impacts to this factor are manageable.</p> <p>Accordingly, the EPA did not consider Social Surroundings (Amenity) from dust and noise was required to be assessed as a key environmental factor in its assessment.</p>
Social Surroundings (Heritage)	<ul style="list-style-type: none"> Construction of the proposal may uncover undiscovered wrecks. 	<ul style="list-style-type: none"> While there are no known wrecks in the proposed area of development, this does not preclude the possibility that there could be as yet undiscovered wrecks. 	<p>Social Surroundings with respect to Heritage was not identified as a preliminary key environmental factor in the ESD.</p> <p>Investigations undertaken by the proponent did not identify any known Aboriginal sites or archaeological material of significance within the Development Envelope.</p> <p>A search of State Register of Heritage Place identified one site within 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>Development Envelope; 'Rock Inscription, Ocean Reef Beach'. This was identified as not having any current statutory heritage listings.</p> <p>The proposal will not encroach on any protected zones declared under the <i>Maritime Archaeology Act 1973</i>, however, the proponent acknowledges that any discovery of shipwrecks or relics shall give cause for s 17 notifications to be made.</p> <p>Having regard to:</p> <ul style="list-style-type: none"> • the results of the cultural heritage assessment; • acknowledgement of the proponent of its responsibilities under the <i>Maritime Archaeology Act 1973</i>; and • the significance considerations in the <i>Statement of Environmental Principles, Factors and Objectives</i>, <p>the EPA considers that it is unlikely that the proposal would have a significant impact on Social Surroundings (Heritage) and that the impacts to this factor are manageable.</p> <p>Accordingly, the EPA did not consider Social Surroundings (Heritage) was</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
			required to be assessed as a key environmental factor in its assessment.

Appendix 4: Identified Decision-Making Authorities and Recommended Environmental Conditions

Identified Decision-making Authorities

Section 44(2) of EP Act 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.

Section 45(1) requires the Minister for Environment to consult with decision-making authorities (DMAs), and if possible, agree on whether or not the proposal may be implemented, and if so, to what conditions and procedures, if any, that implementation should be subject.

The following decision-making authorities have been identified:

Decision-making Authority	Legislation (and Approval)
1. Minister for Environment	<i>Conservation and Land Management Act 1984 and Regulations</i>
2. Minister for Transport; Planning; Lands	<i>Jetties Act 1926</i> <i>Planning and Development Act 2005</i>
3. Minister for Lands	<i>Land Administration Act 1997</i>
4. CEO, Department of Transport	<i>Jetties Act 1926</i>
5. Chair, Western Australian Planning Commission	<i>Planning and Development Act 2005</i>
6. CEO, City of Joondalup	<i>Local Planning Scheme</i>

Note: In this instance, agreement is only required with DMA 1, 2 and 3 since these DMAs are a Ministers.

Statement No. XXX

RECOMMENDED ENVIRONMENTAL CONDITIONS

STATEMENT THAT A PROPOSAL MAY BE IMPLEMENTED
(*Environmental Protection Act 1986*)

OCEAN REEF MARINA

Proposal: The proposal is for redevelopment and enlargement of the existing Ocean Reef Boat Harbour, located at Ocean Reef, approximately 29 km north of the Perth central business district.

Proponent: Western Australian Land Authority T/as Landcorp
Australian Company Number 34 868 192 835

Proponent Address: Level 6, 40 The Esplanade PERTH WA 6000

Assessment Number: 2012

Report of the Environmental Protection Authority: XXXX

Pursuant to section 45 of the *Environmental Protection Act 1986* it has been agreed that the proposal described and documented in Table 1-2 of Schedule 1 may be implemented and that the implementation of the proposal is subject to the following implementation conditions and procedures:

1 Proposal Implementation

1-1 When implementing the proposal, the proponent shall not exceed the authorised extent of the proposal as defined in Table 2 in Schedule 1, unless amendments to the proposal and the authorised extent of the proposal have been approved under the EP Act.

2 Contact Details

2-1 The proponent shall 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.

3 Time Limit for Proposal Implementation

- 3-1 The proponent shall not commence implementation of the proposal after five (5) years from the date on this Statement, and any commencement, prior to this date, must be substantial.
- 3-2 Any commencement of implementation of the proposal, on or before five (5) years from the date of this Statement, must be demonstrated as substantial by providing the CEO with written evidence, on or before the expiration of five (5) years from the date of this Statement.

4 Compliance Reporting

- 4-1 The proponent shall prepare and maintain 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 4-6, or prior to implementation of the proposal, whichever is sooner.
- 4-2 The Compliance Assessment Plan shall indicate:
- (1) the frequency of compliance reporting;
 - (2) the approach and timing of compliance assessments;
 - (3) the retention of compliance assessments;
 - (4) the method of reporting of potential non-compliances and corrective actions taken;
 - (5) the table of contents of Compliance Assessment Reports; and
 - (6) public availability of Compliance Assessment Reports.
- 4-3 After receiving notice in writing from the CEO that the Compliance Assessment Plan satisfies the requirements of condition 4-2, the proponent shall assess compliance with conditions in accordance with the Compliance Assessment Plan required by condition 4-1.
- 4-4 The proponent shall retain reports of all compliance assessments described in the Compliance Assessment Plan required by condition 4-1 and shall make those reports available when requested by the CEO.
- 4-5 The proponent shall advise the CEO of any potential non-compliance within seven (7) days of that non-compliance being known.
- 4-6 The proponent shall submit to the CEO the first Compliance Assessment Report fifteen (15) months from the date of issue of this Statement, addressing the twelve (12) month period from the date of issue of this Statement, and then

annually from the date of submission of the first Compliance Assessment Report, or as otherwise agreed in writing by the CEO.

The Compliance Assessment Report shall:

- (1) be endorsed by the proponent's Chief Executive Officer or a person delegated to sign on the Chief Executive Officer's behalf;
- (2) include a statement as to whether the proponent has complied with the conditions;
- (3) identify all potential non-compliances and describe corrective and preventative actions taken;
- (4) be made publicly available in accordance with the approved Compliance Assessment Plan; and
- (5) indicate any proposed changes to the Compliance Assessment Plan required by condition 4-1.

5 Public Availability of Data

5-1 Subject to condition 5-2, within a reasonable time period approved by the CEO of the issue of this Statement and for the remainder of the life of the proposal the proponent shall make publicly available, in a manner approved by the CEO, all validated environmental data (including sampling design, sampling methodologies, empirical data and derived information products (e.g. maps)), management plans and reports relevant to the assessment of this proposal and implementation of this Statement.

5-2 If any data referred to in condition 5-1 contains particulars of:

- (1) a secret formula or process; or
- (2) confidential commercially sensitive information;

the proponent may submit a request for approval from the CEO to not make these data publicly available. In making such a request the proponent shall provide the CEO with an explanation and reasons why the data should not be made publicly available.

6 Benthic Communities and Habitats and Marine Environmental Quality

6-1 The Proponent shall ensure implementation of the proposal achieves the following Environmental Protection Outcomes:

- (1) Benthic Communities and Habitats - No change from the baseline cover and composition of seagrass and macroalgal communities outside of the authorised Development Envelope (Zone of High Impact) as spatially defined in Figure 1.
- (2) Marine Environmental Quality - During construction activities water quality outside the Development Envelope, as shown in Figure 1, shall be maintained to at least a 'High Level of Ecological Protection' as described in Figure 2.
- (3) Marine Environmental Quality - Within one month following cessation of construction activities, water quality will return to at least a 'High Level of Ecological Protection' in the waters offshore from the breakwater, but within the Development Envelope (as shown in Figure 1) and at least a 'Moderate Level of Ecological Protection' within the marina, as shown in Figure 2.
- (4) Marine Environmental Quality - During marina operations, water quality shall be maintained to protect the environmental values and achieve the Environmental Quality Objectives (EQO) and levels of ecological protection as identified in the operational environmental quality plan shown in Figure 2.

6-2 In order to meet the requirements of condition 6-1, the proponent shall prepare and submit a Marina Construction Monitoring and Management Plan and a Marine Operations Management Plan to the requirements of the CEO in consultation with the Department of Transport, the Department of Primary Industries and Regional Development and Department of Biodiversity, Conservation and Attractions.

6-3 The Marina Construction Monitoring and Management Plan shall be prepared and submitted prior to construction and include:

- (1) map(s) spatially representing the **Zone of High Impact** and **Zone of Influence**;
- (2) map(s) spatially representing the environmental quality objectives to be achieved and the levels of ecological protection referred to above and consistent with Figure 2, including:
 - (a) a defined **Moderate Ecological Protection Area**; and

- (b) a defined **High Ecological Protection Area** outside of the Moderate Ecological Protection Area.
 - (3) a requirement for all marina construction activities to be managed with the objective of achieving the Environmental Protection Outcomes established in condition 6-1(1-3);
 - (4) descriptions of the environmental indicators to be monitored (physical, chemical and biological) and management triggers that will be used for assessing environmental performance against the Environmental Protection Outcomes set in condition 6-1(1-3);
 - (5) the monitoring methodologies to be applied to measure the environmental indicators;
 - (6) the timing and frequency for monitoring the environmental indicators at the different impact and reference sites to inform adaptive management of the identified marina construction activities;
 - (7) the procedures for assessing the monitoring data against the management triggers to assess achievement of the Environmental Protection Outcomes set in condition 6-1(1-3);
 - (8) procedure for determining whether any exceedances are attributable to the implementation of the proposal;
 - (9) management actions that will be implemented in the event that the management triggers set in condition 6-3(4) are not met;
 - (10) mechanisms to provide the public with details of any exceedances of management triggers and contingency actions as soon as practicable; and
 - (11) protocols and procedures (incorporating marine fauna observers, defined buffers and search times, ramp up and shutdown procedures) to manage and minimise impacts to marine fauna.
- 6-4 The Marine Operations Management Plan shall be prepared and submitted prior to operating the marina and include:
- (1) map(s) spatially representing the environmental quality objectives to be achieved and the levels of ecological protection referred to above and consistent with Figure 2, including:
 - (a) a defined Moderate Ecological Protection Area; and
 - (b) a defined High Ecological Protection Area outside of the Moderate Ecological Protection Area.

- (2) measures for all marina-related operational and maintenance activities to be managed with the objective of achieving the Environmental Protection Outcomes in conditions 6-1(1) and 6-1(4);
- (3) description of a monitoring program to:
 - (a) confirm that any loss of seagrass and macroalgal communities does not extend beyond the Development Envelope as shown in Figure 1.
 - (b) characterise any changes within the abalone monitoring zone as shown in Figure 3, in the cover and composition of macroalgal communities, including non-geniculated coralline algae, as well as changes in the abundance of key invertebrate grazers including abalone, limpets and chitons, having regard to any changes to the hydrodynamics.
 - (c) complement the Abalone Habitat and Biomass Baseline Survey and Monitoring Plan required by condition 8-2.
- (4) description of how the Marine Operations Management Plan complements and links with the Coastal Processes and Wrack Management Plan required by Condition 7-2;
- (5) descriptions of the environmental indicators to be monitored (physical, chemical and biological) and management triggers that will be used for assessing environmental performance against the Environmental Protection Outcome set in condition 6-1(4);
- (6) the monitoring methodologies to be applied to measure the environmental indicators;
- (7) the timing and frequency for monitoring the environmental indicators at the different impact and reference sites to inform adaptive management of the identified marina-related operational and maintenance activities;
- (8) the procedures for assessing the monitoring data against the management triggers to assess achievement of the Environmental Protection Outcome set in condition 6-1(4);
- (9) management actions that will be implemented in the event that the management triggers in condition 6-4(5) are not met; and
- (10) mechanisms to provide the public with details of any exceedances of management triggers and contingency actions as soon as practicable.

6-5 The proponent shall implement the Marina Construction Monitoring and Management Plan until the CEO has confirmed by notice in writing that the

Marina Construction Monitoring and Management Plan meets the relevant Environmental Protection Outcomes required by condition 6-1.

6-6 The proponent:

- (1) may review and revise the Marine Operations Management Plan; or
- (2) shall review and revise the Marine Operations Management Plan as and when directed by the CEO.

6-7 The proponent shall implement the latest revision of the Marine Operations Management Plan, which the CEO has confirmed by notice in writing, satisfies the requirements of condition 6-4.

6-8 In the event that monitoring carried out under the Marina Construction Monitoring and Management Plan and Marine Operations Management Plan determines that the relevant Environmental Protection Outcomes set in condition 6-1 are not being achieved the proponent shall:

- (1) immediately implement the relevant contingency management actions specified in the Marina Construction Monitoring and Management Plan and Marine Operations Management Plan, and continue implementation of those actions until it is demonstrated that the Environmental Protection Outcomes set in condition 6-1 are being achieved and will continue to be achieved;
- (2) investigate the likely cause of the Environmental Protection Outcomes set in condition 6-1 not being achieved;
- (3) within 24 hours of determining that any of the Environmental Protection Outcomes set in condition 6-1 are not being achieved, report the non-achievement to the CEO;
- (4) within seven (7) days of determining that any of the Environmental Protection Outcomes set in condition 6-1 are not being achieved submit to the CEO a report detailing the following:
 - (a) the results of the monitoring that led to the determination that any of the Environmental Protection Outcomes set in condition 6-1 are not being achieved;
 - (b) the investigation being undertaken as required by condition 6-8(2); and
 - (c) any notifications and contingency management actions implemented by the proponent following determination that any of the Environmental Protection Outcomes set in condition 6-1 are not being achieved;

- (5) provide a report detailing the findings of the investigation required by condition 6-8(2) to the CEO within twenty-one (21) days of first determining that any of the Environmental Protection Outcomes set in condition 6-1 are not being achieved.
- 6-9 The proponent shall submit to the CEO annual compliance assessment reports in accordance with condition 4-6 which includes:
- (1) all monitoring data and reportable incidents required by conditions 6-3 and 6-4;
 - (2) an analysis and interpretation of monitoring data to demonstrate compliance with the requirements of condition 6-1; and
 - (3) an assessment of the effectiveness of monitoring, management and contingency measures implemented to ensure compliance with the requirements of conditions 6-1.
- 6-10 Within three (3) years, of completion of dredging activities and the construction of the marina breakwater, the proponent shall provide a close-out report to the CEO summarising the monitoring required by condition 6-4 (3) and comparing the actual and predicted environmental impacts and effects of the proposal footprint.

7 Coastal Processes

- 7-1 The proponent in consultation with the Department of Transport shall ensure that design, construction and operation of the proposal will minimise sediment and wrack accumulation within the marina, on adjacent shorelines and on seagrass and macroalgal communities as far as is reasonably practicable as measured under a Coastal Processes and Wrack Management Plan approved by condition 7-2.
- 7-2 Prior to the commencement of construction activities, the proponent shall revise and submit the Coastal Processes and Wrack Management Plan (Revision B) to the requirements of the CEO in consultation with the Department of Transport, Department of Water and Environmental Regulation and Department of Biodiversity, Conservation and Attractions. The revised plan shall include:
- (1) shoreline mapping and beach profiles at Ocean Reef Marina using on-ground surveys which monitor beach width and slope, and records significant inflection points and features including primary dune, vegetation line, scarp, high tide mark, water line;
 - (2) procedures to track changes in sediment distribution, including management triggers, within the near-shore area adjacent to Ocean Reef Marina;
 - (3) The use of the most up-to-date wave and current data collected by the Department of Transport to optimise the breakwater layout and harbour entrance;
 - (4) monitoring of wrack accumulation within the marina and on adjacent shorelines against management trigger values relevant to achieving the objective in condition 7-1;
 - (5) management measures that will be implemented in the event that management triggers are exceeded including methods of sediment and wrack bypassing and maintenance dredging;
 - (6) description of wrack disposal locations and procedures for undertaking sediment and wrack bypassing so that impacts to seagrass and macroalgal communities are avoided;
 - (7) An outline of community engagement to be undertaken prior to and during implementation of the management measures (as per 7-2(5) and disposal locations and procedures (as per (7-2 (6) above) to ensure impacts on recreational values are identified and minimised; and
 - (8) spatial data to define the following areas:

- a. the near-shore area adjacent to the Ocean Reef Marina as described in condition 7-2(2);
 - b. the adjacent shorelines as described in condition 7-2(4); and
 - c. the wrack disposal locations as required by condition 7-2(6).
- 7-3 The proponent shall implement the approved Coastal Processes and Wrack Management Plan referred to in condition 7-2.
- 7-4 The proponent shall report any non-achievement of the management triggers referred to in condition 7-2, along with measures taken and/or proposed to be taken, and strategies to be implemented in response to the non-achievement, to the CEO within twenty-one (21) days of the non-achievement being identified.
- 7-5 The proponent:
 - (1) may review and revise the Coastal Processes and Wrack Management Plan, or
 - (2) shall review and revise the Coastal Processes and Wrack Management Plan as and when directed by the CEO.
- 7-6 The proponent shall implement the latest version of the Coastal Processes and Wrack Management Plan which the CEO has confirmed by notice in writing, satisfies the requirements of condition 7-2.

8 Social Surroundings (Abalone)

- 8-1 Prior to the commencement of construction, the proponent shall submit, an Abalone Habitat and Biomass Baseline Survey and Monitoring Plan to the requirements of the CEO in consultation with the Department of Primary Industries and Regional Development and the Department of Biodiversity, Conservation and Attractions. .
- 8-2 The Abalone Habitat and Biomass Baseline Survey and Monitoring Plan required by Condition 8-1 shall:
- (1) describe the potential indirect impacts of the proposal on abalone habitat and biomass (within the 500 metre abalone monitoring zone as shown in Figure 3;
 - (2) detail the proposed methodology for the baseline surveys including the parameters to be monitored to determine whether there are any adverse changes to abalone biomass beyond those predicted in condition 8-2(1);
 - (3) describe the method, including the development of monitoring criteria, to demonstrate that the actual indirect impacts to abalone biomass are within those predicted in condition 8-2(1);
 - (4) identify and spatially define the proposed survey locations, within the 500 metre abalone monitoring zone as shown in Figure 3, and reference/control sites and provide rationale for the location of the sites;
 - (5) detail the proposed frequency and timing for the baseline surveys and ongoing monitoring;
 - (6) detail the proposed frequency and timing of reporting for the ongoing monitoring;
 - (7) contingency management actions that will be implemented in the event that monitoring indicates that the indirect impacts to abalone habitat or biomass are beyond those predicted in condition 8-2(1); and
 - (8) complement the monitoring program required by condition 6-4(3).
- 8-3 After receiving notice in writing from the CEO that Abalone Habitat and Biomass Baseline Survey and Monitoring Plan meets the requirements of condition 8-2, the proponent shall undertake the baseline survey in accordance with the Abalone Habitat and Biomass Baseline Survey and Monitoring Plan.
- 8-4 On completion of the baseline survey undertaken in accordance with the requirements of the Abalone Habitat and Biomass Baseline Survey and Monitoring Plan as required by condition 8-1, and prior to the commencement of construction activities, the proponent shall report to the CEO on the following;

- (1) the results of the Abalone Habitat and Biomass Baseline Survey as required by condition 8-1; and
 - (2) the monitoring criteria referred to in condition 8-2(3).
- 8-5 The proponent shall continue to implement the Abalone Habitat and Biomass Baseline Survey and Monitoring Plan, or any subsequent revisions as approved by the CEO, for a minimum period of 5 years or until the CEO has confirmed by notice in writing that the implementation of the management plan is no longer required.
- 8-6 The proponent shall not undertake
- (1) construction of the outer breakwaters within seventy (70) metres of the existing abalone habitat during the Abalone spawning period between 1 June and 31 October;
 - (2) Dredging during the abalone spawning period unless the outer breakwaters are completed first.
- 8-7 In the event that monitoring indicates that the indirect impacts to abalone habitat or biomass are beyond those predicted in condition 8-2(1) the proponent shall:
- (1) immediately implement the contingency management actions specified in the approved Abalone Habitat and Biomass Baseline Survey and Monitoring Plan;
 - (2) and continue to implement the approved Abalone Habitat and Biomass Baseline Survey and Monitoring Plan until the CEO has confirmed by notice in writing that it has been demonstrated that the completion criteria in the Abalone Habitat and Biomass Baseline Survey and Monitoring Plan have been met and therefore the implementation of the contingency management actions are no longer required; and
 - (3) report any exceedances of the predicted indirect impacts as referred to in condition 8-2(1), along with measures taken and/or proposed to be taken, and strategies to be implemented in response to the exceedances, to the CEO within twenty-one (21) days of the non-achievement being identified.
- 8-8 The proponent:
- (1) May review and revise the Abalone Habitat and Biomass Baseline Survey and Monitoring Plan; or
 - (2) shall review and revise the Abalone Habitat and Biomass Baseline Survey and Monitoring Plan as and when directed by the CEO.

8-9 The proponent shall implement the latest version of the Abalone Habitat and Biomass Baseline Survey and Monitoring Plan, which the CEO has confirmed by notice in writing, satisfies the requirements of condition 8-2.

9 Offsets – Benthic Communities and Habitat

9-1 The proponent shall undertake an offset with the objective of maintaining the **ecological integrity** of the nearshore macroalgal habitats and other similar habitats through improvements in management and protection in the **Local Assessment Unit** to counterbalance the significant residual impact from the proposal to 12.5 ha of nearshore macroalgal habitats.

9-2 Prior to the commencement of construction activities, the proponent shall prepare and submit an Offset Strategy to achieve the objective identified in condition 9-1, to the requirements of the EPA, in consultation with the Conservation and Parks Commission, Department of Biodiversity, Conservation and Attractions and the Department of Primary Industries and Regional Development.

9-3 The Offset Strategy, required by condition 9-2, shall:

- (1) identify management actions that can be implemented based on findings from the *Report on Ten-Year Audit of Marmion Marine Park Management Plan*²;
- (2) include a research and monitoring program to update the findings of the *Report on Ten-Year Audit of Marmion Marine Park Management Plan*¹ (including any revisions of this document) addressing the current threats and pressures to the nearshore macroalgal reef habitats and other similar habitats in the Local Assessment Unit to improve current understanding of environmental values being affected;
- (3) identify additional management actions to apply to nearshore macroalgal reef habitats and other similar habitats to achieve the objective of condition 9-1, having regard to 9-3(2) above;
- (4) demonstrate how the actions and research from conditions 9-3(1), 9-3(2) and 9-3(3) complement the strategies and recommendations in the *Marmion Marine Park Management Plan*³ (including any updates of this document);
- (5) identify the nature, timing and quantum of resources to support the implementation of the management actions in condition 9-3(3). Include

² Marine Parks and Reserves Authority 2012, Report on Ten-year Audit of Marmion Marine Park Management Plan.

³ Department of Conservation and Land Management and National Parks and Nature Conservation Authority 1992, Marmion Marine Park Management Plan 1992-2002, National Parks and Nature Conservation Authority, Perth, Western Australia.

- documented agreements with any relevant management body and a timeframe or schedule for implementation of actions;
- (6) provide a monitoring plan (using measures for ecological integrity of marine habitats) to be implemented to determine the effectiveness of the management actions in condition 9-3(3) to achieve the objective in condition 9-1; and
 - (7) include an education and interpretation program for marine park users.
- 9-4 The proponent must not commence construction until the EPA has confirmed in writing that the Offset Strategy satisfies the requirements of conditions 9-1, 9-2 and 9-3.
- 9-5 Within twelve (12) months of receiving notice in writing from the EPA that the Offset Strategy satisfies the requirements of conditions 9-1, 9-2 and 9-3 the proponent shall implement, or fund the implementation of, the actions in condition 9-3(3) in accordance with the requirements of the approved Offset Strategy.
- 9-6 The proponent shall continue to implement the approved Offset Strategy until the EPA has confirmed in writing that it has been demonstrated that the objective of condition 9-1 has been met and therefore the implementation of the actions in condition 9-3(3) are no longer required.
- 9-7 The proponent shall review and revise the Offset Strategy as and when directed by the EPA, in consultation with the Conservation and Parks Commission and the Department of Biodiversity, Conservation and Attractions.
- 9-8 The proponent shall implement the latest version of the Offset Strategy, which the EPA has confirmed by notice in writing, satisfies the requirements of conditions 9-1, 9-2 and 9-3.

Table 1: Summary of the Proposal

Proposal Title	Ocean Reef Marina proposal
Short Description	<p>The proposal is for the redevelopment and enlargement of the existing Ocean Reef Boat Harbour, located at Ocean Reef, approximately 29 km north of the Perth central business district. The Ocean Reef Marina proposal includes the development of 750 boat pens.</p> <p>The proposal includes:</p> <ul style="list-style-type: none"> • Construction of two new outer breakwaters • Removal of existing breakwaters from the boat launching harbor • Dredging of sand and rock inside the new outer breakwaters • Disposal of capital dredge spoil into land reclamations inside the breakwaters • Construction of jetties to support piled boat mooring pens • Piling works for new boat mooring pens. <p>The proposal also includes the ongoing management and maintenance of the marina water body.</p>

Table 2: Location and authorised extent of physical and operational elements

Column 1	Column 2	Column 3
Element	Location	Authorised Extent
Development envelope	Figure 1	61 ha
Marine construction activity		
Dredging	Figure 1	No more than 4.5 ha within the Indicative Dredging Area
Reclamation and construction of breakwaters	Figure 1	No more than 28.5 ha within the Development Envelope
Removal of existing breakwaters	Figure 1	Within the Proposal Footprint
Physical marine infrastructure		
Proposal footprint	Figure 1	No more than 28.5 ha within the Development Envelope
Jetties and associated structures	Within marina	No more than 750 boat pens within the marina in the Development Envelope

Table 3: Abbreviations and Definitions

Acronym or Abbreviation	Definition or Term
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 his delegate.
CD	Chart Datum
Ecological integrity	Ecological integrity is the composition, structure, function and processes of ecosystems, and the natural variation of these elements
EPA	Environmental Protection Authority
EP Act	<i>Environmental Protection Act 1986</i>
EQO	Environmental quality objective as defined in the EPA's Technical Guidance Protecting the Quality of Western Australia's Marine Environment (December, 2016)
ha	Hectare
High Level of Ecological Protection	As defined in the EPA's Technical Guidance Protecting the Quality of Western Australia's Marine Environment (December, 2016)
Irreversible impacts	Impacts on benthic communities or habitats are irreversible means lacking a capacity to return or recover to a state resembling that prior to being impacted within a timeframe of five years or less.
km	kilometres
Local Assessment Unit	The area contained within the Marmion Marine Park.
m	metres
Moderate Level of Ecological Protection	As defined in the EPA's Technical Guidance Protecting the Quality of Western Australia's Marine Environment (December, 2016)
ZoHI	Zone of High Impact (ZoHI) is the area where impacts on benthic communities or habitats are predicted to be irreversible (lacking a capacity to return or recover to a state resembling that prior to being impacted within a timeframe of five years or less).
Zol	Zone of Influence (Zol) is the area where the dredge plume is visible (defined as 2 mg/L above background) at any time during the total construction period.

Figures (attached)

Figure 1. Development Envelope, Proposal Footprint and Zones of Impact

Figure 2. Operational Environmental Quality Plan

Figure 3. Abalone monitoring zone

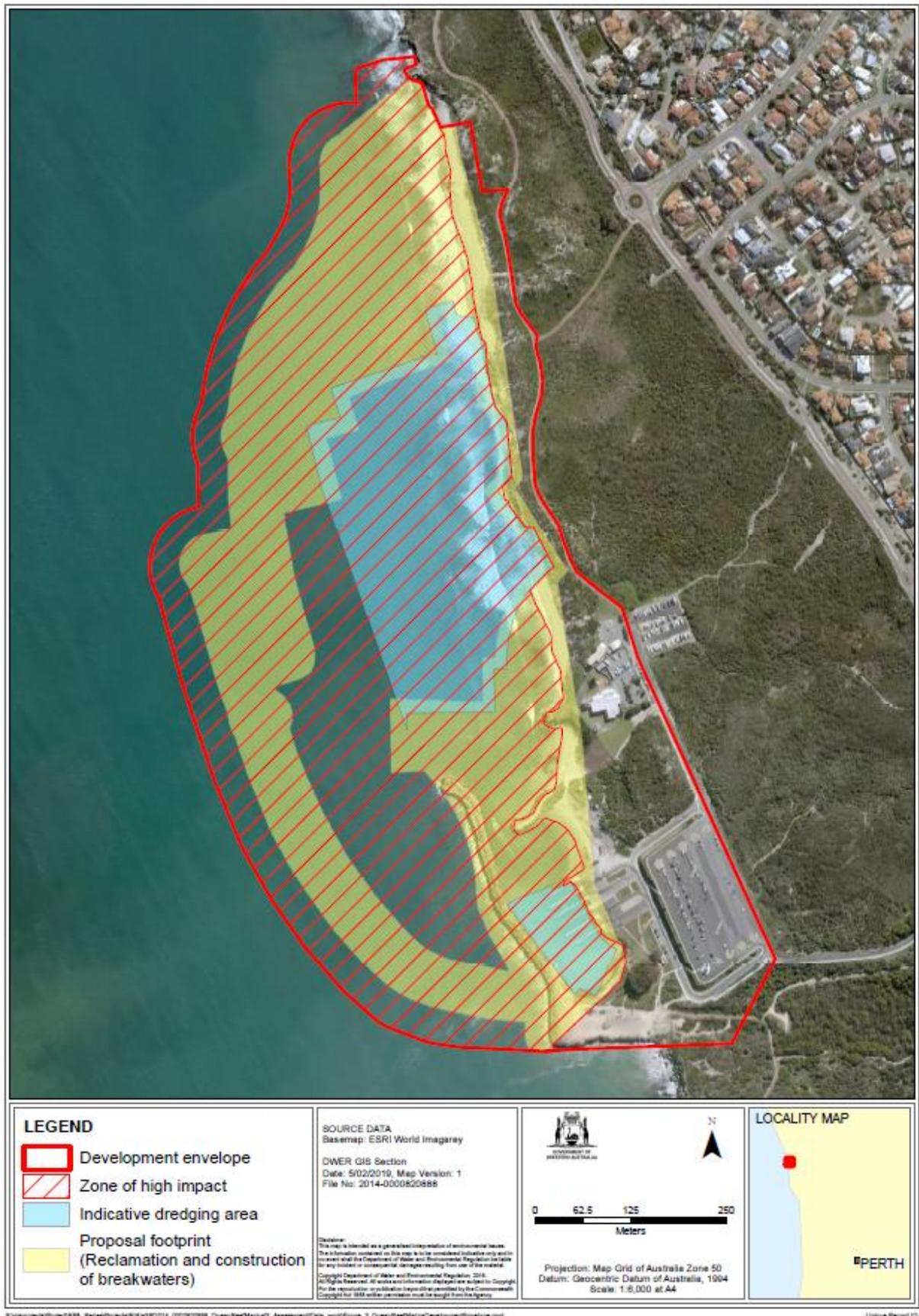


Figure 1 Development Envelope, Proposal Footprint and Zones of Impact

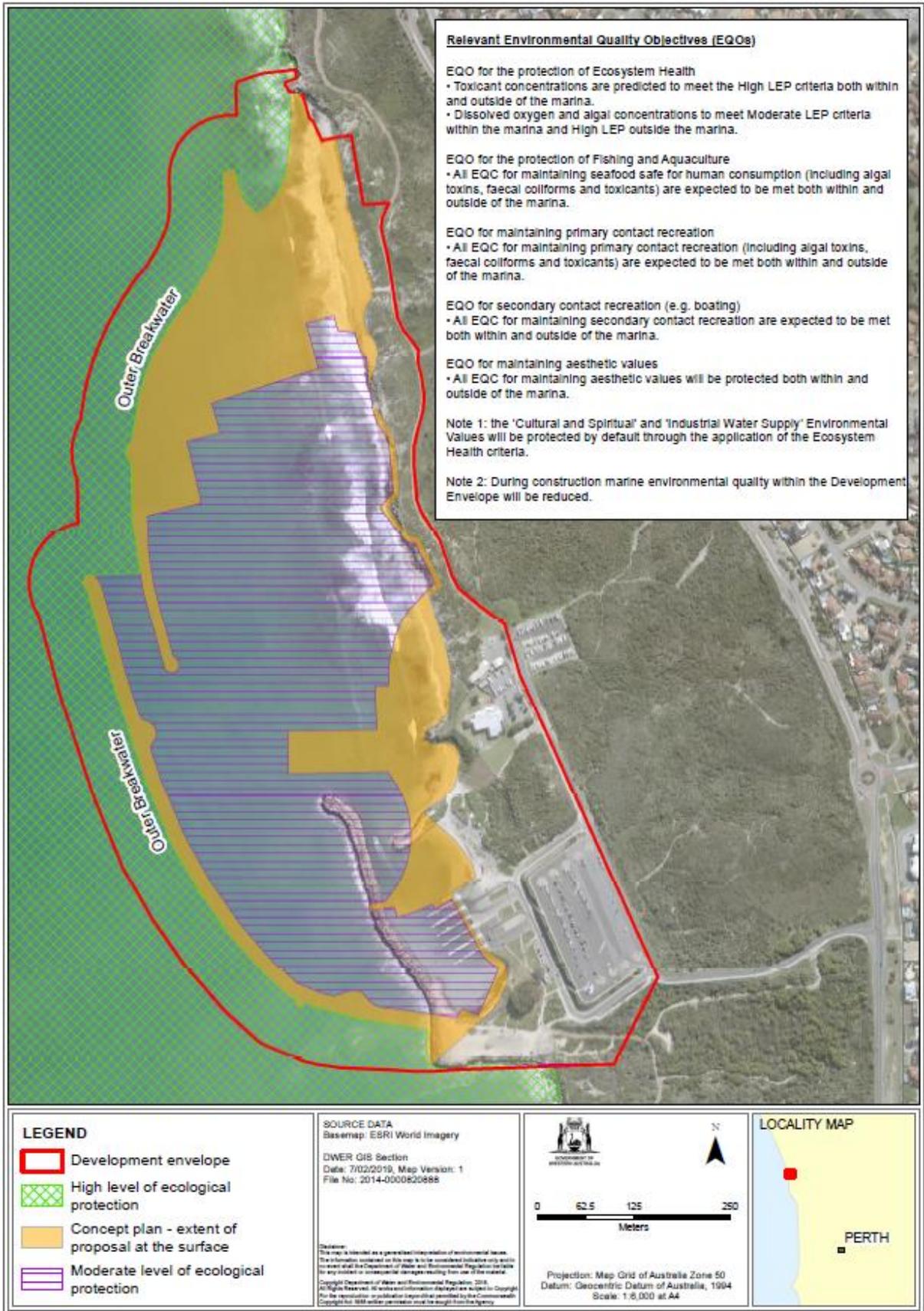


Figure 2 Operational Environmental Quality Plan



Figure 3. Abalone monitoring zone

Schedule 2

Coordinates defining the Development Envelope and Indicative Proposal Footprint are held by the Department of Water and Environmental Regulation, Document Reference Number 2018-1543990721805