GOVERNMENT OF WESTERN AUSTRALIA

Environmental Protection Authority

EPA REFERRAL FORM PROPONENT

Referral of a Proposal by the Proponent to the Environmental Protection Authority under Section 38(1) of the *Environmental Protection Act 1986*.

PURPOSE OF THIS FORM

Section 38(1) of the *Environmental Protection Act 1986* (EP Act) provides that where a development proposal is likely to have a significant effect on the environment, a proponent may refer the proposal to the Environmental Protection Authority (EPA) for a decision on whether or not it requires assessment under the EP Act. This form sets out the information requirements for the referral of a proposal by a proponent.

Proponents are encouraged to familiarise themselves with the EPA's *General Guide on Referral of Proposals* [see Environmental Impact Assessment/Referral of Proposals and Schemes] before completing this form.

A referral under section 38(1) of the EP Act by a proponent to the EPA must be made on this form. A request to the EPA for a declaration under section 39B (derived proposal) must be made on this form. This form will be treated as a referral provided all information required by Part A has been included and all information requested by Part B has been provided to the extent that it is pertinent to the proposal being referred. Referral documents are to be submitted in two formats – hard copy and electronic copy. The electronic copy of the referral will be provided for public comment for a period of 7 days, prior to the EPA making its decision on whether or not to assess the proposal.

CHECKLIST

Before you submit this form, please check that you have:

	Yes	No
Completed all the questions in Part A (essential).		
Completed all applicable questions in Part B.		
Included Attachment 1 – location maps.		
Included Attachment 2 – additional document(s) the proponent wishes to provide (if applicable).		
Included Attachment 3 – confidential information (if applicable).		
Enclosed an electronic copy of all referral information, including spatial data and contextual mapping but excluding confidential information.		

Following a review of the information presented in this form, please consider the following question (a response is optional).

Do you consider the proposal requires formal environmental impact assessment? ☐ No
If yes, what level of assessment? N/a

PROPONENT DECLARATION (to be completed by the proponent)

I, DARREN FRIEND, *(full name)* declare that I am authorised on behalf of SHIRE OF COOKAU (being the person responsible for the proposal) to submit this form and further declare that the information contained in this form is true and not misleading.

Signature	Name (print) DARREN FRIEND
Position CEO.	Company SHIRE OF COOKAU.
Date 5.4.2013.	

PART A - PROPONENT AND PROPOSAL INFORMATION
(All fields of Part A must be completed for this document to be treated as a referral)

1 PROPONENT AND PROPOSAL INFORMATION

1.1 Proponent

Name	The Shire of Coorow
Joint Venture parties (if applicable)	
Australian Company Number (if applicable)	
Postal Address (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)	Shire of Coorow PO Box 238 LEEMAN WA 6514
Key proponent contact for the proposal: • name • address • phone • email	Darren Friend Chief Executive Officer Shire of Coorow PO Box 238 LEEMAN WA 6514 P: 08 9952 0100 (Thursday & Friday) 08 9953 1388 (Monday to Wednesday) M: 0428 52 1100 E: ceo@coorow.wa.gov.au
Consultant for the proposal (if applicable): • name • address • phone • email	John Braid AECOM Australia Pty. Ltd. Forrest Place, Perth, WA 6000 GPO Box B59 Perth WA 6849 P: 08 6208 1018 E: john.braid@aecom.com

1.2 Proposal

Title	Leeman Boat Ramp
Description	To construct and manage a new boating facility in Leeman (the proposal). The facility comprises dual ramps, a finger jetty, car and trailer parking, toilet block and fish cleaning station.
Extent (area) of proposed ground disturbance.	1.7ha (Including marine environment)
Timeframe in which the activity or development is proposed to occur (including start and finish dates where applicable).	Construction is proposed to commence in July 2013, with a six month construction timeframe.
Details of any staging of the proposal.	The project will not staged
Is the proposal a strategic proposal?	No
Is the proponent requesting a declaration that the proposal is a derived proposal? If so, provide the following information on the strategic assessment within which the referred	No

proposal was identified: • title of the strategic assessment; and • Ministerial Statement number.	
Please indicate whether, and in what way, the proposal is related to other proposals in the region.	The proposal is not related to other development proposals in the area.
Does the proponent own the land on which the proposal is to be established? If not, what other arrangements have been established to access the land?	No. Appropriate arrangements will be made to ensure access to the land.
What is the current land use on the property, and the extent (area in hectares) of the property?	The land is reserved under the local planning scheme for parks and recreation. It is currently unutilised, except for road drainage purposes.

1.3 Location

Name of the Shire in which the proposal is located.	Shire of Coorow
For urban areas: • street address; • lot number; • suburb; and • nearest road intersection.	27 Illyarrie Street Leeman Illyarrie Street and Nairn Street
For remote localities: • nearest town; and • distance and direction from that town to the proposal site.	
Electronic copy of spatial data - GIS or CAD, geo-referenced and conforming to the following parameters: • GIS: polygons representing all activities and named; • CAD: simple closed polygons representing all activities and named; • datum: GDA94; • projection: Geographic (latitude/longitude) or Map Grid of Australia (MGA); • format: Arcview shapefile, Arcinfo coverages, Microstation or AutoCAD.	Enclosed?: Yes

1.4 Confidential Information

Does the proponent wish to request the EPA to allow any part of the referral information to be treated as confidential?	No
If yes, is confidential information attached as a separate document in hard copy?	

1.5 Government Approvals

Is rezoning of any land required before the proposal can be implemented? If yes, please provide details.		No	
Is approval required from any Commonwealth or State Government agency or Local Authority for any part of the proposal? If yes, please complete the table below.		Yes	
Agency/Authority	Approval required	Application lodged Yes / No	Agency/Local Authority contact(s) for proposal
Shire of Coorow	Yes	No	Darren Friend Chief Executive Officer Shire of Coorow PO Box 238 LEEMAN WA 6514 P: 08 9952 0100 (Thursday & Friday) 08 9953 1388 (Monday to Wednesday) M: 0428 52 1100 E: ceo@coorow.wa.gov.au
Department of Fisheries	Yes – permit to "take" seagrass under the *Fish Resources Management Act 1994*	No	Carli Telfer Department of Fisheries 3rd Floor The Atrium 168 St Georges Tce Perth WA 6000 P: 9482 7200
Department of Environment and Conservation	Yes – clearing permit	Yes – advertised on 11 March 2013	Clare Ryan DEC Native Vegetation Conservation Branch P: 9219 8726

PART B - ENVIRONMENTAL IMPACTS AND PROPOSED MANAGEMENT

2. ENVIRONMENTAL IMPACTS

Describe the impacts of the proposal on the following elements of the environment, by answering the questions contained in Sections 2.1-2.11:

2.1 flora and vegetation;

2.2 fauna;

2.3 rivers, creeks, wetlands and estuaries;

2.4 significant areas and/ or land features;

2.5 coastal zone areas;

2.6 marine areas and biota;

2.7 water supply and drainage catchments;

2.8 pollution;

2.9 greenhouse gas emissions;

2.10 contamination; and

2.11 social surroundings.

These features should be shown on the site plan, where appropriate.

For all information, please indicate:

(a) the source of the information; and

(b) the currency of the information.

2.1 Flora and Vegetation

2.1.1 Do you propose to clear any native flora and vegetation as a part of this proposal?

[A proposal to clear native vegetation may require a clearing permit under Part V of the EP Act (Environmental Protection (Clearing of Native Vegetation) Regulations 2004)]. Please contact the Department of Environment and Conservation (DEC) for more information.

(please tick) ☐ Yes

If yes, complete the rest of this section.

If no, go to the next section

2.1.2 How much vegetation are you proposing to clear (in hectares)?

1.1ha

2.1.3 Have you submitted an application to clear native vegetation to the DEC (unless you are exempt from such a requirement)?

☐ Yes

If yes, on what date and to which office was the application submitted of the DEC?

An application to clear native vegetation was submitted to the DEC in March 2013 and was subsequently advertised on 11 March 2013 for a 21 day submission period.

2.1.4 Are you aware of any recent flora surveys carried out over the area to be disturbed by this proposal?

☐ Yes

If yes, please attach a copy of any related survey reports and provide the date and name of persons / companies involved in the survey(s).

If no, please do not arrange to have any biological surveys conducted prior to consulting with the DEC.

A site specific flora survey was carried out by AECOM's senior botanist Floora de Wit (flora collection permit no. SL010212) on Thursday 29 November 2012. The report is contained in Attachment 2 (Appendix B of the EIAMP document).

2.1.5 Has a search of DEC records for known occurrences of rare or priority flora or threatened ecological communities been conducted for the site?

☐ Yes

If you are proposing to clear native vegetation for any part of your proposal, a search of DEC records of known occurrences of rare or priority flora and threatened ecological communities will be required. Please contact DEC for more information.

A search of DEC records was undertaken for known occurrences of rare or priority flora as well as threatened ecological communities. The search results are contained in Attachment 2.

2.1.6 Are there any known occurrences of rare or priority flora or threatened ecological communities on the site?

☐ No

If yes, please indicate which species or communities are involved and provide copies of any correspondence with DEC regarding these matters.

2.1.7 If located within the Perth Metropolitan Region, is the proposed development within or adjacent to a listed Bush Forever Site? (You will need to contact the Bush Forever Office, at the Department for Planning and Infrastructure)

☐ No

If yes, please indicate which Bush Forever Site is affected (site number and name of site where appropriate).

2.1.8 What is the condition of the vegetation at the site?

The condition of vegetation ranges from Completely Degraded to Very Good, with cleared areas classified as Completely Degraded. These include the tracks visible on the aerial photographs. The majority of the remnant vegetation within the Project

Area is in Good to Very Good condition (see Attachment 2 – EIAMP, Appendix B, Figure 4)

2.2 Fauna

2.2.1 Do you expect that any fauna or fauna habitat will be impacted by the proposal?

(please tick) ☐ Yes **If yes**, complete the rest of this section.

If no, go to the next section.

2.2.2 Describe the nature and extent of the expected impact.

The primary impact to terrestrial fauna will be the loss of habitat through the clearing of native vegetation for the construction of the carpark and associated facilities. Approximately 1.1 ha of fauna habitat will be impacted by the proposal.

2.2.3 Are you aware of any recent fauna surveys carried out over the area to be disturbed by this proposal?

☐ Yes **If yes**, please attach a copy of any related survey reports and provide the date and name of persons / companies involved in the survey(s).

If no, please do not arrange to have any biological surveys conducted prior to consulting with the DEC.

The field assessment for fauna values was conducted in conjunction with the field assessment of flora and vegetation. A copy of the survey report is attached.

2.2.4 Has a search of DEC records for known occurrences of Specially Protected (threatened) fauna been conducted for the site?

☐ Yes (please tick)

2.2.5 Are there any known occurrences of Specially Protected (threatened) fauna on the site?

☐ No **If yes**, please indicate which species or communities are involved and provide copies of any correspondence with DEC regarding these matters.

2.3 Rivers, Creeks, Wetlands and Estuaries

2.3.1 Will the development occur within 200 metres of a river, creek, wetland or estuary?

(please tick) **If yes**, complete the rest of this section.

☐ No **If no**, go to the next section.

2.3.2 Will the development result in the clearing of vegetation within the 200 metre zone?

☐ No **If yes**, please describe the extent of the expected impact.

2.3.3 Will the development result in the filling or excavation of a river, creek, wetland or estuary?

☐ No **If yes**, please describe the extent of the expected impact.

2.3.4 Will the development result in the impoundment of a river, creek, wetland or estuary?

☐ No **If yes**, please describe the extent of the expected impact.

2.3.5 Will the development result in draining to a river, creek, wetland or estuary?

☐ No **If yes**, please describe the extent of the expected impact.

2.3.6 Are you aware if the proposal will impact on a river, creek, wetland or estuary (or its buffer) within one of the following categories? (please tick)

Conservation Category Wetland	☐ No
Environmental Protection (South West Agricultural Zone Wetlands) Policy 1998	☐ No
Perth's Bush Forever site	☐ No
Environmental Protection (Swan & Canning Rivers) Policy 1998	☐ No
The management area as defined in s4(1) of the *Swan River Trust Act 1988*	☐ No
Which is subject to an international agreement, because of the importance of the wetland for waterbirds and waterbird habitats (e.g. Ramsar, JAMBA, CAMBA)	☐ No

2.4 Significant Areas and/ or Land Features

2.4.1 Is the proposed development located within or adjacent to an existing or proposed National Park or Nature Reserve?

☐ Yes **If yes**, please provide details.

There are no reserves or conservation areas intersecting the proposal area. Several reserves and conservation areas occur in the vicinity of Leeman:

- Beekeepers Nature Reserve located approximately 500 metres from the project area. This Nature Reserve extends for approximately 80 km along the mid-west coast between Green Head and Dongara. It is reserved for the purpose of protecting flora.
- Stockyard Gully Reserve, located approximately 10 km east of Leeman, is managed for the purpose of conserving flora, water and the protection of caves.
- Lesueur National Park is located approximately 9 km south-east of the project area.
- "Islands" Nature Reserve A29259, consisting of Lipfert, Milligan and Snag Islands and Webb Islet and Orton and Drummond Rocks. Snag Island is located 150 metres to the west north west of the project area, and Drummond Rocks are 700 metres south west. This chain of islands is part of a chain of 13 island nature reserves, including 40 islands, off the coast between Lancelin and Dongara

2.4.2 Are you aware of any Environmentally Sensitive Areas (as declared by the Minister under section 51B of the EP Act) that will be impacted by the proposed development?

☐ No **If yes**, please provide details.

2.4.3 Are you aware of any significant natural land features (e.g. caves, ranges etc) that will be impacted by the proposed development?

☐ No **If yes**, please provide details.

2.5 Coastal Zone Areas (Coastal Dunes and Beaches)

2.5.1 Will the development occur within 300metres of a coastal area?

(please tick) ☐ Yes **If yes**, complete the rest of this section.

If no, go to the next section.

2.5.2 What is the expected setback of the development from the high tide level and from the primary dune?

The proposal cannot be setback from the coast as it is coastally dependent.

2.5.3 Will the development impact on coastal areas with significant landforms including beach ridge plain, cuspate headland, coastal dunes or karst?

☐ No **If yes**, please describe the extent of the expected impact.

The coastal landforms in the Leeman area are not unique.

2.5.4 Is the development likely to impact on mangroves?

☐ No **If yes**, please describe the extent of the expected impact.

2.6 Marine Areas and Biota

2.6.1 Is the development likely to impact on an area of sensitive benthic communities, such as seagrasses, coral reefs or mangroves?

☐ Yes **If yes**, please describe the extent of the expected impact.

The proposal will impact benthic primary producer habitat (BPPH) through temporary direct loss (temporary burial during construction), direct loss through placement of the concrete ramp footing, indirect loss due to increased boating activity and temporary indirect loss as a result of localised changes in water quality and coastal processes during construction. Refer to the attached environmental impact assessment for further details.

2.6.2 Is the development likely to impact on marine conservation reserves or areas recommended for reservation (as described in *A Representative Marine Reserve System for Western Australia*, CALM, 1994)?

☐ No **If yes**, please describe the extent of the expected impact.

2.6.3 Is the development likely to impact on marine areas used extensively for recreation or for commercial fishing activities?

☐ Yes **If yes**, please describe the extent of the expected impact, and provide any written advice from relevant agencies (e.g. Fisheries WA).

The Department of Fisheries advised that the construction of the proposal may increase recreational fishing pressure, leading to localised fish stock depletions. The Department recommended that the Shire of Coorow, in liaison with the Department, may wish to consider an appropriate public awareness strategy (Attachment 2 – Advice from the Department of Fisheries).

2.7 Water Supply and Drainage Catchments

2.7.1 Are you in a proclaimed or proposed groundwater or surface water protection area?

(You may need to contact the Department of Water (DoW) for more information on the requirements for your location, including the requirement for licences for water abstraction. Also, refer to the DoW website)

☐ Yes **If yes**, please describe what category of area.

The project area is located within the Arrowsmith groundwater proclamation area (Dow 2009b).

2.7.2 Are you in an existing or proposed Underground Water Supply and Pollution Control area?

(You may need to contact the DoW for more information on the requirements for your location, including the requirement for licences for water abstraction. Also, refer to the DoW website)

☐ No — **If yes**, please describe what category of area.

2.7.3 Are you in a Public Drinking Water Supply Area (PDWSA)?

(You may need to contact the DoW for more information or refer to the DoW website. A proposal to clear vegetation within a PDWSA requires approval from DoW.)

☐ No — **If yes**, please describe what category of area.

2.7.4 Is there sufficient water available for the proposal?

(Please consult with the DoW as to whether approvals are required to source water as you propose. Where necessary, please provide a letter of intent from the DoW)

☐ Yes (please tick)

2.7.5 Will the proposal require drainage of the land?

☐ Yes — **If yes**, how is the site to be drained and will the drainage be connected to an existing Local Authority or Water Corporation drainage system? Please provide details.

Yes, the existing drainage sump will be modified to accommodate increased stormwater flow from impervious areas.

2.7.6 Is there a water requirement for the construction and/ or operation of this proposal?

(please tick) ☐ Yes — **If yes**, complete the rest of this section.

If no, go to the next section.

2.7.7 What is the water requirement for the construction and operation of this proposal, in kilolitres per year?

Construction water requirements will be minimal (less than 1000 kL), and will only be required for dust suppression and compaction.

Operational water requirements for the toilets and fish cleaning facilities will not be significant.

2.7.8 What is the proposed source of water for the proposal? (e.g. dam, bore, surface water etc.)

Where possible, water for construction will be abstracted from local bores. If this is not feasible, then the Leeman scheme water supply will be used. For operation of the facility, potable water will be source from the Leeman scheme water supply.

2.8 Pollution

2.8.1 Is there likely to be any discharge of pollutants from this development, such as noise, vibration, gaseous emissions, dust, liquid effluent, solid waste or other pollutants?

☐ Yes

If yes, complete the rest of this section.

If no, go to the next section.

2.8.2 Is the proposal a prescribed premise, under the Environmental Protection Regulations 1987?

(Refer to the EPA's *General Guide for Referral of Proposals to the EPA under section 38(1) of the EP Act 1986* for more information)

☐ No

If yes, please describe what category of prescribed premise.

2.8.3 Will the proposal result in gaseous emissions to air?

☐ No

If yes, please briefly describe.

2.8.4 Have you done any modelling or analysis to demonstrate that air quality standards will be met, including consideration of cumulative impacts from other emission sources?

☐ No

If yes, please briefly describe.

2.8.5 Will the proposal result in liquid effluent discharge?

☐ Yes

If yes, please briefly describe the nature, concentrations and receiving environment.

Liquid effluent discharge will occur on site. A toilet block will be constructed and connected to underground deep sewage for disposal and treatment via the Water Corporation's sewage treatment plant.

2.8.6 If there is likely to be discharges to a watercourse or marine environment, has any analysis been done to demonstrate that the State Water Quality Management Strategy or other appropriate standards will be able to be met?

☐ No

If yes, please describe.

2.8.7 Will the proposal produce or result in solid wastes?

☐ Yes

If yes, please briefly describe the nature, concentrations and disposal location/ method.

During construction, solid waste streams will be produced including:

- General litter
- Construction waste (excess soil, aggregate, bricks, packaging)

Operation of the boat ramp will produce a number of waste streams:

- General litter
- Biological waste (fish waste from the fish cleaning facility

During construction all solid waste material will be removed from the construction area and disposed of appropriately in accordance with local by-laws and DEC land fill waste classification requirements.

General litter will be disposed of in supplied commercial bins and regularly emptied by the Shire of Coorow as part of Leeman's waste management program.

A fish waste disposal strategy will be developed post-construction in consultation with the Keep Australia Beautiful Council to manage fish waste from the fish cleaning facility

2.8.8 Will the proposal result in significant off-site noise emissions?

☐ Yes **If yes**, please briefly describe.

Noise impacts during construction may be significant due to the type of noise being produced. Piling and blasting will both be employed during construction of the proposal. Piling will result in loud, repetitious noise over long periods. Blasting will cause intermittent loud explosions that may impact nearby sensitive receivers.

2.8.9 Will the development be subject to the Environmental Protection (Noise) Regulations 1997?

☐ Yes

If yes, has any analysis been carried out to demonstrate that the proposal will comply with the Regulations?

Please attach the analysis.

No analysis has been carried out to demonstrate that the proposal will comply with the Regulations.

Piling, and other construction noise, will be managed in accordance with Regulation 13 of the Noise Regulations.

Blasting will be managed in accordance with Regulation 11 of the Noise Regulations.

2.8.10 Does the proposal have the potential to generate off-site, air quality impacts, dust, odour or another pollutant that may affect the amenity of residents and other "sensitive premises" such as schools and hospitals (proposals in this category may include intensive agriculture, aquaculture, marinas, mines and quarries etc.)?

☐ Yes **If yes**, please describe and provide the distance to residences and other "sensitive premises".

There is the potential for nearby sensitive premises to be impacted by dust generated by the proposal Residential dwellings located 50 m to the east of the project site.

2.8.11 If the proposal has a residential component or involves "sensitive premises", is it located near a land use that may discharge a pollutant?

☐ Not Applicable

If yes, please describe and provide the distance to the potential pollution source

2.9 Greenhouse Gas Emissions

2.9.1 Is this proposal likely to result in substantial greenhouse gas emissions (greater than 100 000 tonnes per annum of carbon dioxide equivalent emissions)?

☐ No **If yes**, please provide an estimate of the annual gross emissions in absolute and in carbon dioxide equivalent figures.

2.9.2 Further, if yes, please describe proposed measures to minimise emissions, and any sink enhancement actions proposed to offset emissions.

2.10 Contamination

2.10.1 Has the property on which the proposal is to be located been used in the past for activities which may have caused soil or groundwater contamination?

☐ No **If yes**, please describe.

2.10.2 Has any assessment been done for soil or groundwater contamination on the site?

☐ Yes **If yes**, please describe.

A search conducted on the DEC Contaminated Sites database (DEC 2012) found no contaminated sites to occur within or adjacent to the proposed project area.

2.10.3 Has the site been registered as a contaminated site under the *Contaminated Sites Act 2003*? (on finalisation of the CS Regulations and proclamation of the CS Act)

☐ No **If yes**, please describe.

2.11 Social Surroundings

2.11.1 Is the proposal on a property which contains or is near a site of Aboriginal ethnographic or archaeological significance that may be disturbed?

☐ No **If yes**, please describe.

2.11.2 Is the proposal on a property which contains or is near a site of high public interest (e.g. a major recreation area or natural scenic feature)?

☐ No **If yes**, please describe.

2.11.3 Will the proposal result in or require substantial transport of goods, which may affect the amenity of the local area?

☐ No **If yes**, please describe.

3. PROPOSED MANAGEMENT

3.1 Principles of Environmental Protection

3.1.1 Have you considered how your project gives attention to the following Principles, as set out in section 4A of the EP Act? (For information on the Principles of Environmental Protection, please see EPA Position Statement No. 7, available on the EPA website)

1. The precautionary principle. ☐ Yes
2. The principle of intergenerational equity. ☐ Yes
3. The principle of the conservation of biological diversity and ecological integrity. ☐ Yes
4. Principles relating to improved valuation, pricing and incentive mechanisms. ☐ Yes
5. The principle of waste minimisation. ☐ Yes

3.1.2 Is the proposal consistent with the EPA's Environmental Protection Bulletins/Position Statements and Environmental Assessment Guidelines/Guidance Statements (available on the EPA website)?

☐ Yes

3.2 Consultation

3.2.1 Has public consultation taken place (such as with other government agencies, community groups or neighbours), or is it intended that consultation shall take place?

☐ Yes

If yes, please list those consulted and attach comments or summarise response on a separate sheet.

This proposal has been considered for more than a decade, and the Shire has consulted with the public on many occasions, and will continue to consult with the public during construction and operation.

In the past year consultation has occurred with the following agencies:

- Department of Fisheries
- Department of Environment and Conservation
    - Moora District Office
    - Environmental Management Branch
    - Native Vegetation Conservation Branch

- Department of Transport
- Department of Regional Development and Lands
- Office of the Environmental Protection Authority

ATTACHMENT 1

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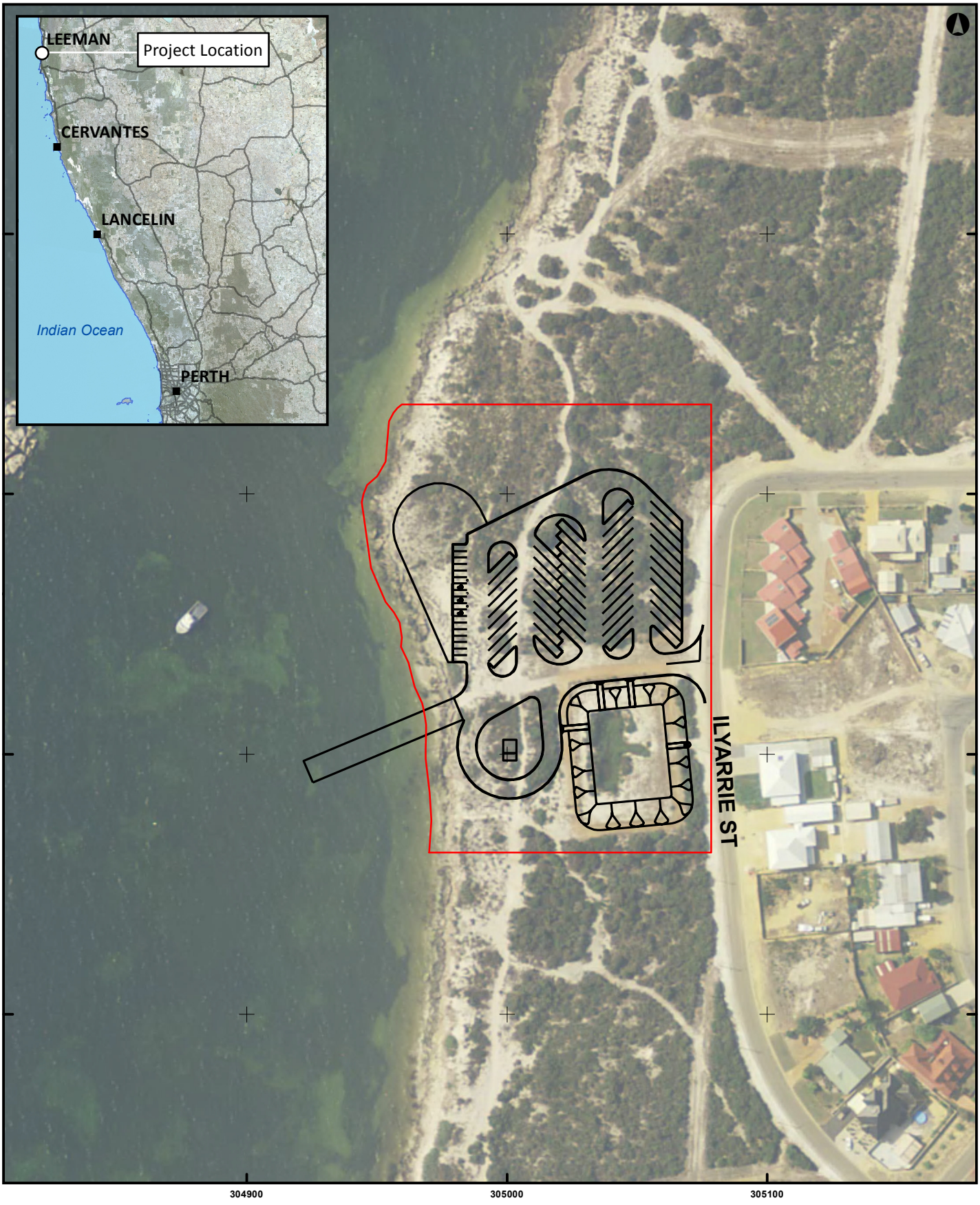

Project Area

Figure 1

Coordinate System: GDA 1994 MGA Zone 50

0 10 20 30 40 50

Metres

1:2,000 (A4)

LEGEND

- Proposed Boat Ramp Design
- Project Area

AECOM does not warrant the accuracy or completeness of information displayed in this map and any person using it does so at their own risk. AECOM shall bear no responsibility or liability for any errors, faults, defects, or omissions in the information.

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ATTACHMENT 2

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ADM0441 IcR136476

Government of **Western Australia**
Department of **Fisheries**

SHIRE OF COOROW
19 FEB 2013
RECEIVED

Fish for the future

Our Ref: 104/13
Your Ref: ADM0441
Enquiries: Carli Telfer (9482 7200)

Mr Darren Friend
Chief Executive Officer
PO Box 42
Coorow WA 6515

Dear Mr Friend

LEEMAN BOAT RAMP

Thank you for the opportunity to provide comment on the Environmental Impact Assessment and Management Plan for the Leeman Boat Ramp. Officers of the Department of Fisheries (the Department) have reviewed the document, and have generated a list of comments (Attachment 1) which relate to specific sections of the plan.

In summary, the Department suggests that the plan could be strengthened, by the provision of a section on the potential impacts on fish and fish habitat and mitigation strategies.

Yours sincerely

for **STUART SMITH**
DIRECTOR GENERAL

7 February 2013

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LEEMAN BOAT RAMP
ENVIRONMENTAL IMPACT ASSESSMENT AND MANAGEMENT PLAN
Department of Fisheries (Attachment 1)

Key issues	Section	Department of Fisheries - Comments
Direct loss of Seagrass meadows	4.3	• Seagrass meadows are important nursery areas for marine organisms, including blue swimmer crabs, prawns, western rock lobster, whiting, tailor, herring, squid and wrasse. Juvenile fish shelter in coastal embayment and estuary seagrass areas before moving offshore to complete their life cycle. In addition, dead seagrass (seawrack) plays an essential role in the nutrient enrichment of nearshore marine ecosystems. Because of the potential impacts of this important part of the ecosystem, the Department requests that the environmental impact assessment and management plan specifically qualifies these impacts and identifies the mitigation strategies to reduce this risk. • The Department recommends that a navigation channel (marked with buoys) is included as part of the proposed construction of the Leeman Boat Ramp. This will protect surrounding seagrass meadows from propeller scouring and turbulence from motor boats. Consultation should be undertaken with the Department of Transport regarding navigation channels and boating safety. • Pre-construction – The Shire of Coorow, will require an exemption from the Department of Fisheries to remove seagrass. Under the *Fish Resources Management Act 1994*, seagrass is a fish and therefore any application to remove seagrass or seawrack requires an exemption to 'take'. Also note that under the *Environment Protection Act 1986* there is a legislation requirement relating to the clearing native aquatic vegetation the Department recommends you consult the Environment Protection Authority.
Monitoring	5.3	• The Department recommends that pre-and post-construction monitoring of seagrass density be undertaken to ensure the construction of the new ramp has no long-term impacts.
Noise and vibration	4.4	• Exposing fish to moderate noise has been shown to damage their hearing organs, and cause temporary hearing loss. Even a short term loss of acoustic communication in fish, may mean they are unable to avoid predators or detect prey or make use of the general acoustic 'soundscape', which provides important information about the surrounding area. The Department supports the proposed action taken by the Shire of Coorow to mitigate this risk.

Piling	4.4.3	• Sediment plumes may be created around pilings when they are installed. These plumes may contain contaminants, which may be released into the sediment during the installation process. These contaminates (e.g. heavy metals) may negatively impact fish and habitats. The Department recommends that the environmental impact assessment and management plan includes a section in the plan describing how sediment dispersal will be reduced, to mitigate the impacts on the local environment during the construction phase. Strategies such as placement of a silt curtain around the immediate area of impact are recommended.
Increase on recreational fishing pressure Fishing Cleaning station	General	• The construction of the Leeman boat ramp and surrounding infrastructure can increase recreational fishing pressure, leading to localised fish stock depletions. This includes increased pressure on specific targeted fish stocks and/or an increase in shore based fishing of residents and visitors. The Shire of Coorow, in liaison with the Department, may wish to consider appropriate public awareness strategies in this regard. • The inclusion of a fish cleaning station is supported by the Department. Keep Australia Beautiful Council http://www.kabc.wa.gov.au, the organisation responsible for the education in litter prevention and environmental sustainability, have public strategies dealing with fish waste, the Department encourages consultation with Keep Australia Beautiful Council.

Government of **Western Australia**
Department of **Environment and Conservation**

Your ref: ADM0441
Our ref: 33778
Enquiries: Liz Rushforth
Telephone: 08 9652 1911
Fax: 08 9652 1922
Email: elizabeth.rushforth@dec.wa.gov.au

Mr Darren Friend
Chief Executive Officer
Shire of Coorow
PO Box 42
COOROW WA 6515

Dear Mr Friend

LEEMAN BOAT RAMP – ENVIRONMENTAL IMPACT ASSESSMENT AND MANAGEMENT PLAN

Thank you for your letter of 21 January 2013 seeking comment from the Department of Environment and Conservation (DEC) regarding the Leeman Boat Ramp Environmental Impact Assessment and Management Plan. DEC has the following comments.

Marine fauna

Section 4.2 (page 23) indicates that a 500 metre blast exclusion zone will be implemented for marine fauna. DEC recommends that the plan outline the measures to be taken to establish and maintain the fauna exclusion zone.

Section 5.1.4 (page 28): DEC requests that in the event of injured or dead marine fauna being observed, immediate contact be made with the Moora District office on (08) 9652 1911 as well as written observations provided within 24 hours – as indicated in the plan.

Reserves and conservation areas

Section 3:13 (page 18) lists reserves and conservation areas in the vicinity of Leeman. The listed reserves do not include the Islands Nature Reserve chain A29259. The islands in this chain which are in the vicinity of the proposed Leeman boat ramp are Snag Island Nature Reserve and Drummond Rocks Nature Reserve. DEC recommends that the plan be amended to include these island nature reserves and due consideration is given to their conservation values.

Please contact Liz Rushforth at the DEC Moora District office on (08) 9652 1911 if you have any queries.

Yours sincerely

Nigel Sercombe
REGIONAL MANAGER
Midwest Region

26 February 2013

Regional Services Division - Midwest Region
Foreshore Centre, 201 Foreshore Drive, Geraldton, WA 6530
Phone: (08) 9921 5955 Fax: (08) 9921 5713
PO Box 72, Geraldton, WA 6531
www.dec.wa.gov.au

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Government of **Western Australia**
Department of Environment and Conservation

NOTIFICATION OF APPLICATIONS RECEIVED FOR CLEARING PERMITS AND AMENDMENTS AVAILABLE FOR PUBLIC SUBMISSIONS AND/OR REGISTRATIONS OF INTEREST

Applications for clearing permits with a *7 day* submission period

1. City of Fremantle, Area Permit, Lots 629 and 2465 on Plan 11526 – Reserve 34233, Samson, **City of Fremantle**, fire hazard reduction and pathway maintenance, 1ha, (CPS 5515/1)

Applications for clearing permits with a *21 day* submission period

1. Shire of Coorow, Purpose Permit, Lot 340 on Deposited Plan 66641 – Reserve 50828, Leeman and unallocated Crown land, **Shire of Coorow**, Leeman boating facility, 1.025ha, (CPS 5500/1)
2. Department of Water, Purpose Permit, Lot 26 on Deposited Plan 221072 – Reserve 22615, Dampier Peninsula, **Shire of Broome**, groundwater monitoring bores and access tracks, 0.266ha, (CPS 5506/1)
3. Shire of Collie, Area Permit, Lot 143 on Deposited Plan 190669 – Reserve 16403, Allanson, **Shire of Collie,** Allanson Volunteer Bush Fire Brigade station and access road, 0.45ha, (CPS 5508/1)
4. Nubloom Pty Ltd, Area Permit, Lot 854 on Deposited Plan 134689, Walsall, **City of Busselton**, compost site, 3.59ha, (CPS 5514/1)
5. BR and GE Linaker, Area Permit, Lot 102 on Deposited Plan 70352, Davenport, **City of Bunbury**, hardstand area extension, 0.09ha, (CPS 5516/1)
6. Nicvil Pty Ltd, Area Permit, Lot 30 on Plan 4829, Wattleup, **City of Cockburn**, hardstand area, 2.7ha, (CPS 5520/1)

Submissions for applications for clearing permits are to be made within the time frame specified. Submissions may be forwarded to Native Vegetation Conservation Branch, Locked Bag 104, Bentley Delivery Centre, Bentley WA 6983, or email to nvp@dec.wa.gov.au. Further information is available through the website ftp.dec.wa.gov.au/Permit or telephone (08) 9219 8744.

NOTIFICATION OF DECISIONS AVAILABLE FOR PUBLIC APPEAL

Clearing permits granted

1. Schaffer Corporation Ltd, Area Permit, Lot 101 on Plan 64422, Lots 103 and 104 on Plan 71082, Jandakot, **City of Cockburn**, industry infrastructure extension, 3.3ha, permit duration 29 March 2013 to 29 March 2015, (CPS 5289/1)
2. Shire of Murchison, Purpose Permit, Lot 8 on Deposited Plan 220398, Murchison, **Shire of Murchison**, gravel extraction, 81.8ha, permit duration 29 March 2013 to 29 March 2023, (CPS 5382/1)
3. CW Fleay, Purpose Permit, 39 apiary sites within unallocated Crown land, Crown Reserves, Crown Leases, Timber Reserve and State Forests, **Shires of Boddington, Brookton, Carnamah, Coolgardie, Coorow, Dandaragan, Gingin, Northam, Serpentine-Jarrahdale, Toodyay, Victoria Plains and Waroona,** apiary site maintenance, 1.95ha, permit duration 29 March 2013 to 29 March 2018, (CPS 5434/1)
4. Shire of Serpentine-Jarrahdale, Area Permit, Lot 427 on Deposited Plan 202731 – Reserve 36950, Oldbury, **Shire of Serpentine-Jarrahdale**, horse arena, 0.48ha, permit duration 29 March 2013 to 29 March 2015, (CPS 5438/1)
5. Rottnest Island Authority, Area Permit, Lot 10976 on Deposited Plan 216860 – Reserve 16713, Rottnest Island, **City of Cockburn**, rehabilitation, 0.1308ha, permit duration 29 March 2013 to 29 March 2015, (CPS 5456/1)
6. Shire of Esperance, Purpose Permit, Lot 2012 on Deposited Plan 207125 – Reserve 35302 and Fleming Grove Road reserve (PIN 11645143), Gibson, **Shire of Esperance**, source base material for road construction, 2ha, permit duration 29 March 2013 to 29 March 2023, (CPS 5469/1)
7. Shire of Plantagenet, Purpose Permit, Lots 376 and 377 on Deposited Plan 71527 – Reserve 460 and Mitchell Street road reserve (PIN 11723677), Mount Barker, **Shire of Plantagenet**, road realignment, 0.096ha, permit duration 29 March 2013 to 29 March 2015, (CPS 5479/1)

Appeals against the grant of these permits must be made within *21 days* of 7 March 2013.

All appeals to be sent to the Appeals Convenor Level 22 Forrest Centre, 221 St Georges Tce, PERTH WA 6000. Telephone (08) 6467 5190.

For all other decisions, including refusals, revocations and suspensions, refer to the DEC website www.dec.wa.gov.au/nvc.

For copies of above documents visit ftp.dec.wa.gov.au/Permit
Information: www.dec.wa.gov.au/nvc Email: nvp@dec.wa.gov.au

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Government of **Western Australia**
Department of **Regional Development and Lands**

State Land Services

Your ref:
Our ref: 109-2009 Job no: 131027
Enquiries: Sean Browne Ph: (08) 6552 4708
Fax: (08) 6552 4415
Email: sean.browne@rdl.wa.gov.au

Shire of Coorow
C/- Aecom
GPO Box B59
PERTH WA 6849

Attn: John Braid

Dear John

PROPOSED LEEMAN BOAT RAMP, RESERVE 50828 AND ADJOINING SEABED, LEEMAN, SHIRE OF COOROW

Thank you for your email dated 6 March 2013 regarding the construction of the new Leeman Boat ramp and required authorisation to access the seabed.

The Department of Regional Development and Lands herby gives authorisation and approval to the construction of the Leeman boat ramp and associated works including access to the seabed adjoining Reserve 50828.

A new reserve will be created over the completed facility in due course.

If you have any further enquiries, please contact me on (08) 6552 4708.

Yours sincerely

SEAN BROWNE
for MANAGER
STATE LAND SERVICES – MID WEST
LANDS DIVISION

5 April 2013

XDRDL001

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Leeman Boat Ramp
Shire of Coorow
2 April 2013

Leeman Boat Ramp

Environmental Impact Assessment and Management Plan

Leeman Boat Ramp

Environmental Impact Assessment and Management Plan

Prepared for

Shire of Coorow

Prepared by

AECOM Australia Pty Ltd
3 Forrest Place, Perth WA 6000, GPO Box B59, Perth WA 6849, Australia
T +61 8 6208 0000 F +61 8 6208 0999 www.aecom.com
ABN 20 093 846 925

2 April 2013

60282009

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Quality Information

Document Leeman Boat Ramp

Ref 60282009

Date 2 April 2013

Prepared by David Temple-Smith and Matt McDonnell

Reviewed by Jamie Shaw

Revision History

Revision	Revision Date	Details	Authorised	
			Name/Position	Signature
A	05-Dec-2012	For Internal Review	Bob Harrap Project Manager	
B	19-Dec-2012	For Client Review	Bob Harrap Project Manager	
0	17-Jan-2013	Final for issue	Stephan Dickinson Project Manager	
1	02-Apr-2013	Final for issue with updates	Stephan Dickinson Project Manager	

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Executive Summary

The Shire of Coorow proposes to construct and manage a new boating facility in Leeman (the proposal). The facility comprises dual lane concrete ramps, a finger jetty, car and trailer parking, toilet block and fish cleaning station.

The physical setting and the construction footprint of the proposal have been assessed in terms of their environmental values and the requirement for either preservation or management of these values. The assessment is informed by desktop and field studies of flora, vegetation and fauna as well as marine water quality and benthic habitat. The assessment also considers the broader landscape within which the proposal is situated, in terms of the requirement for environmental management as a consequence of the proposal.

The boat ramp and finger jetty will be constructed on piles, thereby minimising permanent loss of Benthic Primary Producer Habitat (BPPH) and maintaining natural coastal processes in perpetuity. Whilst there will be temporary loss of BPPH during construction, affected areas are expected to recover quickly once construction is complete.

Overall the proposal will have minimal effects on the environment. There are some protected marine fauna species expected to occur in the vicinity of the proposal from time to time, such as sharks, sea lions, turtles and dolphins; however the proposal is unlikely to have a significant impact on these species.

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1.0 Introduction

The Shire of Coorow proposes to construct and manage a new boating facility in Leeman (the proposal). The facility comprises dual ramps, a finger jetty, car and trailer parking, toilet block and fish cleaning station (Appendix A).

1.1 Background

Boat launching facilities at Leeman comprise basic concrete ramps at Dee Street and Pioneer Park as well as informal launching across the beach in several locations. Both boat ramps are short and difficult to use at low tide due to the shallow depth of water. In both cases the ramp toe extends only a short distance past the low tide level due the relatively flat beach gradient. They also suffer from sand, seagrass and macroalgae (wrack) inundation, which require regular maintenance to keep the ramps clear.

1.2 Scope of the report

The scope of this Environmental Impact Assessment and Management Plan (EIAMP) is to review the environmental values of the area, assess the environmental impact of the proposal and present management strategies to guide environmental management during the construction and operation phases of the proposal.

1.3 Purpose of this document

The proposal will be partly funded through the Western Australian Government's Recreational Boating Facilities Scheme. The funding is conditional upon all relevant statutory approvals being obtained for the proposal.

This document has been prepared as the basis for formal consultation with environmental regulatory authorities, including referral of the proposal to the Environmental Protection Authority.

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2.0 Proposal description

The proposal comprises the construction of a dual-lane boat ramp and ancillary facilities in accordance with AS 3962 (2001) *Guidelines for the Design of Marinas* and the typical requirements of the Western Australia Department of Transport. A summary of the key proposal characteristics is provided in Table 1.

Table 1 Key proposal characteristics

Item/Aspect	Description	
Summary		
Proposal Title	Leeman Boat Ramp	
Proponent Name	Shire of Coorow	
Short Description	This proposal is to construct and operate a boat ramp at Leeman, including the construction of associated facilities (carpark, toilet block, fish cleaning station) and discharge stormwater to an existing drainage basin (that will be modified).	
Physical Elements	**Location**	**Proposed Extent**
Boat ramp	Figure 1	Disturbance of no more than 0.2 hectares
Associated infrastructure	Figure 1	Clearing of no more than 1 hectares
Stormwater drainage	Figure 1	Clearing of no more than 0.5 hectares

Construction of the offshore component of the facility is expected to occur in one of two ways:

1) Construct a temporary rock/gravel bund to provide access to the furthest pile and to a level to allow pile driver and land-based crane to track over the top of the driven piles

2) Construct the entire facility from a marine-based barge

Regardless of the preferred construction method, blasting will be required to break up existing limestone structures on the shoreline. This material may be used for rock armouring of the ramp abutment.

The assessment of the proposal is based on construction method one above.

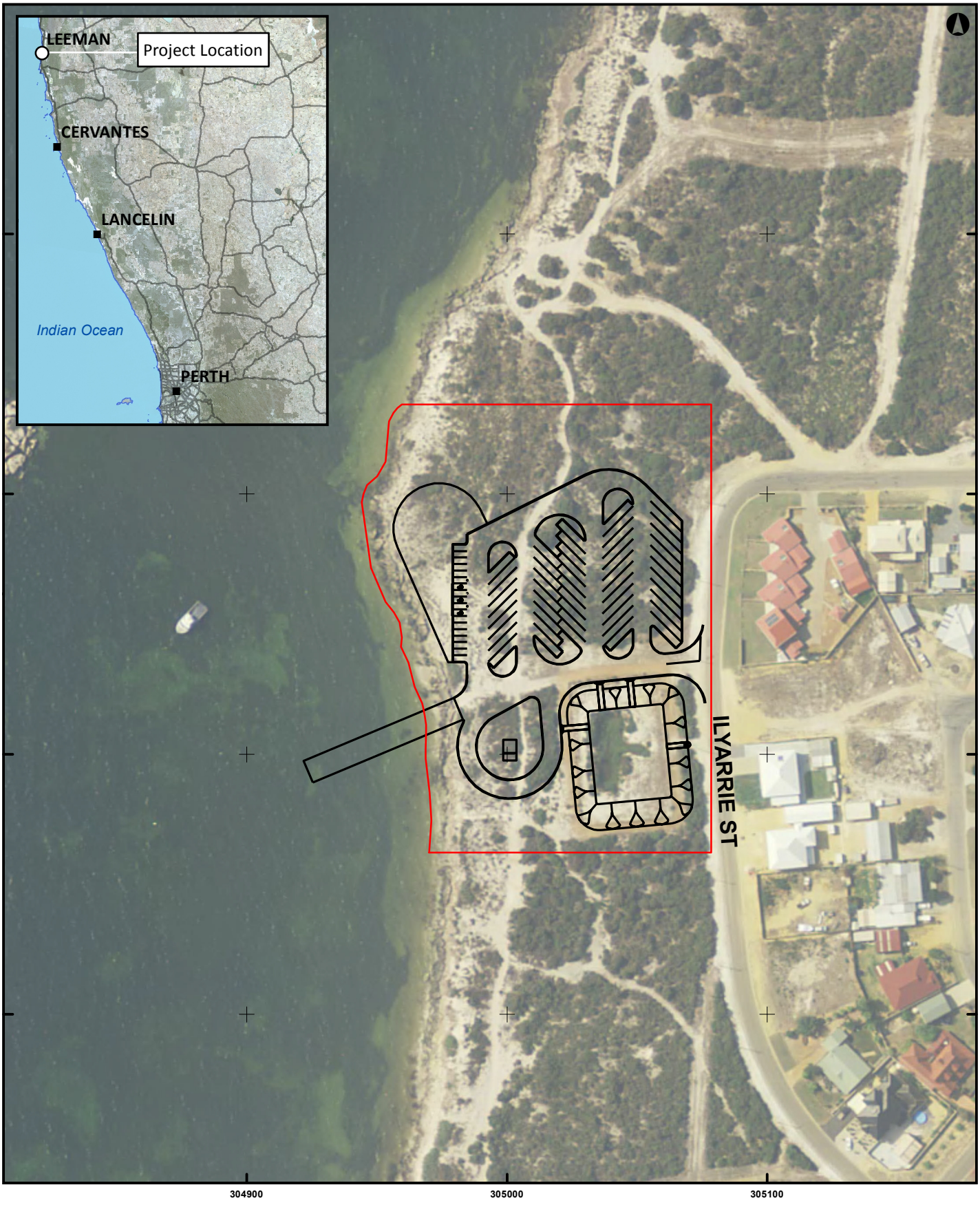
2.1 Alternatives considered

The primary alternative to the proposal is upgrading the existing boat ramp at Dee Street. In its simplest form this upgrade would comprise the construction of a 'causeway' across the beach at the same level as the parking area.

A feasibility study undertaken in 2001 did not recommend the construction of such a 'groyne' as it would contribute to increase ramp and beach maintenance costs due to seasonal accumulation of sand and seaweed, and increased potential for coastal erosion to the north of the structure (Worley 2001).

More recently, other arrangements such as a pile-supported ramp or the use of larger culverts have been considered for the Dee Street upgrade to maintain coastal processes, alleviate sand and seaweed wrack inundation and move the ramp toe further down the beach into deeper water (AECOM 2011).

It was concluded that it would be difficult to achieve sufficient depth at the Dee Street location to enable safe boat launching and retrieval on low tide. For this reason it was decided that a new location further north, with better access to deeper water, should be considered.



Project Area

Figure 1

Coordinate System: GDA 1994 MGA Zone 50

0 10 20 30 40 50

Metres

1:2,000 (A4)

LEGEND

- Proposed Boat Ramp Design
- Project Area

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3.0 Existing environment

This section describes the biophysical environment of the proposal area, as the basis for the assessment of potential impacts (refer section 4.0). The information in this section is sourced from publically available databases and reports as well as the studies undertaken by AECOM in relation to flora, vegetation and fauna as well as marine water quality and benthic habitat.

3.1.1 Vegetation and flora

AECOM undertook a flora, vegetation and fauna survey of the proposal area in November 2012, consistent with EPA Guidance Statement No. 51 (EPA 2004). The results are summarised below and the full report is provided in Appendix B.

3.1.2 Regional vegetation associations and complexes

Pre-European vegetation mapping (Beard 1981) identifies the vegetation of the proposal area as vegetation association 1026 Cliff Head (Figure 2). This is defined as a mosaic of shrublands of *Acacia rostellifera*, *Acacia Cyclops* and *Melaleuca cardiophylla* thicket/shrublands and *Acacia lasiocarpa* and *Melaleuca systena* heath.

3.1.2.1 Vegetation units and condition

The vegetation units of the proposal area were mapped in November 2012, and are listed in Table 2 together with details on their condition and distribution. The distribution of these communities is shown in Figure 3.

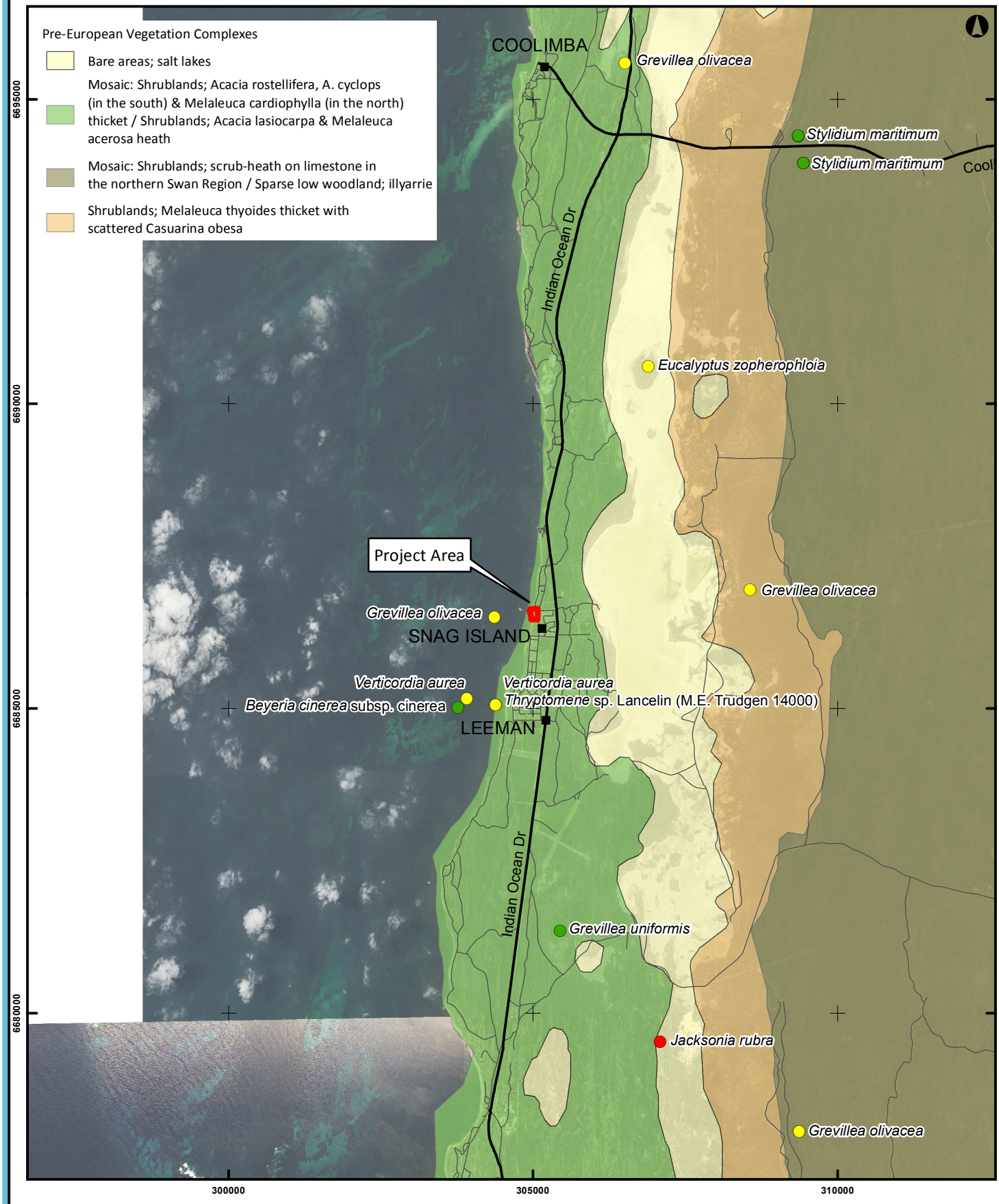
Table 2 Vegetation units and condition

Vegetation Community	Vegetation Condition	Distribution	Description
ScSp	Very Good	Found on a rocky limestone outcrop adjacent to the coast line at the base of the first sand dune	*Sceavola crassifolia*, *Acanthocarpus preissii* and *Acacia blakelyi* low open heathland over *Schoenus pedicellatus* and *Chordifex sinuosus* sparse sedgeland
TdSc	Very Good	Found on the first sand dune on white deep sands	*Templetonia diffusa*, *Acacia saligna* subsp. *saligna* and *Spyridium globulosum* low open shrubland over *Scaevola crassifolia*, *Acanthocarpus preissii* and *Santalum acuminatum* low heathland
MhMc	Good to Very Good	Situated on flat white sandy soils nested between Illyarrie Street, the fenced water sump, and a track travelling parallel to the coastline	*Melaleuca huegelii* subsp. *huegelii* , *Melaleuca lanceolata* and *Acacia saligna* subsp. *saligna* tall open shrubland to shrubland over *Melaleuca cardiophylla, Templetonia retusa* and *Leptomeria preissiana* low open heathland.
OaSc	Good	Situated adjacent to the coastline on white sandy soils with some limestone outcrops	*Olearia axillaris*, *Acacia blakelyi* and *Myoporum insulare* low open shrubland over *Scaevola crassifolia*, *Threlkeldia diffusa* and *Acanthocarpus preissii* low sparse to open heathland.

Vegetation condition within the proposal area is reflective of a disturbed environment adjacent to an urban area; accordingly, condition ranges from Completely Degraded to Very Good. Cleared areas are categorised as Completely Degraded and include the tracks visible on the aerial photographs. The majority of the remnant vegetation within the proposal area is in Good to Very Good condition.

3.1.3 Threatened flora

Six flora species of conservation significance are listed by the DEC (2012) and DSEWPaC (2012) as potentially occurring in the area of the proposal; however none of these are likely to occur due to either a lack of habitat or the fact that the proposal area is outside the species' distribution (Figure 2). None of these species were recorded during the field survey.



Vegetation Complexes and Priority Flora

Figure 2

Coordinate System: GDA 1994 MGA Zone 50

0 0.5 1 1.5 2

Kilometres

1:85,000 (A4)

LEGEND

Project Area

DEC/WA Herbarium Flora Search Results

- P2
- P3
- P4

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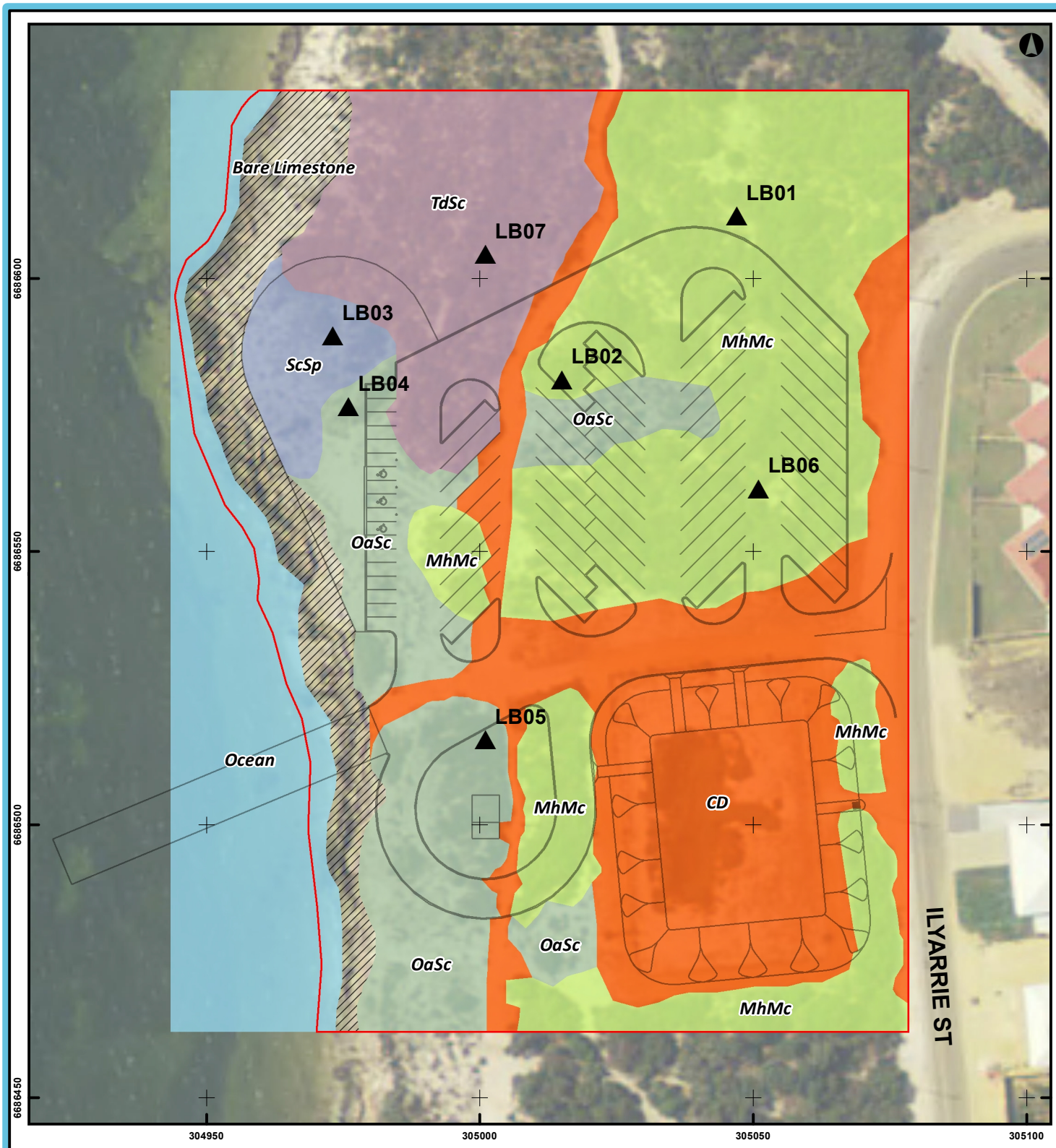

Unit Description	Code	Assocation
Sceavola crassifolia , *Acanthocarpus preissii* and *Acacia blakely*i low open heathland over *Schoenus pedicellatus* and *Chordifex sinuosus* sparse sedgeland	ScSp	Scaevola heathland
Templetonia diffusa , *Acacia saligna* subsp. *saligna* and *Spyridium globulosum* low open shrubland over *Scaevola crassifolia, Acanthocarpus preissii* and *Santalum acuminatum* low heathland	TdSc	Templetonia shrubland
Melaleuca huegelii subsp. *huegelii* , *Melaleuca lanceolata* and *Acacia saligna* subsp. *saligna* tall open shrubland to shrubland over *Melaleuca cardiophylla, Templetonia retusa* and *Leptomeria preissiana* low open heathland	MhMc	Melaleuca shrubland
Olearia axillaris, Acacia blakelyi and *Myoporum insulare* low open shrubland over *Scaevola crassifolia, Threlkeldia diffusa* and *Acanthocarpus preissii* low sparse to open heathland	OaSc	Olearia shrubland

Vegetation Communities

Figure 3

Coordinate System: GDA 1994 MGA Zone 50

0 5 10 15 20 25

Metres

1:1,000 (A4)

LEGEND

Proposed Boat Ramp Design

Project Area

Vegetation Community

MhMc

OaSc

ScSp

TdSc

Ocean

Compl. Degraded

Bare Limestone

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3.1.1 Threatened and priority ecological communities

There are no Threatened Ecological Communities (TECs) or Priority Ecological Communities (PECs) listed as potentially occurring within the proposal area and its immediate surrounds.

3.2 Terrestrial fauna and habitat

3.2.1 Terrestrial fauna

Sixteen fauna species were recorded during the field survey in November 2012 (Appendix B), of which five are of conservation significance. All five species of conservation significance are birds and all are protected under the EPBC Act:

- *Sterna anaethetus* (Bridled Tern): Marine and migratory
- *Larus novaehollandiae* (Silver Gull): Marine
- *Larus pacificus* (Pacific Gull): Marine
- *Haliastur sphenurus* (Whistling Kite): Marine
- *Falco cenchroides* (Australian Kestrel): Marine

3.2.2 Threatened terrestrial fauna

There are 33 fauna species of conservation significance having the potential to occur in the area of the proposal. These species, their conservation status, likelihood of occurrence and field observation results are listed in Table 3.

Table 3 Fauna of conservation significance potentially occurring in the proposal area

Scientific	Conservation Status		Likelihood of occurrence	Field notes
	EPBC Act	WC Act		
Birds				
Western Ground Parrot *Pezoporus wallicus subsp. flaviventrus*	E	S1	Unlikely to occur. Proposal lies outside known range of this species	Not observed
Fairy Tern *Sterna nereis subsp. nereis*	V	S1	Unlikely to occur	Not observed No habitat occurs within proposal area
Australian Lesser Noddy *Anous tenuirostris melanops*	V	S1	Unlikely to occur. No records exist nearby	Not observed
Carnaby's Cockatoo *Calyptorhynchus latirostris*	E	S1	May overfly the area. Breeding and foraging habitat not expected within the proposal area.	Not observed. The species is unlikely to persist here as the proposal area lacks significant trees or foraging habitat
Amsterdam Albatross *Diomedea exulans amsterdamensis*	E	S1	May overfly the area however likelihood of the species persisting is low	Not observed. No suitable habitat occurs in the proposal area.
Tristan Albatross *Diomedea exulans exulans*	E	S1	May overfly the area however likelihood of the species persisting is low	Not observed. No suitable habitat occurs in the proposal area

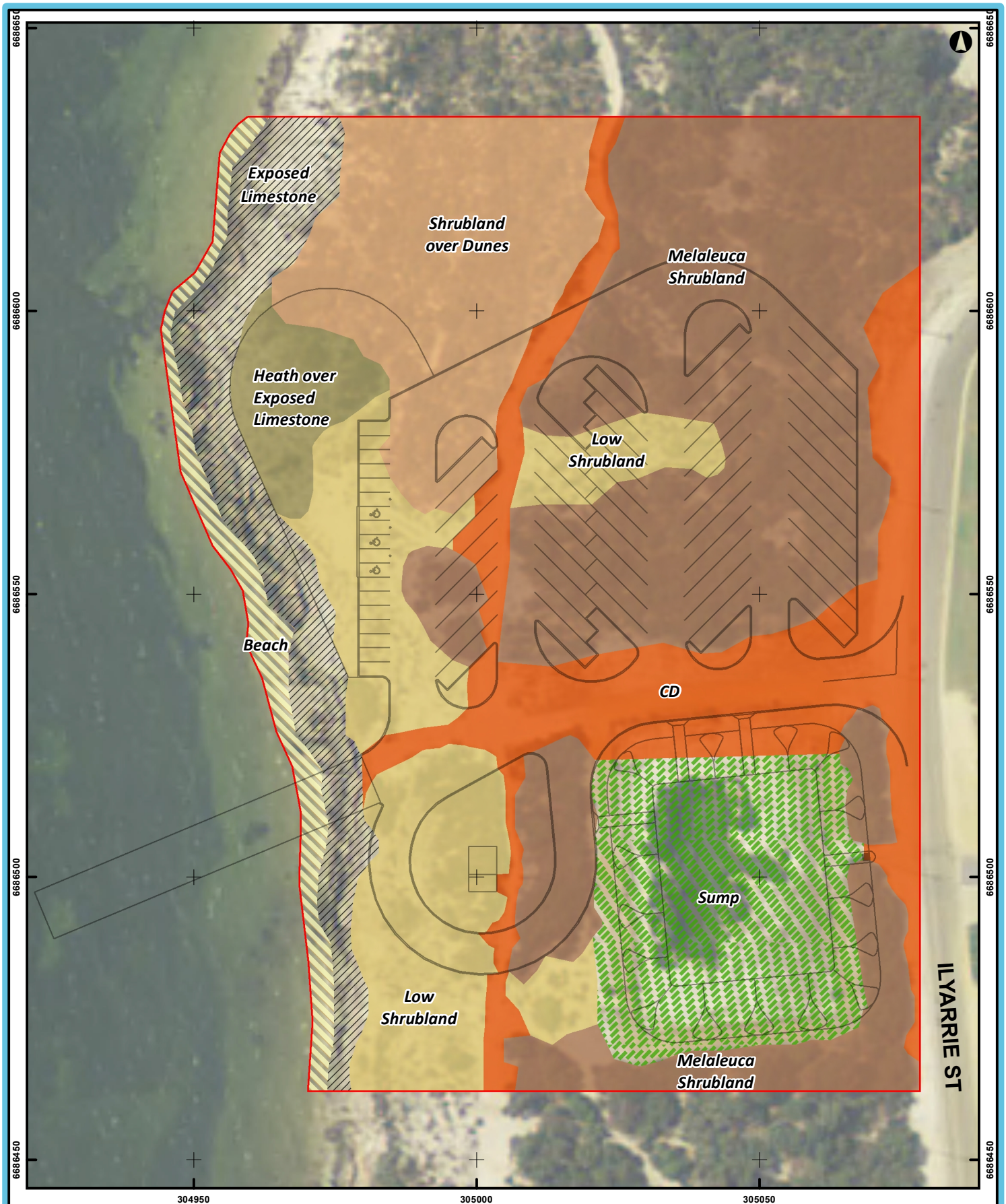
Scientific	Conservation Status		Likelihood of occurrence	Field notes
Gibson's Albatross *Diomedea exulans gibsoni*	V	S1	May overfly the area however likelihood of the species persisting is low	Not observed. No suitable habitat occurs in the proposal area
Wandering Albatross *Diomedea exulans*	V	S1	May overfly the area however likelihood of the species persisting is low	Not observed. No suitable habitat occurs in the proposal area
Indian Yellow-nosed Albatross *Thalassarche carteri*	V	S1	May overfly the area however likelihood of the species persisting is low	Not observed. No suitable habitat occurs in the proposal area
Shy Albatross *Thalassarche cauta cauta*	V	S1	May overfly the area however likelihood of the species persisting is low	Not observed. No suitable habitat occurs in the proposal area
Black-Browed Albatross *Thalassarche melanophris*	V	S1	May overfly the area however likelihood of the species persisting is low	Not observed. No suitable habitat occurs in the proposal area
Malleefowl *Leipoa ocellata*	V	S1	Unlikely to occur. The proposal area lies outside known range for the species and suitable habitat is not expected to occur within the proposal area	Not observed. No suitable habitat occurs in the proposal area
Southern Giant-Petrel *Macronectes giganteus*	E	S1	May overfly the area however likelihood of the species persisting is low	Not observed. No suitable habitat occurs in the proposal area
Northern Giant-Petrel *Macronectes halli*	V	S1	May overfly the area however likelihood of the species persisting is low	Not Observed
Soft-plumaged Petrel *Pterodroma mollis*	V	S1	May overfly the area however likelihood of the species persisting is low	Not Observed
Hooded Plover *Charadrius rubricollis*		P4	May occur. Records exist near the proposal area	Not Observed.
Rainbow Bee-eater *Merops ornatus*	Migratory	S3	May occur. Records exist near the proposal area and the species may nest in dunes found within the proposal area	Not Observed
Common Sandpiper *Actitis hypoleucos*	Marine Migratory	S3	May occur Records exist near the proposal area	Not Observed
Ruddy Turnstone *Arenaria interpres*	Marine Migratory	S3	May occur Records exist near the Project Area	Not Observed
Red-necked Stint *Calidris ruficollis*	Marine Migratory	S3	May occur Records exist near the proposal area	Not Observed

Scientific	Conservation Status		Likelihood of occurrence	Field notes
White-bellied Sea-Eagle *Haliaeetus leucogaster*	Marine Migratory	S3	May occur Records exist near the proposal area	Not Observed
Whimbrel *Numenius phaeopus*	Marine Migratory	S3	May occur Records exist near the proposal area	Not Observed
Grey Plover *Pluvialis squatarola*	Marine Migratory	S3	May occur Records exist near the proposal area	Not Observed
Caspian Tern *Sterna caspia*	Marine Migratory	S3	May occur Records exist near the proposal area	Not Observed
Great Egret *Ardea alba*	Marine Migratory	S3	May occur	Not Observed
Cattle Egret *Ardea ibis*	Marine Migratory	S3	May occur	Not Observed
Fork-tailed Swift *Apus pacificus*	Marine & Migratory	S3	May overfly proposal area	Not Observed
Osprey *Pandion haliaetus*	Marine & Migratory	S3	May occur	Not Observed
Roseate Tern *Sterna dougallii*	Marine & Migratory	S3	May occur	Not Observed
Grey-tailed Tattler *Tringa brevipes*	Marine & Migratory	S3	Likely to occur. Records exist near the proposal area and habitat is suitable	Not Observed
Eastern Reef Heron *Egretta sacra*	Marine & Migratory	S3	Likely to occur. Records exist near the proposal area and habitat is suitable	Not Observed
Silver Gull *Larus novaehollandiae*	Marine	-	Likely to occur	Observed
Pacific Gull *Larus pacificus*	Marine	-	Likely to occur	Observed
Mammals				
Ghost Bat *Macrodermagigas*	-	P4	Unlikely to occur	
Invertebrates				
Graceful Sun Moth *Synemon gratiosa*	E	P4	May Occur. Records exist near the proposal area	No *Lomandra maritima* or *Lomandra hermaphrodita* recorded within the proposal area.

E – Endangered
V – Vulnerable
P4 – Priority 4
S1 – Schedule 1
S3 – Schedule 3

3.2.3 Terrestrial fauna habitat

The proposal area contains seven terrestrial fauna habitat types, which are shown in Figure 4 and listed in Table 4 together with their respective areas and relative proportion of the overall proposal area.



Terrestrial Fauna Habitat

Figure 4

Coordinate System: GDA 1994 MGA Zone 50

0 5 10 15 20 25

Metres

1:900 (A4)

LEGEND

- Proposed Boat Ramp Design
- Project Area

Fauna Habitats

- Completely Degraded
- Beach
- Sump
- Melaleuca Shrubland
- Low Shrubland
- Heath over Exposed Limestone
- Shrubland over Dunes
- Exposed Limestone

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Table 4 Fauna habitat types

Fauna Habitat	Description	Area (ha)	% of Survey area
Exposed Limestone	Rocky exposed limestone with crevices throughout	0.17	14.68
Melaleuca Shrubland	Melaleuca shrubland over low heathland	0.68	33.26
Shrubland over Dunes	Mixed open shrubland over undulating dunes	0.25	11.91
Heath over Exposed Limestone	Low clumps of heath scattered of limestone outcrop	0.06	2.88
Low Shrubland	Mixed low shrubland over sand	0.30	14.60
Beach	Thin strip of exposed sand and seaweed	0.7	3.18
Sump	Man-made sump	0.24	11.44

3.3 Marine fauna

3.3.1 Fish

While targeted fish surveys were not conducted, a number of fish were sighted opportunistically during the benthic habitat surveys. These included the weeping toadfish *Torquigener pleurogramma*, common hardyhead *Atherinomorus ogilbyi* and smooth stingray *Dasyatis brevicaudata*. However, it should be noted that these are highly conspicuous species, i.e. either occurring in large schools or being of a large size, and that more cryptic species, such as members of the Labridae (wrasses) and Monacanthidae (leatherjackets), are likely to dominate the fish fauna of study area.

The fish fauna of the nearby Jurien Bay Marine Park have been studied extensively by Fairclough et al (2011). During that study, 52 fish species were recorded in unvegetated surf zones, with the most speciose genera including the Labridae (wrasses), Monacanthidae (leatherjackets), Syngnathidae (seahorses and pipefish) and Terapontidae (grunters). Trawling over inshore seagrass beds and unvegetated sand, resulted in 41 species being recorded, with the Labridae (wrasses) and Monacanthidae (leatherjackets) again being among the most diverse families in both of these habitats (Fairclough et al. 2011).

3.3.2 Threatened fauna

A desktop assessment was undertaken for the Leeman area to identify the potential occurrence of marine species of conservation significance either within the proposal area or its immediate surrounds. In general, there is little information on the marine environment of the Leeman area; although Jurien Bay Marine Park to the south has been the subject of some marine research.

There are 12 listed threatened and migratory marine species and 3 listed migratory species potentially occurring in the Leeman area. These threatened and migratory species are defined as matters of national environmental significance under the EPBC Act. These species, their conservation status and likelihood of occurrence are listed in Table 5.

There are a further 42 listed marine species and 11 whales and other cetaceans (e.g. dolphins) potentially occurring in the Leeman area that are also protected under the EPBC Act. These species, their conservation status and likelihood of occurrence are listed in Appendix C.

Table 5 Threatened and migratory marine species potentially occurring in the proposal area

Common Name	Scientific Name	Conservation Status	Habitat Presence
Birds			
Southern Giant-Petrel	*Macronectes giganteus*	Endangered Migratory	Species or species habitat may occur within area
Northern Giant-Petrel	*Macronectes halli*	Vulnerable Migratory	Species or species habitat may occur within area

Common Name	Scientific Name	Conservation Status	Habitat Presence
Shy Albatross, Tasmanian Shy Albatross	*Thalassarche cauta cauta*	Vulnerable Migratory	Species or species habitat may occur within area
Mammals			
Southern Right Whale	*Eubalaena australis*	Endangered Migratory	Species or species habitat known to occur within area
Humpback Whale	*Megaptera novaeangliae*	Vulnerable Migratory	Congregation or aggregation known to occur within area
Australian Sea-lion	*Neophoca cinerea*	Vulnerable	Breeding known to occur within area
Bryde's Whale	*Balaenoptera edeni*	Migratory	Species or species habitat may occur within area
Killer whale	*Orcinus orca*	Migratory	Species or species habitat known to occur within area
Reptiles			
Loggerhead Turtle	*Caretta caretta*	Endangered Migratory	Species or species habitat known to occur within area
Green Turtle	*Chelonia mydas*	Vulnerable Migratory	Species or species habitat likely to occur within area
Leatherback Turtle, Leathery Turtle	*Dermochelys coriacea*	Endangered Migratory	Species or species habitat may occur within area
Sharks			
Grey Nurse Shark (west coast population)	*Carcharias taurus (west coast population)*	Vulnerable	Species or species habitat may occur within area
Great White Shark	*Carcharodon carcharias*	Vulnerable Migratory	Species or species habitat known to occur within area
Whale Shark	*Rhincodon typus*	Vulnerable Migratory	Species or species habitat may occur within area
Porbeagle, Mackerel Shark	*Lamna nasus*	Migratory	Species or species habitat may occur within area

3.4 Benthic habitat

A benthic habitat survey of the Leeman area was undertaken by AECOM in December 2012 to identify marine habitat types. The results of this work are summarised below and reported in detail in Appendix D.

The marine environment of the Leeman area comprises extensive seagrass beds interspersed with relatively small patches of sand. The distribution of benthic habitat types is shown in Figure 5.

Seagrass beds are a mixture of *Posidonia sinuosa* and *Amphibolis* spp., the latter of which had the red algae *Haliptilon roseum* as a prominent epiphyte. The majority of the *Amphibolis* spp. observed was confirmed as *Amphibolis antarctica* during ground-truthing and is likely to be the dominant representative of the genus in the area. *Amphibolis antarctica* was the sole seagrass species within the footprint of the proposal.

Posidonia and *Amphibolis* also dominate the seagrass beds of the Jurien Bay Marine Park (JBMP) (CALM 2005), the northern boundary of which is located approximately 15 kilometres south of Leeman. While the presence of *Amphibolis antarctica* was confirmed during the current study, it should be noted that *Amphibolis griffithii* has also been recorded in the JBMP and may be present in low densities within the project area.

Higher energy mobile sand areas in the JBMP also support meadows of the ephemeral *Halophila ovalis* (CALM. 2005), which are often removed by winter storms. The timing of the Leeman benthic habitat survey shortly after the passage of a cold front decreased the likelihood of detection of this species.

3.5 Marine water quality

Water quality monitoring was undertaken by AECOM in December 2012 at six locations in the vicinity of the proposal, including four impact sites and two reference sites. The results of this work are summarised below and reported in detail in Appendix D.

While sea conditions were calm during monitoring, it is relevant to note that a strong cold front passed through the study site six days prior to field work being conducted (on the 28 November). This weather event resulted in strong wind warnings being issued and average wind speeds for Jurien Bay of 56 km/h (NNW) at 9 am and 63 km/h (WNW) at 3 pm. These conditions are likely to have led to increased wave energy and mixing of the nearshore water column, leading to sediment resuspension and increased turbidity. While the weather in the lead up to field work was relatively calm, it is likely that turbidity levels were still slightly elevated at the time of sampling. While base turbidity levels were not captured during this field trip, strong south westerly winds are a feature of this coastline throughout summer and are likely to consistently elevate turbidity during this period. Due to the variability in LACs measured during the present study, turbidity may therefore be more suitable as indicator of suspended sediment that might impact the productivity and health of benthic primary producers during boat ramp construction.

Light attenuation coefficients for impact and reference sites were higher at the time of survey than the ANZECC/ARMCANZ (2000) guideline for unmodified inshore waters in South West Australia. This is attributed to the passage of the strong cold front six days prior to the survey and the persistence of relatively strong winds in the lead-up to the survey.

Turbidity levels at most sites were generally below the ANZECC/ARMCANZZ (2000) guideline level for inshore waters in South West Australia. Turbidity at one site (Site I4) was well above the guideline level and was particularly noticeable towards the bottom of the water column where there was also a considerable amount of detached seagrass and macroalgae (wrack) over a predominantly sand substrate.

The remaining water physical parameters measured are typical of inshore marine waters, with pH readings of approximately 8.2 and salinity readings around 36 parts per thousand. The water is well oxygenated with dissolved oxygen saturation levels ranging between 131.1% and 145.3%. The high levels of dissolved oxygen saturation observed are likely due to photosynthetic activities of the benthic primary producers in the study area.

Benthic Habitat

Figure 5

Coordinate System: GDA 1994 MGA Zone 50

0 10 20 30 40

Metres

1:1,500 (A4)

LEGEND

- Proposed Boat Ramp Design
- Sand
- Seagrass (*Amphibolis* spp. and *Posidonia sinuosa*)

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3.6 Oceanography and coastal processes

At a macro scale the Leeuwin Current is a key element of Western Australia's oceanography. The Leeuwin Current is a shallow and narrow current (less than 300m deep and 100km wide) that transports warm, nutrient-depleted water from the tropics southward along the western coastline of Western Australia (DEWHA 2008). The Leeuwin Current impedes large-scale upwelling on the west coast.

Eddies generated by the Leeuwin Current at certain locations are hundreds of kilometres in diameter and spin in an anti-clockwise direction away from the shoreline. One of these eddies occurs south-west of Jurien Bay, which is about 50 km from Leeman. Eddies in the Leeuwin Current provide nutrient-rich waters on the continental shelf that enhance biological productivity (DEWHA 2008).

The limestone reef system offshore from Leeman is part of the longest continuous limestone reef system in Australia. This reef system extends approximately 400 kilometres from Trigg (Perth) to Dongara along the Western Australian coast (CALM 2005). The reef system lies parallel to shore at a distance of between five and seven kilometres offshore. It dissipates the prevailing seas and swells along much of this coast, resulting in an inshore marine environment typified by shallow, sheltered lagoons with depths of less than 10 metres.

An assessment of near-shore coastal processes at Leeman was undertaken by Worley in 2001 using aerial photographs in conjunction with site observations. In summary, the assessment found that:

- offshore swell is dissipated by the reef system offshore from Leeman
- there is seasonal movement of sand in both northerly and southerly directions; during summer, the sea breezes push sand in a northerly direction while during winter the north-westerly storms cause sediment transport in a southerly direction
- seasonal and annual sediment transport along the coastline is highly variable
- there are extensive seagrass beds offshore and this material builds up on the beach and moves around with the sediment transport until becoming buried or breaking down (Worley 2001).

3.7 Meteorology

Leeman's climate is typical of coastal areas within Western Australia's Mid-West region, experiencing hot/dry summers and mild/wet winters. The coastal areas of the Mid-West region are some of the sunniest locations in Australia, with over 11 hours of sunshine per day on average in summer months, and 5 to 6 hours of sunshine a day in winter months (Mid-West Development Commission 2012).

Basic weather information is available for Leeman; however comprehensive climate data is only available for Jurien Bay; located about 50 km south of Leeman. Weather conditions in Jurien Bay are expected to be similar in Leeman, and are described in further detail below.

Jurien Bay is known for its strong off and onshore winds, with the annual mean wind speed at 3pm being 22 km/h. Winds are at their strongest during the summer months with winds consistently over 29 km/h, and more subtle during the winter months averaging 17-18km/h (Bureau of Meteorology 2012).

The annual mean number of clear days in Jurien Bay is 128.7 days a year, further highlighting the Mediterranean climate present in coastal areas of the Mid-West region.

The annual mean maximum temperature at Jurien Bay is 24.8 degrees Celsius (°C), with summer temperatures averaging a maximum of 29.6°C. During winter the mean maximum temperature is 20.03°C (Bureau of Meteorology 2012). The annual mean minimum temperature at Jurien Bay is 13.0°C, with temperatures dropping as low as 9.0°C during the winter months.

The mean annual average rainfall in Leeman, as measured since 1983, is 615.5mm. The majority of this rainfall occurs between the winter months of June and August (BoM 2012). Leeman received an annual rainfall of 343 millimetres (mm) in 2011, and is expected to receive approximately 400mm in 2012 (BoM 2012).

3.8 Geology, landform and soils

The Leeman area broadly consists of coastal silt and evaporite deposits; estuarine, lagoonal, and lacustrine deposits (Geological Survey of WA and Geoscience Australia 2008).

The landforms and soils of the project area and surrounds are described as broad swales between units A13 and B24, and characterised by salt lakes; chief soils are shallow calcareous sands (Uc11) with aeolianite occurring as a continuous substance within 12 inches of the surface (A16) (Bureau of Rural Sciences 2009). Descriptions of landforms and soils within the project area are provided in Table 6.

Table 6 Landform and soil description

Landform/soil unit	Description
A13	Coastal dune formations backed by the low-lying deposits of inlets and estuaries: chief soils are calcareous sands (Uc1.11) on the dunes. Associated are various (Uc), (Um), (Uf), (Ug), and acid peat (O) soils in the swale behind the coastal dunes.
B24	Undulating dune landscape underlain by aeolianite which is frequently exposed; small swales of estuarine deposits are included: chief soils are siliceous sands (Uc1.22) with smaller areas of brown sands (Uc4.22) and leached sands (Uc2.21) in the wetter sites. Associated are various (Uc), (Um), (Uf), (Ug), and acid peat (O) soils in the swales.

3.8.1 Acid sulfate soils

The proposal is situated within an area of extremely low risk with respect to the occurrence of acid sulfate soils (Figure 6).

3.9 Contamination

There are no registered contaminated sites within or adjacent to the proposal, based on a search of the DEC's contaminated sites database (DEC 2012). (Figure 6).

3.10 Water resources

The proposal does not lie within, nor is it adjacent to, a Public Drinking Water Source Area. The proposal is not located within a surface water proclamation area under the *Rights in Water and Irrigation Act 1914* (DoW 2009a).

The proposal is located within the Arrowsmith groundwater proclamation area (Dow 2009b). In proclaimed areas, under the *Rights in Water and Irrigation Act 1914*, it is illegal to take water from a watercourse or groundwater aquifer without a licence. Should water be required from this proclamation area for construction or other purposes, licences to construct a well and abstract water will be required.

3.11 Groundwater

The project area is located in the Dongara subarea along the western coastline of the Arrowsmith groundwater area (DoW 2012a). Groundwater resources of the Arrowmsith groundwater area comprise unconfined superficial and surficial aquifers, fractured rocks and the semi-confined to confined aquifers of Leederville-Parmelia, Yarragadee, Cattamarra, Eneabba, Lesueur and Otorowiri (DoW 2012a).

There is only one aquifer beneath the project area in Leeman, being the Perth-Superficial Swan unconfined aquifer. This aquifer consists of Quaternary and Late Tertiary sediments extending from Geraldton in the north to Busselton in the south. The coastal plain formation is bounded to the east by Gingin Scarp in the north of the aquifer. Groundwater salinity within the project area is brackish / saline with a total dissolved salt (TDS) content of 3000-7000 mg/L (DoW 2012b).

Acid Sulfate Soils and Contaminated Sites

Figure 6

Coordinate System: GDA 1994 MGA Zone 50

0 50 100 150 200

Metres

1:10,000 (A4)

LEGEND

Proposed Boat Ramp Design

Acid Sulfate Soil Risk

- High Probability of Occurrence, >70% chance
- Low Probability of Occurrence, 6-70% chance
- Extremely Low Probability of Occurrence, 1-5% chance in small localised areas

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3.12 Surface water

The project area is situated in the Moore-Hill Rivers Basin, which lies mostly in the Yilgarn Plateau in an area of mature and ancient drainage (Australian Natural Resources Atlas 2009).

There are no natural surface water features within the project area. The nearest natural surface water feature is an unnamed ephemeral lake to the east of Leeman townsite (Figure 7). There are no Ramsar wetlands or Nationally Important Wetlands within or adjacent to the project area.

3.13 Reserves and conservation areas

There are no reserves or conservation areas intersecting the proposal area. Several reserves and conservation areas occur in the vicinity of Leeman and are managed by the DEC:

- Beekeepers Nature Reserve located approximately 500 metres from the project area. This Nature Reserve extends for approximately 80 km along the mid-west coast between Green Head and Dongara. It is reserved for the purpose of protecting flora.
- Stockyard Gully Reserve, located approximately 10 km east of Leeman, is managed for the purpose of conserving flora, water and the protection of caves.
- Lesueur National Park is located approximately 9 km south-east of the project area.
- “Islands” Nature Reserve A29259, consisting of Lipfert, Milligan and Snag Islands and Webb Islet and Orton and Drummond Rocks. Snag Island is located 150 metres to the west north west of the project area, and Drummond Rocks are 700 metres south west. This chain of islands is part of a chain of 13 island nature reserves, including 40 islands, off the coast between Lancelin and Dongara

3.14 Heritage

There are no heritage sites of world, national, state or local significance within the project area (DSEWPaC 2012; HCWA 2012, Shire of Coorow 2012). The nearest place of national heritage significance is the Beekeepers-Lesueur-Coomallo Area and Nambung National Park; this place has National Heritage significance and is situated approximately 500 m east of the project area. There are several places of local heritage significance within two kilometres of the project area that are shown in Table 7. The proposal will not impact these local heritage places.

Table 7 Local heritage places in Leeman

Name	Distance from project area (km)
Leeman Primary School (Snag Island School)	1.5
Tea Tree Point	Unknown
Leeman Roadhouse and Post Office (Truscott's Milk Bar)	0.5
Wilson's Cottage	1.2
Leeman Police Station	1.5
Army Well Site	1.8
McTaggart's Jetty (Wann's Jetty)	1.1
Queen of Peace Catholic Church	1.5
McTaggart Cottage	1.0

3.15 Aboriginal heritage

The site has no particular significance with respect to Aboriginal heritage, based on a recent archaeological and ethnographic survey (Goode et al., 2012).

3.16 Land use

As the project area is situated on the coastline of Leeman, the land use to the west of the project area is coastal and marine. To the east of the project area it is zoned residential, with low density dwellings on large allotments the common. Land north and south of the project area it is crown reserve and crown allotment.

Surface Water, Environmentally Sensitive Areas and Conservation Areas

Figure 7

Coordinate System: GDA 1994 MGA Zone 50

0 150 300 450 600

Metres

1:25,000 (A4)

LEGEND

- Project Area
- DEC Nature Reserve
- Surface Water

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4.0 Environmental impact assessment

An aspect, factor and impact model was used to assess the environmental impact of the proposal. This approach considers each aspect of the proposal, the relevant environmental factor(s) for the purpose of assessment and the inherent and residual impacts on each factor. A summary of the aspects, relevant factors and inherent impacts (if unmanaged) is provided in Table 8.

Table 8 Aspects, factors and potential impacts

Aspect	Factor	Inherent Impact
Onshore		
Car park and turning bay	Flora Fauna	Clearing of native vegetation and fauna habitat results in loss of individual plants or animals
General construction activities	Noise	Noise and vibration emissions adversely affect adjacent residential receivers
Toilet block	Water quality	Elevated nutrients enter surrounding environment and lead to environmental degradation and deterioration of human health
Stormwater drainage	Water quality	Elevated nutrient and contaminant levels within stormwater enters the surrounding environment and leads to environmental degradation
Fish cleaning station	Water quality Land (terrestrial)	Ad hoc disposal of solid and liquid waste leads to environmental degradation and deterioration of human health
General boat ramp use	Land (terrestrial) Fauna (marine)	Ad hoc disposal of solid waste leads to environmental degradation
Offshore		
Piling for ramp and finger jetty	Noise Land (marine) Water quality	Noise emissions adversely affect marine fauna and adjacent residential receivers Direct loss of fauna habitat and consequent displacement and/or loss of marine fauna Potential indirect loss of fauna habitat and consequent displacement and/or loss of marine fauna through reduced water quality
Blasting for ramp abutment	Noise Fauna (marine)	Noise and vibration emissions and/or fly-rock adversely affect adjacent residential premises and marine fauna
General construction activities	Noise	Noise and vibration emissions adversely affect adjacent residential premises

4.1 Vegetation and flora

Clearing of native vegetation will occur during site preparation for the onshore components of the proposal, i.e. car park, toilet block, fish cleaning station and stormwater drainage network.

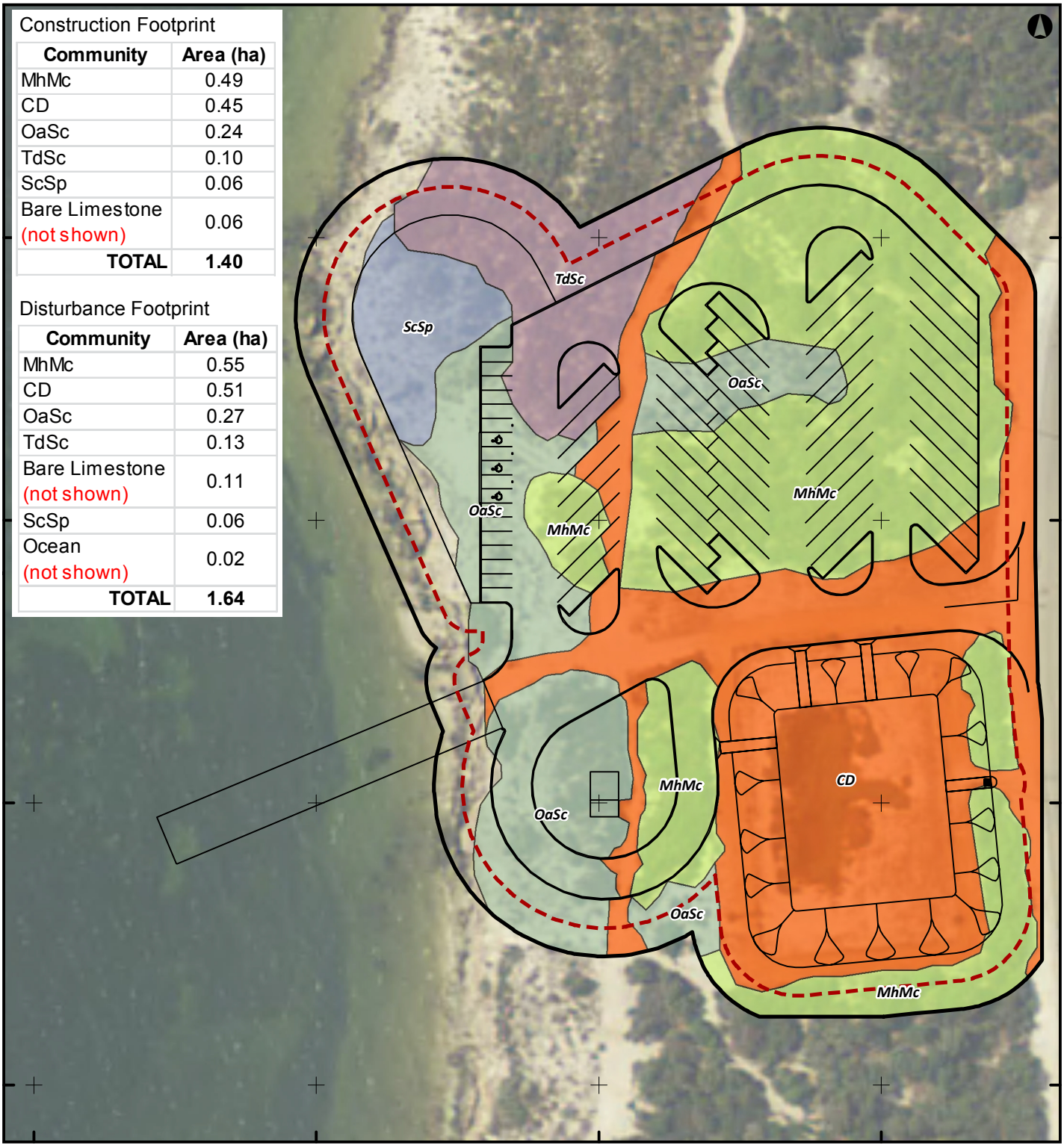
The total onshore clearing footprint of the proposal is 0.89 hectares comprised of the vegetation communities listed in Table 9. This total area is inclusive of a 5 metre buffer for construction purposes, shown in Figure 8. A further 0.12 hectares *may* also be disturbed indirectly as a result of edge effects such as weed incursion. This area has been calculated based on an additional buffer of 5 metres from the edge of the construction buffer (Table 9).

Construction Footprint

Community	Area (ha)
MhMc	0.49
CD	0.45
OaSc	0.24
TdSc	0.10
ScSp	0.06
Bare Limestone (not shown)	0.06
TOTAL	**1.40**

Disturbance Footprint

Community	Area (ha)
MhMc	0.55
CD	0.51
OaSc	0.27
TdSc	0.13
Bare Limestone (not shown)	0.11
ScSp	0.06
Ocean (not shown)	0.02
TOTAL	**1.64**



Unit Description	Code	Assocation
Sceavola crassifolia , *Acanthocarpus preissii* and *Acacia blakely*i low open heathland over *Schoenus pedicellatus* and *Chordifex sinuosus* sparse sedgeland	ScSp	Scaevola heathland
Templetonia diffusa , *Acacia saligna* subsp. *saligna* and *Spyridium globulosum* low open shrubland over *Scaevola crassifolia, Acanthocarpus preissii* and *Santalum acuminatum* low heathland	TdSc	Templetonia shrubland
Melaleuca huegelii subsp. *huegelii* , *Melaleuca lanceolata* and *Acacia saligna* subsp. *saligna* tall open shrubland to shrubland over *Melaleuca cardiophylla, Templetonia retusa* and *Leptomeria preissiana* low open heathland	MhMc	Melaleuca shrubland
Olearia axillaris, Acacia blakelyi and *Myoporum insulare* low open shrubland over *Scaevola crassifolia, Threlkeldia diffusa* and *Acanthocarpus preissii* low sparse to open heathland	OaSc	Olearia shrubland

Disturbance Areas of Terrestrial Vegetation

Figure 8

Coordinate System: GDA 1994 MGA Zone 50

0 5 10 15 20 25

Metres

1:1,000 (A4)

LEGEND

Proposed Boat Ramp Design

Construction Footprint (5m buffer)

Disturbance Footprint (10m buffer)

Vegetation Community

- MhMc
- OaSc
- ScSp
- TdSc
- Compl. Degraded

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Table 9 Native vegetation clearing extent

Direct Loss (includes 5 m construction buffer)		Potential Indirect Loss (5m buffer)	Cumulative Area (ha)
Vegetation Unit	Area (ha)	Area (ha)	
MhMc	0.49	0.06	0.55
OaSc	0.24	0.03	0.27
TdSc	0.10	0.03	0.13
ScSp	0.06	0.00	0.06
TOTAL	**0.89**	**0.12**	**1.01**

An application for a clearing permit will be submitted pursuant to the *Environmental Protection Act 1986* (EP Act). In this regard, an assessment of the proposed clearing will be undertaken against the clearing principles set out in Schedule 5 of the EP Act. This will include an assessment of impacts to terrestrial fauna habitat.

Disturbance of marine vegetation and flora such as seagrass and macroalgae will occur as a result of construction of the offshore component of the facility. Potential impacts on marine vegetation and flora are assessed in further detail in the context of benthic primary producer habitat (BPPH) in Section 4.3

4.2 Marine fauna

4.2.1 Construction impacts

Noise and vibration from land-based blasting and piling activities will emit noise of varying frequencies into the marine environment, albeit over a relatively short period of time (weeks). The range at which marine fauna will detect this noise will vary according to the frequency, duration and power of the source and environmental conditions such as depth of water, benthic substrate and bathymetry.

The shallow inshore marine environment at Leeman provides little suitable habitat for large marine fauna such as whales; however other marine fauna such as turtles, sea lions, dolphins, sharks and fish may reasonably be expected to occur in the vicinity of the proposal from time to time.

The scale of blasting required is minor and air-blast and ground vibration reduce rapidly in impact with distance from the blast site. Consequently, the limited blasting of rock material above the waterline is not expected to result in either injury or behavioural disturbance to marine fauna. As a precaution, however, a blast exclusion zone of 500 metres radius from the works for marine mammals and other large marine fauna will be implemented. The exclusion zone will be established and maintained through visual observation of the area and works will cease if fauna is observed inside the exclusion zone. Injury and/or death from fly-rock is not expected provided the appropriate blasting procedures are implemented.

It is expected that marine fauna species, if present, will temporarily shift their swimming direction to avoid piling activities whilst in progress. Piling activities will not adversely affect whale migration pathways due to the large separation distance involved.

4.2.2 Post-construction impacts

The construction of the boat ramp and the surrounding infrastructure may increase the recreational fishing pressure in the area, leading to localised fish stock reduction. This increase in fishing pressure may be on specific targeted fish stocks and/or due to an increase in shore based fishing from residents and visitors.

In order to manage this localised depletion of fish stocks, the Shire of Coorow, in liaison with the Department of Fisheries, will conduct an appropriate public awareness strategy to inform recreational anglers and the public of the risks of over fishing in the vicinity of the boat ramp.

4.3 Benthic primary producer habitat

The proposal will impact benthic primary producer habitat (BPPH) through temporary direct loss (temporary burial during construction), direct loss through placement of concrete ramp footing, indirect loss due to increased boating activity and temporary indirect loss as a result of localised changes in water quality and coastal processes during construction.

Loss of BPPH through burial and altered water quality and coastal processes will be temporary as the bund material placed in the water will be removed following the completion of construction. Natural coastal processes will be reinstated and over time it is expected that the seabed will be recolonised by seagrass and/or macroalgae. During construction a silt curtain will be placed around the works to prevent sediment dispersal from the area of disturbance impacting on areas of BPPH outside of the works.

The total temporary direct loss of BPPH through burial is 0.1 ha of the BPPH type seagrass, while permanent direct loss through placement of the piles and concrete ramp is estimated at 0.015 ha. Permanent indirect loss of BPPH due to increased boating activity is estimated at 0.005 ha while temporary indirect loss from altered water quality and coastal processes during construction is estimated at 0.03 ha (Table 10).

Table 10 BPPH loss calculation

Habitat type	Direct loss (ha)		Indirect loss		Total Perm Loss
	Temporary	Permanent	Temporary	Permanent	
Seagrass	0.11	0.015	0.03	0.005	0.02 hectares

With the exception of the Leeman jetty to the south of the proposal, there is no other development in the Leeman area that has resulted in a significant loss of benthic habitat. The predicted permanent loss of BPPH arising from the proposal is 0.2 ha, which is not significant when considered in the context of the undeveloped nature of the surrounding marine environment.

To reduce the impact of the operation of the boat ramp on BPPH, the Shire of Coorow will consult with the Department of Transport and the Department of Fisheries to determine the feasibility of constructing a navigation channel. The operation of the boat ramp and the associated motor boat traffic is likely to result in damage to seagrass meadows from propeller scouring and turbulence. A navigation channel will protect the surrounding seagrass meadows and limit the area of potential disturbance.

4.4 Noise and vibration

Noise and vibration have the potential to adversely affect marine fauna and adjacent residential receivers during the construction phase. Construction noise and vibration impacts are temporary; however they have a nuisance effect and, in more severe cases, can impact on the health of both humans and animals.

Major causes of impacts from construction noise are:

- extremely loud, repetitive noise, such as blasting and piling at any time of the day
- loud, continuous noise, such as drilling at any time of the day
- out of hours works, particularly night works
- pre-start noise (e.g. vehicles starting up, pre-start meetings, workers gathering), particularly when the site office or compound is close to residential premises
- noisy plant and equipment (especially where other quieter plant and equipment is available)
- reversing beepers (particularly at night)

Vibration has the potential to cause structural damage to nearby buildings, especially where the ground particle velocity exceeds 5mm/s. It also has nuisance value for humans as well as the ability to affect marine fauna where construction activities take place over water.

Aspects of the proposal having the potential to generate adverse noise and vibration impacts include general construction activities as well as drilling, blasting and piling. These aspects and their management are considered in further detail below.

4.4.1 General construction noise

Construction noise is required to comply with Regulation 13 of the *Environmental Protection (Noise) Regulations 1997* (Noise Regulations). A Construction Environmental Management Plan (CEMP) will be submitted to DEC and the Shire of Coorow for approval prior to the commencement of construction. The CEMP will comply with Regulation 13(6) of the Noise Regulations as well as Section 6 of *AS2436 (1981) Guide to Noise Control on Construction, Maintenance and Demolition Sites*.

4.4.2 Land-based blasting

Blasting of limestone surface material on the shoreline is required to reduce limestone into manageable sizes for removal and potential replacement as rock armour on the ramp abutment. Blasting comprises air-blast overpressure and ground vibration and blast characteristics vary depending on factors that include the hardness of the material, the location and size of the charge and the prevailing weather conditions.

Regulatory noise levels for blasting are defined in the Noise Regulations, which stipulate that 9 out of 10 consecutive blasts are to be less than 120dB with no blast exceeding 125dB.

Ground vibration is guided by *AS2187 (1993) Explosives – Storage, Transport and Use* and specifies a maximum of 10mm/sec for dwellings. AS2187 provides blasting guidelines and methods and these will be implemented during construction.

4.4.3 Piling

Pile driving will be necessary to provide the foundation for the pre-cast concrete ramps, finger jetty and steel walkways. Pile driving is typically associated with impulse hammering noise that varies depending on factors such as the type and size of the pile, the geotechnical conditions, the depth of water and the type and size of the pile driving equipment. Noise from piling activities will be managed as per general construction noise (section 4.4.1). A silt curtain will surround any works in the water to prevent sediment deposition outside of the project area.

4.5 Dust

Dust emissions will be generated from construction activities such as clearing of planted vegetation and earthworks, traffic movements, loading and dumping of material and wind action over freshly disturbed areas. Dust has the potential to cause nuisance and loss of amenity within the surrounding environment. In addition, construction machinery will also generate exhaust fumes creating inhalable particulates that can impact the health of fauna and construction personnel.

The generation of dust and inhalable exhaust particles therefore has the potential for adverse impacts upon surrounding vegetation and the health, welfare and amenity of wildlife. However, the impacts are likely to be negligible due to the small size of the area to be cleared, the short-term nature of the construction activity and because the carpark is to be sealed. For these reasons it is unlikely that this aspect will require further consideration beyond standard construction dust management actions to ensure emissions remain within acceptable levels.

The proximity of the project to residential areas increases the risk that queries and/or complaints will be made regarding air quality in and around the proposal area. Management measures for minimising dust emissions during construction are outlined in the EMP (section 5.0) and include treatment of exposed areas, visual monitoring of excessive dust and proactive provision of information to the community on construction activities, timing and progress.

4.6 Waste management

Waste generated during the construction phase of the proposal includes liquid and solid waste such as steel off-cuts (piles, walkways, and concrete reinforcing bars), green waste, bitumen and concrete rubble, packaging material, human excreta and general litter. To prevent potential environmental impacts, all liquid and solid waste material will be removed from the construction area and disposed of appropriately in accordance with local by-laws and DEC land fill waste classification requirements.

Once operational the proposal will provide facilities for basic solid and liquid waste reception and ongoing management in accordance with ANZECC (1997) Best Practice Guidelines for Waste Reception Facilities at Ports, Marinas and Boat Harbours in Australia and New Zealand. The primary waste-producing activities are litter and sewage from boat ramp users together with offal from recreational fish cleaning. General litter will be disposed of in supplied commercial bins and regularly emptied by the Shire of Coorow as part of Leeman's waste management program.

Fish cleaning facilities will include a shelter, benches, water supply, wastewater collection tanks and treatment devices, waste bins and an associated waste collection service operated by the Shire of Coorow. The Shire will consult with the Keep Australia Beautiful Council to develop a strategy for dealing with fish waste.

A toilet block will be constructed and connected to underground deep sewage for disposal and treatment via the Water Corporation's sewage treatment plant.

4.7 Stormwater and drainage management

The impervious area created by the car park, boat turn-around and other hard surfaces will increase the volume of stormwater requiring disposal to the environment. Stormwater collected within the facility will be controlled and managed to ensure that nutrients and/or contaminants do not have an adverse impact on either the terrestrial or marine environment.

4.8 Visual impact

There is the potential for short term impacts on visual amenity during construction of the project, such as dust temporary modifications to the Leeman Boat Ramp and carpark, and construction vehicles, machinery and equipment associated with the ground disturbing activities.

The project is likely to result in visual intrusion into adjacent residential properties. Visual intrusion impacts occur when a project allows a new intrusive view from a public area into an otherwise private area of a residential property. The proposal is constructed at natural surface level, and there is no topographic variability between the proposal and the adjacent residential premises on Illyarrie Street.

It is expected that visual intrusion impacts can be managed through appropriate landscape treatment.

5.0 Environmental Management Plan

This Environmental Management Plan (EMP) describes the management strategies required to reduce the risk of adverse environmental impacts occurring during construction and operation of the Leeman boat ramp. It is intended to inform the preparation of a detailed Construction Environmental Management Plan (CEMP). This EMP also provides an approach to monitoring, auditing and commitments.

5.1 Management measures

A Construction Environmental Management Plan (CEMP) will be prepared prior to the commencement of construction. The CEMP will be a comprehensive document addressing all aspects of the proposal with particular reference to the broad measures outlined in this EMP. The CEMP will expand upon the measures outlined in this EMP and contain information on:

- action (specific)
- objective (which management objective is being met)
- location (specific)
- timing (project stage, and linkage to construction schedule)
- responsibly part (contractor's Environmental Officer, other specified staff)
- requirements/consultation/acceptance criteria (Shire of Coorow, DEC, Fisheries)
- monitoring
- contingency measures, including emergency response (e.g. spills, fire)

Construction personnel will be made aware of the issues and actions in this EMP and be trained in how to undertake works in an environmentally sensitive manner. Emergency training in relation to fires, chemical spills and other risks will be carried out early in the construction phase.

5.1.1 Vegetation and flora

The impact of the proposal on native vegetation will be minimised by:

- only clearing the minimum area necessary
- retaining existing native flora species where possible, including isolated trees and shrubs
- clearly marking areas to be cleared
- disposing of all weedy topsoil and vegetation and not re-using it in landscaping
- ensuring all native vegetation is chipped and stockpiled for landscaping
- locating mulch and woodchip stockpiles away from the drainage sump and the coast
- ensuring land outside the project is not be disturbed
- undertaking landscaping for adjacent areas as necessary

5.1.2 Weeds

The proposal will minimise and manage the spread of weeds by implementing the following measures:

- Prior to clearing, weeds will be encouraged to grow and sprayed prior to setting seed.
- All weed-infested areas will be marked prior to clearing
- All construction machinery brought to site will be washed within a contained area and inspected for any weeds and seeds remaining
- Wash material will be disposed of as deep fill or in a suitable landfill
- Weedy topsoil will not be re-used on-site

5.1.3 Fire management

Appropriate fire prevention measures will be taken to protect the surrounding areas from fire, including the following:

- All machinery to have spark arrestors fitted to the exhaust system
- All vehicles and plant to be fitted with fire extinguishers
- Water tankers, equipment and personnel trained to fight fires in the work area will be provided
- All hot works will be undertaken in accordance with standard safety procedures
- Workers will extinguish and report fires occurring within the project area.

5.1.4 Benthic primary producer habitat

Potential impacts to BPPH may occur to due to direct clearing of the seabed, sediment transport and by boat traffic post-construction. Impacts will be avoided or minimised by:

- Obtain an exemption from the Department of Fisheries to remove seagrass under the *Fish Resources Management Act 1994*
- Clearly marking any areas of BPPH to be cleared
- Installing a silt curtain around any marine works
    - Daily visual inspection of the integrity of the silt curtain
    - Cessation of works and remediation if the silt curtain is observed to fail
    - Reporting of silt curtain failures
- Considering the construction of a navigation channel
- Sea grass density monitoring pre and post-construction to determine the extent of actual impacts

5.1.5 Fauna

Injury to and/or death of terrestrial and marine fauna will be minimised through implementation of the following measures:

- Blasting will be minimised as much as practicable
- A marine fauna (mammals) exclusion zone of 500 metres radius will be maintained by observation around the site during blasting and piling operations
- If marine mammals are observed moving inside the 500 metre exclusion zone, work will cease until the marine mammals have moved on
- A post-blast and piling fauna inspection will be carried out after blasting and piling to identify any dead or injured fauna
- In the event of dead or injured marine fauna being found, immediate contact is to be made with the DEC Moora Office on (08) 9652 1911
- A written report will be provided to DEC within 24 hours of any observed injured or dead marine fauna
- Records of all marine fauna sightings, weather conditions and details pertaining to the blasting and piling are to be maintained
- Post construction – in consultation with the Department of Fisheries, develop a public awareness strategy to inform recreational anglers and the public of the potential for localised depletion of fish stocks around the boat ramp and ways to they can prevent this from happening

5.1.6 Surface water and drainage

Potential impacts on the marine environment from sediment and contaminants in stormwater runoff will be reduced through implementation of the following management measures:

- Prior to the commencement of construction, temporary site drainage aimed at containing sediment and other contaminants within the project area will be undertaken
- Existing natural drainage paths and stormwater drains will not unnecessarily blocked or restricted during construction
- The drainage basin will be regularly inspected for sediment and other contaminants, particularly following periods of rainfall
- Vehicle and equipment wash-down areas will be located away from the marine environment
- Hazardous substances will be used and stored appropriately
- Liquid and solid wastes will be disposed of appropriately
- Disturbed areas will be stabilised and landscaped immediately following the completion of work.

5.1.7 Noise and vibration

The management of construction noise will be addressed in the Construction Environmental Management Plan and will meet the requirements of the Noise Regulations. Blasting will be carried out in accordance with the Noise Regulations and relevant Australian Standards.

5.1.8 Air quality (dust)

Dust suppression will be required during the construction phase of the project where high winds coincide with vegetation clearing, earthworks and/ or other ground disturbance. The following dust management measures will be applied during construction:

- Only clear vegetation when necessary to avoid unnecessary exposure of soil.
- A water tanker is to be available to dampen exposed surfaces within construction and laydown areas, particularly during ground disturbing activities.
- Adequate signage of works in progress to be posted in visible areas.
- Dust-generating activities are to be minimised during days with high winds.
- Respond to complaints by nearby residents rapidly.
- Visual monitoring for excessive dust.

5.1.9 Waste and contamination

The following management measures will be implemented to reduce the risk of contamination incidents and ensure that construction waste is disposed of appropriately:

- Temporary storage of bitumen, asphalt, concrete or aggregate should only occur at a designated depot or controlled hardstand. Pre-coating of aggregate will only occur in approved areas.
- Bulk fuel and hazardous material storage areas will be bunded and managed to comply with applicable Australian Standards.
- Regular vehicle servicing is not to occur on site.
- Adequate fire suppressant equipment, spill trays and spill response equipment will be available near the fuel storage or refuelling area.
- Emergency clean-up procedures shall be implemented in the case of any spillage; these procedures will include control of spilled material and removal of contaminated soil to a site approved by the DEC.
- Any spills will be reported.
- On discovery of pre-existing ground contamination work will cease, management will be notified and specialist advice will be sought on a course of action.
- Identify waste products from construction activities and dispose of controlled waste in a licenced facility.

- General construction waste (i.e. non-controlled waste) and other rubbish will be contained in bins with lids and removed weekly.
- Post construction – develop a fish waste strategy in consultation with the Keep Australia Beautiful Council

5.2 Incident management

The procedure for managing environment incidents involves the assignment of the incident to an incident category based on its particular characteristics, and the timely notification of relevant parties based on the incident category. Definitions of environmental incident categories are listed in Table 11 and the corresponding required incident notification procedure is listed in Table 12.

Table 11 Environmental incident categories

Incident Category	Definition	Examples
MINOR ENVIRONMENTAL INCIDENT	- Where the environmental impact is limited and is confined within the work site. - Environmental impacts are readily addressed through clean up or changes to work practices. - Breach of project or contract EMP. NB: Minor incidents that have a high frequency of recurrence are indicative of underlying issues associated with work practices. This in turn increases the potential for these minor incidents to develop into significant incidents.	- Uncontained hydrocarbon spillage <100 L. - Dust suppression spray failure without causing off site impact. - Construction waste enters marine environment
SIGNIFICANT ENVIRONMENTAL INCIDENT	- Incident involving off site environmental impacts that requires significant resources to address. - Non-compliance with statutory requirements or environmental criteria requiring reporting to authorities.	- Clearing outside of approved area (<100m^2). - Over spray of herbicides damaging nearby crops or native vegetation. - Noise monitoring results exceed statutory criteria. - Failure to submit compliance report to DEC within the timeframe.
	- Non-conformance with Contractor's EMP occurring within the work site where the environmental impact is significant and has the potential for an offsite environmental impact.	- Uncontained hydrocarbon spillage >100 L. - Dust suppression spray failure causing actual off-site impact. - Unauthorised clearing of threatened flora and/or ecological community.
MAJOR ENVIRONMENTAL INCIDENT	- Any on site or off-site environmental incident resulting in significant long term environmental harm - An incident resulting in prosecution under environmental laws.	- Unauthorised clearing of a large area (>100 m^2). - Actual pollution of waterways (e.g. by on-site or off-site fuel spills). - Land disturbance resulting in damage to public infrastructure (power line or water pipes) which impact on a group of people. - Death or injury to marine fauna

Table 12 Environmental incidents – notification procedure

Incident Category	Personnel to be Notified by Whom	Timing of Notification
MINOR	- Observer(s) notifies the relevant Supervisor	- By the end of the working day.
SIGNIFICANT	- Observer(s) notifies the relevant Supervisor	- Upon completion of remediation actions
	- Contractor's Supervisor notifies the Contractor's Representative and Contract Manager	- Upon completion of initial incident assessment.
	- Contract Manager notifies DEC if the incident is a non-compliance with statutory requirements or has resulted in pollution or environmental harm.	- Upon completion of initial incident assessment.
MAJOR	- Observer(s) notifies the relevant Supervisor.	- Immediately.
	- Contractor's Supervisor notifies Contractor's Representative and Contract Manager.	- Immediately.
	- Contract Manager notifies DEC.	- Immediately by phone - Upon completion of initial incident assessment and/or site emergency response procedure.

5.3 Monitoring

There are various aspects of the proposal that require ongoing monitoring during construction and operation to ensure that the risk of adverse environmental impacts is minimised. Monitoring requirements for particular aspects of the project are summarised in Table 13.

Table 13 Project monitoring requirements

Factor	Monitoring Activity	Timing	Trigger	Response
Air Quality (dust)	Visual observations of dust	Daily	Excessive dust plumes observed Dust is affecting visibility	Apply dust suppression or stop work.
	Weekly vehicle checklists	Weekly	Exhaust quality exceeds acceptable levels	Service vehicle or remove from service.
	Complaints register	Ongoing	Complaints received	Address complaints.
Acid Sulfate Soils	Visual observations of soil	During excavation	Wet grey or dark soils; hydrogen sulphide smell	Obtain laboratory report to confirm whether ASS are present. Develop and implement ASS Management Plan where lab results confirm the presence of ASS.
Flora and vegetation	Vehicle inspections	Upon arrival at site	1) Seed and organic material present 2) No spark arrestors or fire extinguishers fitted	1) Vehicle washdown 2) Have spark arrestors and fire extinguishers fitted or remove from service.
	Topsoil stockpile inspections	Monthly	Weeds emerging from topsoil	Spray with weed control.
	Limit movement of plants, seed and all parts of Declared Weeds as proscribed by DAF. Dispose of all contaminated soil.	During clearing and earthworks	Plants, seeds and parts present in soil moved within the site and not disposed of	Dispose of all weed matter.
	Incident register	Weekly	Unacceptable number of fires recorded	Repeat induction
Fauna	Visual observation of native fauna	During clearing and earthworks	Presence of native fauna	Remove and relocate fauna
	Visual observation of marine mammals within exclusion zone (500m radius of site)	1) Prior to, and during, blasting and piling activities 2) Post-blasting and piling activities	1) Marine mammal is observed within exclusion zone 2) Injured marine mammal is observed	1) Delay blasting and/or piling until marine mammal has left exclusion zone 2) Cease blasting/piling and notify DEC immediately

Factor	Monitoring Activity	Timing	Trigger	Response
Surface Water	Visual inspection of storm water drains and sediment traps	Following rainfall	Build-up of sediment observed	Clean out sediment traps Review site drainage.
Groundwater	Depth to groundwater	Monthly	Pre-determined drawdown level reached	Reduce or cease consumption.
	Volumes abstracted	Monthly	Exceedance of volume specified by Licence condition	Reduce or cease consumption.
Marine Water Quality	Visual inspection of silt curtain	Daily	Damage to silt curtain Observation of sediment plume	Repair damage and secure silt curtain to prevent sediment transport
Contamination	Vehicle inspections	Daily	Leaky hoses, engines	Service vehicle or remove from service.
	Vehicle servicing	Per owner manuals	Poor vehicle / machinery performance	Service vehicle or remove from service.
	Visual inspection of stormwater drains, drainage basin and refuelling area	Following incident	1) Contaminants observed in stormwater drains 2) Contaminants observed in drainage basin and/or refuelling area	1) Clean stormwater drains 2) Remove and dispose of contaminated soil via appropriate facility
Noise and vibration	Noise monitoring	Weekly	Exceedance of assigned levels	Change activity, review methods or stop work
	Vibration monitoring	Weekly	Exceedance of acceptable levels	Change activity, review methods or stop work
	Complaints register	Ongoing	Complaints received	Address complaint
Sea Grass Density	Measure sea grass density pre-construction to establish baseline density	Pre-construction	None	Establish baseline for future monitoring
	Measure sea grass density immediately post-construction	Post-Construction	Density less than baseline	Determine cause of sea grass density decline in consultation with the Department of Fisheries
	Measure sea grass density 12 months after construction	12 months after construction	Density less than baseline	Determine cause of sea grass density decline in consultation with the Department of Fisheries

5.4 Auditing and reporting

The following actions will be undertaken to ensure that management requirements are being implemented and are meeting their objectives:

- an incidents and complaints register will be maintained during construction
- a documented monitoring and auditing schedule will be developed and implemented, and
- daily inspections of construction areas to be conducted in accordance with specific checklists and a record of inspections will be maintained.

6.0 Conclusions

The following conclusions based on the understanding of the existing environment of the proposal area and its surrounds, together with the identification and assessment of potential impacts arising from the proposal as described in this report.

The environmental factors of relevance to the proposal are flora and vegetation, terrestrial fauna, marine fauna, benthic habitat and noise and vibration. There will be some irreversible loss of native vegetation and benthic primary producer habitat as a result of the proposal; however the magnitude of these losses is not significant, particularly when considered in the context of the surrounding environment.

Noise and vibration emissions from blasting and piling activities has the potential to impact on marine fauna such as dolphins, turtles, sea lions and sharks that may be present in the area. The blasting required for the project is minor in nature and will not occur underwater; therefore significant impacts on marine fauna are not expected from this activity. Marine fauna will likely avoid the proposal area during piling activities and are therefore not likely to be harmed.

The environmental impact of the proposal is not significant, and can be further minimised by implementing the identified management measures through a Construction Environmental Management Plan.

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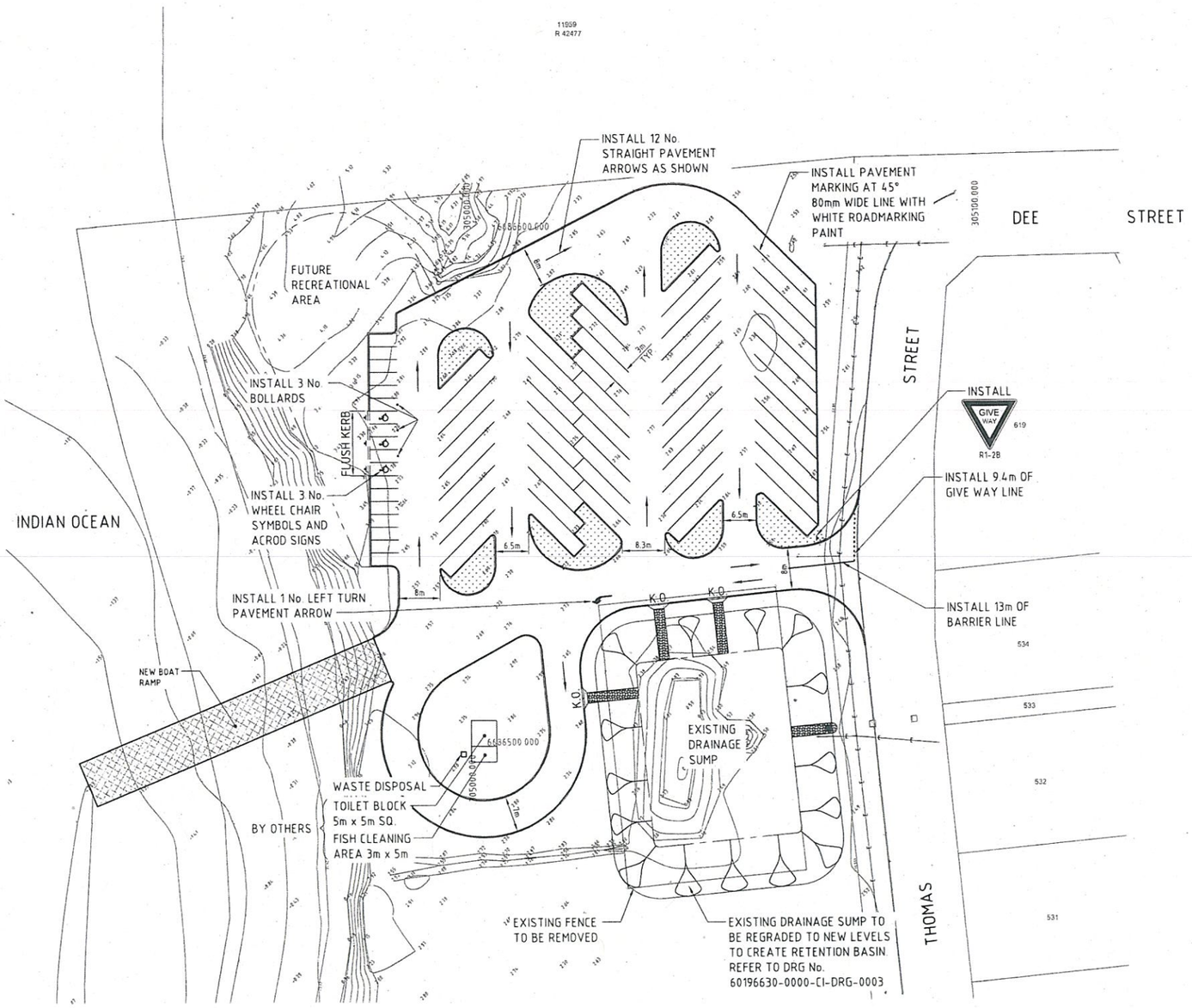
Appendix A

Boat ramp design

Appendix A Boat ramp design



PLAN
SCALE 1:500

NOTES

1. KERBING TO BE SEMI-MOUNTABLE SM-1 REFER TO DETAIL DRG No 60196630-0000-CI-DRG-0006 UNLESS OTHERWISE NOTED.
2. FOR DRAINAGE LAYOUT REFER TO DRG No. 60196630-0000-CI-DRG-0003.
3. FOR SETOUT DETAILS REFER TO DRG No. 60196630-0000-CI-DRG-0004.
4. THE CONTRACTOR SHALL SET OUT ALL WORKS IN ACCORDANCE WITH THE LINES AND LEVELS ON THE DRAWINGS.
5. LEVELS ARE SHOWN IN CHART DATUM UNLESS OTHERWISE NOTED. (AHD = CHART DATUM -0.953m).
6. THE CONTRACTORS SHALL COMPLY WITH THE SERVICE PROVIDERS WORKING PRACTICES AND REQUIREMENTS SHOULD THERE BE ANY WORKS WITHIN THE VICINITY OF SERVICES.
7. ANY COST INCURRED DUE TO DAMAGE AND DISRUPTION OF SERVICES SHALL BE AT THE CONTRACTORS EXPENSE.
8. THE CONTRACTOR IS TO ORGANISE A SURVEY OF EXISTING SERVICES TO CONFIRM IF ANY CLASHES WITH PROPOSED WORKS AND REPORT FINDINGS TO SUPERINTENDENT.
9. THE CONTRACTOR IS TO CONTACT DIAL BEFORE YOU DIG 1100 BEFORE PROCEEDING WITH ANY WORKS.
10. THE CONTRACTOR IS TO BE AWARE THAT ALL EXISTING SERVICES MAY NOT HAVE BEEN PROVIDED. APPROPRIATE CAUTION AND MEASURES ARE TO BE USED TO ENSURE THE PROTECTION OF SERVICES.
11. FOR DETAILS ON PAVEMENT MARKING REFER TO MAIN ROADS DRG No. 200331-184.
12. ALL SIGNS SHALL COMPLY WITH AS 1742.1 - 2003 AND AS/NZS 2890.1-2004.
13. ROAD PAVEMENT MARKING SHALL COMPLY WITH MAIN ROADS WA STANDARDS AND SPECIFICATIONS AND 2890.1 LATEST EDITION.
14. CONTRACTOR TO SPOT AND SETOUT TEMPORARY PAVEMENT MARKING FOR RECEIVAL OF PERMANENT MARKING.
15. AT PROPOSED SIGN LOCATIONS CONTRACTOR TO INSTALL 150mmΦ PVC SLEEVES.

LEGEND

- NEW SEMI-MOUNTABLE KERB
- NEW FLUSH KERB
- 3.21 EXISTING LEVEL
- E EXISTING UNDERGROUND ELECTRICITY
- D EXISTING STORMWATER PIPE
- EXISTING SEP
- 3.31 DESIGN LEVEL
- PROPOSED GULLY
- D PROPOSED STORMWATER PIPE
- FLOW ARROW MIN. FALL 1:100 U.O.N.
- OVERLAND FLOW PATH
- GRASS INFILL
- K.O. INSTALL KERB OPENING. REFER TO DETAIL ON DRG No. 60196630-0000-CI-DRG-0006

PRELIMINARY COPY
NOT TO BE USED FOR CONSTRUCTION PURPOSES

10 0 10 20 30 40 50m
SCALE 1:500

REVISIONS No.	BY	DATE	DESCRIPTION	APPD
0	RH	08.04.2011	DETAILED DESIGN	AD

REFERENCE DRGS. DRG. No | TITLE

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Datum	CHART DATUM	Survey	MGA 94 ZONE 50

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AECOM Australia Pty Ltd A.B.N. 20 093 846 925

Client: SHIRE OF COOROW

DEE STREET BOAT RAMP, LEEMAN
CAR PARK LAYOUT PLAN

Scale		Drg No.	Rev.
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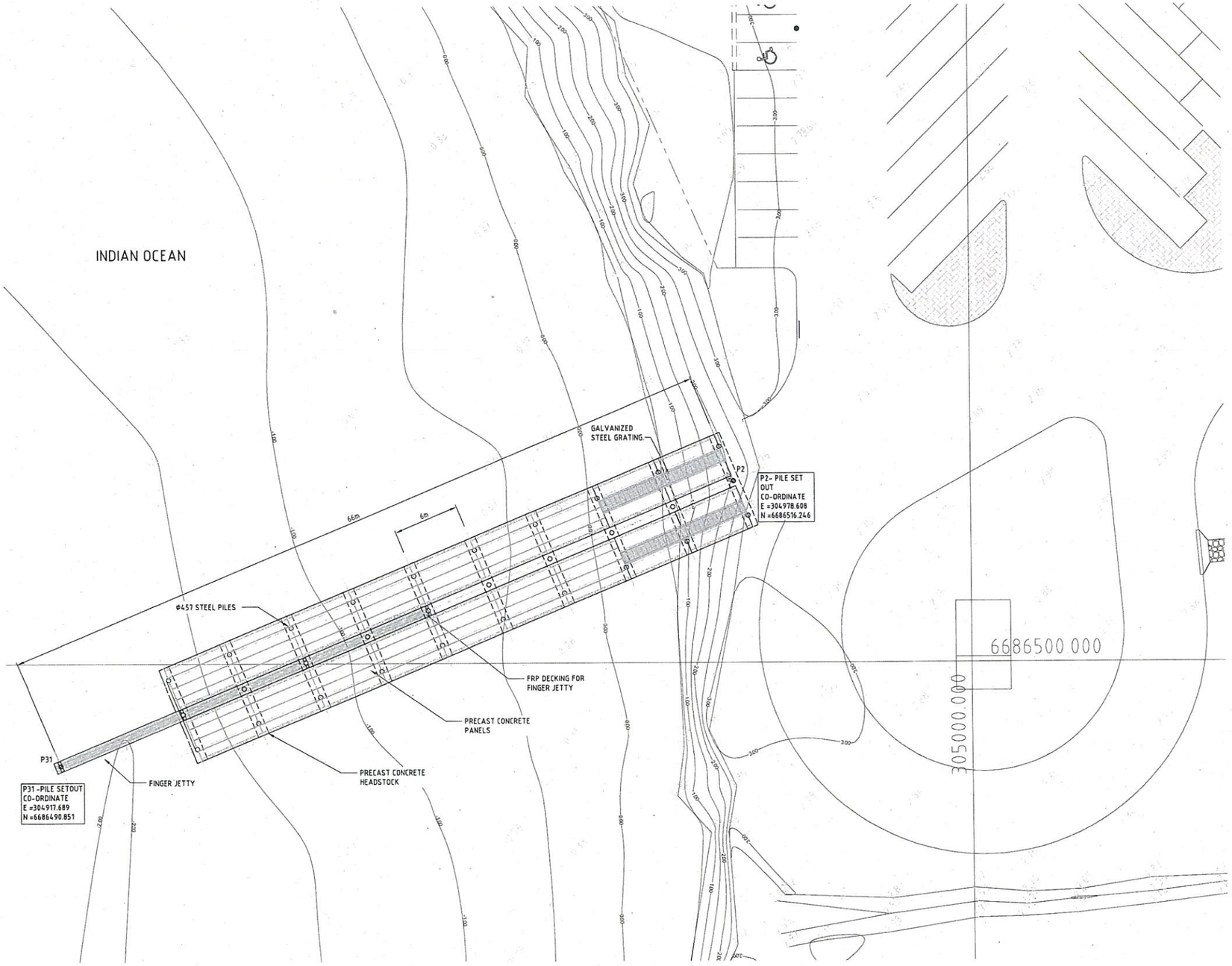


LAYOUT PLAN
SCALE 1:200

NOTES

1. EXISTING SERVICES TO BE INVESTIGATED PRIOR TO CONSTRUCTION.
2. FOR PILE SCHEDULE & DETAILS REFER TO DRG No. MA-DRG-0010

LEGEND

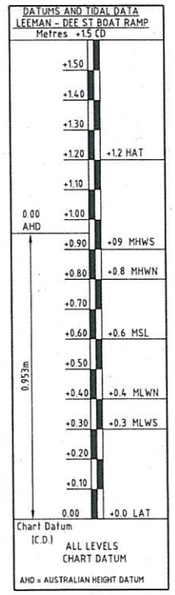
EXISTING CONTOUR INTERPOLATED FROM SURVEY

EXISTING SPOT LEVEL

TRAFFICABLE GALVANISED STEEL GRATING

FINGER JETTY FRP DECKING

TIDAL LEVELS AND DATUMS



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Client
SHIRE OF COOROW

DEE STREET BOAT RAMP, LEEMAN

BOAT RAMP
GENERAL ARRANGEMENT
RAMP & JETTY LAYOUT

Scale		Drg No	Rev
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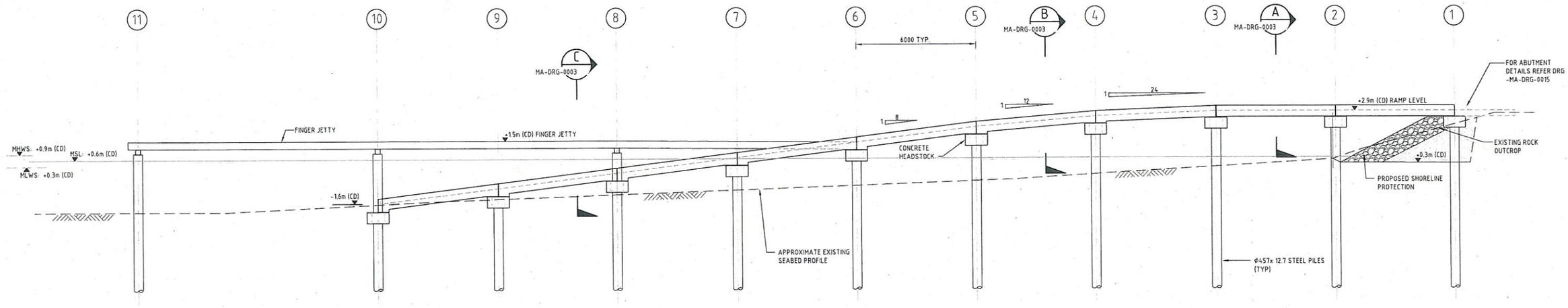

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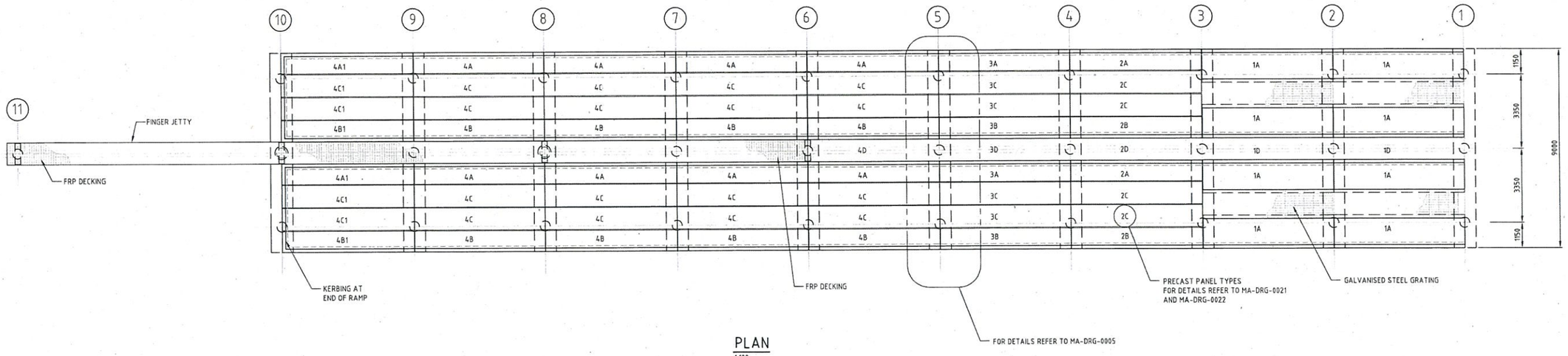

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Datum		Survey	

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Client
SHIRE OF COOROW

DEE STREET BOAT RAMP, LEEMAN

BOAT RAMP
GENERAL ARRANGEMENT
PLAN & ELEVATION

Scale A1- 1:100 A3-1:200

Drg No. 60196630-0000-MA-DRG-0002

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Appendix B

Flora, vegetation and fauna assessment

Appendix B Flora, vegetation and fauna assessment

AECOM

Leeman Boat Ramp

Shire of Coorow

2 April 2013

Document No. 60282009-000-ENV-REP-0003

Flora, Vegetation and Fauna Assessment

Flora, Vegetation and Fauna Assessment

Prepared for

Shire of Coorow

Prepared by

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2 April 2013

60282009

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Quality Information

Document Flora, Vegetation and Fauna Assessment

Ref 60282009

Date 2 April 2013

Prepared by Floora de Wit & Matthew Cann

Reviewed by Andrew Batty

Revision History

Revision	Revision Date	Details	Authorised	
			Name/Position	Signature
A	20-Nov-2012	Report	Jamie Shaw Associate Director Environment	
B	14-Dec-2012	Internal Review	Jamie Shaw Associate Director Environment	
0	17-Jan-2013	For issue to Client	Jamie Shaw Associate Director Environment	
1	02-Apr-2013	For issue to Client	Jamie Shaw Associate Director Environment	

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1.0 Introduction

1.1 Background

AECOM Australia Pty Ltd was commissioned by the Shire of Coorow in Western Australia to undertake a flora, vegetation and fauna assessment of a proposed boat ramp and associated infrastructure. The flora, vegetation and fauna survey is necessary to obtain statutory approvals for clearing native vegetation in the township of Leeman. The project involves building a new boat ramp near Illyarrie Street with a car park and small recreational area with a total terrestrial construction footprint of 2.06 ha (herein after referred to as the Project Area). Terrestrial ecological values of the Project Area are assessed by implementing a Level 1 flora and vegetation survey in accordance with the Environmental Protection Authority (EPA) Guidance Statement 51 (EPA, 2004a) and a Level 1 fauna survey in accordance with EPA Guidance Statement 56 (2004b).

1.2 Objectives

The purpose of the biological investigation is to provide data to assess the Project under the *Environmental Protection Act 1986*. A Level 1 flora, vegetation and fauna survey was completed to provide information to support a Native Vegetation Clearing Permit. The assessment of ecological values and impacts to these will be comprehensively assessed in the environmental impact assessment.

To ensure the objectives of the Project were appropriately addressed the following tasks were conducted:

- Desktop assessment: review of existing information of environmental values incorporating flora, vegetation and fauna of conservation significance listed both under State and Federal legislation
- Preliminary site investigations: completed on 29 November 2012.
- Level 1 flora, vegetation and fauna survey was completed to:
    - ground-truth desktop assessment results
    - assess additional environmental values of the Project Area to identify potential environmental constraints that will trigger the need for statutory approval (a referral) under the *EPBC Act 1999*
    - ensure adequate information is obtained to support a Clearing Permit Application or an environmental assessment under the *EP Act 1986*
    - identify the need for additional surveys if gaps in data are present
- Report findings incorporating information as stipulated in the EPA Guidance Statement 51 for a Level 1 flora and vegetation survey (EPA 2004).

1.3 Location

The Project Area is located in the northwest corner of the township of Leeman, west of Indian Ocean Drive approximately 250 kms north of Perth in Western Australia. The Project Area is situated west of Illyarrie Street and extends to the coastline. This is illustrated in Figure 1.

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2.0 Methodology

2.1 Desktop Assessment

The desktop assessment was done from a centre point and included a 10 km buffer. The centre point used was (GDA94, Zone 50):

29° 56' 11.23"

114° 58' 47.90"

The desktop assessment incorporated database searches from:

- DEC Declared Rare Flora and Priority Flora database
- Western Australian State Herbarium (WAH) Specimen database for opportunistically collected Priority species
- DEC Threatened Ecological Community and Priority Ecological Community database
- DEC Naturemap website
- Department of Sustainability, Environment, Water and Communities DRF and TEC database (online); and
- Environment Protection and Biodiversity Conservation Protected Matters Database (online).

The likelihood of species of conservation significance identified in the desktop assessment occurring in the Project Area was based on known distribution and whether suitable habitat is present.

2.2 Field Survey

The field survey was conducted by senior botanist Floora de Wit (flora collection permit no. SL010212) and zoologist Matthew Cann, on Thursday 29 and morning of Friday 30 November 2012. The Project Area was traversed on foot and relevés completed to represent the different vegetation communities present.

At each flora and vegetation relevé the following parameters were recorded:

- date
- recorder
- GPS location – obtained by using a Garmin GPSmap 62s (coord system etc.)
- species
    - height
    - foliage cover
- soil type
- topography
- disturbance
- additional observations

For all vascular plant species observed in the Project Area their associated height and foliage cover was recorded to be used for vegetation mapping purposes.

The fauna field assessment was conducted in conjunction with the flora field assessment and focused on recording observations of fauna or evidence of fauna activity such as scats, tracks and diggings and calls. In particular attention was given to species of conservation significance identified in the desktop assessment as having potential to occur in the area.

Conducting the two assessments concurrently also enabled interpretation of the habitat value of each of the vegetation units described and mapped, and determination of each of these as suitable for significant fauna. . . Where species or habitats of significance were observed, site details were recorded using a GPS (GDA 94, MGA zone 50)and the key aspects were recorded and photographed. All observations were made between the daylight hours of 0700 and 1730 hours.

2.2.1 Taxonomy and Nomenclature

Plants unable to be identified in the field were collected and frozen in accordance with the WA Herbarium standards (1998-). To verify identification the collected specimens were compared to specimens held at the WA Herbarium (WAH). Where appropriate, expertise from DEC taxonomists were sought out to ensure accurate identification of specimens.

The taxonomy and nomenclature of vertebrate species for mammals, reptiles and amphibians is consistent with the Western Australian Museum's *Checklist of Vertebrates of Western Australia* (2010) and for bird species the Bird's Australia *Checklist of Australian Birds* (Christidis and Boles, 2008).

2.2.2 Categories of Conservation Significant Species

Categories of flora and fauna of conservation significance under the *Wildlife Conservation Act 1950 (WC Act)*or recognised by the Department of Environment and Conservation (DEC) as in need of protection, or listed under the *Environment, Protection and Biodiversity Conservation Act 1999 (EPBC Act)* are defined in Appendix A. Categories of State and Federal listed TECs and PECs are defined in Appendix B.

2.3 Reporting

2.3.1 Mapping

2.3.1.1 Vegetation Mapping

Vegetation mapping was completed by using ArcGIS 10 (1995-2011) software. Aerial photographs provided the basis for defining vegetation communities. This was further supported by analysing species composition and structure from the relevés on which vegetation community descriptions were based. Relevés were based on a 100 m^2 area.

AECOM cartographers completed the final figures for the report.

2.3.1.2 Condition Mapping

Vegetation condition was determined based primarily on the ratio of introduced (weed) species to native species. Additionally, the nature and degree of disturbance (e.g. grazing, erosion) and the degree of alteration to community structure were also considered. In order to map vegetation condition of the site, the condition was determined at a range of detailed recording sites and in between as necessary, where condition changed. The categories of vegetation condition used were consistent with a combination of methods developed by Keighery (1994), as summarised in Table 1.

Table 1 Bushland Condition Ratings (adapted from Keighery, 1994 and the Braun-Blanquet Scale of Cover Abundance (from Mueller-Dombois and Ellenberg, 1974)

Descriptor	Explanation
Pristine	Pristine or nearly so, no obvious signs of disturbance. *0% weed cover*
Excellent	Vegetation structure intact, disturbance affecting individual species and weeds are non-aggressive species. *1 – 5% weed cover*
Very Good	Vegetation structure altered obvious signs of disturbance. For example, disturbance to vegetation structure caused by repeated fires, the presence of some more aggressive weeds, dieback, logging and grazing. *5 – 25% weed cover*
Good	Vegetation structure significantly altered by very obvious signs of multiple disturbances. Retains basic vegetation structure or ability to regenerate it. For example, disturbance to vegetation structure caused by very frequent fires, the presence of some very aggressive weeds at high density, partial clearing, dieback and grazing. *25 – 50% weed cover*
Degraded	Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management. For example, disturbance of vegetation structure caused by very frequent fires, the presence of very aggressive weeds, partial clearing, dieback and grazing. *50 – 75% weed cover*
Completely Degraded	The structure of the vegetation is no longer intact and the area is completely or almost completely without native species. These areas are often described as “parkland cleared” with the flora comprising weed or crop species with isolated native trees or shrubs. *75 – 100% weed cover*

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3.0 Results

3.1 Flora Desktop Assessment

3.1.1 Vegetation

The Protected Matters Report identified one area of National Environmental Significance, Beekeepers-Lesueur-Coomallo Area and Nambung National Park. This park is situated 5.6 kms east of the Project Area and is unlikely to be impacted.

No TECs or PECs were identified in the desktop assessment as occurring within close proximity of the Project Area. The *EPBC* Protected Matters report and the Naturemap report are provided in Appendix C1 and C2 respectively.

Pre-european vegetation mapping done by Beard (1981) defined the vegetation as vegetation association 1026: Cliff Head. This is defined as a mosaic of shrublands of *Acacia rostellifera, Acacia Cyclops* and *Melaleuca cardiophylla* thicket/shrublands and *Acacia lasiocarpa* and *Melaleuca systena* heath.

3.1.2 Flora

A total of six flora species as listed under the *EPBC Act* 1999 were identified as potentially occurring in the Project Area. Of these, none were considered likely to occur due to lack of habitat present or species distribution does not include the Project Area. All conservation significance were assessed as either unlikely, or likely to occur in the Project Area. All species listed under the *EPBC Act* are summarised in Table 2. A complete list of all flora species of conservation significance identified in the desktop assessment is provided in Appendix C3.

Table 2 Plants listed under the *EPBC Act* identified in the Desktop Assessment, their conservation code, habitat and likelihood of occurring in the Project Area are described

Species	EPBC Cons. Code	State Cons. Code	Habitat	Comment
Grevillea batrachioides	E	T	Sandy loam on sandstone outcrops, in rocky or stony soil and rocky crevices	**Unlikely to occur**: found further inland from the coast
Grevillea humifusa	E	T	Gravelly loam over laterite	**Unlikely to occur**: found further inland, habitat not present.
Hemiandra gardneri	E	T	Grey or yellow sand and clayey sand on sandplains.	**Unlikely to occur**: found further inland, habitat not present.
Isopogon uncinatus	E	T	Loam or sand on granite and peaty sand near swampy depressions and on hill slopes.	**Unlikely to occur**: found in the Albany district, habitat not present.
Leucopogon obtectus	E	T	Grey sand	**Unlikely to occur**: found further inland and North near Eneabba.
Centrolepis caespitosa	E	P4	White sand, clay around salt flats and wet areas.	**Unlikely to occur**: distribution is further south and habitat not present. Likely to be delisted from EBPC due to further studies showing its wide distribution throughout the southwest of WA.

3.2 Flora Field Survey

The flora and vegetation of the Leeman Boat Ramp Project Area was represented by seven relevés. Site data can be found in Appendix D. These are shown on Figure 3.

EPA Position statement No.2 lays out a series of constraints which relate to biodiversity. One of them is to protect at least 30% of the original extent of vegetation complexes in unconstrained areas and 10% in constrained areas (i.e. urban zoned regions). The survey area is considered an unconstrained area; therefore the 30% protection target applies. The CAR reserve analysis shows that there is 92.80 % of the vegetation association 1026 remaining on the Geraldton Sandplains. The vegetation in the Project Area is therefore not considered of local or regional significance.

Table 3 Beard's (1981) Terrestrial Vegetation Community within the Leeman Boat Ramp Project Area

Vegetation Code	Beard Code	Current Extent (ha)	Pre-European extent (ha)	Remaining (%)	Description
1026	A23.32m3Sc/a26m4Zc	10,601.64	11,423.76	92.80	Mosaic of shrublands of *Acacia rostellifera, Acacia cyclops* and *Melaleuca cardiophylla* thicket/shrublands and *Acacia lasiocarpa* and *Melaleuca systena* heath

3.2.1 Vegetation

Four vegetation communities were identified in the Project Area. These are shown in Figure 3 and described below.

ScSp: *Sceavola crassifolia, Acanthocarpus preissii* and *Acacia blakelyi* low open heathland over *Schoenus pedicellatus* and *Chordifex sinuosus* sparse sedgeland.

Community ScSp was found on a rocky limestone outcrop adjacent to the coast line at the base of the first sand dune. The community was characterised by sparse to open shrubland and heathland growing in scattered clumps in crack of the limestone. Vegetation condition was Very Good, with low numbers of one weed species present (**Avena barbata* foliage cover < 1%). Additional associated species includes *Pimelea ferruginea, Olearia axillaris* and *Jacksonia floribunda*. This vegetation community was represented by one relevé.

Plate 1 Community ScSp

TdSc: *Templetonia diffusa, Acacia saligna* subsp. *saligna* and *Spyridium globulosum* low open shrubland over *Scaevola crassifolia, Acanthocarpus preissii* and *Santalum acuminatum* low heathland.

Community TdSc is on the first sand dune on white deep sands. The vegetation community is a low shrubland and heathland that varies in density depending on abiotic factors such as erosion. Vegetation condition is Very Good with only two weed species occurring (**Bromus diandrus* and **Lagurus ovatus* foliage cover < 3%). Additional associated species include: *Zygophyllum fruticulosum, Olearia axillaris* and *Conostylis canescens.* This vegetation community was represented by one relevé.

Plate 2 Community TdSc

MhMc: *Melaleuca huegelii* subsp. *huegelii , Melaleuca lanceolata* and *Acacia saligna* subsp. *saligna* tall open shrubland to shrubland over *Melaleuca cardiophylla, Templetonia retusa* and *Leptomeria preissiana* low open heathland.

Community TdSc was situated on flat white sandy soils nested between Illyarrie Street, the fenced water sump, and a track travelling parallel to the coastline. This community is characterised by tall Melaleuca shrubs over mixed heathland. The vegetation condition is Good to Very Good with some areas of erosion and an area dominated by **Bromus diandrus.* Other weed species present included **Lagurus ovatus* and **Euphorbia terracina* foliage cover <0.2 %). Additional associated species include: *Acrotriche cordata, Cassytha flava, Threlkeldia diffusa, Allocasuarina lehmanniana* subsp. *lehmanniana* and *Melaleuca systena.* This vegetation community was represented by three relevés.

Plate 3 Community MhEb

OaSc: *Olearia axillaris, Acacia blakelyi* and *Myoporum insulare* low open shrubland over *Scaevola crassifolia, Threlkeldia diffusa* and *Acanthocarpus preissii* low sparse to open heathland.

Community OaSc was situated adjacent to the coastline on white sandy soils with some limestone outcrops. The community was characterised by sparse to open shrubland over sparse heathland. Vegetation condition is Good, with areas of erosion, human disturbance, and weeds contributing to the low condition level. Weed species present included **Carpobrotus edulis, *Tetragonia decumbens* and **Avena barbata* (foliage cover <5 %). Additional associated species include *Sarcocornia quinqueflora* and *Frankenia pauciflora.* This vegetation community was represented by two relevés.

Plate 4 Community OaSc

3.2.2 Condition

Vegetation condition within the Project Area was typical of what you would expect in a disturbed environment adjacent to an urban area. The condition of vegetation ranged from Completely Degraded to Very Good, with areas that were cleared considered Completely Degraded. These include the tracks visible on the aerial photographs (Figure 4). The majority of the remnant vegetation within the Project Area was in Good to Very Good condition. Major contributing factors to condition include:

- Human activities: several tracks in the Project Area, a man-made fenced sump, and a bird nest pole
- Erosion: from wind and off road tracks
- Weed species: six species present, some areas are dominated by them which has contributed to he displacement of native species.

3.2.3 Flora

No Threatened or Priority flora as listed under the *EPBC Act 1999;* the *Wildlife Conservation Act 1950;* or listed by the Department of Environment was recorded in the Project Area. The P3 species *Stylidium maritimum* identified as likely to occur in the Project Area was not recovered following a 30 minute search of the Project Area in potential habitat vegetation communities.

A total of 37 native vascular plant species of 32 genera and 23 families were recorded in the Project Area. The most common species was *Threlkeldia diffusa* which was found at six relevés, followed by *Templetonia retusa* which occurred in four of the relevés. The Fabaceae (pea) family was the best represented by eight species.

One flora species was unable to be accurately identified due to lack of material present (no flowers, fruits or seeds). However, this species was identified as potentially being *Rhagodia ?latifolia.*

A total of six introduced (weed) species from six genera and three families were recorded. The most common weed species was **Avena barbata* which occurred at three relevés. None of the weed species are listed as Declared Weeds under the *Agriculture and Related Resources Protection Act 1976* or listed as a Weed of National Significance.

A complete species list is provided in Appendix E.

3.3 Fauna

3.3.1 Desktop Assessment

A total of 33 Threatened, Priority and Migratory fauna species were identified from the database searches. Two listed Marine birds determined to be likely to occur within the Project Area have been included. Database search results and the analysis of these are provided in Table 4. Conclusions from the field survey on each species have been included. The EPBC Act Protected Matters reports are presented in Appendix C1.

Table 4 Fauna species of conservation significance potentially occurring within the Project Area

Scientific	Vernacular	EPBC Status	WA Conservation Status	Description	Likelihood of occurrence	Field survey conclusions
Birds						
Pezoporus wallicus subsp. flaviventrus	Western Ground Parrot	Endangered	Schedule 1	The Western Ground Parrot is a slender, long tailed green parrot occupying coastal heaths, swamps, dry ridges and occasionally grasslands (Pizzey & Knight 2007). Historically the species occurred from Perth to Dongara however was last recorded north of Perth at the end of the 19th century. Now occurs on the south coast of Western Australia (Garnett *et al* 2010)	Unlikely to occur. Project Area lies outside known range of this species	Not observed
Sterna nereis subsp. nereis	Fairy Tern	Vulnerable	Schedule 1	The Fairy tern is a small bird weighing approximately 70 g and is found along coasts of Victoria, Tasmania, South Australia and Western Australia. The Fairy Tern nests on sheltered sandy beaches, spits and banks (DSEWPaC 2012)	Unlikely to occur	Not observed No habitat occurs within Project Area
Anous tenuirostris melanops	Australian Lesser Noddy	Vulnerable	Schedule 1	The Australian Lesser Noddy is a small Noddy, standing at approximately 34 cm and a wingspan of 60 cm (Pizzey & Knight 2007). The species breeds on the Abrolhos Islands and is sedentary however sometimes beachwashed to Cape Naturaliste (Pizzey & Knight 2007)	Unlikely to occur. No records exist nearby	Not observed
Calyptorhynchus latirostris	Carnaby's Cockatoo	Endangered	Schedule 1	Carnaby's Cockatoo is a postnuptial nomad and typically moves west soon after breeding. The Species nests in hollows of smooth-barked eucalypts, particularly Salmon Gum (*Eucalyptus salmonophloia)* and Wandoo (*Eucalyptus Wandoo)* but is not limited to these eucalypts. Diet consists of an array of Proteaceous and Eucalypt species (Johnstone *et al* 2010), considered unlikely to occur within the Project Area.	May overfly the area. Breeding and foraging habitat not expected within the Project Area.	Not observed. The species is unlikely to persist here as the Project Area lacks significant trees or foraging habitat

Scientific	Vernacular	EPBC Status	WA Conservation Status	Description	Likelihood of occurrence	Field survey conclusions
Diomedea exulans amsterdamensis	Amsterdam Albatross	Endangered	Schedule 1	Large, well known oceanic birds with extremely long wings, which allow the birds to fly effortlessly, using wind harnessed energy. Main foods include cuttlefish, fish and other marine organisms (Pizzey & Knight 2007)	May overfly the area however likelihood of the species persisting is low	Not observed. No suitable habitat occurs in the Project Area
Diomedea exulans exulans	Tristan Albatross	Endangered	Schedule 1		May overfly the area however likelihood of the species persisting is low	Not observed. No suitable habitat occurs in the Project Area
Diomedea exulans gibsoni	Gibson's Albatross	Vulnerable	Schedule 1		May overfly the area however likelihood of the species persisting is low	Not observed. No suitable habitat occurs in the Project Area
Diomedea exulans	Wandering Albatross	Vulnerable	Schedule 1		May overfly the area however likelihood of the species persisting is low	Not observed. No suitable habitat occurs in the Project Area
Thalassarche carteri	Indian Yellow-nosed Albatross	Vulnerable	Schedule 1		May overfly the area however likelihood of the species persisting is low	Not observed. No suitable habitat occurs in the Project Area
Thalassarche cauta cauta	Shy Albatross	Vulnerable	Schedule 1		May overfly the area however likelihood of the species persisting is low	Not observed. No suitable habitat occurs in the Project Area

Scientific	Vernacular	EPBC Status	WA Conservation Status	Description	Likelihood of occurrence	Field survey conclusions
Thalassarche melanophris	Black-Browed Albatross	Vulnerable	Schedule 1		May overfly the area however likelihood of the species persisting is low	Not observed. No suitable habitat occurs in the Project Area
Leipoa ocellata	Malleefowl	Vulnerable	Schedule 1	Malleefowl habitat requirements are quite specific. The species requires unburnt mallee and woodland with low scrub and abundant litter to use in nesting mounds (Morcombe 2003)	Unlikely to occur. The project area lies outside known range for the species and suitable habitat is not expected to occur within the Project Area	Not observed. No suitable habitat occurs in the Project Area
Macronectes giganteus	Southern Giant-Petrel	Endangered	Schedule 1	The Southern Giant Petrel is known to occur in Antarctic to subtropical waters. It typically nests in areas of exposed vegetation (DSEWPaC 2012). The species typically frequents Oceans, bays, seas, islands and mainland coastal areas (Pizzey & Knight 2007)	May overfly the area however likelihood of the species persisting is low	Not observed. No suitable habitat occurs in the Project Area
Macronectes halli	Northern Giant-Petrel	Vulnerable	Schedule 1	Similar in appearance to the South Giant-Petrel and hybrids of both species exist (Pizzey & Knight 2007). The species typically frequents Oceans, bays, seas, islands and mainland coastal areas (Pizzey & Knight 2007)	May overfly the area however likelihood of the species persisting is low	Not Observed
Pterodroma mollis	Soft-plumaged Petrel	Vulnerable	Schedule 1	The Soft-plumaged Petrel has a whitish forehead and blue-grey back and is often seen in small groups flying close to the water (DSEWPaC 2012). The species typically frequents Oceans, bays, seas, islands and mainland coastal areas (Pizzey & Knight 2007)	May overfly the area however likelihood of the species persisting is low	Not Observed

Scientific	Vernacular	EPBC Status	WA Conservation Status	Description	Likelihood of occurrence	Field survey conclusions
Charadrius rubricollis	Hooded Plover		Priority 4	A small, stocky plover standing at between 19 -23 cm tall, this species frequents broad sandy beaches with plentiful seaweed and jetsam, adjacent dune vegetation, weedy rocky shelves and reefs (Pizzey & Knight 2007)	May occur. Records exist near the Project Area	Not Observed.
Merops Ornatus	Rainbow Bee-eater	Migratory	Schedule 3	The Rainbow Bee-eater is a common species which occupies numerous habitats including open woodlands with sandy loamy soil, sand ridges, sandpits, riverbanks, road cuttings, beaches, dunes, cliffs, mangroves and rainforests. (Morcombe 2003).	May occur. Records exist near the Project Area and the species may nest in dunes found within the Project Area	Not Observed
Actitis hypoleucos	Common Sandpiper	Marine & Migratory	Schedule 3	The Common Sandpiper is widespread throughout Australia, with few important sites for the species within Australia. They visit Australia during the non-breeding season. Preferred habitat is coastal wetlands with muddy margins or rocky shores (DSEWPaC 2012)	May occur Records exist near the Project Area	Not Observed
Arenaria interpres	Ruddy Turnstone	Marine & Migratory	Schedule 3	The Ruddy Turnstone is a stocky, medium build wader with a short wedge shaped bill, orange-red legs and black or dark-brown chest. It is widespread throughout Australia during its non-breeding season. It prefers rocky shores or beaches with rotting seaweed. It breeds in northern hemisphere, but there are several Australian site of international importance in the north of WA	May occur Records exist near the Project Area	Not Observed
Calidris ruficollis	Red-necked Stint	Marine & Migratory	Schedule 3	The Red-necked Stint is the smallest wader in Australia and is distributed along most of the Australian coastline, with the greatest densities in Victoria and Tasmania. The nearest internationally important site for the species is the Alfred Cove Nature Reserve on the Swan River (DSEWPaC 2012).	May occur Records exist near the Project Area	Not Observed

Scientific	Vernacular	EPBC Status	WA Conservation Status	Description	Likelihood of occurrence	Field survey conclusions
Haliaeetus leucogaster	White-bellied Sea-Eagle	Marine & Migratory	Schedule 3	The White-bellied Sea Eagle is a large raptor that is widespread throughout coastal Australia. The White Bellied Sea-Eagle occupies a wide range of habitats, usually in close proximity to a large body of water (including the ocean). Breeding usually occurs in tall open woodlands overlooking bodies of water (DSEWPaC 2012)	May occur Records exist near the Project Area	Not Observed
Numenius phaeopus	Whimbrel	Marine & Migratory	Schedule 3	A medium sized curlew with a wingspan of 76-89 cm and weighing approximately 350g, the Whimbrel is a regular migrant to Australia. It has occasionally been recorded in the south west of Western Australia (DSEWPaC 2012)	May occur Records exist near the Project Area	Not Observed
Pluvialis squatarola	Grey Plover	Marine & Migratory	Schedule 3	The Grey Plover is a medium sized plover, with the Australian population breeding in Siberia between May and August, with individuals reaching the south coast of Australia in October and November (DSEWPaC 2012). The closest site of international significance for this species is Thomsons Lake in Perth	May occur Records exist near the Project Area	Not Observed
Sterna caspia	Caspian Tern	Marine & Migratory	Schedule 3	The Caspian Tern is the largest tern in Australia. It breeds in WA in the Recherche Archipelago and up to Dirk Hartog Island and also in the Pilbara. It distribution is more widespread, occurring virtually all along the WA coast. Its preferred habitat is sheltered coastal areas, near coastal or inland wetlands (DSEWPaC 2012)	May occur Records exist near the Project Area	Not Observed
Ardea alba	Great Egret	Marine & Migratory	Schedule 3	The Great Egret occupies a wide variety of wet habitats including freshwater wetlands, dams, flooded pastures, estuarine mudflats, mangroves and reefs (Morcombe 2003). The species is also known to visit shallows of rivers, sewage ponds and irrigation areas (Pizzey & Knight 2007).	May occur	Not Observed

Scientific	Vernacular	EPBC Status	WA Conservation Status	Description	Likelihood of occurrence	Field survey conclusions
Ardea ibis	Cattle Egret	Marine & Migratory	Schedule 3	The Cattle Egret is a small egret weighing only 390g and standing 70cm tall. The heaviest distribution of this species in WA is in the north east, and up into the Northern Territory. In the non-breeding season, it can be found throughout most of Australia (DSEWPaC 2012).	May occur	Not Observed
Apus pacificus	Fork-tailed Swift	Marine & Migratory	Schedule 3	The Fork-tailed Swift is almost exclusively aerial, and a non-breeding visitor to Australia (DSEWPaC 2012). They are rarely seen roosting on land.	May overfly Project Area	Not Observed
Pandion haliaetus	Osprey	Marine & Migratory	Schedule 3	A medium sized raptor, the Osprey usually occurs singly and occasionally in pairs. The distribution is thought to be continuous from the south west to the south eastern coasts, except for a gap at Eighty Mile Beach (DSEWPaC 2012)	May occur	Not Observed
Sterna Dougallii	Roseate Tern	Marine & Migratory	Schedule 3	The Roseate Tern is relatively small, the smallest of all “commic" terns (meaning similar to the Common Tern), with long white tail streamers and a long black bill, occasionally with red on the base (Pizzey & Knight 2007, Morcombe 2003). The flight is distinctive, with a direct and fast movement rather than buoyant flight observed in other comic terns. The Roseate Tern is common in seas around Northern Australia and breeds on islands off both the north east and western coasts, possibly expanding southwards in Western Australia where it is now a casual visitor to the area (Morcombe 2003).	May occur	Not Observed
Tringa brevipes	Grey-tailed Tattler	Marine & Migratory	Schedule 3	With records from around most of Australia’s coast, the Grey-tailed Tattler is a common species inhabiting estuaries, mangroves, tidal mudflats, wave washed rocks and reefs (Pizzey & Knight 2007)	Likely to occur. Records exist near the Project Area and habitat is suitable	Not Observed

Scientific	Vernacular	EPBC Status	WA Conservation Status	Description	Likelihood of occurrence	Field survey conclusions
Egretta sacra	Eastern Reef Heron	Marine & Migratory	Schedule 3	Occurs in two morphs, a dark and light morph, the Eastern Reef Heron inhabits islands, rocky shores, exposed coral reefs, beaches, tidal rivers and inlets (Pizzey & Knight 2007)	Likely to occur. Records exist near the Project Area and habitat is suitable	Not Observed
Larus novaehollandiae	Silver Gull	Marine	-	The Silver Gull is a widespread and common species, frequenting beaches and coastal areas across Australia	Likely to occur	
Larus pacificus	Pacific Gull	Marine	-	The Pacific Gull is a moderately common large coastal bird ranging across the southern half of Western Australia, typically inhabiting an array of coastal environs (Pizzey &	Likely to occur	
Mammals						
Macroder magigas	Ghost Bat	-	Priority 4	Australia's only strictly carnivorous bat and feeds on both vertebrates and large insects. This species occurs in Western Australia's Pilbara region (Van Dyck & Strahan 2008)	Unlikely to occur	
Invertebrates						
Synemon gratiosa	Graceful Sun Moth	Endangered	Priority 4	The Graceful Sun Moth occurs throughout the Swan Coastal Plain and extends north into the Geraldton Sandplain (DEC 2011). It is associated with two habitat types: coastal heathland on Quindalup dunes and *Banksia* woodland on Spearwood and Bassendean dunes, where the second known host plant *Lomandra hermaphrodita* is widespread. Dispersal is thought to be limited by fragmentation of habitat (DEC 2011). Recent discoveries have resulted in this species being downgraded to P4 (DEC 2012).	May Occur. Records exist near the Project Area	No *Lomandra maritima* or *Lomandra hermaphrodita* recorded within the Project Area.

EPBC Act Commonwealth Environment Protection and Biodiversity Conservation Act, 1999: EX Extinct, E Endangered, VU Vulnerable M Migratory
WC Act Western Australia Wildlife Conservation Act, 1950: Schedule 1, S2, S3, S4
Priority Species Department of Environment and Conservation's Priority Species List: Priority 1, P2, P3, P4, P5

3.3.2 Field Observations

3.3.2.1 Fauna

Sixteen fauna species were recorded during the field survey. This included 15 birds and one reptile (Table 5).Five species were considered to be of conservation significance.

Table 5 Fauna Species recorded within the survey area November 2012

Species	Vernacular	Conservation Significance
Birds		
Sterna anaethetus	Bridled Tern	Marine & Migratory (EPBC)
Larus novaehollandiae	Silver Gull	Marine (EPBC)
Larus pacificus	Pacific Gull	Marine (EPBC)
Haliastur sphenurus	Whistling Kite	Marine (EPBC)
Falco cenchroides	Australian Kestrel	Marine (EPBC)
Ocyphaps lophotes	Crested Pigeon	None
Elanus caeruleus	Black-shouldered Kite	None
Coracina novaehollandiae	Black-faced Cuckoo-shrike	None
Cracticus torquatus	Grey Butcherbird	None
Grallina cyanoleuca	Mudlark	None
Rhipidura leucophrys	Willy Wagtail	None
Hirundo neoxena	Welcome Swallow	None
Anthochaera carunculata	Red Wattlebird	None
Undefined	Honeyeater sp.	None
Phalacrocorax melanoleucos	Little Pied Cormorant	None
Reptiles		
Gehyra variegata	Gecko	None

3.3.2.2 Fauna Habitat

Seven fauna habitats have been defined and mapped for the survey area based on the results of the field assessment. (Figure 5). These habitats are listed in Table 6

The habitats listed above occupy areas as shown in Table 6.

Table 6 Fauna habitat areas of the survey area

Fauna Habitat	Description	Area (ha)	% of Survey area
Exposed Limestone	Rocky exposed limestone with crevices throughout	0.17	14.68
Melaleuca Shrubland	Melaleuca shrubland over low heathland	0.68	33.26
Shrubland over Dunes	Mixed open shrubland over undulating dunes	0.25	11.91
Heath over Exposed Limestone	Low clumps of heath scattered of limestone outcrop	0.06	2.88
Low Shrubland	Mixed low shrubland over sand	0.30	14.60
Beach	Thin strip of exposed sand and seaweed	0.7	3.18
Sump	Man-made sump	0.24	11.44

4.0 Discussion

4.1 Flora

4.1.1 Desktop Assessment

The Protected Matters Report identified one area of National Environmental Significance, Beekeepers-Lesueur-Coomallo Area and Nambung National Park. This park is situated 5.6 kms east of the Project Area and is unlikely to be impacted

A total of six flora species as listed under the *EPBC Act* 1999 were identified as potentially occurring in the Project Area. It should be mentioned that all six of these species were identified in the Protected Matters Report but not in the DEC database searches which are usually more accurate, and based on previously recorded information rather than the likelihood of potential habitat being present. This means that the locations of these Endangered species is unknown, unlikely to be in close proximity to the project area, and therefore unlikely to be adversely affected.

Based on desktop assessment of specimen records and preferred habitat, it has been determined that the following species are likely to occur in the survey area, however were not recorded in the field survey:

- *Thryptomene* sp. Lancelin (M.E. Trudgen 14000) P2
- *Stylidium maritimum* P3
- *Beyeria cinerea* subsp. *cinerea* P3
- *Eucalyptus zopherophloia* P4

4.1.2 Field Survey

The field survey was conducted on 29 November 2012 by senior botanist Floora de Wit. Seven relevés were completed to assess flora and vegetation values.

4.1.3 Vegetation

No Threatened or Priority Ecological Communities were identified in the Project Area. Four vegetation communities were defined and delineated, these were typical of the region (Beard 1981).

Vegetation condition was found to vary from completely degraded, Good and Very Good. Areas that were completely degraded included four-wheel drive tracks, and the man-made sump which consists of a hole with stagnant water barricaded with a fence for drainage purposes. Areas that were good contained either numerous weed species, or a dominant weed species. The most dominating weed was **Bromus diandrus* which is likely to have caused some displacement of native vegetation in areas where it dominates the undergrowth strata. Other areas showed signs of erosion due to clearing from human activities. Areas considered in very good condition showed only minor signs of disturbance from human activities and weed species.

The majority of the very good vegetation is located in the north east of the Project Area. Approximately 30 % of this vegetation is likely to be retained due to the location of the proposed project footprint. Clearing outside of the footprint should be avoided to maximise retention of this vegetation.

4.1.4 Flora

No Threatened or Priority flora was identified in the Project Area. A total of 37 native vascular plant species of 34 genera and 23 families were recorded in the Project Area. The most common species was *Threlkeldia diffusa* which was found at six relevés, followed by *Templetonia retusa* which occurred in four of the relevés. The Fabaceae (pea) family was the best represented by eight species. One flora species was unable to be accurately identified due to lack of material present (no flowers, fruits or seeds). This species was identified as potentially being *Rhagodia ?latifolia.*

A total of six introduced (weed) species from six genera and three families were recorded. The most common weed species was **Avena barbata* which occurred at three relevés. None of the weed species are listed as Declared Weeds under the *Agriculture and Related Resources Protection Act 1976* or listed as a Weed of National Significance.

4.2 Fauna

4.2.1 Desktop Assessment

4.2.1.1 EPBC and WC Act Listed Fauna

Graceful Sun Moth was determined from the Desktop Assessment to have the potential to occur in the area. Due to the lack of its host-species (Lomandra maritima) being recorded within the Project Area (Section 3.2.3), this invertebrate species is unlikely to occur in the Project Area and therefore will not be impacted by the Project..

Based on the desktop assessment, the likelihood of the remaining listed 15 Threatened species occurring in the Project Area is low therefore impacts to these species will be unlikely especially as most of the species are birds species that cover large ranges throughout their lifecycle..

Species listed under the EPBC Act as Migratory and/or Marine or Schedule 3 under the WC Act deemed likely to occur are listed below:

- *Tringa brevipes* (Grey-tailed Tattler)
- *Egretta sacra* (Eastern Reef Heron)
- *Larus novaehollandiae* (Silver Gull)
- *Larus pacificus* (Pacific Gull)

These species are all widespread and common and the Project is unlikely to impact these species.

Based on the desktop assessment, 13 species listed under the EPBC Act as Migratory and/or Marine have the potential (may) occur within the project area. These species are all common and widespread, therefore potential impacts to these species are low. For specific conclusions on each species, refer to Table 4.

4.2.1.2 Priority Fauna

The Hooded Plover (Priority four) may occur due to suitable habitat within the Project Area and records exist within 10 km of the Project Area. This species typically lays eggs in a scrape in sand on exposed beaches (Pizzey & Knight 2007) The Projecet Area lacks suitably sized beach for this species to utlilise it for breeding habitat.Due to the relatively small size of the Project Area, the mobile nature of the species and lack of breeding habitat in the Project Area impacts to the species will be low.

The Ghost Bat is unlikely to occur within the Project Area. The species has experienced an historical range contraction approximately 10,000 years ago and populations were thought to survive in the south west of Western Australia up until 200 years ago (Van Dyck & Strahan 2008). Today, it currently survives in the Pilbara region of Western Australia (Van Dyck & Strahan 2008)

4.2.2 Field Observations

Five species of conservation significance were observed during the field survey. The Bridled Tern is listed under the EPBC Act as Migratory and Marine and is a widespread, common species usually foraging on open seas, but has been observed frequenting islands, reefs and occasionally inshore waters (Morcombe 2003). The Proposed development is unlikely to impact this species.

The Silver Gull, Pacific Gull, Whistling Kite and Australian Kestrel are all listed under the EPBC Act as Marine and are widespread and common species. The Proposed development is unlikely to impact these species.

No other species of conservation significance were observed during the field survey.

4.2.3 Habitat

Seven habitats were defined and mapped from the Project area. Melaleuca Shrubland provides good nesting habitat for small birds such as wrens, honeyeatersand wattlebirds. Exposed Limestone and Heath over Exposed Limestone provides good habitat for small reptiles, however the likelihood of Threatened or Priority species using these habitats is low.

5.0 Conclusion and Recommendations

A flora, vegetation and fauna assessment was conducted for the proposed Leeman Boat Ramp area. The Project Area is situated between Illyarrie Road and the coast line in Leeman and was defined by the location of proposed infrastructure associated with the boat ramp including a car park, small recreational area, and roads.

The summary of results is provided below:

- Six flora species listed under the *EPBC Act 1999* were identified in the Desktop Assessment. None of these were considered likely to occur in the Project Area, and the field survey did not record any of these species.
- 16 Threatened fauna species listed under the *Environment, Protection and Biodiversity Conservation Act 1999* were identified in the Desktop Assessment. None were considered likely to occur in the Project Area and none were recorded during the field survey
- Five fauna species listed as Migratory, Marine or both under the *Environment, Protection and Biodiversity Conservation Act 1999* and/or Schedule 3 under the *Wildlife Conservation Act 1950* were recorded during the survey. These are all widespread and common species and the Project is unlikely to significantly impact these species.
- No Threatened species as listed under the *Wildlife Conservation Act 1950* were identified in the Project Area during the field survey.
- No priority flora species were located in the survey area
- No Threatened or Priority Ecological Communities were identified in the desktop assessment nor were any recorded in the Project Area.
- Four vegetation communities were defined and delineated. These consisted of common species that were expected to occur in the habitats present.
- Thirty-seven native vascular plant species were recorded. None of these were range extensions, or considered of local or regional significance.

Based on the findings of the survey the following recommendations are made:

- Confine vegetation clearing to only areas required for infrastructure.
- Implement weed hygiene measures to avoid the introduction and spread of weed species in the local area.

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6.0 List of Participants

- David Temple-Smith (Principal Environmental Scientist
  - Project Manager
- Floora de Wit (Senior Botanist)
  - Field Assessment, Data collation and Report preparation
- Matthew Cann (Graduate Environmental Scientist)
  - Field Assessment, Data collation, Report preparation
- Andrew Batty Review

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Figures

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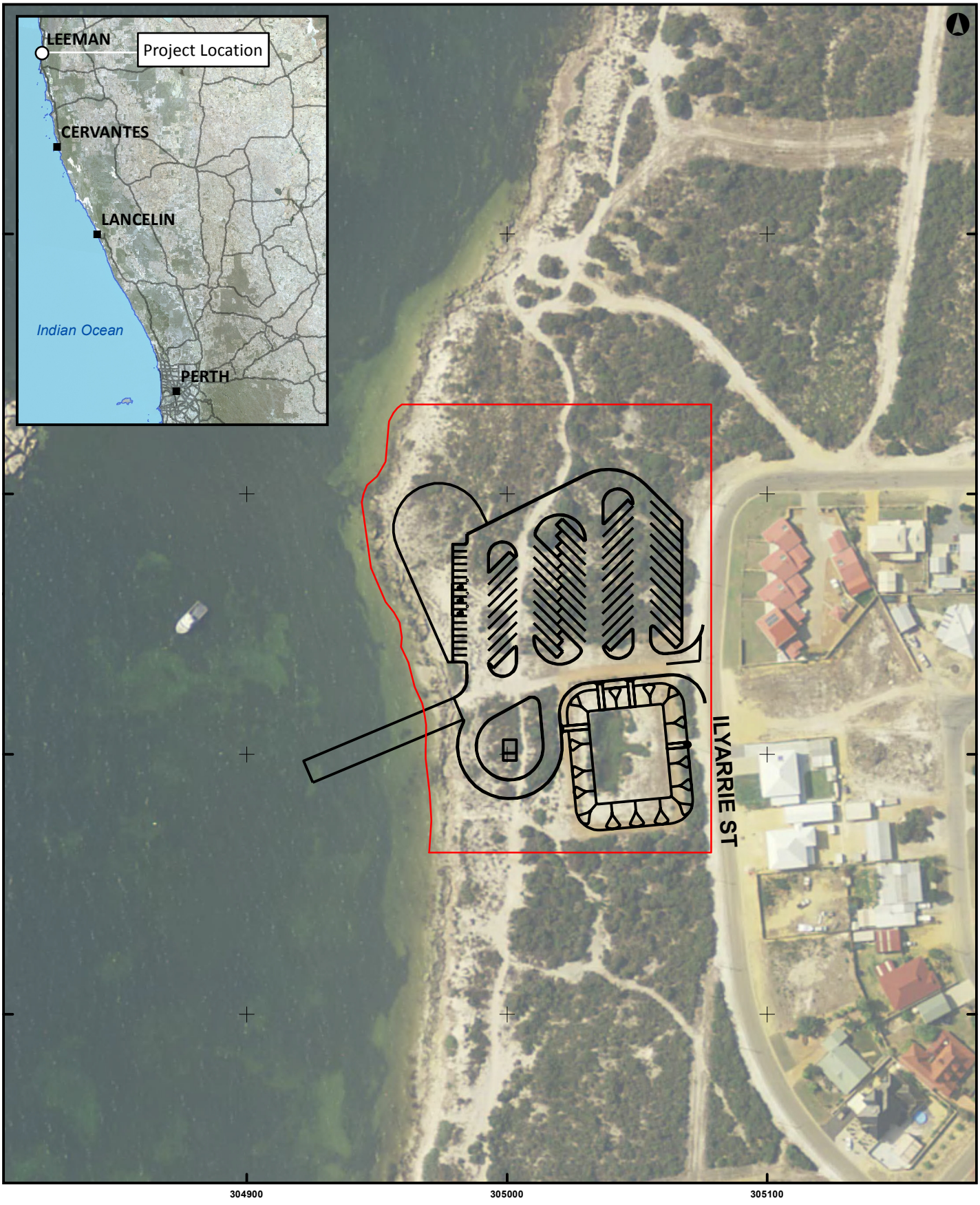

Project Area of Leeman Boat Ramp

Figure 1

Coordinate System: GDA 1994 MGA Zone 50

0 10 20 30 40 50

Metres

1:2,000 (A4)

LEGEND

- Proposed Boat Ramp Footprint
- Project Area

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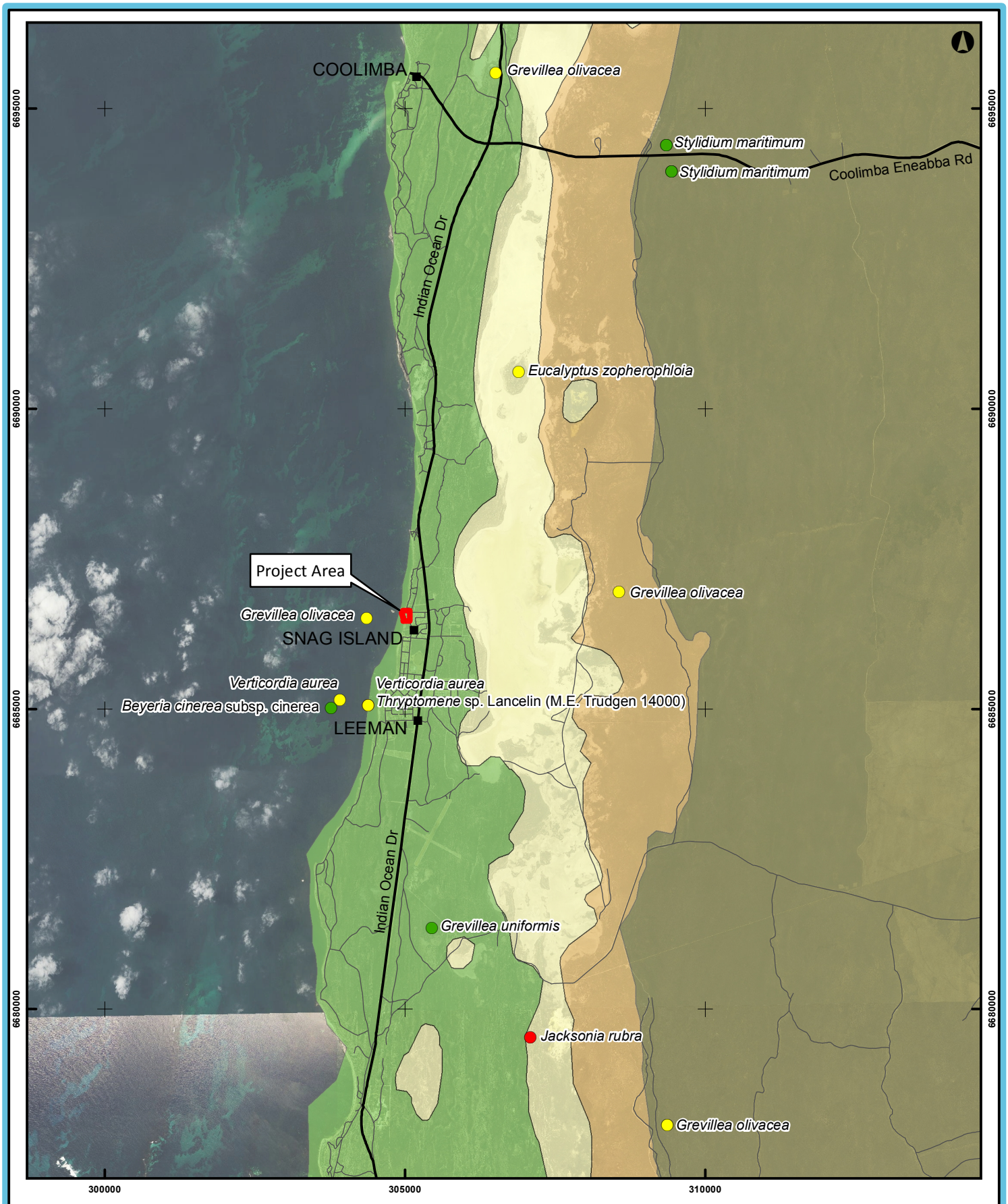

Desktop Results – Flora of Conservation Significance

Figure 2

Coordinate System: GDA 1994 MGA Zone 50

0 0.5 1 1.5 2

Kilometres

1:85,000 (A4)

LEGEND

Project Area

DEC/WA Herbarium Flora Search Results

- P2
- P3
- P4

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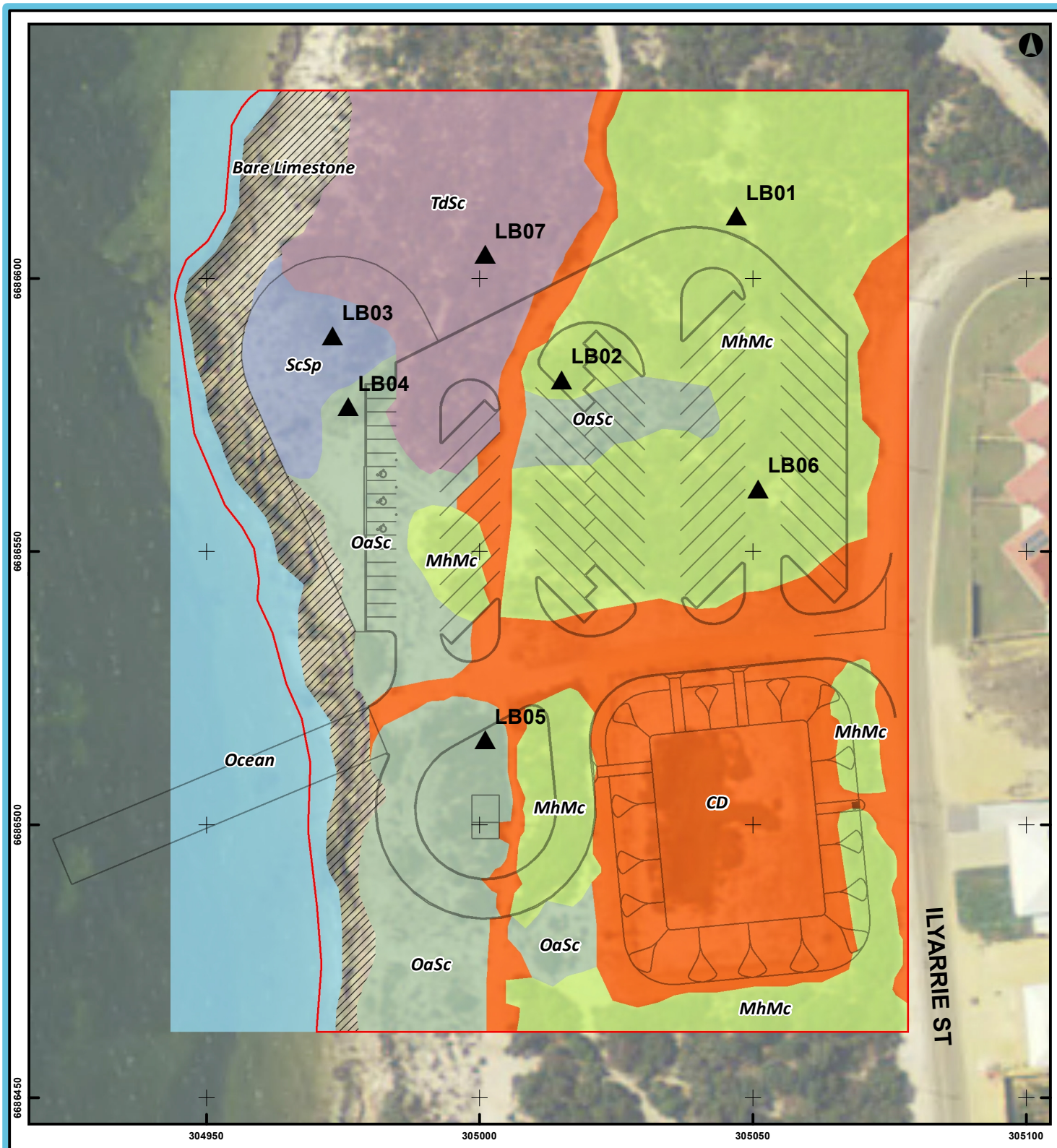

Unit Description	Code	Assocation
Sceavola crassifolia , *Acanthocarpus preissii* and *Acacia blakely*i low open heathland over *Schoenus pedicellatus* and *Chordifex sinuosus* sparse sedgeland	ScSp	Scaevola heathland
Templetonia diffusa , *Acacia saligna* subsp. *saligna* and *Spyridium globulosum* low open shrubland over *Scaevola crassifolia, Acanthocarpus preissii* and *Santalum acuminatum* low heathland	TdSc	Templetonia shrubland
Melaleuca huegelii subsp. *huegelii* , *Melaleuca lanceolata* and *Acacia saligna* subsp. *saligna* tall open shrubland to shrubland over *Melaleuca cardiophylla, Templetonia retusa* and *Leptomeria preissiana* low open heathland	MhMc	Melaleuca shrubland
Olearia axillaris, Acacia blakelyi and *Myoporum insulare* low open shrubland over *Scaevola crassifolia, Threlkeldia diffusa* and *Acanthocarpus preissii* low sparse to open heathland	OaSc	Olearia shrubland

Vegetation Mapping of the Leeman Boat Ramp Project Area

Figure 3

Coordinate System: GDA 1994 MGA Zone 50

0 5 10 15 20 25

Metres

1:1,000 (A4)

LEGEND

Proposed Boat Ramp Footprint

Project Area

Vegetation Community

MhMc

OaSc

ScSp

TdSc

Ocean

Compl. Degraded

Bare Limestone

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Condition Mapping of the Leeman Boat Ramp Project Area

Figure 4

Coordinate System: GDA 1994 MGA Zone 50

0 5 10 15 20 25

Metres

1:1,000 (A4)

LEGEND

Proposed Boat Ramp Footprint

Project Area

Vegetation Condition

- Very Good (VG)
- Good (G)
- Completely Degraded (CD)
- Ocean
- Bare Limestone

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Fauna Habitats of the Project Area

Figure 5

Coordinate System: GDA 1994 MGA Zone 50

0 5 10 15 20 25

Metres

1:900 (A4)

LEGEND

- Proposed Boat Ramp Footprint
- Project Area
- Completely Degraded

Fauna Habitats

- Melaleuca Shrubland
- Low Shrubland
- Heath over Exposed Limestone
- Shrubland over Dunes
- Exposed Limestone
- Sump
- Beach

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Appendix A

Definitions of Threatened and Priority Flora and Fauna Species Listed under State and Federal Legislation

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Appendix A - Definition of Threatened and Priority Flora and Fauna Species Listed Under State and Federal Legislation

Table 1 Categories of Rare and Priority Flora Species under the *Wildlife Conservation Act* 1950 [WA}

Conservation Code	Category
X	**Presumed Extinct Flora (Declared Rare Flora - Extinct)** Taxa which have been adequately searched for and there is no reasonable doubt that the last individual has died, and have been gazetted as such Schedule 2 under the WC Act.
T	**Threatened Flora – (Declared Rare Flora – Extant)** Taxa which have been adequately searched for and are deemed to be in the wild either rare, in danger of extinction, or otherwise in need of special protection and have been gazetted as such (Schedule 1 under the WC Act).
P1	**Priority One – Poorly Known Species** Species that are known from one or a few collections or sight records (generally less than five), all on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, Shire, Westrail and Main Roads WA road, gravel and soil reserves, and active mineral leases and under threat of habitat destruction or degradation. Species may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes.
P2	**Priority Two – Poorly Known Species** Species that are known from one or a few collections or sight records, some of which are on lands not under imminent threat of habitat destruction or degradation, e.g. national parks, conservation parks, nature reserves, State forest, vacant Crown land, water reserves, etc. Species may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes.
P3	**Priority Three – Poorly Known Species** Species that are known from collections or sight records from several localities not under imminent threat, or from few but widespread localities with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Species may be included if they are comparatively well known from several localities but do not meet adequacy of survey requirements and known threatening processes exist that could affect them.
P4	**Priority Four – Rare, Near Threatened and other species in need of monitoring** (a) Rare. Species that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These species are usually represented on conservation lands. (b) Near Threatened. Species that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable. (c) Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.
P5	**Priority Five: Conservation Dependent species** Species that are not threatened but are subject to a specific conservation program, the cessation of which would result in the species becoming threatened within five years.

Table 2 Categories of Species Listed under Schedule 179 of the *Environment, Protection and Biodiversity Conservation* Act 1999 [Commonwealth]

Conservation	Code Category
Ex	**Extinct** Taxa which at a particular time if, at that time, there is no reasonable doubt that the last member of the species has died.
ExW	**Extinct in the Wild** Taxa which is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; or it has not been recorded in its known and/or expected habitat, at appropriate seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form.
CE	**Critically Endangered** Taxa which at a particular time if, at that time, it is facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria.
E	**Endangered** Taxa which is not critically endangered and it is facing a very high risk of extinction in the wild in the immediate or near future, as determined in accordance with the prescribed criteria.
V	**Vulnerable** Taxa which is not critically endangered or endangered and is facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria.
CD	**Conservation Dependent** Taxa which at a particular time if, at that time, the species is the focus of a specific conservation programme, the cessation of which would result in the species becoming vulnerable, endangered or critically endangered within a period of 5 years.

Definitions of Threatened and Priority Fauna Categories

Table 1 WC Act Codes for Threatened Flora

Conservation Code	Category
Schedule 1	Fauna that is rare or likely to become extinct, are declared to be fauna that is in need of special protection.
Schedule 2	Fauna that is presumed to be extinct, are declared to be fauna that is in need of special protection.
Schedule 3	Birds that are subject to an agreement between the governments of Australia and Japan relating to the protection of migratory birds and birds in danger of extinction are declared to be fauna that is in need of special protection.
Schedule 4	Fauna that is in need of special protection, otherwise than for the reasons mentioned [in Schedule 1 – 3].

Table 2 Categories of Specially Protected Fauna Species as prioritised by DEC

Conservation Code	Category
P1	**Priority One** Taxa with few, poorly known populations on threatened lands. Taxa which are known from few specimens or sight records from one or a few localities on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, active mineral leases. The taxon needs urgent survey and evaluation of conservation status before consideration can be given to declaration as threatened fauna.
P2	**Priority Two** Taxa with few, poorly known populations on conservation lands. Taxa which are known from few specimens or sight records from one or a few localities on lands not under immediate threat of habitat destruction or degradation, e.g. national parks, conservation parks, nature reserves, State forest, vacant Crown land, water reserves, etc. The taxon needs urgent survey and evaluation of conservation status before consideration can be given to declaration as threatened fauna.
P3	**Priority Three** Taxa with several, poorly known populations, some on conservation lands. Taxa which are known from few specimens or sight records from several localities, some of which are on lands not under immediate threat of habitat destruction or degradation. The taxon needs urgent survey and evaluation of conservation status before consideration can be given to declaration as threatened fauna.
P4	**Priority Four** Taxa in need of monitoring. Taxa which are considered to have been adequately surveyed, or for which sufficient knowledge is available, and which are considered not currently threatened or in need of special protection, but could be if present circumstances change. These taxa are usually represented on conservation lands.
P5	**Priority Five** Taxa in need of monitoring. Taxa which are not considered threatened but are subject to a specific conservation program, the cessation of which would result in the species becoming threatened within five years.

Table 3 Categories of Threatened Fauna Species – EPBC Act

Conservation Code	Category
Ex	**Extinct** Taxa not definitely located in the wild during the past 50 years
ExW	**Extinct in the Wild**

Conservation Code	Category
	Taxa known to survive only in captivity
CE	**Critically Endangered** Taxa facing an extremely high risk of extinction in the wild in the immediate future
E	**Endangered** Taxa facing a very high risk of extinction in the wild in the near future
V	**Vulnerable** Taxa facing a high risk of extinction in the wild in the medium-term
NT	**Near Threatened** Taxa that risk becoming Vulnerable in the wild
CD	**Conservation Dependent** Taxa whose survival depends upon ongoing conservation measures. Without these measures, a conservation dependent taxon would be classified as Vulnerable or more severely threatened
DD	**Data Deficient (Insufficiently Known)** Taxa suspected of being Rare, Vulnerable or Endangered, but whose true status cannot be determined without more information

Appendix B

Definitions of Threatened and Priority Ecological Communities

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Appendix B - Definitions of Threatened and Priority Ecological Communities

Table 1 Categories of Threatened Ecological Communities listed by the DEC (2010)

Conservation Code	Category
PD	**Presumed Totally Destroyed** An ecological community that has been adequately searched for but for which no representative occurrences have been located. The community has been found to be totally destroyed or so extensively modified throughout its range that no occurrence of it is likely to recover its species composition and/or structure in the foreseeable future. An Ecological community will be listed as presumed totally destroyed if there are no recent records of the community being extant **and either** of the following applies (A or B): A) Records within the last 50 years have not been confirmed despite thorough searches of known or likely habitats **or** B) All occurrences recorded within the last 50 years have since been destroyed
CR	**Critically Endangered** An ecological community that has been adequately surveyed and found to have been subject to a major contraction in area and/or that was originally of limited distribution and is facing severe modification or destruction throughout its range in the immediate future, or is already severely degraded throughout its range but capable of being substantially restored or rehabilitated. An ecological community will be listed as **Critically Endangered** when it has been adequately surveyed and is found to be facing an extremely high risk of total destruction in the immediate future. This will be determined on the basis of the best available information, by it meeting **any one or more of** the following criteria (A, B or C): A) The estimated geographic range, and/or total area occupied, and/or number of discrete occurrences since European settlement have been reduced by at least 90% **and either or both** of the following apply (i or ii): i. geographic range, and/or total area occupied and/or number of discrete occurrences are continuing to decline such that total destruction of the community is imminent (within approximately 10 years); ii. modification throughout its range is continuing such that in the immediate future (within approximately 10 years) the community is unlikely to be capable of being substantially rehabilitated. B) Current distribution is limited, **and one or more** of the following apply (i, ii or iii): i. geographic range and/or number of discrete occurrences, and/or area occupied is highly restricted and the community is currently subject to known threatening processes which are likely to result in total destruction throughout its range in the immediate future (within approximately 10 years); ii. there are very few occurrences, each of which is small and/or isolated and extremely vulnerable to known threatening processes; iii. there may be many occurrences but total area is very small and each occurrence is small and/or isolated and extremely vulnerable to known threatening processes. C) The ecological community exists only as highly modified occurrences that may be capable of being rehabilitated if such work begins in the immediate future (within approximately 10 years).
EN	**Endangered**

Conservation Code	Category
	An ecological community that has been adequately surveyed and found to have been subject to a major contraction in area and/or was originally of limited distribution and is in danger of significant modification throughout its range or severe modification or destruction over most of its range in the near future. An ecological community will be listed as **Endangered** when it has been adequately surveyed and is not Critically Endangered but is facing a very high risk of total destruction in the near future. This will be determined on the basis of the best available information by it meeting **any one or more of** the following criteria (A, B, or C). A) The geographic range, and/or total area occupied, and/or number of discrete occurrences since European settlement have been reduced by at least 70% **and either or both** of the following apply (i or ii): i. the estimated geographic range, and/or total area occupied and/or number of discrete occurrences are continuing to decline such that total destruction of the community is imminent (within approximately 20 years); ii. modification throughout its range is continuing such that in the immediate future (within approximately 20 years) the community is unlikely to be capable of being substantially rehabilitated. B) Current distribution is limited, **and one or more** of the following apply (i, ii or iii): i. geographic range and/or number of discrete occurrences, and/or area occupied is highly restricted and the community is currently subject to known threatening processes which are likely to result in total destruction throughout its range in the immediate future (within approximately 20 years); ii. there are very few occurrences, each of which is small and/or isolated and extremely vulnerable to known threatening processes; iii. there may be many occurrences but total area is very small and each occurrence is small and/or isolated and extremely vulnerable to known threatening processes. The ecological community exists only as highly modified occurrences that may be capable of being rehabilitated if such work begins in the immediate future (within approximately 20 years).
VU	**Vulnerable** An ecological community that has been adequately surveyed and is found to be declining and/or has declined in distribution and/or condition and whose ultimate security has not yet been assured and/or a community that is still widespread but is believed likely to move into a category of higher threat in the near future if threatened processes continue or begin operating throughout its range. An ecological community will be listed as **Vulnerable** when it has been adequately surveyed and is not Critically Endangered or Endangered but is facing a high risk of total destruction or significant modification in the medium to long-term future. This will be determined on the4 basis of the best available information by it meeting **any one or more of** the following criteria (A, B, or C). A) The ecological community exists largely as modified occurrences that are likely to be capable of being substantially restored or rehabilitated. B) The ecological community may already be modified and would be vulnerable to threatening processes, is restricted in area and/or range and/or is only found at a few locations. C) The ecological community may be still widespread but is believed likely to move into a category of higher threat in the medium or long term future because of existing or impending threatening processes.

Table 2 Categories of Priority Ecological Communities as listed by DEC (2010).

Conservation Code	Category
P1	**Priority One**: poorly-known ecological communities Ecological communities that are known from very few occurrences with a very restricted distribution (generally ≤5 occurrences or a total area of ≤ 100ha). Occurrences are believed to be under threat either due to limited extent, or being on lands under immediate threat (e.g. within agricultural or pastoral lands, urban areas, active mineral leases) or for which current threats exist. May include communities with occurrences on protected lands. Communities may be included if they are comparatively well-known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under immediate threat from known threatening processes across their range.
P2	**Priority Two**: poorly-known ecological communities Communities that are known from few occurrences with a restricted distribution (generally ≤10 occurrences or a total area of ≤200ha). At least some occurrences are not believed to be under immediate threat of destruction or degradation. Communities may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under threat from known threatening processes.
P3	**Priority Three**: poorly known ecological communities i. Communities that are known from several to many occurrences, a significant number or area of which are not under threat of habitat destruction or degradation or: ii. communities known from a few widespread occurrences, which are either large or with significant remaining areas of habitat in which other occurrences may occur, much of it not under imminent threat, or; iii. communities made up of large, and/or widespread occurrences, that may or may not be represented in the reserve system, but are under threat of modification across much of their range from processes such as grazing by domestic and/or feral stock, and inappropriate fire regimes. Communities may be included if they are comparatively well known from several localities but do not meet adequacy of survey requirements and/or are not well defined, and known threatening processes exist that could affect them.
P4	**Priority Four**: ecological communities that are adequately known, rare but not threatened or meet criteria for Near Threatened, or that have been recently removed from the threatened list. These communities require regular monitoring. i. Rare. Ecological communities known from few occurrences that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These communities are usually represented on conservation lands. ii. Near Threatened. Ecological communities that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable. iii. Ecological communities that have been removed from the list of threatened communities during the past five years.
P5	**Priority Five:** Conservation Dependent ecological communities. Ecological communities that are not threatened but are subject to a specific conservation program, the cessation of which would result in the community becoming threatened within five years.

Table 3 Categories of Threatened Ecological Communities listed under the *Environment Protection and Biodiversity Conservation Act 1999.*

Conservation Code	Category
CE	**Critically Endangered** If, at that time, it is facing an extremely high risk of extinction in the wild in the immediate future.
E	**Endangered** If, at that time, it is not critically endangered and is facing a very high risk of extinction in the wild in the near future.
V	**Vulnerable** If, at that time, it is not critically endangered or endangered, and is facing a high risk of extinction in the wild in the medium-term future.

Appendix C

Desktop Assessment Results

C1: Environment, Protection and Biodiversity Conservation Protected Matters Report

C2: Naturemap Report

C3: Summary Table of Flora Desktop Results

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Australian Government

Department of Sustainability, Environment, Water, Population and Communities

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information about the EPBC Act including significance guidelines, forms and application process details can be found at http://www.environment.gov.au/epbc/assessmentsapprovals/index.html

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Coordinates
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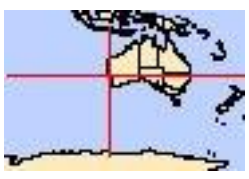

Summary

Matters of National Environment Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance - see http://www.environment.gov.au/epbc/assessmentsapprovals/guidelines/index.html

World Heritage Properties:	None
National Heritage Places:	1
Wetlands of International	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Areas:	1
Threatened Ecological Communities:	None
Threatened Species:	30
Migratory Species:	32

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place and the heritage values of a place on the Register of the National Estate. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage/index.html

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species. Information on EPBC Act permit requirements and application forms can be found at http://www.environment.gov.

Commonwealth Lands:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	53
Whales and Other Cetaceans:	13
Critical Habitats:	None
Commonwealth Reserves:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have

Place on the RNE:	5
State and Territory Reserves:	4
Regional Forest Agreements:	None
Invasive Species:	9
Nationally Important Wetlands:	None

Details

Matters of National Environmental Significance

National Heritage Properties [Resource Information]

Name	State	Status
Natural		
Beekeepers-Lesueur-Coomallo Area and Nambung National Park	WA	Nominated place

Commonwealth Marine Areas [Resource Information]

Approval may be required for a proposed activity that is likely to have a significant impact on the environment in a Commonwealth Marine Area, when the action is outside the Commonwealth Marine Area, or the environment anywhere when the action is taken within the Commonwealth Marine Area. Generally the Commonwealth Marine Area stretches from three nautical miles to two hundred

Name
EEZ and Territorial Sea

Threatened Species		[Resource Information]
Name	Status	Type of Presence
BIRDS		
Anous tenuirostris melanops		
Australian Lesser Noddy [26000]	Vulnerable	Species or species habitat may occur within area
Calyptorhynchus latirostris		
Carnaby's Black-Cockatoo, Short-billed Black-Cockatoo [59523]	Endangered	Species or species habitat likely to occur within area
Diomedea exulans amsterdamensis		
Amsterdam Albatross [82330]	Endangered	Species or species habitat may occur within area
Diomedea exulans exulans		
Tristan Albatross [82337]	Endangered	Foraging, feeding or related behaviour may occur within area
Diomedea exulans gibsoni		
Gibson's Albatross [82271]	Vulnerable	Species or species habitat may occur within area
Diomedea exulans (sensu lato)		
Wandering Albatross [1073]	Vulnerable	Species or species habitat may occur within area
Leipoa ocellata		
Malleefowl [934]	Vulnerable	Species or species habitat may occur within area
Macronectes giganteus		
Southern Giant-Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli		
Northern Giant-Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Pterodroma mollis		
Soft-plumaged Petrel [1036]	Vulnerable	Species or species habitat may occur within area
Thalassarche carteri		
Indian Yellow-nosed Albatross [64464]	Vulnerable	Foraging, feeding or related behaviour may occur within area
Thalassarche cauta cauta		
Shy Albatross, Tasmanian Shy Albatross [82345]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris		
Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
INSECTS		
Synemon gratiosa		
Graceful Sun Moth [66757]	Endangered	Species or species habitat known to occur within area
MAMMALS		
Balaenoptera musculus		
Blue Whale [36]	Endangered	Species or species habitat may occur within area
Eubalaena australis		
Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area
Megaptera novaeangliae		
Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area

Name	Status	Type of Presence
Neophoca cinerea		
Australian Sea-lion [22]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
PLANTS		
Centrolepis caespitosa		
[6393]	Endangered	Species or species habitat may occur within area
Grevillea batrachioides		
Mt Lesueur Grevillea [21735]	Endangered	Species or species habitat may occur within area
Grevillea humifusa		
Spreading Grevillea [61182]	Endangered	Species or species habitat may occur within area
Hemiandra gardneri		
Red Snakebush [7945]	Endangered	Species or species habitat likely to occur within area
Isopogon uncinatus		
Hook-leaf Isopogon [20871]	Endangered	Species or species habitat may occur within area
Leucopogon obtectus		
Hidden Beard-heath [19614]	Endangered	Species or species habitat may occur within area
REPTILES		
Caretta caretta		
Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
Chelonia mydas		
Green Turtle [1765]	Vulnerable	Species or species habitat likely to occur within area
Dermochelys coriacea		
Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat likely to occur within area
SHARKS		
Carcharias taurus (west coast population)		
Grey Nurse Shark (west coast population) [68752]	Vulnerable	Species or species habitat may occur within area
Carcharodon carcharias		
Great White Shark [64470]	Vulnerable	Species or species habitat likely to occur within area
Rhincodon typus		
Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area

Migratory Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba		
Great Egret, White Egret [59541]		Species or species habitat may occur within area
Ardea ibis		
Cattle Egret [59542]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Diomedea amsterdamensis Amsterdam Albatross [64405]	Endangered*	Species or species habitat may occur within area
Diomedea dabbenena Tristan Albatross [66471]	Endangered*	Foraging, feeding or related behaviour may occur within area
Diomedea exulans (sensu lato) Wandering Albatross [1073]	Vulnerable	Species or species habitat may occur within area
Diomedea gibsoni Gibson's Albatross [64466]	Vulnerable*	Species or species habitat may occur within area
Macronectes giganteus Southern Giant-Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant-Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Sterna caspia Caspian Tern [59467]		Breeding known to occur within area
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Foraging, feeding or related behaviour may occur within area
Thalassarche cauta (sensu stricto) Shy Albatross, Tasmanian Shy Albatross [64697]	Vulnerable*	Species or species habitat may occur within area
Thalassarche chlororhynchos Yellow-nosed Albatross, Atlantic Yellow-nosed Albatross, Indian Yellow-nosed Albatross [66481]	Vulnerable*	Foraging, feeding or related behaviour may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Migratory Marine Species		
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat may occur within area
Caperea marginata Pygmy Right Whale [39]		Species or species habitat may occur within area
Carcharodon carcharias Great White Shark [64470]	Vulnerable	Species or species habitat likely to occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat likely to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat likely to occur within area

Name	Threatened	Type of Presence
Eubalaena australis		
Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area
Lagenorhynchus obscurus		
Dusky Dolphin [43]		Species or species habitat may occur within area
Lamna nasus		
Porbeagle, Mackerel Shark [83288]		Species or species habitat may occur within area
Megaptera novaeangliae		
Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
Orcinus orca		
Killer Whale, Orca [46]		Species or species habitat may occur within area
Rhincodon typus		
Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area
Migratory Terrestrial Species		
Haliaeetus leucogaster		
White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area
Leipoa ocellata		
Malleefowl [934]	Vulnerable	Species or species habitat may occur within area
Merops ornatus		
Rainbow Bee-eater [670]		Species or species habitat may occur within area
Migratory Wetlands Species		
Ardea alba		
Great Egret, White Egret [59541]		Species or species habitat may occur within area
Ardea ibis		
Cattle Egret [59542]		Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Birds		
Anous tenuirostris melanops		
Australian Lesser Noddy [26000]	Vulnerable	Species or species habitat may occur within area
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba		
Great Egret, White Egret [59541]		Species or species habitat may occur within area
Ardea ibis		
Cattle Egret [59542]		Species or species habitat may occur within

Name	Threatened	Type of Presence
		area
Catharacta skua Great Skua [59472]		Species or species habitat may occur within area
Diomedea amsterdamensis Amsterdam Albatross [64405]	Endangered*	Species or species habitat may occur within area
Diomedea dabbenena Tristan Albatross [66471]	Endangered*	Foraging, feeding or related behaviour may occur within area
Diomedea exulans (sensu lato) Wandering Albatross [1073]	Vulnerable	Species or species habitat may occur within area
Diomedea gibsoni Gibson's Albatross [64466]	Vulnerable*	Species or species habitat may occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area
Larus novaehollandiae Silver Gull [810]		Breeding known to occur within area
Larus pacificus Pacific Gull [811]		Foraging, feeding or related behaviour known to occur within area
Macronectes giganteus Southern Giant-Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant-Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Breeding known to occur within area
Pterodroma mollis Soft-plumaged Petrel [1036]	Vulnerable	Species or species habitat may occur within area
Puffinus assimilis Little Shearwater [59363]		Foraging, feeding or related behaviour known to occur within area
Sterna caspia Caspian Tern [59467]		Breeding known to occur within area
Sterna dougallii Roseate Tern [817]		Foraging, feeding or related behaviour likely to occur within area
Sterna nereis Fairy Tern [796]		Breeding known to occur within area
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Foraging, feeding or related behaviour may occur within area
Thalassarche cauta (sensu stricto) Shy Albatross, Tasmanian Shy Albatross [64697]	Vulnerable*	Species or species habitat may occur within area

Name	Threatened	Type of Presence
Thalassarche chlororhynchos		
Yellow-nosed Albatross, Atlantic Yellow-nosed Albatross, Indian Yellow-nosed Albatross [66481]	Vulnerable*	Foraging, feeding or related behaviour may occur within area
Thalassarche melanophris		
Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Fish		
Acentronura australe		
Southern Pygmy Pipehorse [66185]		Species or species habitat may occur within area
Campichthys galei		
Gale's Pipefish [66191]		Species or species habitat may occur within area
Choeroichthys suillus		
Pig-snouted Pipefish [66198]		Species or species habitat may occur within area
Halicampus brocki		
Brock's Pipefish [66219]		Species or species habitat may occur within area
Hippocampus angustus		
Western Spiny Seahorse, Narrow-bellied Seahorse [66234]		Species or species habitat may occur within area
Hippocampus breviceps		
Short-head Seahorse, Short-snouted Seahorse [66235]		Species or species habitat may occur within area
Hippocampus subelongatus		
West Australian Seahorse [66722]		Species or species habitat may occur within area
Lissocampus fatiloquus		
Prophet's Pipefish [66250]		Species or species habitat may occur within area
Maroubra perserrata		
Sawtooth Pipefish [66252]		Species or species habitat may occur within area
Mitotichthys meraculus		
Western Crested Pipefish [66259]		Species or species habitat may occur within area
Nannocampus subosseus		
Bonyhead Pipefish, Bony-headed Pipefish [66264]		Species or species habitat may occur within area
Phycodurus eques		
Leafy Seadragon [66267]		Species or species habitat may occur within area
Phyllopteryx taeniolatus		
Common Seadragon, Weedy Seadragon [66268]		Species or species habitat may occur within area
Pugnaso curtirostris		
Pugnose Pipefish, Pug-nosed Pipefish [66269]		Species or species habitat may occur within area
Solegnathus lettiensis		
Gunther's Pipehorse, Indonesian Pipefish [66273]		Species or species habitat may occur within area
Stigmatopora argus		
Spotted Pipefish, Gulf Pipefish [66276]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Stigmatopora nigra		
Widebody Pipefish, Wide-bodied Pipefish, Black Pipefish [66277]		Species or species habitat may occur within area
Syngnathoides biaculeatus		
Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish [66279]		Species or species habitat may occur within area
Urocampus carinirostris		
Hairy Pipefish [66282]		Species or species habitat may occur within area
Vanacampus margaritifer		
Mother-of-pearl Pipefish [66283]		Species or species habitat may occur within area
Mammals		
Arctocephalus forsteri		
New Zealand Fur-seal [20]		Species or species habitat may occur within area
Neophoca cinerea		
Australian Sea-lion [22]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Reptiles		
Aipysurus pooleorum		
Shark Bay Seasnake [66061]		Species or species habitat may occur within area
Caretta caretta		
Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
Chelonia mydas		
Green Turtle [1765]	Vulnerable	Species or species habitat likely to occur within area
Dermochelys coriacea		
Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat likely to occur within area
Disteira kingii		
Spectacled Seasnake [1123]		Species or species habitat may occur within area
Pelamis platurus		
Yellow-bellied Seasnake [1091]		Species or species habitat may occur within area

Whales and other Cetaceans		[Resource Information]
Name	Status	Type of Presence
Mammals		
Balaenoptera acutorostrata		
Minke Whale [33]		Species or species habitat may occur within area
Balaenoptera edeni		
Bryde's Whale [35]		Species or species habitat may occur within area
Balaenoptera musculus		
Blue Whale [36]	Endangered	Species or species habitat may occur within area
Caperea marginata		
Pygmy Right Whale [39]		Species or species habitat may occur within area
Delphinus delphis		
Common Dophin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within

Name	Status	Type of Presence
		area
Eubalaena australis Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area
Grampus griseus Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
Lagenorhynchus obscurus Dusky Dolphin [43]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Stenella attenuata Spotted Dolphin, Pantropical Spotted Dolphin [51]		Species or species habitat may occur within area
Tursiops aduncus Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area
Tursiops truncatus s. str. Bottlenose Dolphin [68417]		Species or species habitat may occur within area

Extra Information

Places on the RNE [Resource Information]

Note that not all Indigenous sites may be listed.

Name	State	Status
Natural		
Moore River to Murchison River Area	WA	Indicative Place
Beekeepers Reserve	WA	Registered
Islands between Dongara and Lancelin	WA	Registered
Mount Lesueur Area	WA	Registered
Mount Lesueur Proposed Reserve	WA	Registered

State and Territory Reserves [Resource Information]

Name	State
Beekeepers	WA
Lesueur	WA
Lipfert, Milligan, Etc Islands	WA
Unnamed WA46982	WA

Invasive Species [Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit,

Name	Status	Type of Presence
Mammals		
Capra hircus Goat [2]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
[Felis catus](#) Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
[Oryctolagus cuniculus](#) Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
[Sus scrofa](#) Pig [6]		Species or species habitat likely to occur within area
[Vulpes vulpes](#) Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
[Asparagus asparagoides](#) Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
[Cenchrus ciliaris](#) Buffel-grass, Black Buffel-grass [20213]		Species or species habitat may occur within area
[Lycium ferocissimum](#) African Boxthorn, Boxthorn [19235]		Species or species habitat may occur within area
[Tamarix aphylla](#) Athel Pine, Athel Tree, Tamarisk, Athel Tamarisk, Athel Tamarix, Desert Tamarisk, Flowering Cypress, Salt Cedar [16018]		Species or species habitat likely to occur within area

Coordinates

-29.93639 114.97972

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World Heritage and Register of National Estate properties, Wetlands of International Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

For species where the distributions are well known, maps are digitised from sources such as recovery plans and detailed habitat studies. Where appropriate, core breeding, foraging and roosting areas are indicated under 'type of presence'. For species whose distributions are less well known, point locations are collated from government wildlife authorities, museums, and non-government organisations; bioclimatic distribution models are generated and these validated by experts. In some cases, the distribution maps are based solely on expert knowledge.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Department of Environment, Climate Change and Water, New South Wales
-Department of Sustainability and Environment, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment and Natural Resources, South Australia
-Parks and Wildlife Service NT, NT Dept of Natural Resources, Environment and the Arts
-Environmental and Resource Management, Queensland
-Department of Environment and Conservation, Western Australia
-Department of the Environment, Climate Change, Energy and Water
-Birds Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-SA Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Atherton and Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
-State Forests of NSW
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact Us page.

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NatureMap
Mapping Western Australia's biodiversity

NatureMap Species Report - Leeman

Created By Guest user on 28/11/2012

Current Names Only Yes
Core Datasets Only Yes
Method 'By Rectangle'
Extent 114°57' 24" E, 115°00' 53" E, 29°53' 23" S, 30°01' 10" S

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
1.	11611	*Acacia lasiocarpa var. lasiocarpa*			
2.	3525	*Acacia rostellifera (Summer-scented Wattle)*			
3.	3584	*Acacia truncata*			
4.	3604	*Acacia xanthina (White-stemmed Wattle)*			
5.	24260	*Acanthiza apicalis (Broad-tailed Thornbill)*			
6.	24261	*Acanthiza chrysorrhoa (Yellow-rumped Thornbill)*			
7.	1208	*Acanthocarpus preissii*			
8.	17739	*Acetosa vesicaria*	Y		
9.	6295	*Acrotriche cordata (Coast Ground Berry)*			
10.	41323	*Actitis hypoleucos (Common Sandpiper)*		IA	
11.	4905	*Alyogyne hakeifolia*			
12.	4906	*Alyogyne huegelii (Lilac Hibiscus)*			
13.	13267	*Amyema linophylla subsp. linophylla*			
14.	7827	*Angianthus cunninghamii (Coast Angianthus)*			
15.	6949	*Anthocercis littorea (Yellow Tailflower)*			
16.	24561	*Anthochaera carunculata (Red Wattlebird)*			
17.	24341	*Ardea pacifica (White-necked Heron)*			
18.	25736	*Arenaria interpres (Ruddy Turnstone)*		IA	
19.	34236	*Beyeria cinerea subsp. cinerea*		P3	
20.	25333	*Brachyurophis fasciolata subsp. fasciolata*			
21.	247	*Bromus arenarius (Sand Brome)*			
22.	27602	*Buellia georgei*			
23.	25716	*Cacatua sanguinea (Little Corella)*			
24.	18035	*Caladenia bicalliata subsp. bicalliata*			
25.	2860	*Calandrinia polyandra (Parakeelya)*			
26.	24788	*Calidris ruficollis (Red-necked Stint)*		IA	
27.	2798	*Carpobrotus virescens (Coastal Pigface)*			
28.	2948	*Cassytha aurea*			
29.	1742	*Casuarina obesa (Swamp Sheoak)*			
30.	26559	*Caulerpa cupressoides*			
31.	17685	*Chaetanthus aristatus*			
32.	24370	*Charadrius bicinctus subsp. bicinctus*			
33.	24376	*Charadrius rubricollis (Hooded Plover)*		P4	
34.	24377	*Charadrius ruficapillus (Red-capped Plover)*			
35.	10804	*Clematis linearifolia*			
36.	25675	*Colluricincla harmonica (Grey Shrike-thrush)*			
37.	24399	*Columba livia (Domestic Pigeon)*			
38.	40872	*Commersonia borealis*			
39.	1427	*Conostylis candicans (Grey Cottonhead)*			
40.	12027	*Conostylis candicans subsp. calcicola*			
41.	25568	*Coracina novaehollandiae (Black-faced Cuckoo-shrike)*			
42.	25592	*Corvus coronoides (Australian Raven)*			
43.	25701	*Coturnix ypsilophora (Brown Quail)*			
44.	25596	*Cracticus torquatus (Grey Butcherbird)*			
45.	4802	*Cryptandra mutila*			
46.	30899	*Ctenophorus adelaidensis (Southern Heath Dragons)*			
47.	25039	*Ctenotus fallens*			
48.	25087	*Cyclodomorphus celatus*			
49.	5518	*Darwinia neildiana (Fringed Bell)*			
50.	25766	*Delma fraseri (Fraser's Legless Lizard)*			
51.	17663	*Desmocladus asper*			
52.	25607	*Dicaeum hirundinaceum (Mistletoebird)*			
53.	24938	*Diplodactylus ornatus*			
54.	25251	*Echiopsis curta (Bardick)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
55.	24652	*Eopsaltria georgiana (White-breasted Robin)*			
56.	7215	*Eremophila glabra (Tar Bush)*			
57.	17175	*Eremophila glabra subsp. albicans*			
58.	5722	*Eucalyptus obtusiflora (Dongara Mallee)*			
59.	5761	*Eucalyptus rigidula (Stiff-leaved Mallee)*			
60.	13544	*Eucalyptus zopherophloia (Blackbutt Mallee)*		P4	
61.	24471	*Falco berigora subsp. berigora*			
62.	25622	*Falco cenchroides (Australian Kestrel)*			
63.	25623	*Falco longipennis (Australian Hobby)*			
64.	5209	*Frankenia pauciflora (Seaheath)*			
65.	32371	*Funaria microstoma*			
66.	907	*Gahnia trifida (Coast Saw-sedge)*			
67.	24959	*Gehyra variegata*			
68.	25530	*Gerygone fusca (Western Gerygone)*			
69.	24443	*Grallina cyanoleuca (Magpie-lark)*			
70.	2054	*Grevillea olivacea (Olive Grevillea)*		P4	
71.	13900	*Grevillea uniformis*		P3	
72.	24487	*Haematopus longirostris (Pied Oystercatcher)*			
73.	24293	*Haliaeetus leucogaster (White-bellied Sea-Eagle)*		IA	
74.	25119	*Hemiergis quadrilineata*			
75.	24491	*Hirundo neoxena (Welcome Swallow)*			
76.	12741	*Hyalosperma cotula*			
77.	14751	*Jacksonia rubra*		P2	
78.	4029	*Jacksonia sternbergiana (Stinkwood)*			
79.	4044	*Kennedia prostrata (Scarlet Runner)*			
80.	4046	*Lablab purpureus (Lablab Bean)*	Y		
81.	25637	*Larus novaehollandiae (Silver Gull)*			
82.	25638	*Larus pacificus (Pacific Gull)*			
83.	4959	*Lawrencia squamata*			
84.	933	*Lepidosperma gladiatum (Coast Sword-sedge)*			
85.	36060	*Lepidosperma sp. Coastal Dunes (R.J. Cranfield 9963)*			
86.	2344	*Leptomeria empetriformis*			
87.	2352	*Leptomeria preissiana*			
88.	25133	*Lerista elegans*			
89.	25165	*Lerista praepedita*			
90.	6427	*Leucopogon parviflorus (Coast Beard-heath)*			
91.	24581	*Lichenostomus virescens (Singing Honeyeater)*			
92.	25661	*Lichmera indistincta (Brown Honeyeater)*			
93.	25651	*Malurus lamberti (Variegated Fairy-wren)*			
94.	25652	*Malurus leucopterus (White-winged Fairy-wren)*			
95.	25654	*Malurus splendens (Splendid Fairy-wren)*			
96.	31351	*Malva preissiana*			
97.	5881	*Melaleuca brevifolia*			
98.	5887	*Melaleuca cardiophylla (Tangling Melaleuca)*			
99.	13280	*Melaleuca viminea subsp. viminea*			
100.	25192	*Morethia obscura*			
101.	24223	*Mus musculus (House Mouse)*			
102.	7289	*Myoporum caprarioides (Slender Myoporum)*			
103.	7295	*Myoporum tetrandrum (Boobialla)*			
104.	11327	*Nicotiana occidentalis subsp. hesperis*			
105.	4366	*Nitraria billardierei (Nitre Bush)*			
106.	25742	*Numenius phaeopus (Whimbrel)*		IA	
107.	24407	*Ocyphaps lophotes (Crested Pigeon)*			
108.	2365	*Olax benthamiana*			
109.	18256	*Opercularia spermacocea*			
110.	25679	*Pachycephala pectoralis (Golden Whistler)*			
111.	25680	*Pachycephala rufiventris (Rufous Whistler)*			
112.	25543	*Pandion haliaetus (Osprey)*			
113.	25682	*Pardalotus striatus (Striated Pardalote)*			
114.	24648	*Pelecanus conspicillatus (Australian Pelican)*			
115.	20368	*Petrophile axillaris*			
116.	24744	*Pezoporus wallicus subsp. flaviventrus (Western Ground Parrot)*		T	
117.	25698	*Phalacrocorax melanoleucos (Little Pied Cormorant)*			
118.	24667	*Phalacrocorax sulcirostris (Little Black Cormorant)*			
119.	25699	*Phalacrocorax varius (Pied Cormorant)*			
120.	551	*Phalaris minor (Lesser Canary Grass)*	Y		
121.	4675	*Phyllanthus calycinus (False Boronia)*			
122.	5243	*Pimelea ferruginea*			
123.	5246	*Pimelea gilgiana*			
124.	24383	*Pluvialis squatarola (Grey Plover)*		IA	

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
125.	577	*Poa poiformis (Coastal Poa)*			
126.	24907	*Pogona minor subsp. minor*			
127.	25722	*Polytelis anthopeplus (Regent Parrot)*			
128.	25264	*Pseudonaja nuchalis (Gwardar)*			
129.	15426	*Pterostylis aspera*			
130.	19222	*Pterostylis sp. mid-west coast (G. Brockman GBB134)*			Y
131.	25008	*Pygopus lepidopodus (Common Scaly Foot)*			
132.	6014	*Regelia inops*			
133.	8197	*Reichardia tingitana (False Sowthistle)*	Y		
134.	25614	*Rhipidura leucophrys (Willie Wagtail)*			
135.	30434	*Salsola australis*			
136.	6484	*Samolus repens (Creeping Brookweed)*			
137.	2356	*Santalum acuminatum (Quandong)*			
138.	7606	*Scaevola crassifolia (Thick-leaved Fan-flower)*			
139.	7614	*Scaevola globulifera*			
140.	7626	*Scaevola nitida (Shining Fanflower)*			
141.	13152	*Scaevola thesioides subsp. thesioides*			
142.	997	*Schoenus lanatus (Woolly Bog-rush)*			
143.	1004	*Schoenus nitens (Shiny Bog-rush)*			
144.	25534	*Sericornis frontalis (White-browed Scrubwren)*			
145.	25267	*Simoselaps littoralis (West Coast Banded Snake)*			
146.	24109	*Sminthopsis dolichura (Little long-tailed Dunnart)*			
147.	8231	*Sonchus oleraceus (Common Sowthistle)*	Y		
148.	2914	*Spergularia diandra (Lesser Sand Spurry)*	Y		
149.	4828	*Spyridium globulosum (Basket Bush)*			
150.	24523	*Sterna caspia (Caspian Tern)*		IA	
151.	24530	*Sterna nereis subsp. nereis (Fairy Tern)*		T	
152.	25597	*Strepera versicolor (Grey Currawong)*			
153.	25590	*Streptopelia senegalensis (Laughing Turtle-Dove)*			
154.	24942	*Strophurus spinigerus subsp. spinigerus*			
155.	7720	*Stylidium elongatum (Tall Triggerplant)*			
156.	24331	*Tadorna tadornoides (Australian Shelduck)*			
157.	33236	*Tecticornia halocnemoides (Shrubby Samphire)*			
158.	33319	*Tecticornia indica subsp. bidens*			
159.	2820	*Tetragonia decumbens (Sea Spinach)*	Y		
160.	2644	*Threlkeldia diffusa (Coast Bonefruit)*			
161.	17266	*Thryptomene sp. Lancelin (M.E. Trudgen 14000)*		P2	
162.	25203	*Tiliqua occipitalis (Western Bluetongue)*			
163.	25549	*Todiramphus sanctus (Sacred Kingfisher)*			
164.	24386	*Vanellus tricolor (Banded Lapwing)*			
165.	8257	*Vellereophyton dealbatum (White Cudweed)*	Y		
166.	12393	*Verticordia aurea*		P4	
167.	12411	*Verticordia densiflora var. cespitosa*			
168.	6659	*Wilsonia humilis (Silky Wilsonia)*			
169.	25765	*Zosterops lateralis (Grey-breasted White-eye)*			

Conservation Codes
T - Rare or likely to become extinct
X - Presumed extinct
IA - Protected under international agreement
S - Other specially protected fauna
1 - Priority 1
2 - Priority 2
3 - Priority 3
4 - Priority 4
5 - Priority 5

[1] For NatureMap's purposes, species flagged as endemic are those whose records are wholely contained within the search area. Note that only those records complying with the search criterion are included in the calculation. For example, if you limit records to those from a specific datasource, only records from that datasource are used to determine if a species is restricted to the query area.

Appendix C3 – Summary Table of Flora Desktop Results

Table 1 **Flora species of conservation significance identified in the desktop assessment, their conservation status, habitat and likelihood of occurrence in the Project Area**

Species	EPBC Cons. Code	WC Cons. Code	Habitat	Comment
Grevillea batrachioides	E	T	Sandy loam on sandstone outcrops, in rocky or stony soil and rocky crevices	**Unlikely to occur**: found further inland from the coast
Grevillea humifusa	E	T	Gravelly loam over laterite	**Unlikely to occur**: found further inland, habitat not present.
Hemiandra gardneri	E	T	Grey or yellow sand and clayey sand on sandplains.	**Unlikely to occur**: found further inland, habitat not present.
Isopogon uncinatus	E	T	Loam or sand on granite and peaty sand near swampy depressions and on hill slopes.	**Unlikely to occur**: found in the Albany district, habitat not present.
Leucopogon obtectus	E	T	Grey sand	**Unlikely to occur**: found further inland and North near Eneabba.
Centrolepis caespitosa	E	P4	White sand, clay around salt flats and wet areas.	**Unlikely to occur**: distribution is further south and habitat not present. Likely to be delisted from EBPC due to further studies showing its wide distribution throughout the southwest of WA.
Jacksonia rubra		P2	Claye sand	**Unlikely to occur**: habitat not present, found further inland.
Thryptomene sp. Lancelin (M.E. Trudgen 14000)		P2	Calcerous sand	**Likely to occur**: habitat present, distribution includes Leeman.
Stylidium maritimum		P3	Sand over limestone on dune slopes and flats in coastal heath and shrubland and open Banksia woodland.	**Likely to occur**: habitat present, distribution includes Leeman.
Beyeria cinerea subsp. *cinerea*		P3	Unknown	**Likely to occur**: distribution includes Leeman.
Grevillea uniformis		P3	Amongst medium to low trees or tall shrubland in gravelly soil, sand, loam or clay.	**Unlikely to occur**: habitat not present, found further inland.
Verticordia aurea		P4	Deep sands on sandplains.	**Unlikely to occur**: found further inland, habitat not present.
Eucalyptus zopherophloia		P4	Grey/white sand with limestone rubble along coastal areas.	**Likely to occur**: habitat present, distribution includes Leeman.
Grevillea olivacea		P4	Amongst medium to low trees in	**Unlikely to occur**: habitat

Species	EPBC Cons. Code	WC Cons. Code	Habitat	Comment
			gravelly soil, sand or loam. Found on cavestone entrances, lateritic sandplains and limestone swamp flats.	not present

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Appendix D

Flora and Vegetation Site Data for the Leeman Boat Ramp Project

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Leeman Boat Ramp **Site** LB01

Described by FDW **Date** 29/11/2012 **Type** R

Season E **Uniformity**

Location next to Illyarrie road

MGA Zone 50 305047 **mE** 6686600 **mN** 114.980176 **E** -29.935816 **S**

Habitat Melaleuca shrubland

Soil white sand and limestone

Rock Type Limestone

Vegetation Mel over mixed shrubs, minimal herbs

Veg Condition Very good

Fire Age

Notes

SPECIES LIST:

Name	Cover	C Class	Height	Specimen	Notes
Acacia lasiocarpa var. lasiocarpa	0.5		40	FW07	Acacia lasio
Acacia saligna subsp. saligna	3		250	FW04	Acacia segmented
Acacia truncata	1.5		40	FW05	Acacia triangle
Acrotriche cordata	1		40	FW10	green striate under
Allocasuarina lehmanniana subsp. lehmanniana	0.3		80	FW06	Allocas not humilis
Austrostipa elegantissima	0.2		100	FW12	Poa helicopter
Avena barbata	0.5		60		
Cassytha flava	1			FW11	Cassytha
Leptomeria preissiana	2		100	FW03	exocarpus like
Levenhookia pusilla	0.1		10		
Melaleuca cardiophylla	5		140	FW02	Eremaea tall
Melaleuca lanceolata	25		400	FW01	Mel rows
Rhagodia ? latifolia	0.1		70	FW09	Cheno plain
Rhagodia preissii subsp. obovata	0.4		50	FW08	Rhagodia leeman
Templetonia retusa	4		150	FW14	Gastro biloba
Threlkeldia diffusa	3		30	FW13	Maireana
Wahlenbergia sp.	0.05		20		

Leeman Boat Ramp **Site** LB02

Described by FDW **Date** 29/11/2012 **Type** R

Season E **Uniformity**

Location

MGA Zone 50 305015 **mE** 6686570 **mN** 114.979839 **E** -29.936081 **S**

Habitat shrubs

Soil grey sand

Rock Type

Vegetation Shrubs and heath

Veg Condition Very Good

Fire Age

Notes

SPECIES LIST:

Name	Cover	C Class	Height	Specimen	Notes
Acacia lasiocarpa var. lasiocarpa	1.5		30	FW07	Acacia lasio
Acanthocarpus preissii	0.1		30	FW18	Agrostocrinum
Allocasuarina lehmanniana subsp. lehmanniana	2		40	FW15	Allocas nuts
Cassytha flava	0.1			FW11	Cassytha
Jacksonia floribunda	0.3		30		
Kennedia prostrata	0.2				
Labichea lanceolata subsp. lanceolata	0.1		30	fw24	labichea
Lagurus ovatus	0.2		30	FW20	Amphi balls
Leucopogon insularis	0.3		25	FW16	Epacrid
Melaleuca huegelii subsp. huegelii	3		100	FW19	mel tight rows
Melaleuca lanceolata	5		150	FW01	Mel rows
Melaleuca systena	1		110		
Pimelea ferruginea	0.7		30	FW21	pimelea
Rhagodia ? latifolia	0.5		35	FW09	Cheno plain
Santalum acuminatum	1		40	FW22	Santalum
Scaevola crassifolia	1.5		40	fw23	scaevola paddles
Schoenus lanatus	3		30	FW17	Schoenus
Templetonia retusa	2		60	FW14	gastro biloba
Threlkeldia diffusa	5		20	FW13	maireana

Leeman Boat Ramp **Site** LB03

Described by FDW **Date** 29/11/2012 **Type** R

Season E **Uniformity**

Location

MGA Zone 50 304973 **mE** 6686578 **mN** 114.979406 **E** -29.936002 **S**

Habitat limestone outcrop

Soil none

Rock Type

Vegetation open heath

Veg Condition very good

Fire Age

Notes adjacent to ocean

SPECIES LIST:

Name	Cover	C Class	Height	Specimen	Notes
Acacia blakelyi	2		35		
Acanthocarpus preissii	5		30	FW18	agrostocrinum
Atriplex cinerea	0.2		30	FW25	atriplex
Avena barbata	0.5		40		
Chordifex sinuosus	0.4		30	fw29	restio limestone
Jacksonia floribunda	0.3		30		
Kennedia prostrata	0.2				
Labichea lanceolata subsp. lanceolata	0.1		15	FW24	labichea
Leucopogon insularis	0.1		30	FW16	epacrid
Olearia axillaris	0.4		30	FW28	olearia
Pimelea ferruginea	3		20	FW21	pimelea
Samolus repens var. paucifolius	0.01		20	FW26	terminal zigzag
Scaevola crassifolia	6		30	FW23	scaevola paddle
Schoenus pedicellatus	6		20	FW27	schoenus small

Leeman Boat Ramp **Site** LB04

Described by FDW **Date** 29/11/2012 **Type** R

Season E **Uniformity**

Location

MGA Zone 50 304976 **mE** 6686565 **mN** 114.979434 **E** -29.936120 **S**

Habitat

Soil white sand

Rock Type limestone underneath

Vegetation shrubs

Veg Condition Good

Fire Age 10 years

Notes man-made bird nest on tall pole. Deeper sand than surrounding area, likely to be more prone to erosion. Lots of bare ground

SPECIES LIST:

Name	Cover	C Class	Height	Specimen	Notes
Acanthocarpus preissii	2		30	fw18	agrostocrinum
Carpobrotus edulis	4		pr		
Ficinia nodosa	0.5		40	fw32	lepidobolus
Frankenia pauciflora	0.2		20	fw31	heath clumps
Olearia axillaris	3		30	fw28	olearia
Sarcocornia quinqueflora	2.5		20	fw33	halosarcia
Scaevola crassifolia	1		40	fw23	scaevola paddles
Tetragonia decumbens	5		pr	fw30	succulent bush
Threlkeldia diffusa	3		20	fw13	maireana

Leeman Boat Ramp **Site** LB05

Described by FDW **Date** 29/11/2012 **Type** R

Season E **Uniformity**

Location

MGA Zone 50 305001 **mE** 6686504 **mN** 114.979682 **E** -29.936674 **S**

Habitat

Soil

Rock Type

Vegetation

Veg Condition very good

Fire Age 10 plus

Notes

SPECIES LIST:

Name	Cover	C Class	Height	Specimen	Notes
Acacia blakelyi	6		130		
Acanthocarpus preissii	2		35	fw18	agrostocrinum
Avena barbata	0.3		30		
Carpobrotus edulis	1		pr		
Exocarpos sparteus	0.2		100	fw35	terete weird
Frankenia pauciflora	1.5		30	fw31	heath clumps
Levenhookia pusilla	0.1		5		
Myoporum insulare	4		80	fw34	berry bush
Olearia axillaris	3		100	fw28	olearia
Scaevola crassifolia	30		50	FW23	scaevola paddle
Schoenus pedicellatus	0.4		20	fw27	schoenus small
Threlkeldia diffusa	0.6		15	fw13	maireana

Leeman Boat Ramp **Site** LB06

Described by FDW **Date** 29/11/2012 **Type** R

Season E **Uniformity**

Location

MGA Zone 50 305051 **mE** 6686550 **mN** 114.980208 **E** -29.936267 **S**

Habitat

Soil grey sand

Rock Type

Vegetation mel shrubs over mixed shrubs, minimal ground cover/understorey herbs

Veg Condition very good

Fire Age

Notes

SPECIES LIST:

Name	Cover	C Class	Height	Specimen	Notes
Acacia saligna subsp. saligna	5		300	fw04	acacia segmented
Bromus diandrus	15		30	fw38	bromus
Cassytha flava	0.3			fw11	cassytha
Euphorbia terracina	0.1		15		
Melaleuca cardiophylla	7		120	fw02	eremaea tall
Melaleuca huegelii subsp. huegelii	60		250	fw19	mel tight rows
Spyridium globulosum	0.4		130	fw36	trymalium not
Templetonia retusa	10		130	fw14	gastro biloba
Threlkeldia diffusa	1		20	fw13	maireana
Zygophyllum fruticulosum	1.5		130	fw37	dodonaea

Leeman Boat Ramp **Site** LB07

Described by FDW **Date** 30/11/2012 **Type** R

Season E **Uniformity**

Location

MGA Zone 50 305001 **mE** 6686593 **mN** 114.979698 **E** -29.935872 **S**

Habitat side of sand dune

Soil white sand

Rock Type

Vegetation

Veg Condition very good

Fire Age 10 plus

Notes

SPECIES LIST:

Name	Cover	C Class	Height	Specimen	Notes
Acacia saligna subsp. saligna	4		70	fw04	acacia segmented
Acanthocarpus preissii	4		30	fw18	agrostocrinum
Bromus diandrus	2		30	fw38	bromus
Conostylis canescens	0.4		25	fw39	conostylis
Kennedia prostrata	0.2		pr		
Lagurus ovatus	0.1		20	fw20	amphi balls
Olearia axillaris	1		120	fw28	olearia
Santalum acuminatum	2		40	fw22	santalum
Scaevola crassifolia	26		40	fw23	scaevola paddle
Spyridium globulosum	2		100	fw36	trymalium not
Templetonia retusa	25		110	fw14	gasto biloba
Threlkeldia diffusa	0.1		20	fw13	maireana
Zygophyllum fruticulosum	1		30	FW37	Dodonaea

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Appendix E

Vascular Plant Species Recorded in the Leeman Boat Ramp Project Area, November 2012

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APPENDIX E: VASCULAR PLANT SPECIES RECORDED WITHIN THE LEEMAN BOAT RAMP PROJECT ARE/
NOVEMBER 2012

NB: * denotes introduced (weed) species

Family	Weed	Genus	Cons. Status	Range Ext.
Aizoaceae	*	*Carpobrotus edulis*		
	*	*Tetragonia decumbens*		
Asparagaceae		*Acanthocarpus preissii*		
Asteraceae		*Olearia axillaris*		
Campanulaceae		*Wahlenbergia sp.*		
Casuarinaceae		*Allocasuarina lehmanniana* subsp. *lehmanniana*		
Chenopodiaceae		*Atriplex cinerea*		
		Rhagodia ? latifolia		
		Rhagodia preissii subsp. *obovata*		
		Sarcocornia quinqueflora		
		Threlkeldia diffusa		
Cyperaceae		*Ficinia nodosa*		
		Schoenus lanatus		
		Schoenus pedicellatus		
Ericaceae		*Acrotriche cordata*		
		Leucopogon insularis		
Euphorbiaceae	*	*Euphorbia terracina*		
Fabaceae		*Acacia blakelyi*		
		Acacia lasiocarpa var. *lasiocarpa*		
		Acacia saligna subsp. *saligna*		
		Acacia truncata		
		Jacksonia floribunda		
		Kennedia prostrata		
		Labichea lanceolata subsp. *lanceolata*		
		Templetonia retusa		
Frankeniaceae		*Frankenia pauciflora*		
Goodeniaceae		*Scaevola crassifolia*		
Haemodoraceae		*Conostylis canescens*		
Lauraceae		*Cassytha flava*		
Myrtaceae		*Melaleuca cardiophylla*		
		Melaleuca huegelii subsp. *huegelii*		
		Melaleuca lanceolata		
		Melaleuca systena		
Poaceae		*Austrostipa elegantissima*		
	*	*Avena barbata*		
	*	*Bromus diandrus*		
	*	*Lagurus ovatus*		
Primulaceae		*Samolus repens* var. *paucifolius*		
Restionaceae		*Chordifex sinuosus*		
Rhamnaceae		*Spyridium globulosum*		
Santalaceae		*Exocarpos sparteus*		
		Leptomeria preissiana		
		Santalum acuminatum		
Scrophulariaceae		*Myoporum insulare*		
Stylidiaceae		*Levenhookia pusilla*		
Thymelaeaceae		*Pimelea ferruginea*		
Zygophyllaceae		*Zygophyllum fruticulosum*		

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Appendix C

EPBC Act Protected Matters Report

Appendix C EPBC Act Protected Matters Report

Australian Government

Department of Sustainability, Environment, Water, Population and Communities

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

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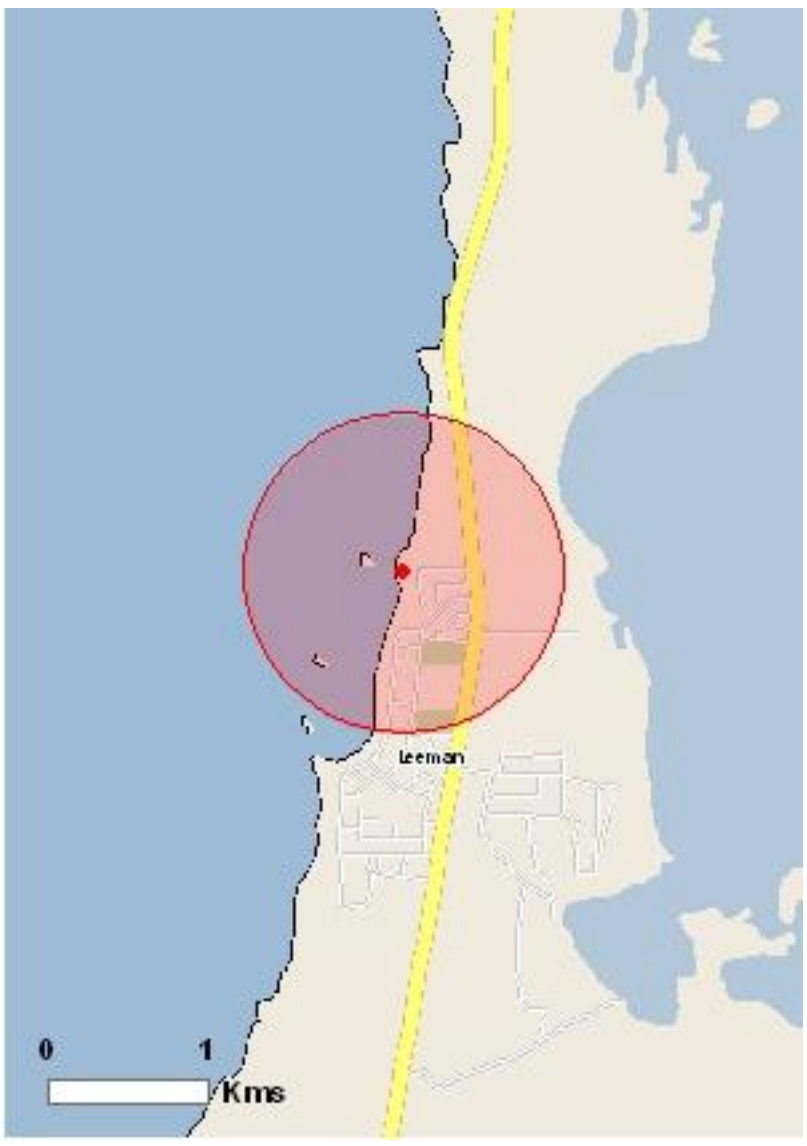

This map may contain data which are ©Commonwealth of Australia (Geoscience Australia), ©PSMA 2010

Coordinates
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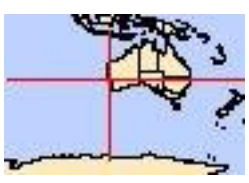

Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	1
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Areas:	None
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	16
Listed Migratory Species:	23

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place and the heritage values of a place on the Register of the National Estate.

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	42
Whales and Other Cetaceans:	11
Critical Habitats:	None
Commonwealth Reserves:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

Place on the RNE:	1
State and Territory Reserves:	2
Regional Forest Agreements:	None
Invasive Species:	9
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

National Heritage Properties [Resource Information]

Name	State	Status
Natural		
Beekeepers-Lesueur-Coomallo Area and Nambung National Park	WA	Nominated place

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		
Calyptorhynchus latirostris Carnaby's Black-Cockatoo, Short-billed Black-Cockatoo [59523]	Endangered	Species or species habitat likely to occur within area
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat may occur within area
Macronectes giganteus Southern Giant-Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant-Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Thalassarche cauta cauta Shy Albatross, Tasmanian Shy Albatross [82345]	Vulnerable	Species or species habitat may occur within area
Insects		
Synemon gratiosa Graceful Sun Moth [66757]	Endangered	Species or species habitat may occur within area
Mammals		
Eubalaena australis Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat known to occur

Name	Status	Type of Presence
		within area
Neophoca cinerea		
Australian Sea-lion [22]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Plants		
Centrolepis caespitosa		
[6393]	Endangered	Species or species habitat may occur within area
Reptiles		
Caretta caretta		
Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
Chelonia mydas		
Green Turtle [1765]	Vulnerable	Species or species habitat likely to occur within area
Dermochelys coriacea		
Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat likely to occur within area
Sharks		
Carcharias taurus (west coast population)		
Grey Nurse Shark (west coast population) [68752]	Vulnerable	Species or species habitat may occur within area
Carcharodon carcharias		
Great White Shark [64470]	Vulnerable	Species or species habitat likely to occur within area
Rhincodon typus		
Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area

Listed Migratory Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba		
Great Egret, White Egret [59541]		Species or species habitat may occur within area
Ardea ibis		
Cattle Egret [59542]		Species or species habitat may occur within area
Macronectes giganteus		
Southern Giant-Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli		
Northern Giant-Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Sterna caspia		
Caspian Tern [59467]		Foraging, feeding or related behaviour known to occur within area
Thalassarche cauta (sensu stricto)		
Shy Albatross, Tasmanian Shy Albatross [64697]	Vulnerable*	Species or species habitat may occur within area
Migratory Marine Species		
Balaenoptera edeni		
Bryde's Whale [35]		Species or species

Name	Threatened	Type of Presence
		habitat may occur within area
Carcharodon carcharias Great White Shark [64470]	Vulnerable	Species or species habitat likely to occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat likely to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat likely to occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area
Lagenorhynchus obscurus Dusky Dolphin [43]		Species or species habitat may occur within area
Lamna nasus Porbeagle, Mackerel Shark [83288]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area
Migratory Terrestrial Species		
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Migratory Wetlands Species		
Ardea alba Great Egret, White Egret [59541]		Species or species habitat may occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species [Resource Information]		
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Species or species habitat may occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area
Larus novaehollandiae Silver Gull [810]		Breeding known to occur within area
Larus pacificus Pacific Gull [811]		Foraging, feeding or related behaviour known to occur within area
Macronectes giganteus Southern Giant-Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant-Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Breeding known to occur within area
Puffinus assimilis Little Shearwater [59363]		Foraging, feeding or related behaviour known to occur within area
Sterna caspia Caspian Tern [59467]		Foraging, feeding or related behaviour known to occur within area
Sterna dougallii Roseate Tern [817]		Foraging, feeding or related behaviour likely to occur within area
Thalassarche cauta (sensu stricto) Shy Albatross, Tasmanian Shy Albatross [64697]	Vulnerable*	Species or species habitat may occur within area
Fish		
Acentronura australe Southern Pygmy Pipehorse [66185]		Species or species habitat may occur within area
Campichthys galei Gale's Pipefish [66191]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Choeroichthys suillus Pig-snouted Pipefish [66198]		Species or species habitat may occur within area
Halicampus brocki Brock's Pipefish [66219]		Species or species habitat may occur within area
Hippocampus angustus Western Spiny Seahorse, Narrow-bellied Seahorse [66234]		Species or species habitat may occur within area
Hippocampus breviceps Short-head Seahorse, Short-snouted Seahorse [66235]		Species or species habitat may occur within area
Hippocampus subelongatus West Australian Seahorse [66722]		Species or species habitat may occur within area
Lissocampus fatiloquus Prophet's Pipefish [66250]		Species or species habitat may occur within area
Maroubra perserrata Sawtooth Pipefish [66252]		Species or species habitat may occur within area
Mitotichthys meraculus Western Crested Pipefish [66259]		Species or species habitat may occur within area
Nannocampus subosseus Bonyhead Pipefish, Bony-headed Pipefish [66264]		Species or species habitat may occur within area
Phycodurus eques Leafy Seadragon [66267]		Species or species habitat may occur within area
Phyllopteryx taeniolatus Common Seadragon, Weedy Seadragon [66268]		Species or species habitat may occur within area
Pugnaso curtirostris Pugnose Pipefish, Pug-nosed Pipefish [66269]		Species or species habitat may occur within area
Solegnathus lettiensis Gunther's Pipehorse, Indonesian Pipefish [66273]		Species or species habitat may occur within area
Stigmatopora argus Spotted Pipefish, Gulf Pipefish [66276]		Species or species habitat may occur within area
Stigmatopora nigra Widebody Pipefish, Wide-bodied Pipefish, Black Pipefish [66277]		Species or species habitat may occur within area
Syngnathoides biaculeatus Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish [66279]		Species or species habitat may occur within area
Urocampus carinirostris Hairy Pipefish [66282]		Species or species habitat may occur within area
Vanacampus margaritifer Mother-of-pearl Pipefish [66283]		Species or species habitat may occur within area
Mammals		

Name	Threatened	Type of Presence
Arctocephalus forsteri		
New Zealand Fur-seal [20]		Species or species habitat may occur within area
Neophoca cinerea		
Australian Sea-lion [22]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Reptiles		
Aipysurus pooleorum		
Shark Bay Seasnake [66061]		Species or species habitat may occur within area
Caretta caretta		
Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
Chelonia mydas		
Green Turtle [1765]	Vulnerable	Species or species habitat likely to occur within area
Dermochelys coriacea		
Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat likely to occur within area
Disteira kingii		
Spectacled Seasnake [1123]		Species or species habitat may occur within area
Pelamis platurus		
Yellow-bellied Seasnake [1091]		Species or species habitat may occur within area

Whales and other Cetaceans		[Resource Information]
Name	Status	Type of Presence
Mammals		
Balaenoptera acutorostrata		
Minke Whale [33]		Species or species habitat may occur within area
Balaenoptera edeni		
Bryde's Whale [35]		Species or species habitat may occur within area
Delphinus delphis		
Common Dophin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area
Eubalaena australis		
Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area
Grampus griseus		
Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
Lagenorhynchus obscurus		
Dusky Dolphin [43]		Species or species habitat may occur within area
Megaptera novaeangliae		
Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
Orcinus orca		
Killer Whale, Orca [46]		Species or species habitat may occur within area
Stenella attenuata		
Spotted Dolphin, Pantropical Spotted Dolphin [51]		Species or species habitat may occur within area

Name	Status	Type of Presence
Tursiops aduncus		
Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area
Tursiops truncatus s. str.		
Bottlenose Dolphin [68417]		Species or species habitat may occur within area

Extra Information

Places on the RNE [Resource Information]

Note that not all Indigenous sites may be listed.

Name	State	Status
Natural		
Moore River to Murchison River Area	WA	Indicative Place

State and Territory Reserves [Resource Information]

Name	State
Beekeepers	WA
Lipfert, Milligan, Etc Islands	WA

Invasive Species [Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence
Mammals		
Capra hircus		
Goat [2]		Species or species habitat likely to occur within area
Felis catus		
Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Oryctolagus cuniculus		
Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Sus scrofa		
Pig [6]		Species or species habitat likely to occur within area
Vulpes vulpes		
Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Asparagus asparagoides		
Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Cenchrus ciliaris		
Buffel-grass, Black Buffel-grass [20213]		Species or species habitat may occur within area
Lycium ferocissimum		
African Boxthorn, Boxthorn [19235]		Species or species habitat may occur within area

Name	Status	Type of Presence
Tamarix aphylla Athel Pine, Athel Tree, Tamarisk, Athel Tamarisk, Athel Tamarix, Desert Tamarisk, Flowering Cypress, Salt Cedar [16018]		Species or species habitat likely to occur within area

Coordinates

-29.93598 114.97955

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World Heritage and Register of National Estate properties, Wetlands of International Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

For species where the distributions are well known, maps are digitised from sources such as recovery plans and detailed habitat studies. Where appropriate, core breeding, foraging and roosting areas are indicated under 'type of presence'. For species whose distributions are less well known, point locations are collated from government wildlife authorities, museums, and non-government organisations; bioclimatic distribution models are generated and these validated by experts. In some cases, the distribution maps are based solely on expert knowledge.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Department of Environment, Climate Change and Water, New South Wales
-Department of Sustainability and Environment, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment and Natural Resources, South Australia
-Parks and Wildlife Service NT, NT Dept of Natural Resources, Environment and the Arts
-Environmental and Resource Management, Queensland
-Department of Environment and Conservation, Western Australia
-Department of the Environment, Climate Change, Energy and Water
-Birds Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-SA Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Atherton and Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
-State Forests of NSW
-Geoscience Australia
-CSIRO
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact Us page.

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Appendix D

Baseline marine survey

Appendix D Baseline marine survey

Leeman Boat Ramp
Shire of Coorow
2 April 2013

Leeman Boat Ramp
Baseline Marine Monitoring

Leeman Boat Ramp Baseline Marine Monitoring

Prepared for

Shire of Coorow

Prepared by

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ABN 20 093 846 925

2 April 2013

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Quality Information

Document Leeman Boat Ramp Baseline Marine Monitoring

Ref 60282009

Date 2 April 2013

Prepared by Stefano Utomo

Reviewed by Bryn Farmer

Revision History

Revision	Revision Date	Details	Authorised	
			Name/Position	Signature
	06-Dec-2012	Draft report for review	Jamie Shaw Associate Director Environment	
0	17-Jan-2013	For issue to Client	Jamie Shaw Associate Director Environment	
1	02-Apr-2013	For issue to Client	Jamie Shaw Associate Director Environment	

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Executive Summary

AECOM Australia Pty Ltd was commissioned by the Shire of Coorow in Western Australia to undertake marine baseline surveys, including water quality monitoring and benthic habitat surveys, in the vicinity of a proposed boat ramp development in the township of Leeman. The development will include a boat ramp, car park and small recreational area. The objective of this marine environmental investigation is to provide a description of the benthic habitat and determine the baseline water quality characteristics within the Project Area, particularly in relation to turbidity and light attenuation i.e. those factors that might impact on the productivity and health of benthic primary producers such as seagrass and macroalgae. All water quality monitoring and benthic habitat surveys were completed on the 4 and 5 December 2012.

The calculated LACs were higher than the ANZECC/ARMCANZ (2000) guideline level for unmodified inshore waters in South West Australia of 0.09 to 0.13 m^{-1} at all sites. A number of factors can cause light scattering and affect the LAC, including inorganic and organic particulate matter suspended in the water column. However, the light readings were also highly variable within small variations of time and space. This was likely due to patchy cloud cover during the day (varying between 30 and 60%), the sensitivity of the Li-Cor Underwater Quantum Sensor and the dynamic characteristics of measuring light in shallow water.

Turbidity levels were generally found to be below the ANZECC/ARMCANZ (2000) guideline level for unmodified inshore waters in South West Australia of 1-2 NTU. However, the bottom reading at Site I4 was well above the guideline level (3.4 NTU). The elevated turbidity was particularly noticeable towards the bottom of the water column at this site, where there was also a considerable amount of detached seagrass and macroalgae (wrack) over a predominantly sand substrate.

While sea conditions were calm during monitoring, it is relevant to note that a strong cold front passed through the study site six days prior to field work being conducted (on the 28 November). This weather event resulted in strong wind warnings being issued and average wind speeds for Jurien Bay of 56 km/h (NNW) at 9 am and 63 km/h (WNW) at 3 pm (BOM 2012a). These conditions are likely to have led to increased wave energy and mixing of the nearshore water column, leading to sediment resuspension and increased turbidity. While the weather in the lead up to field work was relatively calm, it is likely that turbidity levels were still slightly elevated at the time of sampling. While base turbidity levels were not captured during this field trip, strong south westerly winds are a feature of this coastline throughout summer (BOM 2012a) and are likely to consistently elevate turbidity during this period.

Due to the variability in LACs measured during the present study, turbidity may therefore be more suitable as indicator of suspended sediment that might impact the productivity and health of benthic primary producers during boat ramp construction.

The remaining water physical parameters measured were typical of inshore marine waters, with pH readings of approximately 8.2 and salinity readings around 36 ppt. The water in the survey area was well oxygenated with dissolved oxygen saturation levels ranging between 131.1% and 145.3%. The high levels of dissolved oxygen saturation observed are likely due to photosynthetic activities of the benthic primary producers in the study area.

Benthic habitat surveys in the study area confirmed the presence of extensive seagrass beds interspersed with relatively small patches of sand. The seagrass beds within the broader study area were a mix of *Posidonia sinuosa* and *Amphibolis* spp., the latter of which had the red algae *Haliptilon roseum* as a prominent epiphyte. The majority of the *Amphibolis* spp. observed was confirmed as *Amphibolis antarctica* during ground truthing and is likely to be the dominant representative of the genus in the area. *Amphibolis antarctica* was the sole seagrass species within the boat ramp footprint.

Accumulations of detached seagrass and macroalgae (wrack) were common throughout the survey area, which is again likely due to the timing of the field survey shortly after the passage of a cold front. However, there was noticeably less wrack in the vicinity of the proposed boat ramp footprint than around the existing boat ramp just to the south of the site.

While targeted fish surveys were not conducted, a number of fish were sighted opportunistically during the benthic habitat surveys. These included the weeping toadfish *Torquigener pleurogramma*, common hardyhead *Atherinomorus ogilbyi* and smooth stingray *Dasyatis brevicaudata*. However, it should be noted that these are highly conspicuous species, i.e. either occurring in large schools or being of a large size, and that more cryptic species, such as members of the Labridae (wrasses) and Monacanthidae (leatherjackets), are likely to dominate the fish fauna of study area.

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1.0 Introduction

1.1 Background

AECOM Australia Pty Ltd was commissioned by the Shire of Coorow in Western Australia to undertake marine baseline surveys, including water quality monitoring and benthic habitat surveys, in the vicinity of a proposed boat ramp development in the township of Leeman. The development will include a boat ramp, car park and small recreational area.

Leeman is situated west of Indian Ocean Drive, approximately 250 kilometres north of Perth in Western Australia. The site for the proposed boat ramp is shown in Figure 1 and is located in the northwest corner of the township, west of Illyarrie Street and extending to the coastline (hereafter referred to as the Project Area).

The boat ramp development will have both shore-based impacts (e.g. clearing of native vegetation) as well as marine impacts, which might include the loss of marine habitat (including benthic primary producers) and the temporary alteration of coastal processes.

1.2 Objective

The objective of the marine environmental investigations is to provide a description of the benthic habitat and determine the baseline water quality characteristics within the Project Area, particularly in relation to turbidity levels and light attenuation, i.e. those factors that might impact on the productivity and health of benthic primary producers.

The assessment of ecological values and impacts to marine water quality and benthic habitat from the boat ramp development will be comprehensively assessed in the environmental impact assessment.

Project Area

Proposed Leeman Boat Ramp

Figure 1

Coordinate System: GDA 1994 MGA Zone 50

0 10 20 30 40 50

Metres

1:2,000 (A4)

LEGEND

- Proposed Boat Ramp Footprint
- Project Area

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2.0 Methodology

The methodology used for water quality monitoring and benthic habitat surveys are provided in this section. All water quality monitoring and benthic habitat ground truth surveys over the broader study area were carried out on 4 December 2012, while a more detailed survey of the benthic habitat within the boat ramp footprint was carried out on 5 December 2012.

2.1 Water quality monitoring

2.1.1 Monitoring locations

Water quality monitoring was conducted at six sites in the vicinity of the proposed boat ramp, including four putative 'impact' sites and two reference sites (Table 1, Figure 2).

The four putative 'impact' sites were located adjacent to the proposed boat ramp area (Site ID prefix I) for establishing background water quality within the zone of direct impact of proposed development activities. A further two sites were positioned greater than 400 metres to the south of the proposed boat ramp (Site ID prefix R), with the intention of establishing reference locations to help delineate natural variability in the broader study area.

Table 1 Water quality monitoring locations details

Site ID	Easting	Northing
I1	304933	6686536
I2	304897	6686511
I3	304910	6686466
I4	304947	6686459
R1	304823	6686080
R2	304806	6685918

2.1.2 Physical water parameters

Physical water parameters including turbidity (NTU), temperature, pH, and salinity were logged through the water column using a Yellow Springs Instrument (YSI) 6820 V2 multi parameter water quality sensor at all impact and reference sites. Measurements were taken by lowering the YSI slowly through the water column and recording to the unit's internal hard drive. The YSI equipment was serviced and calibrated prior to use.

The Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC/ARMCANZ 2000) advise that in South West Australia, turbidity levels of 1-2 NTU are acceptable in slightly disturbed estuarine and marine waters.

2.1.3 Light attenuation coefficient

Light attenuation levels were determined at all sites by measuring light intensity through the water column using a Li-Cor Biosciences LI-192 Underwater Quantum Sensor coupled with a LI-250A Light Meter head unit. The sensor unit was lowered through the water column with quantum light intensity recorded every 20 centimetres down to a depth of 1.2 metres (near seabed). Light measurements recorded at each depth an average value recorded over a 10 second period.

Cloud cover and sea state were described with each measurement, as they both have an influence on the intensity of light measured at depth.

Water Quality Monitoring Sites

Proposed Leeman Boat Ramp

Figure 2

Coordinate System: GDA 1994 MGA Zone 50

0 20 40 60 80

Metres

1:3,000 (A4)

LEGEND

- Impact Sites
- Reference Sites
- Proposed Boat Ramp

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Last Printed: 18/12/12

The light attenuation coefficient (LAC) for each site was calculated using a light measurement recorded at the surface, taken at a depth of 0.2 metres, and a measurement recorded at a depth of 1.2 metres. LAC quantifies the rate at which light is attenuated as a result of all absorbing and scattering components of the water column. The following calculation was performed:

$$LAC(Log\ 10) = \frac{1}{z} \log 10 \frac{Iz}{Io}$$

Where: Io is the light at surface (0.2 m)
Iz is the light at seabed (1.2 m)
z is the water depth or vertical distance between Io and Iz (1 metre)

The Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC/ARMCANZ 2000) advise that in South West Australia, LAC (log10) of 0.09 to 0.13 m^{-1} are typical in unmodified inshore waters.

2.2 Benthic habitat surveys

2.2.1 Initial benthic habitat delineation

Recent aerial imagery (taken in March 2012) of the study area was used to delineate between areas of bare sand and seagrass substrate prior to visiting the proposed boat ramp site. To confirm the location of these broad habitat classifications and the types of seagrass and other habitat features present, 33 points were selected for subsequent ground truth field surveys using underwater camera equipment (see Appendix A).

2.2.2 Ground truth surveys of sand and seagrass habitat

Ground truth surveys field surveys of the wider study area were conducted on the 4 December 2012. The 33 points selected for ground truthing were primarily located in the visible sand patches identified during the habitat delineation stage. Given the shallow depth of the study area and good water clarity, the location and extent of these could be easily verified from the vessel and documented using underwater camera equipment. The edge habitats around sand patches were also documented, along with any habitat features noted while in transit between each of the monitoring points

The footprint of the proposed boat ramp was surveyed in more detail on 5 December 2012. The location and extent of sand and seagrass habitat within the footprint was verified and documented using underwater camera equipment. All ground truthing data are shown in Appendix A.

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3.0 Results

3.1 Weather and tides

A summary of weather and tidal conditions encountered during monitoring is presented in Table 2. Meteorological data were obtained from BOM (2012a) and are based on observations from Jurien Bay (009131), while tidal data were obtained from BOM (2012b) and the Australian National Tide Table.

Table 2 Meteorological and tidal conditions encountered during the two days of monitoring

4 December 2012			5 December 2012		
Temperature	Air (°C)	17.3 – 34.8	Temperature	Air (°C)	21.0 – 26.2
Tide	Low tide	7:03 am, 0.26 m	Tide	Low tide	7:30 am, 0.29 m
	High tide	9:51 pm, 0.71 m		High tide	10:09 pm, 0.66 m
Wind	9 am wind	ENE 24 km/h	Wind	9 am wind	N 6 km/h
	3 pm wind	NNW 2 km/h		3 pm wind	WNW 9 km/h

Inshore marine conditions were calm during both days of monitoring, with easterly winds on the morning of 4 December tending light northerly for the remainder of the field trip (Figure 3). Due to its effect on light intensity, cloud cover was also documented during water quality monitoring (4 December). Cloud cover was variable, fluctuating between 30% and 60% throughout the day.

Figure 3 Sea conditions on the 4 December 2012

While sea conditions were calm during monitoring, it is relevant to note that a strong cold front passed through the study area six days prior to field work being conducted (on the 28 November). This weather event resulted in strong winds and average wind speeds for Jurien Bay of 56 km/h (NNW) at 9 am and 63 km/h (WNW) at 3 pm (BOM 2012a). It is also relevant to note that relatively strong winds persisted in the lead up to monitoring.

3.2 Water Quality

3.2.1 Physical water characteristics

Water temperature readings varied between 23 °C and 23.9 °C, depending on site depth and monitoring time (Table 3). pH ranged between 8.2 and 8.3 and salinity readings varied from 35.5 to 36.3 ppt. Dissolved oxygen readings at all sites were above the ANZECC/ARMCANZ (2000) lower limit (90%) for marine waters in south west Australia.

Table 3 Physical water characteristics measured at impact and reference sites

Sites	Time	Depth (m)	Temperature (ºC)	pH	Salinity (ppt)	Dissolved Oxygen (%)
		Max	Mean	Mean	Mean	Mean
I1	11:53 AM	1.2	23.1	8.3	36.3	144.9
I2	12:16 PM	2.2	22.8	8.2	36.2	139.9
I3	12:48 PM	1.8	23.0	8.2	36.1	145.3
I4	1:06 PM	1.8	23.0	8.2	36.1	138.4
R1	1:27 PM	1.2	23.6	8.2	35.5	131.1
R2	1:45 PM	1.4	23.9	8.2	36.0	133.1

3.2.2 Light attenuation

Light attenuation coefficients calculated for monitoring sites are presented in Table 4. Light attenuation levels at the proposed boat ramp area were found to be higher than ANZECC/ARMCANZ (2000) guideline of 0.09 to 0.13 m^{-1}. The water was relatively clear at the time of monitoring, but obvious suspended solids were present in the water column and some sites were more turbid than others (see Section 3.2.3 below).

Table 4 Light attenuation coefficients calculated for impact and reference sites

Site	LAC (m^{-1})
I1	0.295
I2	0.181
I3	0.231
I4	0.209
R1	0.192
R2	0.249

3.2.3 Turbidity

The surface and near bottom turbidity measurements were generally below the guideline level of 1 – 2 NTU (ANZECC/ARMCANZ 2000) (Table 5). However, the near bottom reading at Site I4 was above the guideline level (3.4 NTU). While the turbidity at Site I4 seems like an outlier, it was noticeably more turbid at this site (Figure 4). Turbidity was highest towards the bottom of the water column, where there was also a considerable amount of detached seagrass and macroalgae (wrack) over a predominantly sand substrate.

Table 5 Background turbidity readings

Site	Turbidity (NTU)	
	Surface	Bottom
I1	0.6	0.8
I2	0.8	1.1
I3	0.2	0.5
I4	0.7	3.4
R1	0.3	0.9
R2	0.2	0.9

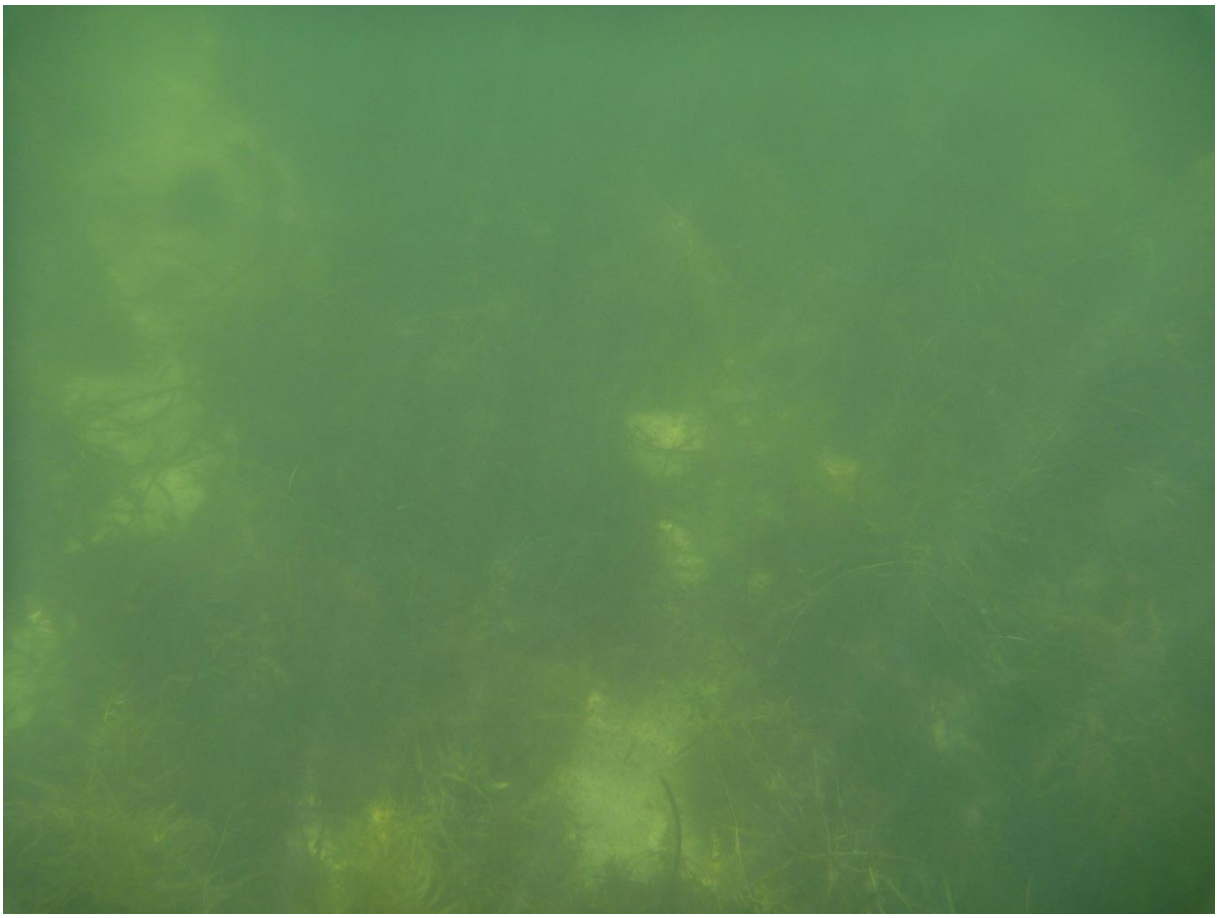


Figure 4 Site I4, showing turbid waters and detached seagrass and algal wrack over a sand substrate

3.3 Benthic habitat survey

3.3.1 Benthic habitat

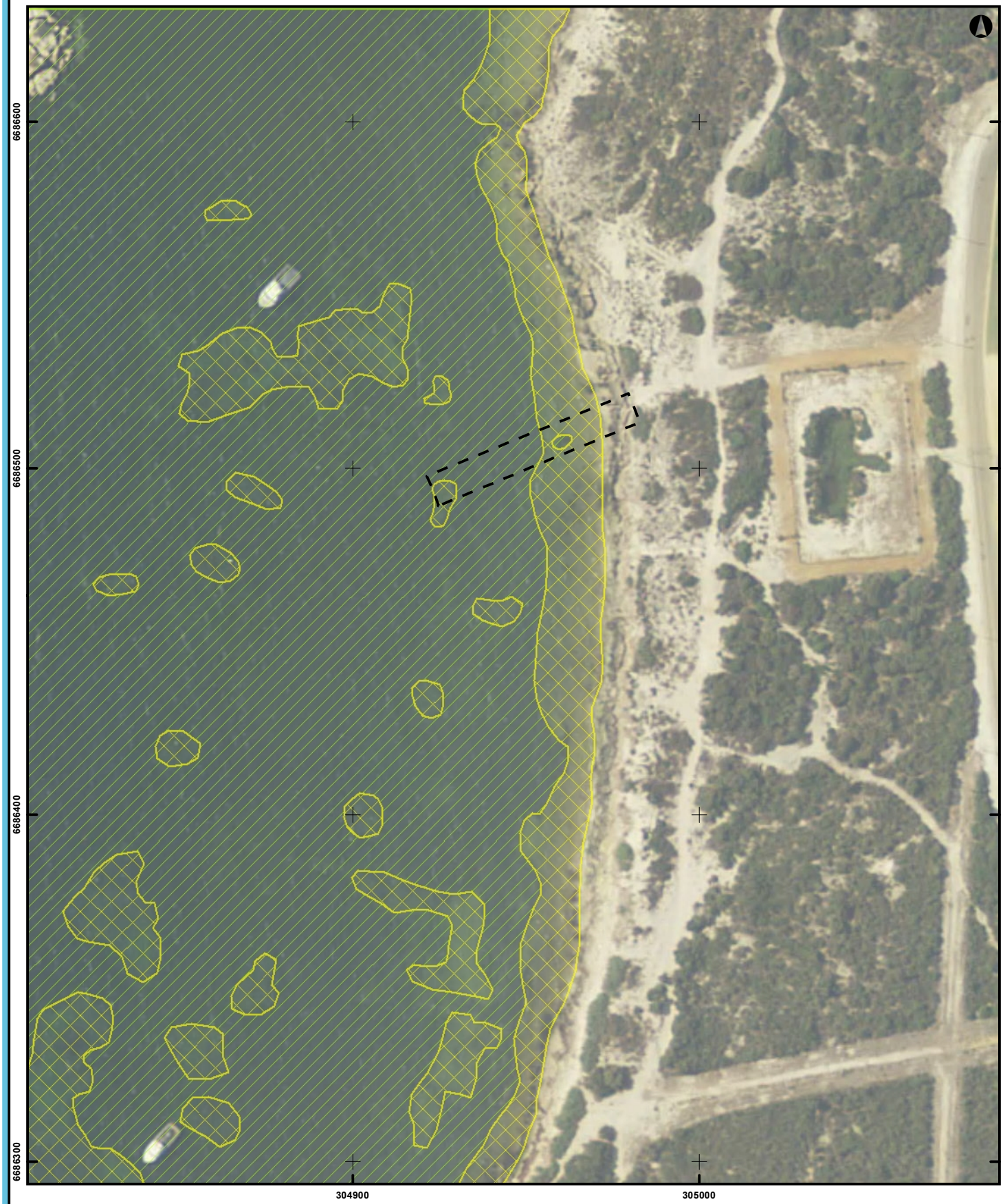
Ground truth field surveys across the study area confirmed the presence of extensive seagrass beds interspersed with relatively small patches of sand. The distribution of these benthic habitats in the broader study area is illustrated in Figure 5, and in the boat ramp footprint in Figure 6.

The seagrass beds within the broad study area were a mix of *Posidonia sinuosa* (Figure 7) and *Amphibolis* spp. (Figure 8), the latter of which had the red algae *Haliptilon roseum* as a prominent epiphyte. The majority of the *Amphibolis* spp. observed was confirmed as *Amphibolis antarctica* during ground truthing and is likely to be the dominant representative of the genus in the area. However, since *Amphibolis griffithii* is also likely to co-occur, it was referred to at the generic level (i.e. *Amphibolis* spp.). Accumulations of detached seagrass and macroalgae were common throughout the survey area (Figure 9).

The benthic habitat within the boat ramp footprint is predominantly bare sand for the first 15 metres from shore, which then gives way to a relatively thick cover of seagrass. However, one small patch of seagrass (approximately 4 metres in diameter) was identified in the zone of predominantly sand habitat and one small patch of sand in the zone of predominantly seagrass habitat (approximately 5 meters in diameter, located at the south western corner of the footprint). *Amphibolis antarctica* was the only seagrass species present, with the red algae *Haliptilon roseum* again a prominent epiphyte (Figure 10).

3.3.2 Other observations

While targeted fish surveys were not conducted, a number of fish were sighted opportunistically during the benthic habitat surveys. These included the weeping toadfish *Torquigener pleurogramma*, common hardyhead *Atherinomorus ogilbyi* and smooth stingray *Dasyatis brevicaudata*.



Benthic Habitat

Proposed Leeman Boat Ramp

Figure 5

Coordinate System: GDA 1994 MGA Zone 50

0 10 20 30 40

Metres

1:1,500 (A4)

LEGEND

- Sand
- Seagrass (*Amphibolis* spp. and *Posidonia sinuosa*)
- Proposed Boat Ramp

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Benthic Habitat
- Boat Ramp Footprint

Proposed Leeman Boat Ramp

Figure 6

Coordinate System: GDA 1994 MGA Zone 50

0 2.5 5 7.5 10

Metres

1:500 (A4)

LEGEND

- Proposed Boat Ramp
- Sand
- Seagrass (*Amphibolis antarctica*)

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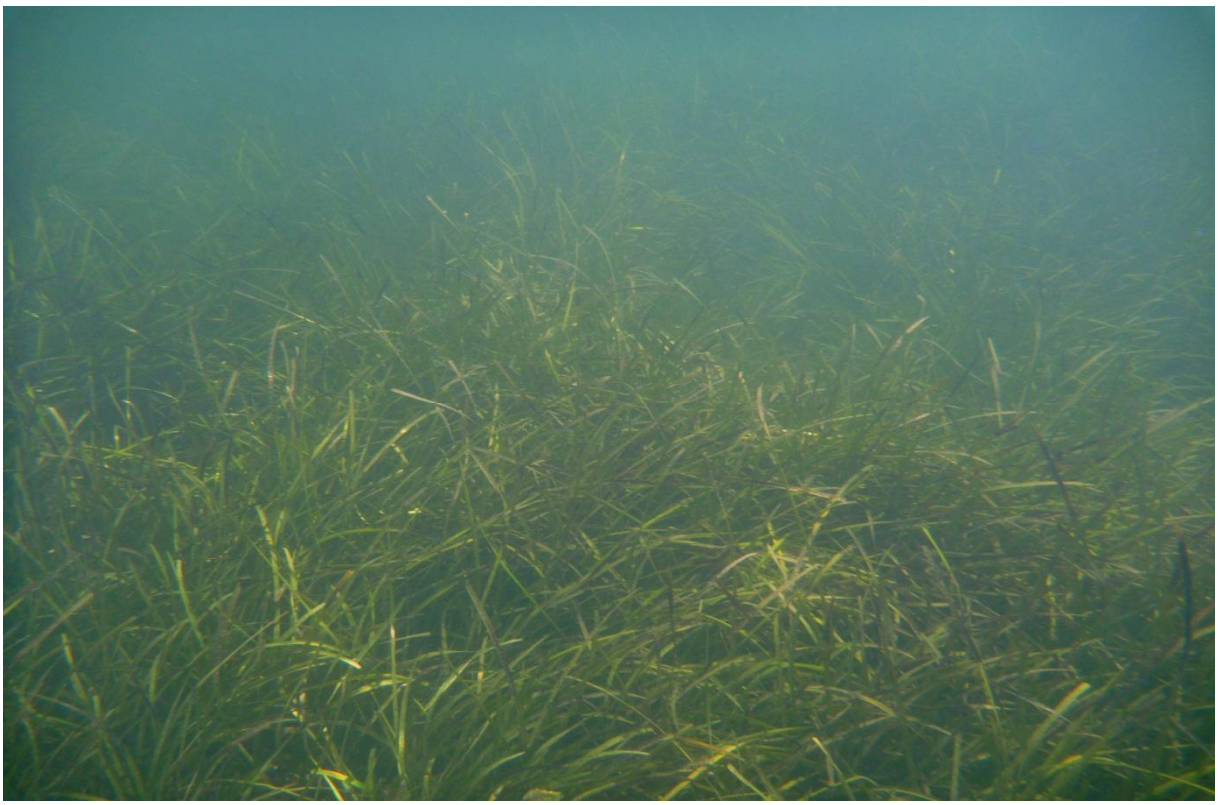

Figure 7 Thick bed of *Posidonia sinuosa*

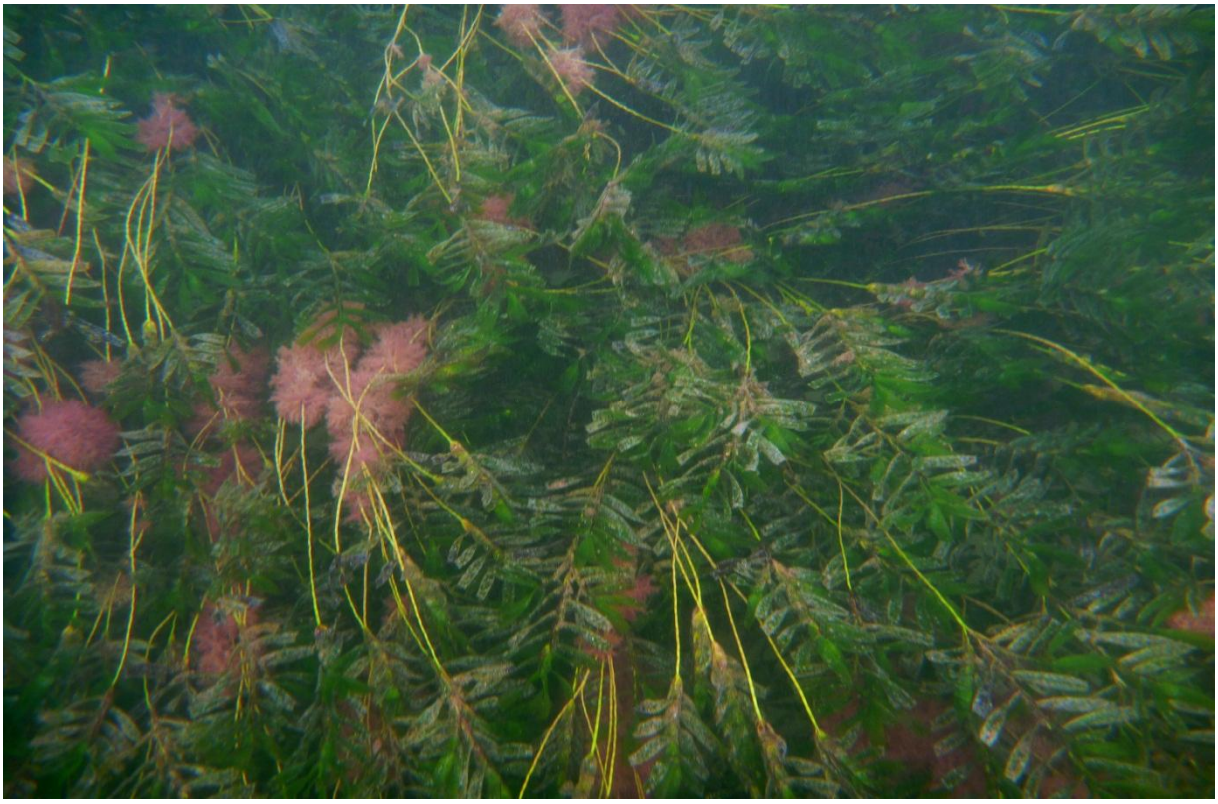

Figure 8 *Amphibolis antarctica*. with the red algae *Haliptilon roseum* as a prominent epiphyte

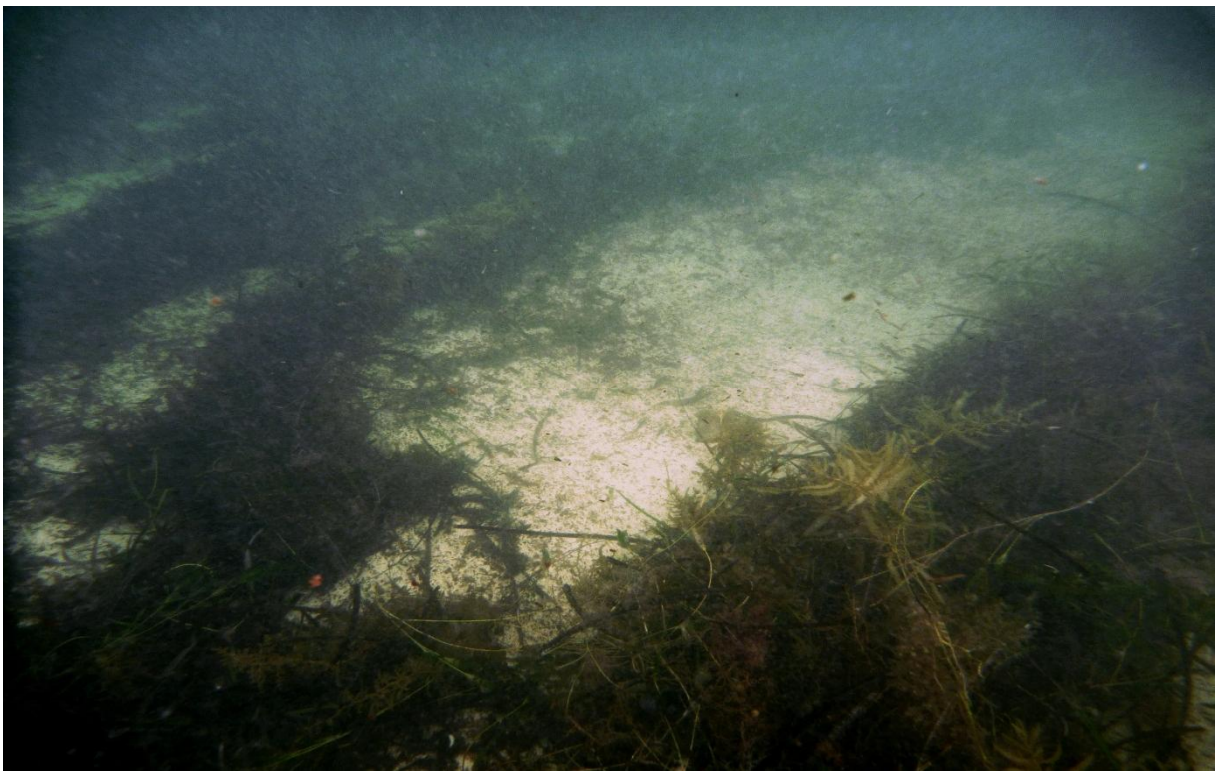

Figure 9 Detached seagrass and macroalgae (wrack) on a sand substrate

Figure 10 Boundary between a bed of *Amphibolis antartica* and a sand patch in the south western corner of the boat ramp footprint

4.0 Discussion

The calculated LACs were higher than the ANZECC/ARMCANZ (2000) guideline level for unmodified inshore waters in South West Australia of 0.09 to 0.13 m^{-1} at all sites. A number of factors can cause light scattering and affect the LAC, including inorganic and organic particulate matter suspended in the water column. However, the light readings were also highly variable within small variations of time and space. This was likely due to patchy cloud cover during the day (varying between 30 and 60%), the sensitivity of the Li-Cor Underwater Quantum Sensor and the dynamic characteristics of measuring light in shallow water. For example, the light field in these shallow waters will be affected by:

- directional reflectance off waves, ripples and the boat
- light scattered into the view of the sensor (light becomes less directional and more diffuse with a broader radiance at depth)
- reflection off the sea surface as the upwelling light flux (from reflection within the water column and off the seabed) reaching the surface of the water. This flux is approximately halved by being reflected back down again with the remainder passing through the water/air interface as an emergent flux (Kirk 1994).

Turbidity levels were generally found to be below the ANZECC/ARMCANZ (2000) guideline level for unmodified inshore waters in South West Australia of 1-2 NTU. However, the bottom reading at Site I4 was well above the guideline level (3.4 NTU). The elevated turbidity was particularly noticeable towards the bottom of the water column at this site, where there was also a considerable amount of detached seagrass and macroalgae (wrack) over a predominantly sand substrate.

While sea conditions were calm during monitoring, it is relevant to note that a strong cold front passed through the study site six days prior to field work being conducted (on the 28 November). This weather event resulted in strong wind warnings being issued and average wind speeds for Jurien Bay of 56 km/h (NNW) at 9 am and 63 km/h (WNW) at 3 pm (BOM 2012a). These conditions are likely to have led to increased wave energy and mixing of the nearshore water column, leading to sediment resuspension and increased turbidity. While the weather in the lead up to field work was relatively calm, it is likely that turbidity levels were still slightly elevated at the time of sampling. While base turbidity levels were not captured during this field trip, strong south westerly winds are a feature of this coastline throughout summer (BOM 2012a) and are likely to consistently elevate turbidity during this period.Due to the variability in LACs measured during the present study, turbidity may therefore be more suitable as indicator of suspended sediment that might impact the productivity and health of benthic primary producers during boat ramp construction.

The remaining water physical parameters measured were typical of inshore marine waters, with pH readings of approximately 8.2 and salinity readings around 36 ppt. The water in the survey area was well oxygenated with dissolved oxygen saturation levels being supersaturated ranging between 131.1% and 145.3%. The high levels of dissolved oxygen saturation observed are likely due to photosynthetic activities of the benthic primary producers in the shallow waters in the study area during the daytime.

Benthic habitat surveys in the study area confirmed the presence of extensive seagrass beds interspersed with relatively small patches of sand. The seagrass beds within the broader study area were a mix of *Posidonia sinuosa* and *Amphibolis* spp., the latter of which had the red algae *Haliptilon roseum* as a prominent epiphyte. The majority of the *Amphibolis* spp. observed was confirmed as *Amphibolis antarctica* during ground truthing and is likely to be the dominant representative of the genus in the area. *Amphibolis antarctica* was the sole seagrass species within the boat ramp footprint.

Posidonia and *Amphibolis* also dominate the seagrass beds of the Jurien Bay Marine Park (JBMP) (CALM 2005), the northern boundary of which is located approximately 15 kilometres south of Leeman. While the presence of *Amphibolis antarctica* was confirmed during the current study, it should be noted that *Amphibolis griffithii* has also been recorded in the JBMP and may be present in low densities within the project area. Higher energy mobile sand areas in the JBMP also support meadows of the ephemeral *Halophila ovalis* (CALM 2005), which are often removed by winter storms. The timing of the benthic habitat surveys shortly after the passage of a cold front decreased the likelihood for detection of this species.

Accumulations of detached seagrass and macroalgae (wrack) were common throughout the survey area, which is again likely due to the timing of the field survey shortly after the passage of a cold front. However, there was noticeably less wrack in the vicinity of the proposed boat ramp footprint than around the existing boat ramp just to the south of the site.

While targeted fish surveys were not conducted, a number of fish were sighted opportunistically during the benthic habitat surveys. These included the weeping toadfish *Torquigener pleurogramma*, common hardyhead *Atherinomorus ogilbyi* and smooth stingray *Dasyatis brevicaudata*. However, it should be noted that these are highly conspicuous species, i.e. either occurring in large schools or being of a large size, and that more cryptic species, such as members of the Labridae (wrasses) and Monacanthidae (leatherjackets), are likely to dominate the fish fauna of study area.

The fish fauna of the nearby Jurien Bay Marine Park have been studied extensively by Fairclough et al (2011). During that study, 52 fish species were recorded in unvegetated surf zones, with the most speciose genera including the Labridae (wrasses), Monacanthidae (leatherjackets), Syngnathidae (seahorses and pipefish) and Terapontidae (grunters). Trawling over inshore seagrass beds and unvegetated sand, resulted in 41 species being recorded, with the Labridae (wrasses) and Monacanthidae (leatherjackets) again being among the most diverse families in both of these habitats (Fairclough et al. 2011).

5.0 References

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Appendix A

Benthic Habitat Ground Truth Field Survey Data

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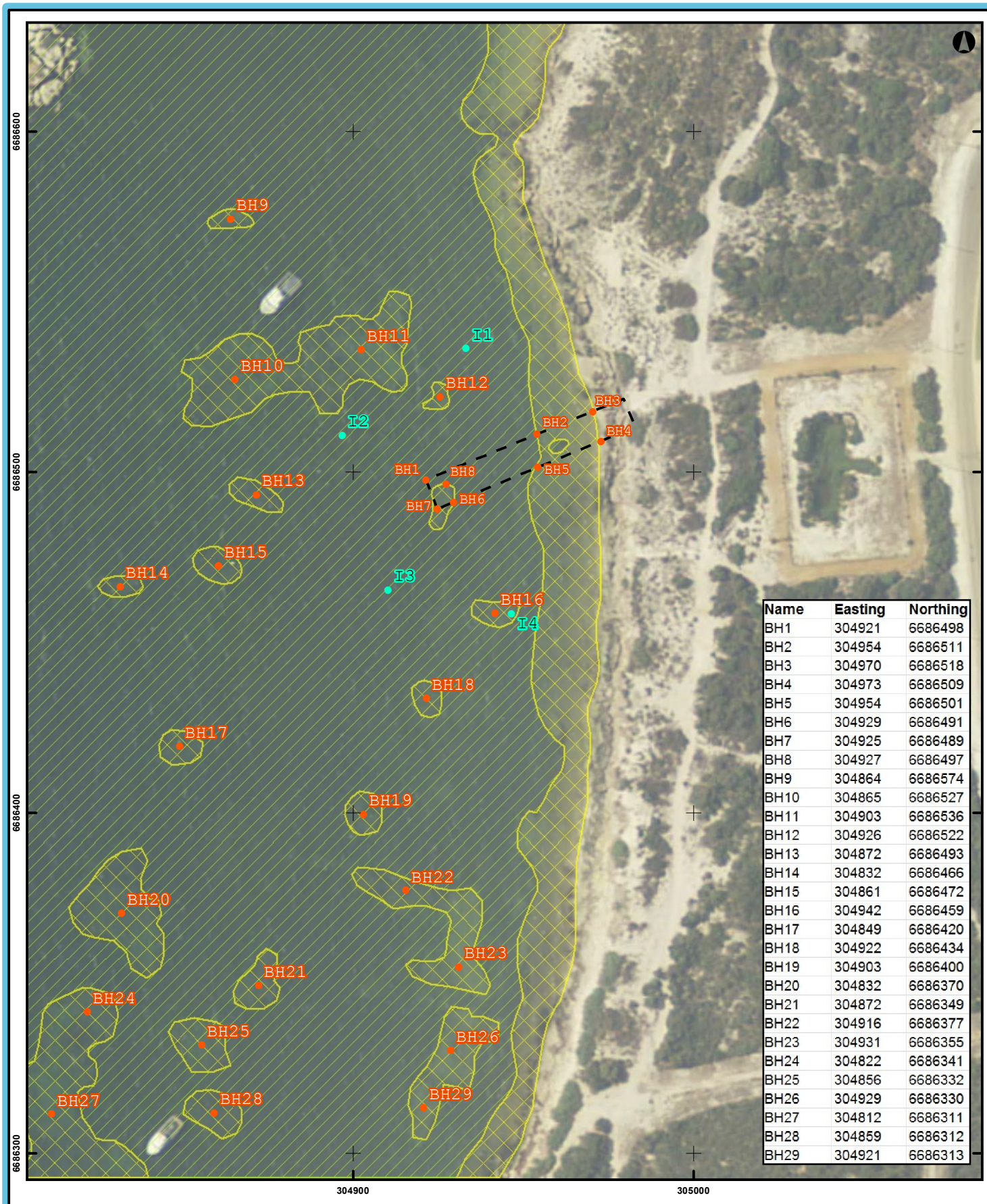

Name	Easting	Northing
BH1	304921	6686498
BH2	304954	6686511
BH3	304970	6686518
BH4	304973	6686509
BH5	304954	6686501
BH6	304929	6686491
BH7	304925	6686489
BH8	304927	6686497
BH9	304864	6686574
BH10	304865	6686527
BH11	304903	6686536
BH12	304926	6686522
BH13	304872	6686493
BH14	304832	6686466
BH15	304861	6686472
BH16	304942	6686459
BH17	304849	6686420
BH18	304922	6686434
BH19	304903	6686400
BH20	304832	6686370
BH21	304872	6686349
BH22	304916	6686377
BH23	304931	6686355
BH24	304822	6686341
BH25	304856	6686332
BH26	304929	6686330
BH27	304812	6686311
BH28	304859	6686312
BH29	304921	6686313

Benthic Habitat Ground Truthing Sites

Leeman Boat Ramp

Figure 1

Coordinate System: GDA 1994 MGA Zone 50

0 10 20 30 40

Metres

1:1,500 (A4)

LEGEND

- Sand
- Seagrass (*Amphibolis* spp. and *Posidonia sinuosa*)
- Benthic Habitat Ground Truthing Sites
- Impact Sites
- Proposed Boat Ramp

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