Environmental Impact Assessment Report

Denham Foreshore and Maritime Facilities Upgrade Works

59915120

Prepared for
Department of Transport

May 2015

Cardno
Shaping the Future

Contact Information

Cardno (WA) Pty Ltd
Trading as Cardno
ABN 77 009 119 000

11 Harvest Terrace, West Perth WA 6005

Telephone: 08 9273 3888
Facsimile: 08 9486 8664
International: +61 8 9273 3888

wa@cardno.com.au
www.cardno.com

Document Information

Prepared for	Department of Transport
Project Name	Denham Recreational Jetty Replacement
File Reference	01 59915120_R001_0_Denham_EIA
Job Reference	59915120
Date	May 2015

Document History

Version	Effective Date	Description of Revision	Prepared by:	Reviewed by:
Rev A	16-04-2015	Draft for Client Review	Jonathon Syron Jo Buckee	Kate Reeds
Rev B	29-04-2015	Draft for Client Review	Jonathon Syron	Jo Buckee
Rev 0	11-5-2015	Final	Jonathon Syron	Jo Buckee

Executive Summary

The Department of Transport (DoT) is planning to upgrade the maritime facilities in Denham, Shark Bay, Western Australia. The existing onshore facilities consist of a service wharf, recreational jetty and boat pens, recreational boat ramp and unsealed parking, a larger ramp for jinker and slipway operations, fuelling facilities, parking and fish cleaning facilities. Foreshore amenities also incorporate a swimming beach and landscaped recreational areas.

A Master Plan was developed by DoT in association with various parties, including the Shire of Shark Bay (SSB) for the future development of the foreshore and maritime facilities. Stage 1 of the Master Plan involved the replacement of the recreational jetty, which was the focus of a previous Environment Impact Assessment (EIA) report (Cardno 2015). Stage 2, which is the subject of this report, consists of a broader works program for upgrade of the service wharf and foreshore maritime facilities including.

> Extension of the existing service wharf;

> Replacement of a timber groyne adjacent to the swimming area;

> Refurbishment of existing rock revetment;

> Extension of rock revetment to formalise the landward beach margin and provide erosion control for storm events;

> Removal of winch house associated with the existing slipway;

> Resurfacing of existing sealed carpark and slipway/jinker ramp, and installation of drainage infrastructure;

> Replacement and realignment of timber finger jetty at slipway/jinker ramp;

> Relocation of existing fuel tank;

> Sealing of unsealed parking areas and installation of drainage infrastructure;

> Upgrading of existing electrical and firefighting services; and

> Relocation of existing fish cleaning facilities; and landscaping.

Stage 1 and 2 works are scheduled to coincide with maintenance dredging carried out as part of the DoT's State-wide program. Dredging beneath the recreational jetty will take place after removal of the existing jetty and prior to the construction of the replacement jetty; and minor sediment removal will occur in association with refurbishment of the rock revetment. It is intended that the upgrade works be finalised in time for the 400th year anniversary and commemorative celebrations of Dirk Hartog's landing on 25th October, 2016.

As for Stage 1 of the Master Plan, Cardno (WA) Pty Ltd was commissioned by DoT to undertake an environmental assessment of the proposed Stage 2 works including identification of potential environmental factors, risks associated with construction and operation and provision of recommendations to appropriately mitigate and manage any potential risks.

Following a comprehensive review and assessment, a number of inherent potential impacts were identified but considered to be of low significance due to the small magnitude of the impact and/or low likelihood of occurrence. These included:

> Direct loss of benthic communities and habitat due to disturbance / smothering of organisms on the existing rock revetment, and removal of existing groyne and finger jetty; and

> Loss of public amenity during construction works.

Potential impacts with the possibility of higher significance (in the absence of appropriate environmental controls) were also identified and included the following:

> Indirect impact on benthic communities and habitat, marine environmental quality (water and sediments) and marine fauna due to construction impacts (e.g. through elevated turbidity, accidental spills and discharges);

> Impacts to marine fauna due to noise associated with piling operations; and

> Impact on terrestrial environmental quality (land and soils) during construction and operation.

Of the few residual impacts identified, all were considered of insignificant magnitude or unlikely to occur.

A number of mitigation measures are considered necessary to ensure that the significance of potential impacts identified during construction and operation remains low and that the EPA's objectives for environmental protection are met. These include:

> Development of a Contractors Environmental Management Plan (CEMP) to be complied with by all works contractors. The CEMP is to demonstrate management of potential impacts associated with:
  - Accidental spills and discharges;
  - Waste management;
  - Dust and noise; and
  - Public amenity.

> Contractors to comply with a Contractors Safety Management Plan; and

> Dredging to be carried out in accordance with DoT's overarching Environmental Management Framework (EMF) (Oceanica 2012a) and Dredging Environmental Impact Assessment (DEIA)(Oceanica 2012b) including adherence to a Dredging Environmental Management Plan (DEMP) ;

Issues associated with long term operation of the upgraded facilities would be largely mitigated through the design of appropriate drainage and waste management systems as well as implementing existing management systems relating to operational conduct and contingency planning. Lighting associated with the upgrade would be also be designed and operated to minimise potential impacts to marine turtles as per EAG 5.

It is concluded that provided the above mitigation measures are adopted and implemented, the development proposal is likely to meet the EPA's objectives for all relevant factors. The proposal is considered unlikely to have a significant impact on the environment, and therefore does not require referral under the EPA Act.

List of Abbreviations and Acronyms

CEMP	Contractors Environmental Management Plan
DEIA	Dredging Environmental Impact Assessment
DEMP	Dredging Environmental Management Plan
DoT	Department of Transport
EAG	Environmental Assessment Guidelines
EIA	Environmental Impact Assessment
EMF	Environmental Management Framework
EPA	Environmental Protection Authority
EP Act	Environmental Protection Act
OEPA	The Office of the Environmental Protection Authority
SSB	Shire of Shark Bay

Table of Contents

1 Introduction 1
1.1 Background 1
1.2 Regulatory Framework 1
1.3 Purpose of this Document 1
2 Proposed works 2
2.5 Location 2
2.6 Summary of Proposed Works 2
2.7 Marine Construction Activities 2
2.8 Onshore Construction Activities 2
2.9 Ongoing Operation 3
3 Existing environment 6
3.1 Setting 6
3.2 Coastal Processes and Management 6
3.3 Environmental Quality (Sediment and Water) 6
3.4 Marine Fauna 7
3.5 Existing Infrastructure 7
4 Environmental Assessment 12
4.1 Relevant Environmental Factors and Objectives 12
4.2 Potential Construction Impacts 16
4.2.1 Removal of Existing Substrata 16
4.2.2 Piling Works 16
4.2.3 Accidental Spillages and Discharges during Construction 17
4.2.4 Parking Area Upgrade 17
4.2.5 Waste Management 17
4.2.6 Public Amenity 17
4.2.7 Contractor Health and Safety 17
4.3 Potential Operational Impacts 18
4.3.1 Accidental Spills and Discharges during Operation 18
4.3.2 Light Impacts on Turtles 18
4.4 Likely Significance and Management of Potential Impacts 18
4.4.1 Inherent Impacts 18
4.4.2 Residual Impacts 18
4.5 Mitigation Measures 18
4.6 Conclusions 19
5 References 20

Tables

Table 4-1 Assessment of the Denham marine facilities upgrade works against EAG 8 environmental factors and objectives (EPA 2013a) 13

Figures

Figure 2-2 Location map showing position of Denham maritime facilities including the Boat Harbour and onshore facilities redevelopment area 4

Figure 2-3 Concept plan for Denham foreshore and marine facilities upgrade. Note that the plan also includes the new recreational jetty (Stage 1) and maintenance dredging areas. 5

Figure 3-1 Existing Maritime Facilities and Foreshore 8

Figure 3-2 Site photographs showing shoreline features: a) timber groyne and beach to the southeast of the project area; b) recreational jetty; c) rock revetment between the recreational jetty and the jinker ramp; d) timber finger jetty and seaward edge of slipway/jinker ramp; e) rock revetment between the service wharf and slipway/jinker ramp; and f) service wharf. 9

Figure 3-3 Site photographs showing onshore features a) grassed area to southeast of the project area; b) slipway/jinker ramp, winch house and sealed parking area; c) sealed parking area between slipway/jinker ramp and service wharf, and existing fuel storage area; d) ablution block and waste oil container; e) unsealed parking area at the northern end of the site; and f) fish cleaning facility. 11

1 Introduction

1.1 Background

Denham's boat harbour and maritime facilities are currently managed by the Shire of Shark Bay (SSB) on behalf of the Department of Transport (DoT). The facilities provide the town's main access to the Shark Bay waters, with the principal use being recreational boating (DoT 2014). The Denham Boat Harbour and Entrance Channel lie within an Exclusion Zone of the Shark Bay Heritage Area (Oceanica 2012b).

As part of the Foreshore and Main Street Revitalisation Plan of Denham (Hames Sharley 2013), and to support the ongoing demand for boating facilities in Denham, the DoT has been working with the SSB to draft a Master Plan for the future development of the maritime facilities in Denham.

Stage 1 involved the replacement of an existing recreational jetty and accompanying boat pens; and was the subject of a previous Environmental Impact Assessment (EIA) report (Cardno 2015). Although it was considered not to require formal assessment it was referred to the Environmental Protection Authority (EPA) under Section 38(1) of the *Environmental Protection Act* (1986) (EP Act). Stage 2 works, which are the subject of this EIA report, consist of a broader upgrade to the maritime facilities and foreshore area. The works are also considered not to require formal assessment, but will be referred to gain EPA confirmation of this.

1.2 Regulatory Framework

The EP Act is the key legislation controlling the assessment of environmental impact of developments in Western Australia. Procedures to be followed are prescribed in the Environmental Impact Assessment (Part IV Divisions 1 and 2) Administrative Procedures 2012 (State of Western Australia 2012). EPA advice on assessment methods is provided in a series of Environmental Assessment Guidelines (EAGs). Of particular relevance to this assessment are the following guidelines:

> EAG 1: Defining the key characteristics of a proposal (EPA 2012);

> EAG 8: Environmental factors and objectives (EPA 2013); and

> EAG 9: Application of a significance framework in the environmental impact assessment process (EPA 2015).

EAG 9 advises that where a proposal is clearly likely to meet the EPA's objectives, it does not need to be referred to the EPA. However, when proponents wish the certainty of an EPA decision on a proposal (and the reduced risk of a later 3rd party referral) then a referral is to be made on the proper form to assist in the proposal's timely consideration.

Further to the above guidance on the assessment process, EAG 5: Environmental Assessment Guideline for Protecting Marine Turtles from Light Impacts was considered at the request of the Office of the Environmental Protection Authority (OEPA).

1.3 Purpose of this Document

The EIA of the proposed marine facility upgrade was undertaken to ensure the works program meets the EPA's objectives for protection of the environment, for the purposes of due diligence, and to support communications with the EPA. Further, the assessment supports referral of the project and the decision that the proposal is unlikely to have a significant impact on the environment, and therefore does not require formal assessment under the EPA Act.

To achieve this, relevant environmental factors potentially impacted by the project characteristics and construction activities will be examined. Inherent and residual risks will be assessed and mitigation methods will be described to outline how potential impacts will be managed.

2 Proposed works

2.5 Location

Denham is located on the western coast of Peron Peninsula within the Western Gulf of Shark Bay, 831 km north of Perth in the Gascoyne region (Error! Reference source not found.). The proposed works are within an Exclusion Zone of the Shark Bay Heritage Area (Oceanica 2012b). The total area of the water area vested under Marine and Harbours Act 1981 is approximately 2,147.86 ha. Of that area, approximately 6.78 ha are used as maritime facilities (1.98 ha basin and 4.8 ha entrance channel).

Denham Boat Harbour and maritime facilities are located adjacent to the town's main shopping centre and commercial precinct on Knight Terrace.

2.6 Summary of Proposed Works

A concept plan of the proposed works is presented in Error! Reference source not found. The works include:

1. Replacement of a timber groyne at the eastern margin of dredged basin;
2. Extension of the rock revetment to formalise the landward beach margin and provide erosion control for storm events;
3. Refurbishment of existing rock revetment (including minor land based dredging / excavation works);
4. Replacement and realignment of timber finger jetty at slipway / jinker ramp;
5. Removal of winch house associated with the existing slipway ;
6. Extension of the existing service wharf;
7. Resurfacing of existing sealed carpark and slipway / jinker ramp and installation of drainage infrastructure;
8. Relocation of existing fuel tank;
9. Sealing of unsealed parking areas and installation of drainage infrastructure;
10. Relocation of existing fish cleaning facilities; and
11. Landscaping of grassed areas.

2.7 Marine Construction Activities

The existing timber groyne to the east of the dredged basin and the timber finger jetty adjacent to the slipway / jinker ramp will be demolished and removed from site. A replacement groyne of material yet to be determined will be installed, and a new finger jetty constructed of steel and concrete. Refurbishment and extension of the rock revetment will involve the minor relocation of rocks and addition of new rocks of the same material as the existing revetment.

Piling works are required to extend the service wharf and install the new finger jetty for the jinker ramp. It is anticipated that new tubular steel piles will be installed using a barge with a piling hammer.

The wharf extension and jetty decking will be made of precast concrete slabs which will be fabricated offsite, and transported to site for installation.

2.8 Onshore Construction Activities

Onshore construction activities will be required for the removal of the slipway winch house, installation of a drainage system for sealed surfaces, resurfacing existing hardstand and sealing of unsealed parking areas.

The fuel storage tank system will be relocated adjacent to the existing ablution block to improve visual amenity and function of the foreshore area.

2.9 Ongoing Operation

The proposed works will ensure the continued use of the foreshore and marine facilities by recreational users. DoT will take over management of the facility from SSB upon completion of the works. The facilities (including the service wharf and jinker ramp) will be included in DoT's assets register. Operation will continue as at present, with the exception of the removal of the winch house for the slipway. Once removed, larger vessels on trailers or jinkers will be required to be towed out of the water by a suitably powered vehicle.

The facilities will be will be managed and maintained in accordance with DoT's existing systems, policies and procedures.

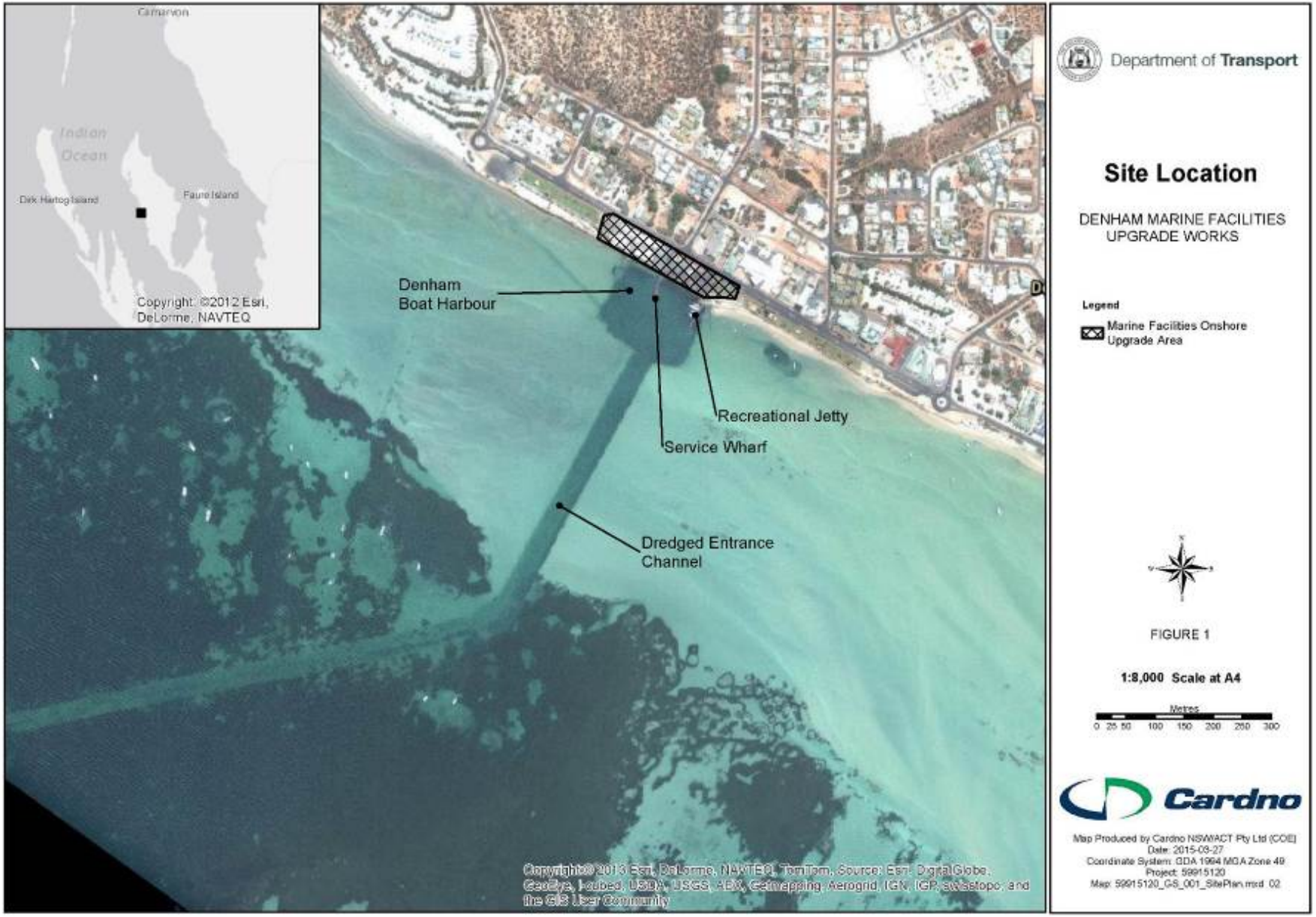

Figure 2-2 Location map showing position of Denham maritime facilities including the Boat Harbour and onshore facilities redevelopment area

Figure 2-3 Concept plan for Denham foreshore and marine facilities upgrade. Note that the plan also includes the new recreational jetty (Stage 1) and maintenance dredging areas.

3 Existing environment

3.1 Setting

Denham Boat Harbour and associated marine facilities lie at the southern end of the Gascoyne region and has a semi-arid climate with hot dry summers and mild wet winters. Annual rainfall is variable, averaging about 223 mm, with peak occurrence in June and July (BOM 2014). The area is subject to cyclones, with impacts occurring on average once every three years. Denham Township can be affected by storm surges at these times, and sandbags are placed along the foreshore, and shop/property entrances when there is a risk of this occurring (Shire of Shark Bay 2015).

Shark Bay is a large shallow embayment of ~13,000 km^2, with an average depth of 9 m. Denham Boat Harbour is within an extensive sand shoal area adjacent to the west coast of the Peron Peninsula. The Boat Harbour is connected to the deeper water of Freycinet Reach within the Western Gulf of Shark Bay via a 30 m wide dredged Entrance Channel (Oceanica 2012b) (Error! Reference source not found.). The Harbour is located centrally within the township of Denham itself, with a swimming beach to the south-east and grassed area and beach with low rock wall to the northwest. The Harbour foreshore precinct is a focal point of the township and valued for its visual and recreational amenity by both tourists and residents.

The shallow nearshore intertidal and shallow subtidal seabed is mostly devoid of benthic vegetation to around 500–700 m from the shoreline (Error! Reference source not found.). Beyond this are extensive meadows of the seagrass *Posidonia australis* (with minor presence of *Halodule uninervis)*(Oceanica 2012b). Detrital seagrass wrack is prevalent in the dredged basin and along the shoreline as shown in site photos presented in **Section 3.5**.

3.2 Coastal Processes and Management

The Denham coast is relatively sheltered from wave energy from Dirk Hartog Island to the west and Dorre and Bernier Islands to the north, with wave action being wind dominated (Port & Harbour 1996). The tides in the region are microtidal and predominantly semi-diurnal with a mean spring tidal range of 0.8 m (CA 2001). Nearshore currents are predominantly wind-driven and have a northerly flow.

Capital dredging of an access channel across the extensive sand shoal area, and establishment of Denham Boat Harbour was first carried out in 1980. To maintain navigable water depths in the Channel (2.4 m) and Harbour (2.2 m), maintenance dredging is required, on average, every 7-10 years (Oceanica 2012b). The assessment and management of the maintenance dredging operations for the Harbour is regulated according to a number of relevant assessment frameworks and guidelines, including the DoT's overarching Environmental Management Framework (EMF) (Oceanica 2012a). The EMF document provides a framework for assessment of impacts and identification of situations where a formal environmental referral may be required.

A Dredging Environmental Impact Assessment (DEIA) was carried out in 2012 in relation to the excavation and shoreline disposal of ~30 000 m^3 of sand from the Boat Harbour and Entrance Channel as part of the DoT's State-wide maintenance dredging program (Oceanica 2012b). The DEIA is currently being updated to enable this dredging work to be carried in conjunction with the jetty upgrade that forms the subject of the Stage 1report, and activities associated with the refurbishment of the rock revetment in Stage 2 (this report).

An investigation into the performance and impacts of the timber groyne to the south east of the harbour was carried out in March 2015 (Appendix A). This study concluded that the groyne has been successful in maintaining a beach in front of the foreshore area, and that there does not appear to be any significant negative impacts to the shoreline at this location since the structure has been in place.

3.3 Environmental Quality (Sediment and Water)

Environmental quality data for the Harbour are available from the DEIA (Oceanica 2012b). Water and sediment sampling, carried out in 2012 to assess the potential impacts of the maintenance dredging and shoreline disposal, found that most of the samples were below the lower National Assessment Guidelines for Dredging (NAGD) trigger values for all potential toxicants, and it was concluded that the dredging operations

do not pose a threat to the local environment (Oceanica 2012b). During the 2012 study, there were elevated levels of elutriate nutrients, but it was deemed unlikely to pose an environmental threat due to the relatively small volume of dredge material and the small likelihood of elutriate metals being released into the water column.

3.4 Marine Fauna

The Shark Bay marine environment is highly valued for its biological diversity and ecological systems. There are a number of threatened marine species which are protected under *Environment Protection and Biodiversity Conservation Act* 1999(Commonwealth of Australia 2015) which have the potential to travel into the vicinity of the Denham Marine facilities:

> Australian Sea-lion (*Neophoca cinerea*) classified as Vulnerable;

> Loggerhead Turtle (*Caretta caretta*) classified as Endangered;

> Green Turtle (*Chelonia mydas*) classified as Vulnerable;

> Leatherback Turtle (*Dermochelys coriacea*) classified as Endangered;

> Flatback Turtle (*Natator depressus*) classified as Vulnerable;

> Dugong (*Dugong dugong*) classified as Threatened; and

> Dusky Dolphin (*Lagenorhynchus obscurus*) classified as Threatened.

3.5 Existing Infrastructure

The marine facilities date back to at least 1906 when the original recreational jetty was constructed. Additional infrastructure and shoreline protection structures were added to the area over time. At present the marine facilities consist of the features shown in the aerial image (**Figure 3-1**).

Shoreline infrastructure (**Figure 3-2)** includes:

> Timber groyne at the eastern margin of dredged basin designed to maintain beach in front of the foreshore area, and reduce littoral movement of sand into the dredged basin;

> Recreational jetty and mooring pens with potable water, power supply and lighting;

> Jinker ramp or slipway (and finger jetty) for launching and retrieving larger vessels;

> Service wharf with refuelling facilities, potable water, power supply and lighting;

> Recreational boat ramp; and

> Rock Revetment.

Onshore facilities include (**Figure 3-3**):

> Grassed recreation areas to the northwest and southeast of the project area

> Sealed and unsealed parking areas (lacking drainage infrastructure), including an area close to the jinker ramp which is currently used informally as hardstand for boat maintenance activities;

> Winch house associated with the existing slipway / jinker ramp (including spill response equipment);

> Bunded and fenced fuel storage tank;

> Ablution block and waste oil facility; and

> Fish cleaning facility.

The maritime facilities are used by both recreational and commercial users. The boat pens and recreational jetty are mainly used by recreational vessels. The service wharf and slipway / jinker ramp is used to some extent by the commercial fishing industry in Shark Bay (prawns, scallops, snapper and western sand whiting) for fuelling and reprovisioning, however most larger vessels in the industry operate out of Carnarvon (DEC 2015).

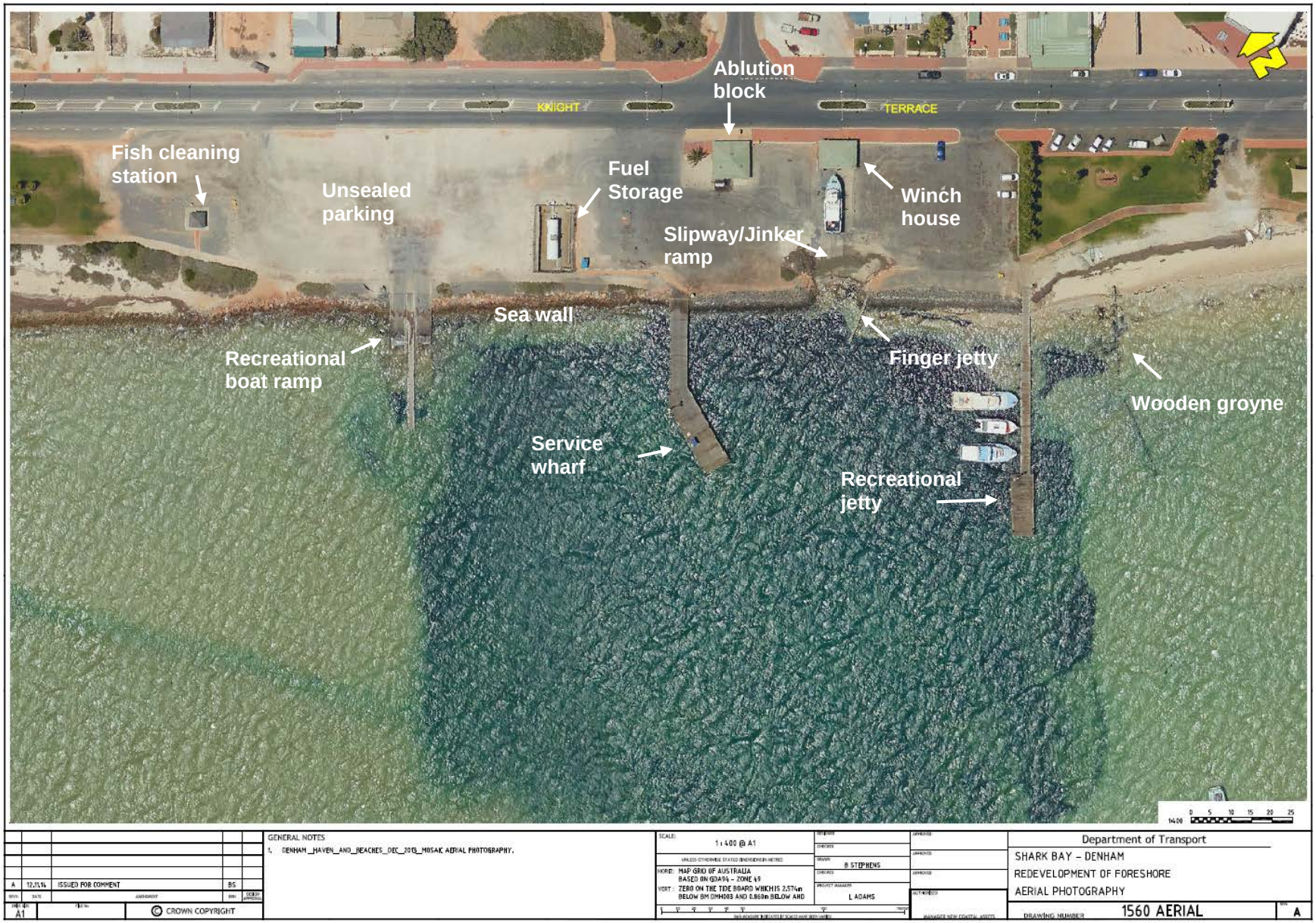

Figure 3-1 Existing Maritime Facilities and Foreshore

Figure 3-2 Site photographs showing shoreline features: a) timber groyne and beach to the southeast of the project area; b) recreational jetty; c) rock revetment between the recreational jetty and the jinker ramp; d) timber finger jetty and seaward edge of slipway/jinker ramp; e) rock revetment between the service wharf and slipway/jinker ramp; and f) service wharf.

Figure 3.3 (Continued) Site photographs showing g) rock revetment between service jetty and recreational boat ramp; h) and i) recreational boat ramp; and j) coastline to the northwest of the project area.

Figure 3-3 Site photographs showing onshore features a) grassed area to southeast of the project area; b) slipway/jinker ramp, winch house and sealed parking area; c) sealed parking area between slipway/jinker ramp and service wharf, and existing fuel storage area; d) ablution block and waste oil container; e) unsealed parking area at the northern end of the site; and f) fish cleaning facility.

4 Environmental Assessment

4.1 Relevant Environmental Factors and Objectives

The EPA's framework for the assessment of potential developments contains a list of factors which may potentially be impacted by a proposal, and provides an objective statement against which the potential impacts can be assessed (EPA 2013 and EPA 2015). **Table 4-1** provides a comprehensive list of factors and the potential inherent impacts, if any, associated with each. Where an impact is identified, information is provided below to support the assessment of significance. Where an impact is considered to be potentially significant, management measures are outlined and residual risks are assessed. A conclusion is provided for each factor about whether or not the EPA's objectives in relation to that factor are met.

Table 4-1 Assessment of the Denham marine facilities upgrade works against EAG 8 environmental factors and objectives (EPA 2013a)

Theme	Factor	EPA objective	Relevant development activity	Potential impacts identified	Significance of impact	Mitigation measures	Likelihood of residual impact	Conclusion
Sea	Benthic Communities and Habitat	To maintain the structure, function, diversity, distribution and viability of benthic communities and habitats at local and regional scales	Removal of existing finger jetty and timber groyne Construction of service wharf extension, finger jetty and replacement groyne Reconstruction of rock revetment	Direct loss of habitat Indirect impacts due to reduced marine environmental quality (see below)	Not significant See Sections 4.2 and 4.3	N/A	N/A	Proposed development meets EPA's Objectives
	Coastal Processes	To maintain the morphology of the sub-tidal, intertidal and supratidal zones and the local geophysical processes that shape them	Construction of service wharf extension, finger jetty and replacement of timber groyne Refurbishment of rock revetment	None identified (See Appendix A)	N/A	N/A	N/A	Proposed development meets EPA's Objectives
	Marine Environmental Quality	To maintain the quality of water, sediment and biota so that the environmental values, both ecological and social, are protected	Removal of existing finger jetty and timber groyne Construction of service wharf extension, finger jetty and replacement groyne Reconstruction of rock revetment Operation of facilities	Turbidity Release of contaminants Accidental spills and discharges during construction Accidental spills and discharges during operation	Potential for Significant impact See Sections 4.2.3; and Section 4.3.1	CEMP (Section 4.5) Drainage design to include interception devices and meet relevant Australian Standards Fuel and waste oil facilities designed to meet relevant Australian Standards Spill response kit to be provided and made available on site	Unlikely	Proposed development meets EPA's Objectives
	Marine Fauna	To maintain the diversity, geographic distribution and viability of fauna at the species and population levels	Removal of existing finger jetty and groyne Piling Operation of facilities	Removal of sessile organisms Noise impacts on marine mammals and turtles Light impacts on Turtles	Potential for Significant impact See Sections 4.2.1, 4.2.2; and 4.3.2	CEMP (Section 4.5) Implement EAG 5	Unlikely	Proposed development meets EPA's Objectives
Land	Flora and	To maintain representation,	None identified	None identified	N/A	N/A	N/A	Proposed

Theme	Factor	EPA objective	Relevant development activity	Potential impacts identified	Significance of impact	Mitigation measures	Likelihood of residual impact	Conclusion
	Vegetation	diversity, viability and ecological function at the species, population and community level.						development meets EPA's Objectives
	Landforms	To maintain the variety, integrity, ecological functions and environmental values of landforms and soils.	None identified	None identified	N/A	N/A	N/A	Proposed development meets EPA's Objectives
	Subterranean Fauna	To maintain representation, diversity, viability and ecological function at the species, population and assemblage level.	None identified	None identified	N/A	N/A	N/A	Proposed development meets EPA's Objectives
	Terrestrial Environmental Quality	To maintain the quality of land and soils so that the environment values, both ecological and social, are protected.	Onshore construction works Relocation of fuel facilities Waste oil facilities	Accidental spills and discharges during construction Accidental spills and discharges during operation	Potential for Significant impact See Sections 4.2.4 and 4.3.1	CEMP (Section 4.5) Drainage design to include interception devices and meet relevant Australian Standards Fuel and waste oil facilities designed to meet relevant Australian Standards	Unlikely	Proposed development meets EPA's Objectives
	Terrestrial Fauna	To maintain representation, diversity, viability and ecological function at the species, population and assemblage level	None identified	None identified	N/A	N/A	N/A	Proposed development meets EPA's Objectives
Water	Hydrological Processes	To maintain the hydrological regimes of groundwater and surface water so that existing and potential uses, including ecosystem maintenance, are protected	None identified	None identified	N/A	N/A	N/A	Proposed development meets EPA's Objectives
Inland Waters	Environmental Quality	To maintain the quality of groundwater and surface water, sediment and biota	None identified	None identified	N/A	N/A	N/A	Proposed development meets EPA's

Theme	Factor	EPA objective	Relevant development activity	Potential impacts identified	Significance of impact	Mitigation measures	Likelihood of residual impact	Conclusion
		so that the environmental values, both ecological and social, are protected.						Objectives
Air	Air Quality	To maintain air quality for the protection of the environment and human health and amenity	Onshore construction works	Dust generation during construction	Potential for significant impact See Sections 4.2 and 4.3	CEMP (Section 4.5)	N/A	Proposed development meets EPA's Objectives
People	Amenity	To ensure that impacts to amenity are reduced as low as reasonably practicable	Marine and onshore construction	Potential impacts to recreational amenity during construction	Not significant See Sections 4.2.6	N/A	Unlikely	Proposed development meets EPA's Objectives
	Heritage	To ensure that historical and cultural associations are not adversely affected	Not considered relevant	None identified	N/A	N/A	N/A	Proposed development meets EPA's Objectives
	Human Health	To ensure that human health is not adversely affected.	Health and Safety impacts during construction	Health and safety risks due to construction activities, large equipment operation, hazardous chemicals such as fuels and dust.	Potential for significant impact See Sections 4.2.7	Contractor's Health and Safety Management Plan (Section 4.5)	Unlikely	Proposed development meets EPA's Objectives
Integrat-ing Factors	Offsets	To counterbalance any significant residual environmental impacts or uncertainty through the application of offsets	Not considered relevant	None identified	N/A	N/A	N/A	Proposed development meets EPA's Objectives
	Rehabilitation and Closure	To ensure that premises are closed, decommissioned and rehabilitated in an ecologically sustainable manner, consistent with agreed outcomes and land uses, and without unacceptable liability to the State.	Not considered relevant	None identified	N/A	N/A	N/A	Proposed development meets EPA's Objectives

4.2 Potential Construction Impacts

4.2.1 Removal of Existing Substrata

Removal of existing structures (timber finger jetty and timber groyne) and refurbishment of the rock revetment is likely to result in the loss of some sessile marine organisms attached to the intertidal and sub-tidal portions of the old structures, and temporary loss of habitat for crabs, fish and other small mobile marine species. Given the small scale of the structures and low tidal range, there is likely to be only a small population of intertidal organisms such as barnacles and oysters. Any species present are likely to be ubiquitous in the Boat Harbour and on hard substrates in nearby intertidal areas. It is likely that mobile species will move away during construction and that sessile organisms will re-colonise the new piles following the completion of works. This unavoidable impact is considered to be of insignificant magnitude and no management actions are proposed.

4.2.2 Piling Works

Piling works are required for the construction of the extension to the service wharf and construction of the new finger jetty. These have the potential to impact on marine fauna due to noise and vibration, disturbance of the seabed and other construction impacts such as accidental spillages and discharges. A conventional pile driving barge (impact hammer) is anticipated to be used for the construction of the service wharf and finger jetty, with piling works estimated to take place over approximately three weeks. This method of piling is used extensively, including in marine environments.

Noise generated from the pile driving hammer is expected to be impulsive in character with multiple pulses occurring at blow rates in the order of 30 to 60 impacts per minute. Most of the sound energy usually occurs at lower frequencies between 100 Hz and 1 kHz, which overlap those used by marine mammals for communication and perception of their environment (Government of South Australia, 2012).

To minimise environmental impact on marine mammals (including cetaceans and dugongs) and marine turtles in the vicinity of the piling operations, a number of management procedures are to be put in place, including:

> Immediately prior to the commencement of piling each day, observations will be carried out over a 20 minute period to verify:
  - No sightings of marine mammals within a 1,000 m radius, and
  - No sightings of marine turtles within a 300 m radius of piling operations;
> A suitable noise dampening material will be used between the hammer and pile to reduce hammer impact noise;
> Soft start procedures (i.e. commencing with reduced noise level to allow animals to move away from the area before increasing the noise levels gradually);
> Marine mammal and turtle observations will be carried out during all piling activities;
> Personnel will be required to report sightings to the Site Engineer immediately and marine mammals spotted during piling operations will be recorded with photos and documentation.
> Piling operations will be put on hold if:
  - Any marine mammal is observed within a 500 m radius, or
  - Any marine turtle is observed within a 100 m radius of piling operations;
> Any observed marine mammal or turtle will be allowed to move away of their own accord;
> Piling operations will not restart until the observations carried out over a 20 minute period verify:
  - No sightings of marine mammals within a 1,000 m radius, and
  - No sightings of marine turtles within a 300 m radius of piling operations;
> Marine mammal procedures will be included in the Site Inductions, Work Instructions and Aspects and Impacts register.

Management of the contract will ensure that the Contractor has appropriate health, safety and environmental (HSE) management systems which are implemented during the works. Contractors will be required to provide and comply with a CEMP as outlined in **Section 4.5**.

4.2.3 Accidental Spillages and Discharges during Construction

The construction activities both over the water and on the adjoining land have the potential to result in the spillages and / or accidental discharge of contaminants (including hydrocarbons) into the Harbour and nearby waters of Shark Bay.

To manage this, all construction contractors will be required to provide a CEMP which details measures to minimise the risk of spills and contingency planning for spill response to the satisfaction of the DoT.

In accordance with the EMF and DEIA, dredging contractors will be required to provide a Dredging Environmental Management Plan (DEMP) which also details measures to minimise the risk of spills and contingency planning for spill response.

It should be noted that the DoT has spill response procedures and maintains spill response equipment at the Harbour which would be available in the event of a spill.

4.2.4 Parking Area Upgrade

The existing environment is highly modified and no potential impacts on terrestrial flora and vegetation have been identified.

The parking areas will be upgraded (resealing of sealed areas and sealing of unsealed areas) and it is expected that the environmental performance of the facility will be improved. Drainage will be designed to meet relevant Australian Standards for achieving containment of runoff from storm events and potential spillages, thereby reducing the risk of discharge of pollutants into the Harbour and nearby coastal waters of Shark Bay. There is potential for dust impacts arising from earthmoving activities and temporary public amenity impacts associated with construction works, which are addressed below.

Contractors will be required to provide a CEMP which details measures to minimise the disturbance to other uses, dust suppression, risk of spills and contingency planning for spill response as outlined in **Section 4.5.**

4.2.5 Waste Management

Construction waste will be disposed of off-site at appropriate receival facilities. Potentially contaminated soils associated with the fuel facility (storage and fuel lines) and the waste oil facility will be sent to an appropriately licenced facility.

Waste management will be conducted in accordance with the building contractor's CEMP.

4.2.6 Public Amenity

There is potential for the marine facility upgrade activities to impact on public amenity and recreational use of the Harbour and foreshore area. The construction works may result in temporary reduction of visual amenity, but this is considered to be insignificant due to the short and temporary nature of the inconvenience caused. There will be additional road traffic at times, and some noise and dust generated from the site. To manage these impacts, construction will predominantly take place during working hours and local residents / users will be forewarned of the works through signage or other forms of communication. Construction works could potentially be carried out in stages to minimise impact on public access to facilities.

4.2.7 Contractor Health and Safety

There is potential for impacts on the health and safely of contractors working on site. To manage this, all contractors will be required to meet the DoT's HSE management system requirements. All contractors will need to provide a Contractor's Health and Safety Management Plan including Safe Work Method Statements to outline how all potential risks will be managed.

4.3 Potential Operational Impacts

4.3.1 Accidental Spills and Discharges during Operation

Potential operational impacts associated with the upgrade mostly relate to activities involving hydrocarbons and other potential contaminants such as antifouling from boat and gear maintenance. The upgrade works will provide formalised parking and vessel heavy maintenance will be discouraged (as currently occurs to some extent in the area surrounding the winch house - see **Figure 3-3**). The design and installation of drainage systems (including interceptor traps) will improve the existing situation, and will reduce the risk of accidental spills and discharges entering the marine environment and the collection of contaminants in runoff from rain events.

Management of the facility including waste from recreational and commercial users will be managed in accordance with SSB and DoT's existing management systems. Detailed information relating to the use of the Denham Boat Harbour facilities including a code of conduct, cyclone contingency plan and other documents are published on line (DoT 2014).

4.3.2 Light Impacts on Turtles

Denham maritime facilities are not in a turtle nesting area so there is no formal imperative for implementing EAG 5, however DoT discussions with the OEPA have encouraged DoT to implement it in the design of the new facilities. Lighting associated with upgrade works, including the new portion of the service wharf, will be designed with consideration of this guideline where possible.

4.4 Likely Significance and Management of Potential Impacts

4.4.1 Inherent Impacts

A number of inherent potential impacts were identified but considered to be of low significance due to the small magnitude of the impact or low likelihood of occurrence:

> Direct loss of benthic communities and habitat due to removal / disturbance of existing structures with portions in the intertidal and subtidal zone; and

> Loss of public amenity during construction works.

Potential inherent impacts identified with the possibility of higher significance were:

> Indirect impact on benthic communities and habitat, marine environmental quality and marine fauna due to construction impacts (turbidity, accidental spills and discharges) and during operation (accidental spills and discharges).

> Impacts to marine fauna (marine mammals and turtles) due to noise associated with construction and piling operations;

> Impacts to turtles due to light from upgraded facilities;

> Impacts to air quality associated with dust from construction activities;

> Impacts on terrestrial environmental quality during construction and operation.

> Impacts on contractor health and safety during construction.

Mitigation measures outlined in **Sections 4.2 and 4.3**; and summarised in **Section 4.5** outline how these potentially significant impacts can be managed to meet the EPAs objectives.

4.4.2 Residual Impacts

Of the few potential residual impacts identified, all were considered of insignificant magnitude or unlikely to occur (**Table 4-1**).

4.5 Mitigation Measures

A number of mitigation measures are considered necessary to ensure that the significance of potential impacts remains low and that the EPA's objectives are met. These include:

> Construction contractors to provide and comply with a CEMP which demonstrates management of potential impacts associated with:
  - Accidental spills and discharges;
  - Noise and vibration impacts on marine mammals and turtles during piling activities;
  - Waste management;
  - Dust and noise; and
  - Public amenity.
> Drainage design to include interception devices and meet relevant Australian Standards;
> Fuel and waste oil facilities designed to meet relevant Australian Standards;
> Spill response kit available on site during construction, spill response during operations managed in accordance with DoT spill response procedures;
> Consideration of EAG 5 in the design and operation of lighting at the upgraded facilities;
> Contractors to provide and comply with a Contractor's Safety Management Plan; and
> Dredging to be carried out in accordance with DoT's overarching Environmental Management Framework (EMF) (Oceanica 2012a) and Dredging Environmental Impact Assessment (DEIA)(Oceanica 2012b) including adherence to a Dredging Environmental Management Plan (DEMP) ;

4.6 Conclusions

It is concluded that, so long as the above mitigation measures are adopted and implemented, the development proposal is likely to meet the EPA's objectives for all relevant factors. The proposal is considered unlikely to have a significant impact on the environment, and therefore, does not require formal assessment under the EPA Act.

5 References

Bureau of Meteorology (2014) Climate Data http://www.bom.gov.au/climate/data/ accessed 17-2-15

Commonwealth of Australia (2015) Protected matters search tool http://www.environment.gov.au/epbc/protected-matters-search-tool Accessed on 15-4-2015

Department of Transport (2015a) Denham Maritime Facility Fact Sheet. Available on website. http://www.transport.wa.gov.au/imarine/denham-facility.asp accessed on 25-2-2015

Department of Transport (2015b) Denham Foreshore Redevelopment Technical Note. Authors Cristina Da Silva Fangjun Li, 26 March 2015

DPAW (2015) Shark Bay World Heritage Area. http://www.sharkbay.org/Default.aspx?WebPageId=239. Accessed on 15-4-2015

D0T (2015) Denham recreational jetty replacement http://www.transport.wa.gov.au/imarine/denham-recreational-jetty-replacement-project.asp Accessed on 18-2-2015

EPA (2010) Environmental Assessment Guideline for Protecting Marine Turtles from Light Impacts (EAG 5). Environmental Protection Authority of Western Australia

EPA (2012) Environmental Assessment Guideline for defining the key characteristics of a proposal (EAG1). Environmental Protection Authority of Western Australia

EPA (2013) Environmental Assessment Guideline for Environmental Factors and Objectives (EAG8). Environmental Protection Authority of Western Australia

EPA (2015) Environmental Assessment Guideline for Application of a significance framework in the environmental impact assessment process (EAG9). Environmental Protection Authority of Western Australia

Government of South Australia (2012) Underwater Piling Noise Guidelines. Version 1, November 2012. Department of Planning, Transport and Infrastructure. Available online at http://www.dpti.sa.gov.au/__data/assets/pdf_file/0004/88591/DOCS_AND_FILES-7139711-v2-Environment_-_Noise_-_DPTI_Final_word_editing_version_Underwater_Piling_Noise_Guide.pdf

Hames Sharley 2013. Foreshore and Main Street Revitalisation Plan of Denham. http://www.sharkbay.wa.gov.au/assets/documents/public/Draft%20Revitalisation%20Plan%20November%202013.pdf

Oceanica (2012a) Department of Transport Maintenance Dredging – Environmental Management Framework. Prepared for Department of Transport by Oceanica Consulting Pty Ltd, Report No 179_004/2, Perth, Western Australia, September 2012

Oceanica (2012b) Denham Boat Harbour and Entrance Channel Maintenance Dredging Program. Dredging Environmental Impact Assessment (DEIA), February, 2012

Port and Harbour (1996) Denham Marine Facilities – Preliminary Development Planning. Port and Harbour Consultants.

Shire of Shark Bay (2009) Cyclone Contingency Plan for the Maritime Facility at Denham. Available online at http://www.sharkbay.wa.gov.au/assets/documents/public/Cyclone%20Contingency%20Plan%202009%20including%20Appendix.pdf

Shire of Shark Bay (2009). Cyclone Advice published online at http://www.sharkbay.wa.gov.au/your-services/emergency/cyclones.html . Accessed on 5-3-15

WA Government (2014) Century old Denham Jetty to be replaced. http://www.mediastatements.wa.gov.au/Pages/StatementDetails.aspx?listName=MinisterialStatementsBarnett&StatId=375. Accessed 25-2-2015

APPENDIX A
DENHAM FORESHORE COASTAL PROCESSES TECHNICAL NOTE

Cardno
Shaping the Future

About Cardno

Cardno is an ASX200 professional infrastructure and environmental services company, with expertise in the development and improvement of physical and social infrastructure for communities around the world. Cardno's team includes leading professionals who plan, design, manage and deliver sustainable projects and community programs. Cardno is an international company listed on the Australian Securities Exchange [ASX:CDD].

Contact

West Perth

11 Harvest Terrace
West Perth WA 6005

PO Box 447
West Perth WA 6872

Phone +61 8 9273 3888
Fax +61 8 9486 8664

wa@cardno.com.au
www.cardno.com

Cardno®
Shaping the Future